Movow: Contextual Information Exchange

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DPC13:
Contextual Information Exchange

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Abstract

The non face-to-face communication of social and emotional experiences between people now happens through phone or other media like e-mail or instant messaging. In these ways of distant communication, the context the communication happens in, pays an important role. Neither the technology nor describing it, enables us to communicate this context in such a way that it can be 'experienced' by the others.

Therefore is asked in this project, to design a product that enables two (or multiple) people to communicate contextual information over distance.
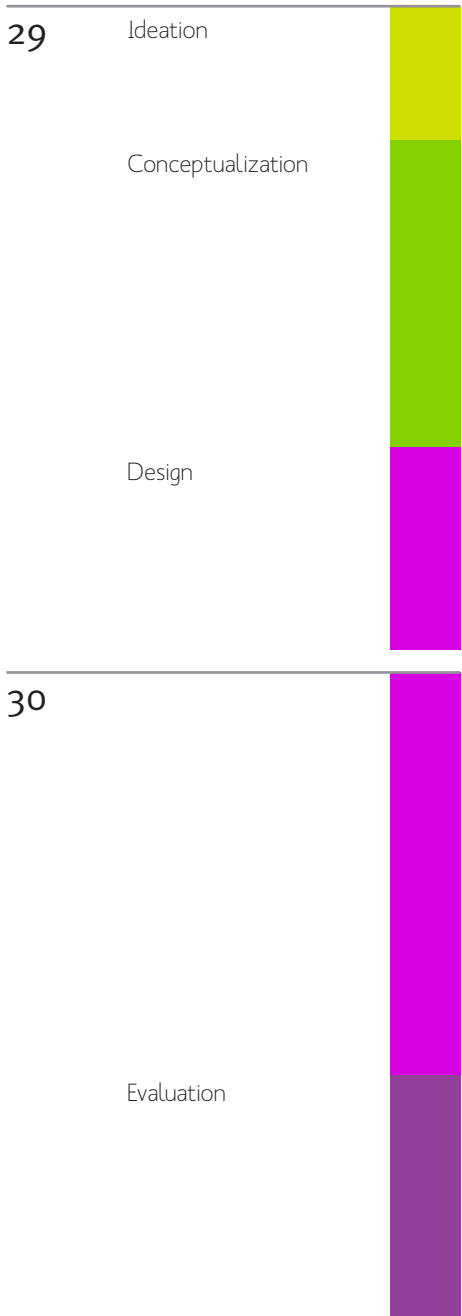
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Approach

The 'Contextual Information Exchange' Project will be executed by use of the 1, 10, 100 method. This means that this project is done in different iterations after each other. The pressure cooker and first iteration is done in a group, the other two iterations are done individually.

Pressure Cooker

29 Ideation

Conceptualization

Design

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Evaluation

During the 'Pressure Cooker' of the 'Contextual Information Exchange' project, the focus was on exploring the definitions of contextual information exchange and the value that contextual information can have for a user. Important questions during the pressure cooker were: *What ways to exchange information are already used? In what way can you add extra value to these information exchange ways?*

Ideation
A short exploration about contextual information exchange followed. This led to two main categories of ways to exchange information over distance: via mobile phone text messaging and via computer messaging, like MSN*. These two categories formed an input for different concepts.

Conceptualization
One of the concepts, which was based on text messaging, was focussing on adding an extra value to text messaging, by exchanging the context of a person that was using his or her mobile phone. When person A sends a message to person B, person A would like to receive a message back. In this case the design question was: *How can you exchange the context of person A to person B via contextual information exchange?*

Another concept was also based on text messaging. This time the focus was not on text messaging itself, but on mobile phone use. Person A could send his context via abstract photographs to person B. This way person B can get an idea of the context of person B.

A concept which used computer messaging as an input, was the concept of a computer mouse of person B which can represent the context of person A. The computer mouse can change appearance in combination with different contexts of person A.

Eventually the last concept is chosen to work out as a prototype within the pressure cooker. This concept was chosen because it adds touch to a mostly visual and text based way to exchange information.

Figure 1: Planning pressure cooker

*MSN is a free Windows based program that can be used to chat with people around the world. It is developed by Microsoft.

Figure 2: 'Normal' computer mouse, clay prototype

Figure 3: 'Happy' computer mouse, clay prototype

Design

The concept with the mouse was chosen to work out during this pressure cooker. In an exploration about this concept, the main problem of communication over distance was addressed; the lack of emotional expression. Therefore in this concept, the focus was on exchanging emotions from person A to person B. The concept is called: 'E-mouse'.

This is done by changing a normal mouse's shape (*figure 2*). With these shapes, an extra experience is given to the use of a computer mouse while chatting Each shape represents a specific emotion of person A, that is experienced by person B. For now, the shapes are chosen on common sense, and own experiences with computer mouses.

When person A is happy, the mouse of person B will get a bolder shape (*figure 3*). The mouse will improve the computer use of person B, because of the shape of the mouse, which is easier to use.

When person A is sad, the mouse of person B will get a flat, triangular shape (*figure 4*). The mouse becomes more difficult to handle, therefore person B experiences the sad emotions of person A while using this computer mouse.

When person A is mad, the mouse of person B will change into a twisted form (*figure 5*). The mouse becomes almost not handable, and person B probably will share the same frustration as person A.

All prototypes were made with use of clay.

Figure 4: 'Sad' computer mouse, clay prototype

Figure 5: 'Sad' computer mouse, clay prototype
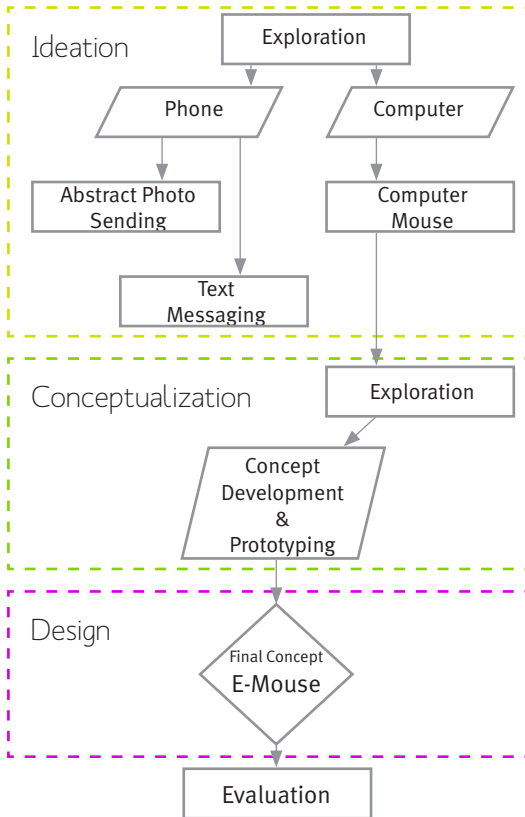
Figure 6: Planning Iteration 1

Evaluation

The pressure cooker was particularly meant as a way to explore the possibilities within the project. The exploration and brainstorm were inspired by our own experiences regarding communication over distance. No research was used to support these assumptions.

Ideation

A focused research as a start of the pressure cooker, would have helped to get a broader view on context and already existing ways to communicate over distance. Now the brainstorm was limited to only phone and computer use, because this was only based on our own experiences with communicating over distance.

Conceptualization

The scenarios in the conceptualization phase are not completely worked out, no specific actions of person A and person B are described.

Design

The final design could be improved by use of extra research about the specific shapes the computer mouse should have. Again these shapes are only based on assumptions and not on research materials. The ergonomic aspect of the mouse would also be a point of research, regarding the user friendliness.

Iteration 1

2	Kick-off project	
	Research	
5	Research	
6	Research	
9	Ideation	
12	Ideation	
13	Ideation	
	Idea Selection	
16	Conceptualization	
19	Design	
	User Research	
20	Presentation	
	Evaluation	

Figure 6: Planning Iteration 1

The first iteration of the project will focus on the definition of context and how you can transport a specific context to another user. The first iteration will last for three weeks, and will be executed in a team consisting of four persons.

Research
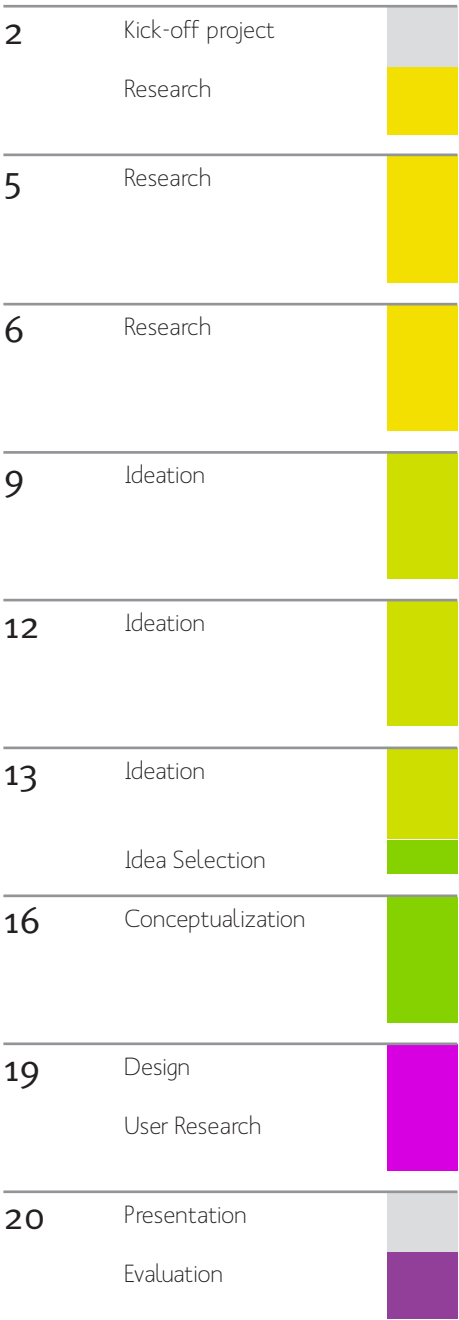
There was a lack of research during the pressure cooker, a more focused research during the first iteration was therefore needed. During the literature research the focus was on: *What is context? What is the value of context? How was the approach of the master students?* A short summary of the total research follows below.

Context

Context contains first of all out of the surrounding; the place, the people who are there and the activity that is going on [1]. Furthermore, the context exists of how the user perceives this total surrounding and the emotions this person has at that specific moment or during the activity, so the user's emotional state, focus of attention location and orientation, date and time, objects and people in the user's environment [2]. Context contains thus out of four elements: the user's physical, informational, social and emotional state [3]. Important aspects of context are: where you are, who you are with, and what resources are nearby [4].

In general these are the definitions of context that are the most common in the papers and that are the most valuable for this project, based on our own interpretation of the project.

The research about context formed an input for an explorative mind map about context and context transfer. This was a way to combine the different research topics in a structured way (*figure 7*).

1. Towards a Better Understanding of Context and Context-Awareness, 1999, Gregory D. Abowd and Anind K. Dey
2. Understanding and Using Context, Anind K. Dey
3. Context-Awareness in Wearable and Ubiqutuous Computing, D. Abowd, A. K. Dey, R. Orr, J. Brotherton
4. A System Architecture for Context-Aware Mobile Computing, 1995, William Noah Schilit
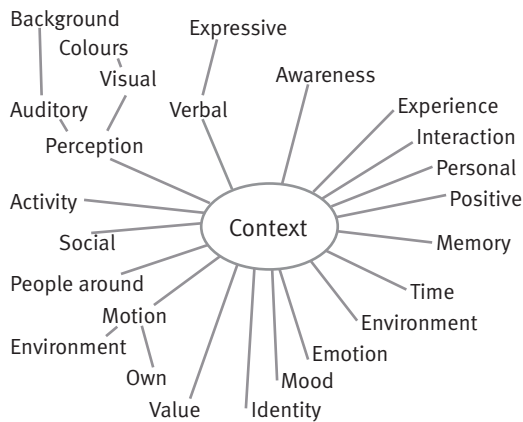
Figure 7: Explorative mind map

The mind map labels (left figure): Background, Colours, Expressive, Visual, Awareness, Auditory, Verbal, Experience, Perception, Interaction, Personal, Activity, Positive, Social, Context, Memory, People around, Time, Motion, Environment, Environment, Emotion, Own, Mood, Value, Identity

Value of Context

To know more about the values a context can have, a mood board is created. The categories in the mood board, respectively: *family/relationship, work, social, home, leisure and travel*, are made with use of our own experiences with context. The surrounding can affect the emotions of the user that is in that surrounding. On the other hand, the user can also affect the people and the activity in the surrounding. There is an interaction between the surrounding and the people in that surrounding, which in total forms the value of context.

The values are based on our own experiences. You can find the categories and their corresponding values below in the mood board.

The explorative mind map (*figure 7*) is constructed using the research and own experiences and ideas of context. This explorative mind map formed the basis of a problem description: *How can we communicate the context of a remote user to a virtual user?*

Answers to this question are formed by the factors that together create context, derived from the research. These different factors are:

Sounds, background and foreground sounds in an environment are one of the factors that create context.

Vision and visuals are give you an idea of how the context look like. To communicate context these visuals can be abstract.

Motion transfer, motions of yourself or people in the environment or motions in the surrounding.

Environmental sensorial experience, with this the total sensorial experience of touch is meant. How you experience the environment via touch.

Emotional atmosphere, the emotional status of the person in the environment.

Personal status/activity, is a factor about the activity that someone is doing.

Social load is about how many people there are in the surrounding, and the contact with those people. Is there no contact with other people in the environment or is there an active contact with people in the environment.

Figure 8: Mood board

Bonding

Sharing

Social

Communicating

Involving

Secure

Love

Family

Appreciation

Support

Intimacy

Recharging

Privacy

Freedom

Living

Home

Skills

Improving

Self-actualising

Rejoining & Separation

Comfort zone

Work

Central

Ongoing

Travel

Controlling

Transporting

Adapting

Exploring

Scenarios

Based on the approach of the master students, the decision was made to make different scenarios based on the categories of the mood board. This would help to create an overview on different design opportunities within this project.

Person A is the sender of the specific context, person B is the receiver of the context.

Family / Relationship

A wife is at home (person A). Her husband (person B) is on a business trip.
Value: She wants to know if he is secure, they want to have a feeling of being together.
Factors: Emotional atmosphere, environmental sensorial experience.
Indication:

Parents (person A) are having dinner at a restaurant and their child (person B) is at home.
Value: Feeling of being secure and being together.
Factors: Emotional atmosphere, environmental sensorial experience.
Indication:

Work

Two managers which have to cooperate and are of different companies. (Can be both person A and person B)
Value: Improving and controlling.
Factors: Personal status/activity.
Indication:

A secretary (person B) is waiting for his boss (person A) who is in a meeting.
Value: Controlling and adapting.
Factors: Personal status/activity and social load (active).
Indication:

Leisure

A friend (person A) is drinking and hanging in a pub and his friend (person B) is at home.
Value: Enjoying.
Factors: Social load, emotional atmosphere, sound and visuals.
Indication:

Someone (person A) is lying in the sun in her backyard while reading a book and her friend (person B) is at work.
Value: Relaxing and enjoying.
Factors: Environmental sensorial experience sounds and visuals.
Indication:

Social

A person (person B) wants to know how a friend (person A) is doing. Person A is on a date.
Value: Sharing and involving.
Factors: Emotional atmosphere.
Indication:

A person (person B) wants to know how her friend (person A) abroad is doing.
Value: Communicating, sharing and bonding.
Factors: Visuals, personal status/activity and emotional atmosphere.
Indication:

Home

There are two roommates. One is at home (person A) and one is at school (person B).
Value: Comforting, familiar and reassuring.
Factors: Sound, social load and visuals.
Indication:

A wife is at home (person A) and the husband (person B) is on a business trip.
Value: Reassuring, comforting and familiar.
Factors: Environmental sensorial experience, emotional atmosphere, sounds and visuals.
Indication:

Travel

One person (person A) is travelling and someone else (person B) is anywhere else.
Value: Transporting.
Factors: Motion, visuals and sounds.
Indication:

Categories	Values	Factors						
		Sounds	Visuals	Motion	Sensorial	Emotional	Activity	Social load
Family / relationship	Love							
	Secure							
	Intimacy							
	Appreciation							
	Support							
Work	Skills							
	Improving							
	Actualising							
	Adapting							
	Controlling							
Leisure	Energizing							
	Relaxing							
	Enjoying							
	Self-releasing							
Social	Communication							
	Involving							
	Sharing							
	Bonding							
Home	Living							
	Reassuring							
	Recharging							
	Privacy							
	Central							
	Familiar							
	Comforting							
Travel	Freedom							
	Ongoing							
	Exploring							
	Transporting							
	Rejoining & separation							

Figure 9: Scenario scheme

The different scenarios are indicated with different colours in the scenario scheme above (*figure 9*).

The values where more colours come together are interesting for that specific category, because more of the scenarios within the category are dealing with the same values.

For the family/relationship category, the context value *secure* and *intimacy* are important. To communicate this context, the factors *environmental sensorial experience* and *emotional atmosphere* are interesting.

When communicating the work the context, the value *adapting* is particular important. The factor that is interesting for communicating the context is *controlling*.

For the leisure category, the values *enjoying* is an interesting crossing point. This value belongs to the factors *sounds* and *visuals*.

The social category has an interesting crossing point in the scheme at the *sharing* value. This value belongs to the *emotional atmosphere* factor.

There are different important values within the home category, respectively *reassuring*, *familiar* and *comforting*. The factors that belong to these values are *sounds* and *visuals*.

There is only one scenario for the travel category, so there are no crossing points in the scheme. The only value is *transporting*.

Problem Defining

With the scenarios and scenario scheme as a basis, a direction had to be chosen for the rest of this iteration. Because the scenarios about home and work were more based on specific places the sender and receiver are, we decided to not choose these ones.

For us it was the most interesting to communicate context for a group of people instead of only one person. Therefore we chose to work with either the *leisure*, *family/relationship* or *social* category. For this iteration we chose the leisure category, because for this category it would be easier for us to empathize with the user.

For the leisure category the crossing points in the scenario scheme were at the *enjoying* value and the *relaxing* value and the factors *sounds*, *visuals, sensorial experience*. Therefore the focus in the problem description is on these factors. The problem description for this iteration is:

"How can we share the experience of enjoyment and relaxation of leisure through visuals, motions and the environmental sensorial experience?"

Ideation

The idea generation phase started with a very broad exploration on contextual information exchange. When the idea generation started, the scenarios were not yet made. Therefore the idea generation had no specific focus at the start.

Two main methods to generate ideas were used, respectively a drawing brainstorm method and the lotus blossom method.

Drawing Brainstorm

In the drawing brainstorm, each person participating in the brainstorm had to draw four pictures on a piece of paper. These could be random objects or places. After ten minutes, the papers had to be passed on to the next person, which uses the first picture as an inspiration for the next picture. This picture represents a product is drawn below the first picture.

This step is repeated until there are four rows of pictures drawn on the paper. On the last row, all the former pictures had to be combined into a usable product within the project description.

Interesting ideas that came out of this brainstorm are: *digital window*, *emotional context paths, the tattoo pattern idea*, *shadow idea* and the *physical object idea*.

The *digital window* (*figure 10*) consists out of a digital screen at the receiver's home. The sender has a camera that records the outside view. The sender (person A) sends his window view to the receiver (person B), which can see the view on a digital window. This way a part of the (visual) context is transferred to the receiver.

The *emotional context paths* idea (*figure 11*) is the idea that persons can leave a trail of dots on the floor. The dots represent the context or emotion the person is in. The sender (person A) can leave a trail, which can be seen and followed by other people (person B).

The idea of the *tattoo pattern* (*figure 12*) is that two people together create a tattoo, that they both have. The contexts of both persons influence the tattoos and this can cause a feeling of being together.

The *shadow idea* is about sending shadows of people in the home of the sender (person A), to the receiver (person B). At the place of the receiver those silhouettes are projected on the wall as shadows. This way to social load and activity of the people are displayed at the receiver's home.

The *physical object idea* is an idea that uses physical objects to communicate context. These objects can move, dependent on the sender (person A) and the receiver (person B).

Lotus Blossom

The starting point of the lotus blossom brainstorm, is a problem or idea, in this case the problem description. The problem or idea is that during this project context of one person has to be communicated to another person. Around this problem or idea, the theme is expanded into other themes. These themes create different entry points for the problem.

In this brainstorm the themes were: *business*,

personal, *artistic*, *technology*, *sensorial*, *passive*, *interaction* and *haptic*. With use of these themes a brainstorm followed.

Interesting usable ideas that came out of this brainstorm are: *context glasses*, *context status on MSN*, *the mood wall*, *motion-dots*, *shape context*, *context plant* and *living patterns* idea.

The *context glasses* change dependent of the context of someone else. The sender (person A) is for example on the beach, the glasses of the receiver (person B) colour blue.

The *context status on MSN* idea, is that the context of the sender (person A) is displayed as background of the text window at the receiver (person B).

The *mood wall*, consists out of faces of different contacts, which displays each contact's context. This idea is suitable for more senders and receivers at a time.

The *motion-dots* are displayed on the floor. They change dependent of someone's context and motion. This idea looks like the emotional paths idea of the former brainstorm. The main difference with this idea is that in this idea there is not focused on emotion, but on context in general.

The *shape context idea*, is that people can change their own environment by their behaviour. In a club, the amount of drinks people buy will change the visuals on the wall for example. The behaviour of the people could also be their movements or activity.

The *context plant* is a plant, that can show to the receiver (person B) the context of the sender (person A). The plant changes dependent of the context, when the person is awake or feeling happy, the flowers are open when someone is sleeping or sad the right picture can be shown.

The *living patterns* idea. is also an interesting idea. This concept is about patterns that are displayed on the wall. The only time you can see this pattern is when there is a specific colour projected on the wall. The patterns change according to the colour that is projected.

All these ideas together belong to a very broad target group. To specify the target group and context for the idea, the scenarios and problem description made. In the idea selection these are used to select the most suitable ideas.
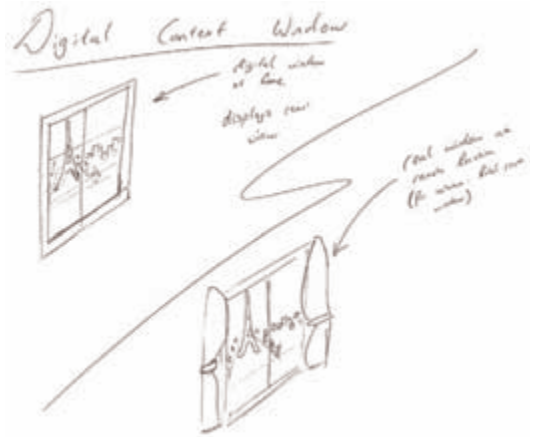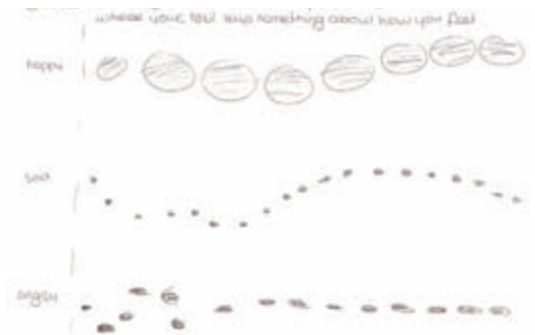

Figure 10: Digital Context Window

Figure 11: Emotional Context Paths

Figure 12: Tattoo Pattern Idea

Idea Selection

The idea selection followed intuitively. In this idea selection the problem description: "How can we share the experience of enjoyment and relaxation of leisure through visuals, motions and the environmental sensorial experience?", was the starting point. With this description in mind we chose the most potential ideas out of the brainstorms. The category leisure was the main category in the problem description. We therefore democratically decided that the shape context would be the idea that we would like to develop, because this idea had opportunities to implement other ideas in it as well.

Conceptualization

The *shape context* idea had the problem that it is not actual contextual information exchange. The idea was more based on changing the context of the people and by the people themselves. Therefore we decided that these people could not influence their own context, but that the context of the people in the building is displayed on the outside.

For this idea we worked on the scenario in the pub, but changed it. The people on the inside of a club are the senders of the context (person A), the people outside the building are the receivers of the context (person B).

To measure the context on the inside of the club, different parameters can be used. According to our own experiences these parameters can either be the *type of music*, *type of activity*, *movements*, *lights* and *time*. These parameters change during the evening in a club.

Regarding our own experiences, at the beginning of the evening a club is more used as a lounge space. At the end of the evening the club is a place to dance. This context has to be translated to the outside of the club, with clear difference between those different stadia.

As concepts for this shape context idea, we used other ideas out of the brainstorms as an inspiration. Four directions were chosen and each worked out. The four directions were: path to building (*paths*), physical object that changes *(wheels),* digital window *(silhouettes)* and *projection* (partly based on the growing tattoo pattern).

Atmospheres

For these concepts we worked with three stadia that the concepts had to represent.

The first stadium, or atmosphere, is the lounge or relaxing stadium. This stadium is represented by slow movements, dimmed lights, moody colour schemes and patterns.

The busy atmosphere is represented by fast movements, bright lights, different colours and irregular patterns.

The pleasant but not yet busy atmosphere is represented with something in between.

Different ideas are worked out into concepts based on the *shape context* concept.

Paths

This concept was derived from the emotion paths idea.

Within this concept the context of the inside is defined by the amount of people inside, their type of activity and the atmosphere of the club itself (for instance type of music and lights used). This is translated into visuals which form a path in front of the building. When walking by the building, this path will move with you a bit as a hologram. The visuals represent the context of the inside. Its colour pattern stand for the mood and type of activity people do, and the amount of differences in colour and amount of circles represent the busyness and the atmosphere of the club. This way, when you walk by, you get an impression of the inside context.

The relax atmosphere is represented by moody dark coloured circles on the ground (*figure 12*).

The pleasant atmosphere is represented with a bright colour pink on the floor (*figure 13*).

The busy atmosphere is represented with bright coloured circles on the ground. (*figure 14*).

Figure 13: Relax Atmosphere, Paths

Figure 14: Pleasant Atmosphere, Paths

Figure 15: Busy Atmosphere, Paths

Silhouettes

This concept was derived from the digital window idea. The context of the inside is defined by the amount of people inside, their type of activity and the atmosphere of the club itself (for instance type of music and lights used). This is translated into visuals that are displayed on screens on the outside of the windows. These visuals simulate silhouettes, which represent the amount of people and their activity in a coloured surrounding. This way, when you walk by, you get an impression of the inside context.

The relax atmosphere is represented by moody pinkish coloured windows. Less diverse colours and sitting silhouettes in the windows (*figure 16*).

The pleasant atmosphere is represented with a combination of different brighter colours. With as most present colour green. Silhouettes represent different activities, both lounging and dancing activities (*figure 17*).

The busy atmosphere is represented with bright blueish colours on the window-displays. Silhouettes are really active (*figure 17*).
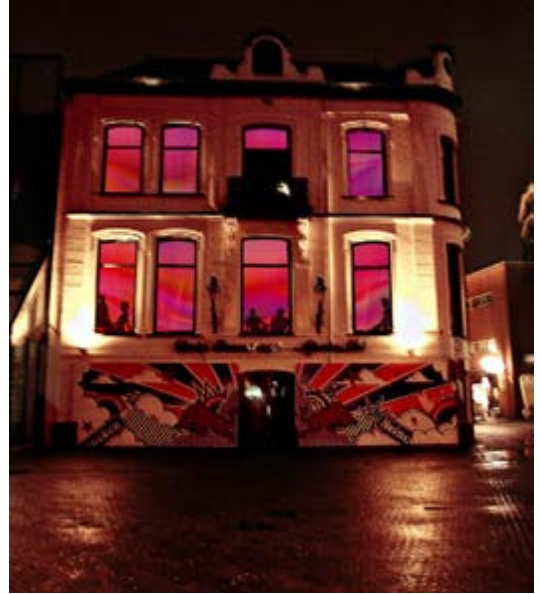
Figure 16: Relax Atmosphere, Silhouettes

Figure 17: Pleasant Atmosphere, Silhouettes

Figure 18: Busy Atmosphere, Silhouettes

Projection

Projection is partly inspired by the tattoo and the growing plant idea.

The context of the inside is defined by the amount of people inside, their type of activity and the atmosphere of the club itself (for instance type of music and lights used). This is translated into blocks that are projected on the building. The blocks itself represent the amount of people that are in the building. The colour of the blocks stand for the activity that those people are doing (sitting, dancing, drinking for example). So according to the context inside, the blocks will fill up a part of the building. The projection 'grows'. This way, when you walk by, you get an impression of the inside context.

The relax atmosphere is represented by green and yellow blocks. The building is only half filled with blocks (*figure 19*).

The pleasant atmosphere is represented with a bright coloured blocks on the wall (*figure 20*).

The busy atmosphere is represented with bright coloured outlines and insides of blocks (*figure 21*).

Figure 19: Relax Atmosphere, Projection

Figure 20: Pleasant Atmosphere, Projection

Figure 21: Busy Atmosphere, Projection

Wheels

This concept was derived from the moving physical objects idea. In this concept a wheel is used.

The wheel is a physical object which communicates the context inside the club with outside. The speed of the rotation of the wheel represents the music inside like an equalizer. The colour of the wheels will also change according to the atmosphere inside the club. The direction of the wheel will change, according to the adaption of the club like more people are joining or leaving. In this way you can easily feel the context inside the club.

An example of the position of the wheels can be found in *figure 22*.

Figure 22: Example , Wheels

User Research

A user research of the four concepts followed, during this research the focus was on the following question: *What does according to you, happen inside this building?* This question is asked with random pictures of the four concepts. It is checked if the people are correct in their assumptions. When all the concepts and their idea are showed, we asked for their preference.

From the first part of the user research, it can be concluded that people can identify the context of the inside of the building better with the silhouettes concept, since the silhouettes resemble real people and activities.

The most favourite concept was the silhouettes concept, since it represents clearly the inside context. Paths on the other hand is not favourite, since you can not see the path when it is busy on the street. The wheels and projection are also less favourite, because the context of the inside is not immediately clear to people walking by. Though the growth of the projection was clear, but not when walking by, you'd have to look at it a bit longer, or have seen it before.

From this can be concluded that the silhouettes concept is most suitable for our problem statement. *How can we share the experience of enjoyment and relaxation of leisure through visuals, motions and environmental sensorial experience?*

Design

Eventually the silhouettes was used as our final concept. The strong points of this concept is that the silhouettes of the people in the windows are recognizable for the people who would walk by the club. The percentage of people on the windows and their activity is recognizable, and the colours strengthen this. On the other hand, it is no contextual EXCHANGE, it is only one way communication and it is only contextual information exchange over a small distance.
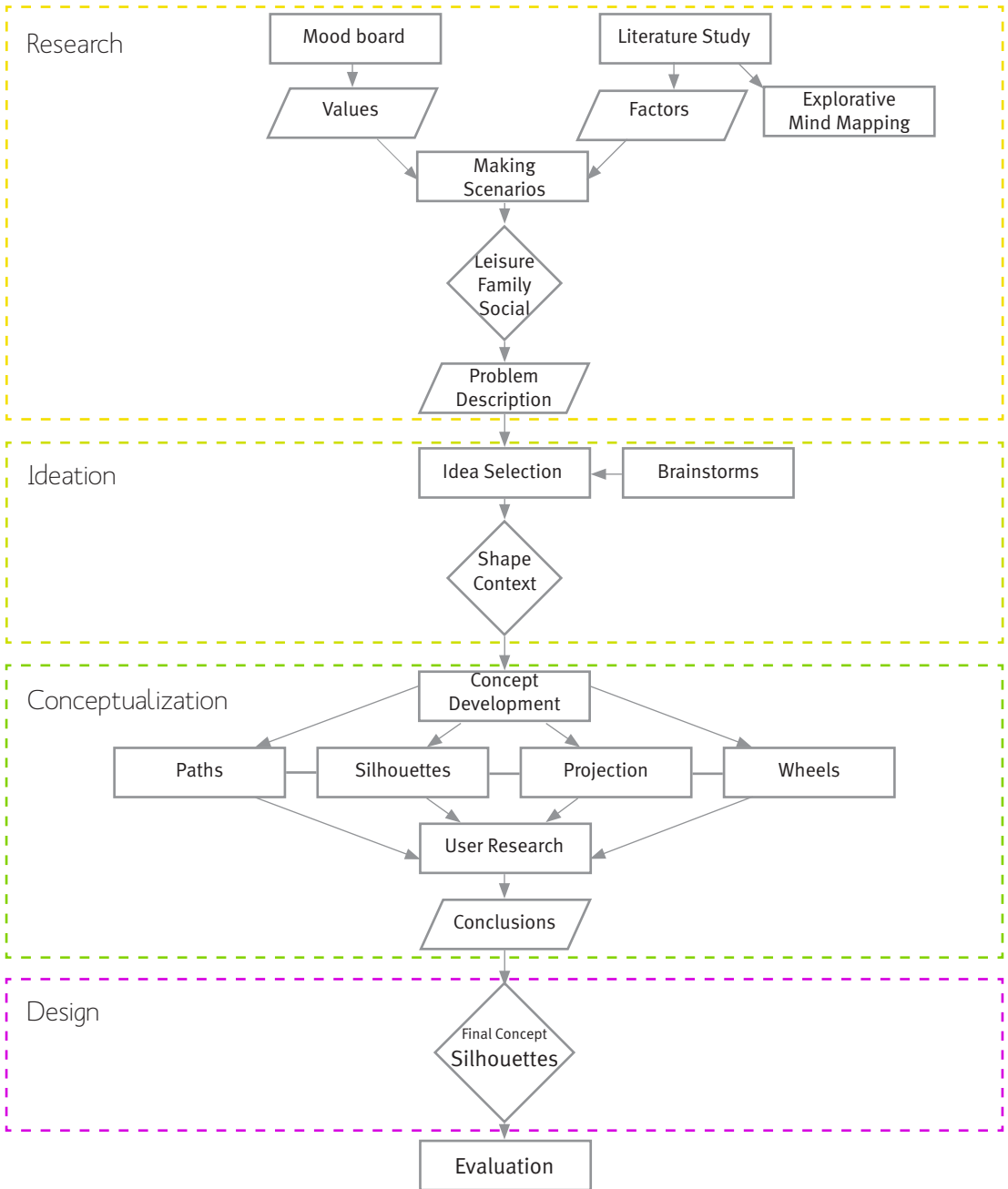
Figure 23: Process Iteration 1

Evaluation

During the process of the first iteration of this project, we used different methods to gather ideas and to structure the knowledge. To know if these methods were suitable for this project we evaluated the four different steps in this iteration (*figure 23*).

Research

We researched upon what is context about. From this we could make the factors. We also read the reports of the masters. These helped us to come up with the values, which we derived from out mood board. We researched upon information exchange and context awareness. We however did not use this, since the found information was too broad to apply within this process. We also found some existing designs upon contextual information exchange, but did not apply what we found. Maybe we should have looked more for information exchange, but it was hard to find any literature which was not on computer.

There are a lot of possible design research processes with researching and defining a problem statement and making scenarios. The way we did it was a good order for this project.

The mood board was helpful to see the different categories within context. It was better if we would have derived them from research, since now we thought of them ourselves. The values helped us to see the different types and this helped us to select our direction.

Making the scenarios helped to give us an overview of which categories were interesting. The values and factors got meaning and we could see interesting combinations which made the choice for direction easier.

We decided which direction we wanted based on the values and our identities, thus what was interesting for us to choose as a group. We made the problem description based on the values and factors and structured them to the essence of the problem.

Ideation

We did the brainstorm too early in the process and therefore it was too broad, because of the broad problem description. We should have done a more specific creative session, for which we needed a more specific problem description first.

We selected the ideas upon personal preference and which fitted to the problem description. Id would have been better if we would have set requirements and have selected the ideas based upon those. This could have made it easier.

Conceptualization

We should have had a complete new brainstorm for sub-ideas of the chosen concept. Then chose again, work it out and get feedback, instead of the four first ideas we came up with.

It was good to get feedback from possible users. But we should have asked for more specific and objective feedback for the choice of concept. The pictures did not give a good and full idea of what the concepts were about. A small wizard of Oz would have been more realistic for the users. The user research was not structured and focused. We should have thought of specific criteria. Since we had not done that, the choice for our final concept was not grounded. User research could have been implemented more and sooner within the process.

Design

We only thought of one way contextual communication, but it is more interesting of we would have thought of a two way contextual information exchange and had included distance. This could have been a requirement.

Strong points: a clear communication, recognizable, easily feasible, easily adaptable to another context, the visuals can be anything.
Weak points: too concrete, we did no research upon the colours, we just tested the pictures and not for real, just one way communication.
It is a nice concept, but there was not enough time to work it out fully, which would have led to better results. We should have been more clear about what exactly is the input and the output.

Iteration 2

2	Research	
5	Research	
6	Research	
9	Ideation	
12	Ideation	
13	Conceptualization	
16	Conceptualization	
19	Design	
20	Design	

23	Design	
26	Design	
27	Evaluation	
30	Identity Week	
31	Identity Week	
1	Identity Week	
2	Exhibition	
3	Exhibition	

Figure 24: Planning Iteration 2

The second iteration of the project will focus on the design of a contextual information exchange product. This iteration will last for four weeks and will be presented during the exhibition of the 2nd and 3rd of April. This iteration is done individually.

Research

Due to the first iteration and my vision it became clear to me that I would like to design a product that can connect and create value for people. Therefore my focus points in the research during the second iteration will be: *What ways of (social) communication exist? What goal can these ways of communication serve?* And: *What designs do already exist in this field?*

There are two main differences in ways to communicate. You can communicate in a physically proximate reality, respectively face-to-face communication. Or you can communicate over distance via computationally mediated interactions[1]. The research question: *What ways of (social) communication exist?*, is therefore divided into *face-to-face communication* and *distant communication*.

Face-to-Face Communication

This way of communication is a synchronous way of interaction and gives immediate feedback. Face-to-face communication also supports intersubjectivity, it refers to the creation of a context in which I know that you know what I know what we are talking about[1]. Face-to-face communication is more likely to 'leak' information about feelings[2]. Ways to communicate in a physically proximate reality are:

- Eye contact[2]
- Facial expressions[2]
- Postural movements (body language)[2]
- Tactile links[3]
- Spoken language[1]
- Voice tone[1]

Distant Communication

Distant communication often uses computationally mediated interactions[2], respectively video conferencing, instant messaging, email and phone. All these different programs make use of three main media forms for distant communication:

- Video[4]
- Words (typed or handwritten)[4]
- Voice[4]
- Or combination of the above mentioned.

The programs that use these media to communicate with others over a distance have often several advantages, it can support saving history of interactions[2] and another characteristic of an electronic medium that is not shared wit face-to-face communication is an ability to be anonymous[1].

Typed words are not a communication-rich medium, the communicator has to decide what to say, compose this thought into a message (which is often incomplete and fragmented) and then type the message. This is a transmission characterized by hesitations, mistakes, changes of thought. These disadvantages are not addressed with spoken language[4].

These media only communicate fragments of face-to-face communication, respectively:

- Facial expressions[2]
- Spoken language[2]
- Voice tone[1]

Eye contact, postural movements and body language and tactile links are not addressed when using different media to communicate over distance.

On the other hand, the handwritten or typed medium is not used during face-to-face communication. This medium is replaced by spoken language in the face-to-face communication.

1. Beyond Being There, Jim Hollan and Scott Stornetta, 1992
2. Staying in Touch, Social Presence and Connectedness, Wijnand IJselsteijn, Joy van Baren and Froukje van Lanen
3. Feather, Scent and Shaker, Rob Strong and Bill Gaver, 1996
4. Computer Supported Cooperative Work: A book of readings, Edited by Irene Greif, 1988

Communication Goals

There are different intentions for social communication. This depends on the goal for the communication. The fundamental need for belonging and connectedness is the basic intention for social communication and interaction[5]. It is about the sense of being together[1].

There are different goals for social communication, these goals support the intentions of communication, respectively:

- Practical goals[6]
- Social goals[6]
- Emotional goals[6]
- Attentive goals[6]

Practical goals are formal informative goals for communication. Social goals are to share experiences of each others lives. Emotional goals are for intimate communication and to share thoughts and feelings with the other person. Attentive goals for communication are to do effort for each other or to let someone know that you are thinking about him/her[6].

Products

In this chapter, abstract products or prototypes, that are already made to communicate over distance, are described.

Feather

The first system, Feather, is designed for situations in which one person is travelling (sender) while another stays at home (receiver). The aim is to indicate, simply and expressively, when the travelling partner is thinking of the other. The sender has a picture-frame like device. In one version you have to rotate the picture-frame, in another version lift up this picture-frame. This gives a precious, almost reverential feel to the interaction. The device of the receiver contains out of a fan and a feather. When the sender interacts with the picture frame, the feather lifts up by use of the fan[3]. This prototypes serves an attentive goal[6].
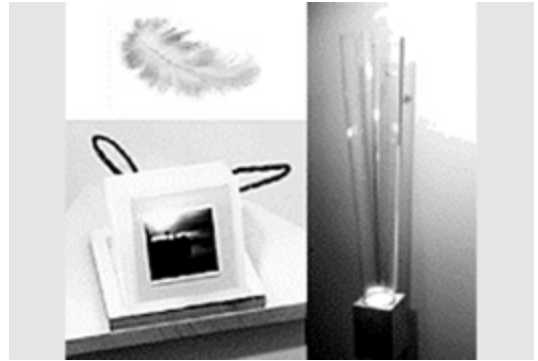
Figure 25: Feather Installation[3]

Figure 26: Shaker Design[3]

Shaker

This system consists of two pairs of devices, one pair carried by each (sender and receiver). When the sender shaker is shaken, this causes the receiver shaker to shake proportionally. Shaker permits the exchange of fairly subtle tactile gestures. There is not a one-to-one correspondence between the units' movement, but the timing and amplitude is maintained. Shakers could be of a form and size that makes them easy to carry or wear as jewellery, using pager or cellphone technology to link them[3]. This prototype serves also an attentive goal of communication[6].

5. Connectedness, Awareness and Social Presence, Ruth Rettie, 2003
6. Staying in touch over distance, Froukje van Lanen, 2003

7. Casablanca: Designing Social Communication Devices for the Home, Debby Hindus, Scott D. Mainwaring, Nicole Leduc, Anna Elisabeth Hagström and Oliver Bayley, 2001

Intentional Presence Lamp

This awareness prototype was based on the Presence Light concept of a decorative object that provided friends or family with an indication of a user's presence. This presence is actively communicated by the sender.

Two prototypes for the same principle are made, one is called the Curtain Intentional Presence Lamp, the other is called Lampshade Intentional Presence Lamp. The Curtain device can be opened with shutters, which indicates the senders presents. The sender can see various objects on a digital screen behind the shutters, these represent other active users. The Lampshade device also represents users in form of pictures when they are present, these pictures are displayed on the lampshade itself.

White Stone

Today, there are a number of alternative technologies that can be used if you want to talk to another person, or that in some other way conveys information in words. However, there is no commercially available technology that offers the sense of touch or presence, which, together with body language, is very important when people meet in real life. The White Stone is a white, round, electronic product about the same size as a pager. It should be used in pairs, which are automatically connected to each other only. Through sensors, for example heat or touch sensors, The White Stone can detect if someone takes it in his or her hand, and in that case it sends a signal to its sister Stone, which will then beep (or produce a similar sound). When the counterpart takes the stone in his or her hand, it will detect the touch and send a signal back to the first stone, which will be warmed up by an internal heating device. In this manner, two people can keep in touch and feel each other's presence in another way than by talking over the phone. The White Stone offers another contact surface between people – communication on a different level.[8] This product is also based on attentive communication goal, because it is only intended to let someone know that people are thinking about one another.[6]

8. Virtually Living Together, Konrad Tollmar, Stefan Junestrand and Olle Torgny

Problem Defining

In the research about social communication and about the existing products to communicate, I came across some principles that come along with my vision.

In my vision, I stated that I would like to create products with which people can create value for each other. By contextual information exchange, I therefore particular would like to communicate because of the social intention of communication, to create a feeling social belonging and connectedness.

The goal of the communication would be an attentive goal. An Attentive goal is about doing effort for each other and to let someone know that you are thinking about him/her. This supports the basic intention of communication, social belonging and connectedness.

Furthermore, I am interested in creating a tactile link in interaction over distance. During the research I investigated both face-to-face communication and distant communication via computationally media. I concluded that parts of the communication via face-to-face communication are not present in face-to-face communication, respectively eye contact, postural movement and tactile links. Therefore I would like to use these as an input for my idea generation.

Ideation

In the research about During the start of the ideation phase of this second iteration process, I noticed that my problem was not clearly defined. Therefore I first started a missing-link brainstorm about the missing links in digital communication, compared with face-to-face communication.

Missing Link Brainstorm

In the missing link brainstorm I focussed on the comparison between face-to-face communication and distant communication (computationally mediated communication). The information out of the research is in black (*figure 27*).

I brainstormed about the context of each specific way of communication. And concluded that in face-to-face communication there is a focus on activity and emotion as most important contextual information to exchange. In distant communication the activity is less important because the way of communication is purpose specific; this means that the activity that the person is doing, is communicating itself, the goal of communication is more practical.

The most important difference between face-to-face-communication and distant communication is the lack of postural movements and tactile links in distant communication. There is also no real eye contact possible within distant communication.

I described a way to communicate postural movements and tactile links over distance by means of 'physical presence'.
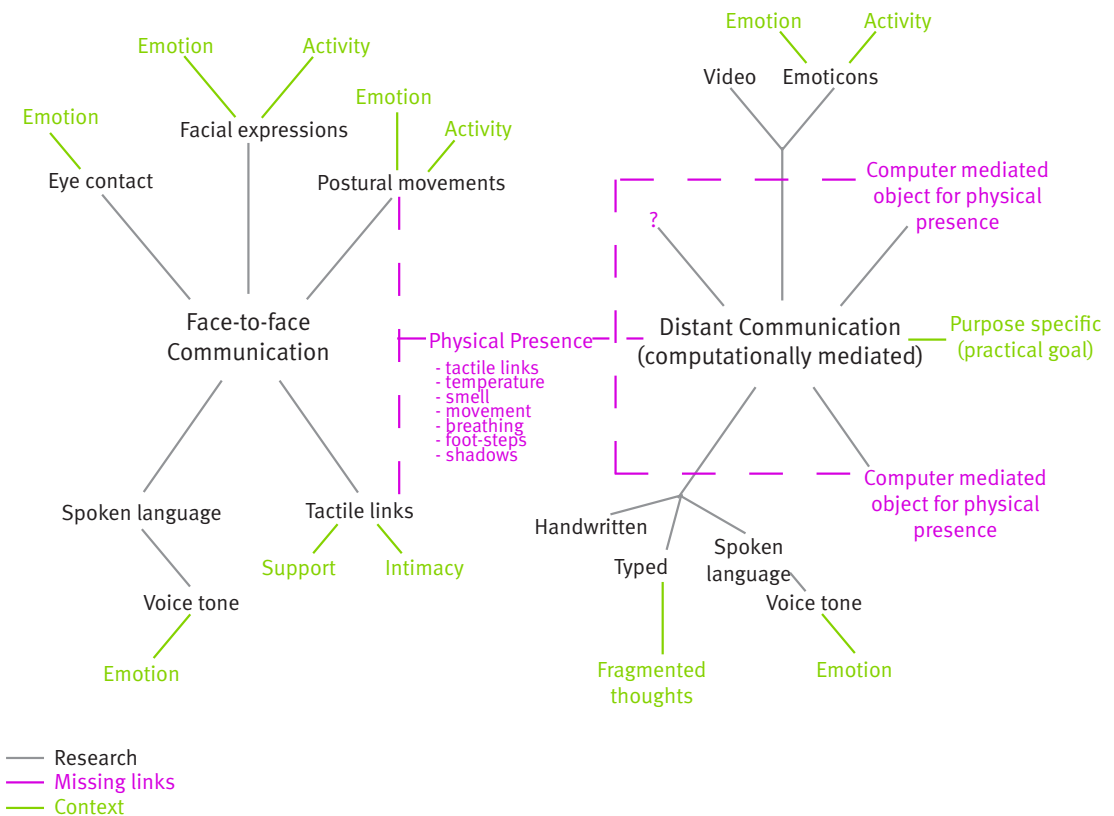

Figure 27: Missing Link Brainstorm

With physical presence, I mean links that show the presence of a person in real life, that could be translated to communicate over distance. These links of physical presence are:

- Tactile links
- Temperature
- Smell
- Movement
- Breathing
- Foot steps
- Shadows

I reviewed my problem definition and added 'physical presence' to it. The new problem definition is then:

"How can we share the attentive experience of physical presence via contextual information exchange?"

Drawing Brainstorm

Because of the good results of former drawing brainstorm, I decided to use this brainstorm technique again. To get more input from other people, I brainstormed with two of my team-mates about contextual information exchange.

Each participant had to draw five pictures, which formed an input for other persons in the brainstorm.

Some ideas that came out of this brainstorm are the *corridor lights*, *distant music*, *building together*, *moving temperature, changing visual* idea and *contextual ceiling* idea.

The *corridor lights* idea is about lights in a corridor, that depicts the amount of activity in rooms over distance. When there is for example much activity in the bathroom, the lights in the corridor will move over the wall to the bathroom door.

The *distant music* idea is about making music together over distance. Each music instrument that someone is handling has another sound, and people can create music together over distance.

The *building together* idea, is to create an object over distance together. This object can 'show' what the other one is building by attraction of blocks.

The *moving temperature* idea is about a soft ball that two people are carrying. When the other one moves further away from the other the balls will change in temperature.

The *changing visual* idea is about a visual that changes according to the attention of someone else. When someone is thinking about another person, the persons picture becomes clearer.

The *contextual ceiling* idea is about a ceiling that can depict the context of someone else.

Brute Thinking

This brainstorm uses the same starting point as the drawing brainstorm. It is based upon associations in the real world that can be transformed into a new idea. In this brainstorm technique, you have to select words from a list and pick an aspect of this word that suits with your problem definition. This forms an starting-point for an idea.

Some ideas that came out of this brainstorm where, the *lobster idea*, *the bridge idea and the diamond idea*.

The *lobster idea* was based about different tentacles, representing different contacts. These tentacles can grow over time, when there is more communication between those people.

The *bridge idea* is to build together a way to communicate.

In the *diamond idea*, two people have each their own stone and can see each others presence through reflections and light in the stone.

Incubation, Brain Writing and Brain Sketching

I used incubation, brain writing and brain sketching combined to define my design opportunity and sketch a scenario for my design.

This led to the *media use idea*, the ring idea and the pillow idea.

The *media use idea* was focussed on using already existing media, such as hyves, facebook, twitter and MSN in a combined way.

The *ring idea*, used rings to communicate movement and activity over distance.

The *pillow idea* was focussing on actual tactile links to communicate over distance.

I selected the ideas with the most potential, regarding my problem definition, the project description and my own vision. The requirements I set for this idea selection are:

- Experience
- Exchanging information
- Physical presence
- Attentive communication
- Feasibility

Conceptualization

The ideas that I selected to work further on are *the media use idea*, *the diamond idea*, *the pillow idea*, *the distant music idea* and the *ring idea*. I developed these ideas into five concepts.

Attention Item

The *attention item* is derived from the *media use idea*. This object focuses on giving other people attention. Many digital media are used today to feel connected, such as hyves, facebook, twitter, email, SMS and MSN.

The main goal of these media is to pay attention to other people and feel connected. I would like to implement this feel of connectedness into a physical object, that lets people, anonymously, know that somebody is thinking about them.

I for now used a boll, but actually this can be any shape or output. The main idea is that when the sender is watching to for example the receiver's hyves page, or is sending an email to the receiver. The receiver gets a notice of this, in this case via an lamp that starts to glow. This is only one way communication, were there can be multiple senders and one receiver.

Living Shadow Stone

The *living shadow stone* is derived from *the diamond idea* that uses reflection and shadow to communicate over distance. This object focuses on attentive contact, and the feeling of 'being there'.

It is formed as a stone, with figures on it. Both sender and receiver have the same stone. The stone of the sender detects the light-intensity on the place of the sender. This light-intensity is transferred to real light at the receivers place, which can create shadows on the surface it is lying on or on the wall (due to the pattern on the stone).

The light-intensity that is detected, can be changed to take the stone to another location, or just hold it in your hand. This is shown at the receiver as a changing light intensity and changing shadows on the wall. These shadows show the 'physical presence' of another person on another place, and shows that somebody is paying attention to you. With this stone there is contextual information exchange.

Physical Pillow

The *physical pillow* idea is derived from *the pillow idea*. In this idea, a pillow is used to exchange physical presence between people. It feels like two people are sitting against each other, because the shape of the pillow is transferred to the other pillow.

Due to this pillow, it feels like there is someone else on the 'other side', physical presence. This is exchanging information because both pillows are detected.

Distanced Sounds

The *distanced sounds* idea comes from the *distant music idea*.

In this idea, two objects that make different sounds are used. Both positioned at another place. When the sender plays with the object, both sender and receiver hear a specific sound for the sender object. The receiver hears that there is played attention to him, and can play along with the sender or just hear to this sound only. When they both play with the object, they can create music together (synchronous communication).

Moving Rings

The *moving rings* idea was derived from the *ring idea*. In this idea, two rings are involved, for both sender and receiver. Simple movements of the rings are detected, and compared to each other. When both rings make the same movement or are in the same position the light on the ring starts to blink. Information is exchanged, both sender and receiver can be the same.
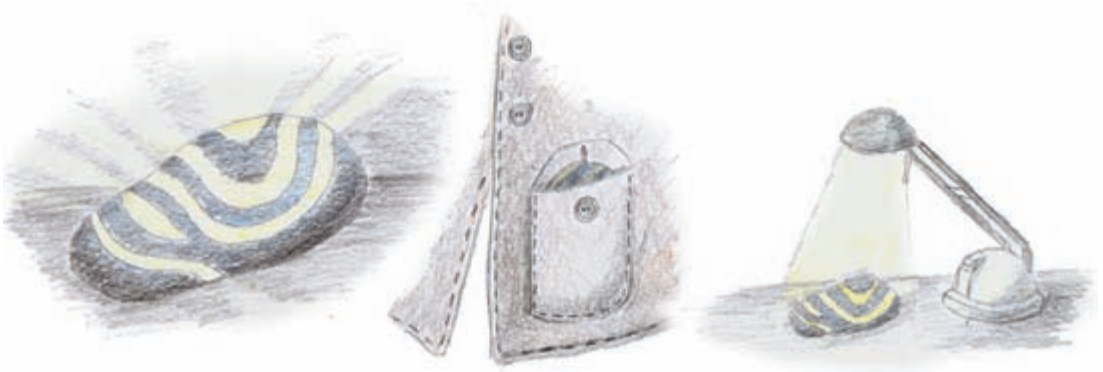
Figure 28: Living Shadow Stone
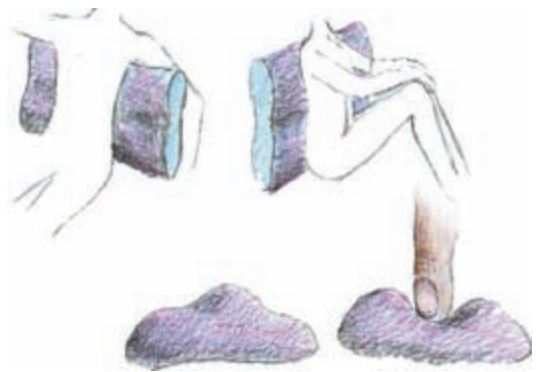

Figure 29: Attention Item
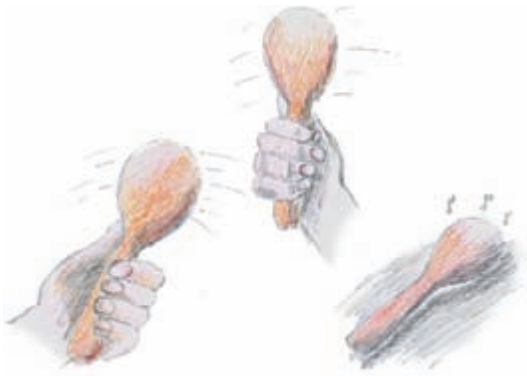

Figure 30: Physical Pillow

Figure 31: Distanced Sounds

Figure 32: Moving Rings

Concept Evaluation

To define with what concept I would like to continue, I did a concept evaluation and used the input from my coach to evaluate all the concepts.

The positive points from the *attentive item* are that it focuses on attentive contact, it is anonymous, and uses existing media and combine them.

Some negative points are that the input is not concrete, you cannot view messages back (now) and it will probably give only a short feeling of connectedness, because the sender is anonymous, it can also be experienced as an obtrusive device.

The positive points of the *living shadow stone* were that it uses light intensity and shadow (physical presence) and is focused on exchange of information.

Negative points are that it looks like a light bulb and it is unclear what the pattern adds. The interaction with the lights maybe does not fit with the stone.

The positive points of the physical pillow are that it is feasible (but not in this time frame) and it delivers direct physical feedback from other user and it is focussed on exchanging information.

The main negative point of this concept is that it is already made by a master student.

Positive points from the distanced sounds concept were that it focuses on synchronous communication, just as in face-to-face communication and also focuses on physical presence; what I stated in my problem definition.

The main negative point is that this concept does not focuses on contextual information exchange, and is thus therefore not suitable for this project.

Positive points from the moving rings concept is that it has movement as an input and the same input can create a different output, in this case light.

Negative points are that jewellery is an easy target in jewellery, and technology is difficult to implement. It has no rich meaning to the user or interaction.

To develop one of the concepts, I decided to use some literature references to continue the process.

Figure 33: Stone Brainstorm

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9. Subject to Change, Creating Great Products and Services for an uncertain world, Peter Merholz, Brandon Shauer, David Verba, Todd Wilkens, 2008

User Defining

I noticed within my last concepts that these ideas were not focused. Therefore, I would like to prescribe an experience on which I would like to focus in my product[9].

The product has to give the attentive experience of physical presence. In this case, I defined physical presence as tactile links, temperature, smell, movement, breathing, footsteps and shadows. The underlying goal of this is to create a feeling of being connected over a long distance without verbal communication. The object or service has to be small; this causes fewer adaptations to the environment, and can be carried around.

Experience Defining

The underlying goal of this product would be to create a feeling of being connected over distance. I think this will come forward out of the desire to be together when (temporary) living apart[10]. The target group are then two people (good friends, relatives or loved ones) who are temporarily not together, but who would like to know how the other one is doing.

Because out of the 'Missing Link Brainstorm' came that distant communication is often not intentionally about activity, I would like to focus on that, with use of the physical presence parts 'movements' and 'shadows' to represent the activity on an abstract level.

Stone Brainstorm

The *living shadow stone*, was my favourite concept, because it uses shadow to create a feeling of connectedness. There are also negative points at this idea, because it is unclear what the pattern has to represent and the interaction does maybe not fit the object, the stone was not good defined, it could actually any shape that can produce shadows.

Therefore, another brainstorm followed, this time with a stone as input. I brainstormed about activities with stones and products using a stone's texture or shape (*figure 33*).

10. The Design of Things to Come, How Ordinary People Create Extraordinary Products, Craig M. Vogel, Jonathan Cagan, Peter Boatwright, 2005

Reflections & Shadows

I noticed that the main thing that changes, when a stone is in another context or environment, is the surface and the shadow. The surface of a stone can (partially) reflect objects in its environment. This is mainly done by reflections. When the context stays the same, the reflection on the stone is unchanged. When there is a certain activity going on, the reflection on the stone also starts to change, they start to move. I would like to transport this to another environment, because I think this is an abstraction of the real context someone is in, and can transfer information about activity and physical presence by use of shadows.

Figure 35: Prototype - No shadows in surrounding

Prototyping

At first instance I decided to create several prototypes to experiment with shadows and reflections.

In one of the prototype I created two semi-spheres that are connected. These semi-spheres represent stones (*figure 34*), (each can be a sender and a receiver in the final product but for now, I decided to create one specific sender stone and one specific receiver stone). The sender stone, senses activity in the room by measuring the light intensity (moving shadows) in the surrounding of the semi-sphere with use of LDRs (*figure 35*). This is translated to dimmed, or turned out lights in the receiver's semi-sphere (*figure 36*). This prototype focuses on the exchange of shadows by movement and activity in the room. The light-intensity is translated so that shadows can be created. Negative point in this prototype is that the imitation of the reflection on a stone, works from the inside out, instead of from the outside. The stone idea does not come to the fore because of the estrangement of the lights in the stone.

Another mock-up models was made with use of black paper in a semi-sphere. This semi-sphere is sandblasted and has to represent a stone and the black paper the shadows (*figure 37*). I also experimented with a mirror in the semi-sphere. This to see how shadows could be created without use of light from the inside of the semi-sphere.

Figure 34: Prototype - LDRs & LEDs
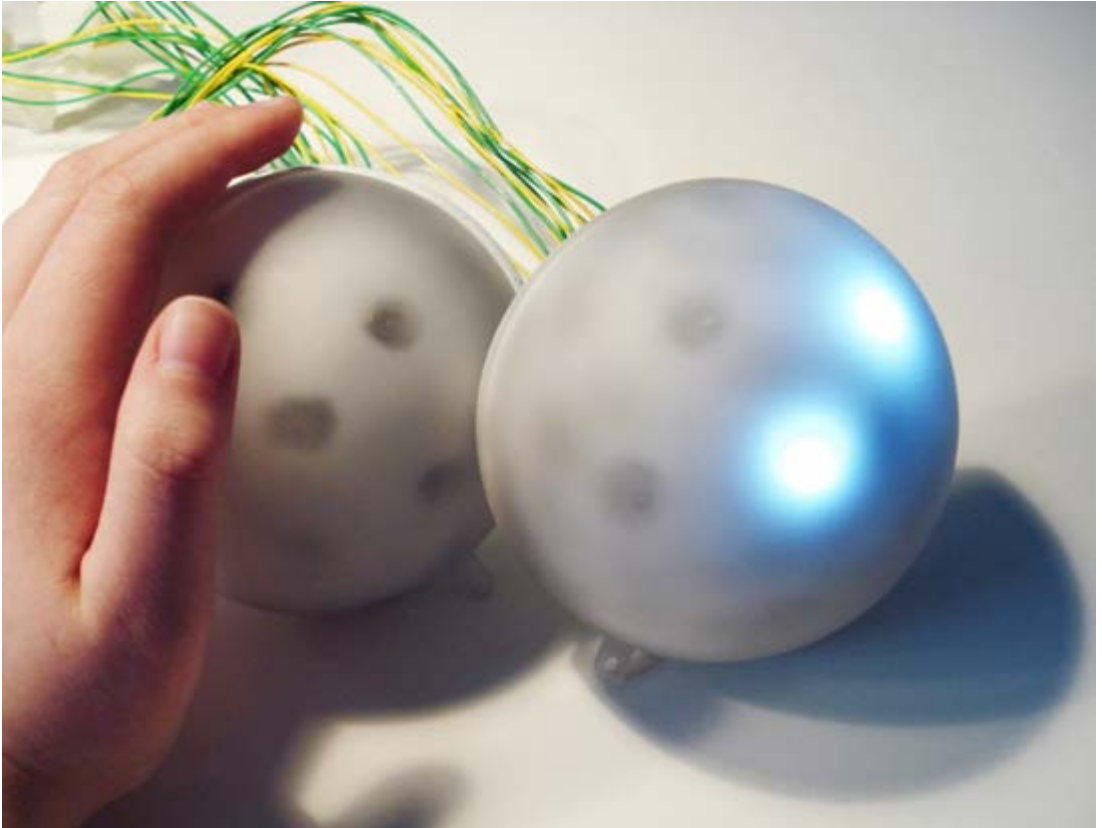

Figure 37: Semi-sphere with paper 'shadow' inside

Figure 36: Prototype - Sensing shadows in surrounding

Evaluation & Discussion

This concept that I prototyped using semi-spheres, was derived from stones, shadows and reflections. In the prototype itself the stones were not recognizable anymore, the semi-spheres are not representing stones anymore. The shadow of the receiver stone is imitated from he inside out, not from the outside as it should be to create shadows. My coach, dr. J. Hu, therefore advised to look to the shadows that the stones create by themselves. And what you can do with arrangements of stones, and what these arrangements can represent.

Final Concept

In my new final concept, I would like to use the shadows of stones to communicate over distance. I would not like to focus on one stone, but about groups of stones. These arrangements can tell something about the context someone is in.

The sender has stones in his/her room. The position of the stones is translated to a shadow at the receivers place. Both sender and receiver can be sender and receiver and can together create a physical and virtual representation of both's contexts.

Design

In the design phase, I am going to work out the final concept of the conceptualization phase. I am going to investigate stone patters and shadows and find a way to communicate this over distance.

Shadows

Objects, in this case stones, are within my design used to communicate over distance and create shadows at the senders place, this to indicate physical presence. The stones can be moved to give the receiver an attentive experience without being obtrusive.

Within my final concept, I chose to work with shadows of stones instead of stones of people. But still with the intention to show physical presence of someone else. I would like to show this with changing compositions of stones at the sender's side and thus also different compositions of shadows at the receiver's side.

Arrangement

Within my idea I use the arrangement of stones to communicate context. The users can manipulate these stones by themselves. I used stones in particular, because these do not have an extra function and can therefore be used by the user with less association and more imagination for arrangement.

The stones arrangement could be contextual information exchange in different ways.

The arrangement of the stones could be intentional interaction of the user, so that the sender manipulates the stones by him or herself according to his/her own emotional feelings and context of that specific moment.

Another option is to manipulate the arrangement of the stones in a technical way. This means that other factors in the surrounding create the input for changing the arrangement of the stones via a machine. To do this I first have to know what factors can manipulate this arrangement and how this can influence the arrangement of the stones. Therefore I would like to do a user evaluation with different arrangements and contexts.

User Evaluation

Within the user evaluation, I would like to investigate what contextual factor can influence the arrangement of the stones. Therefore I did a small user evaluation with six people (figure

Questionnaire

User Evaluation
M.M.L.H. Heuvelings, B2.2 Student Industrial Design, DPC13 Contextual Information Exchange

This is a user evaluation for the project 'Contextual Information Exchange' of Industrial Design.
I would like to ask you to position 6 stones. I will make a photograph of this composition and then you are asked to fill in the form below. Please cross the most appropriate situation. Thank you.

Name | ……………………………………………………………
Place | ……………………………………………………………

Activity
Amount of activity you are currently busy with
little   …………………………………………… *many*

Environment
The atmosphere in the environment
relaxing …………………………………………… *busy*

Sounds
Sounds in the environment
little   …………………………………………… *many*

Social
Amount of people in the environment
little   …………………………………………… *many*

Emotion
Emotional status
happy   …………………………………………… *sad*

Figure 38: User Evaluation Questionnaire

Figure 39: Arrangement Stones - User 1

Figure 40: Arrangement Stones - User 2

Figure 41: Arrangement Stones - User 3

Figure 42: Arrangement Stones - User 4

Figure 43: Arrangement Stones - User 5

Figure 44: Arrangement Stones - User 6

Prototyping

I chose for intentional manipulating of the stones for creating prototypes, because of the user evaluation. I investigated techniques to create shadows and chose to work out two ideas.

Light Prototype

For the light prototype I create a sender base and a receiver base. I used the technique that I implemented in the light stone, earlier in the report. The sender base contains LDRs that can measure the light intensity of the base. When stones are laid on the base, this is detected by the LDRs and send to the receiver base. The LEDs in the receiver base turn off.

Figure 45: Prototype - No Stones

Figure 46: Working Light Prototype
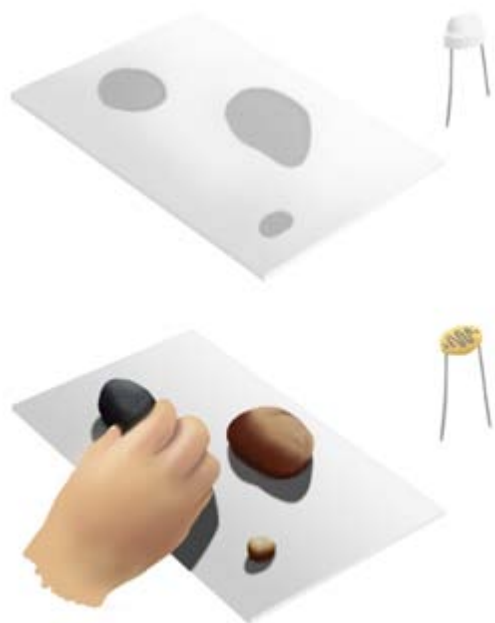
Figure 47: Scenario

Shadow Prototype

For the other prototype I would like to create my final design. This is to create a decorative piece with people over distance, using virtual and physical objects. The sender has only influence on the physical pieces of the decoration, respectively the stones.

I tested this with use of flash programmed stones on my desktop, that can transfer into shadows. These shadows are projected onto the wall of the in this case receiver. The receiver can manipulate his own stones according to his own feelings and context and create together with the sender a decorative wall or floor piece.

Figure 48: Positioning System
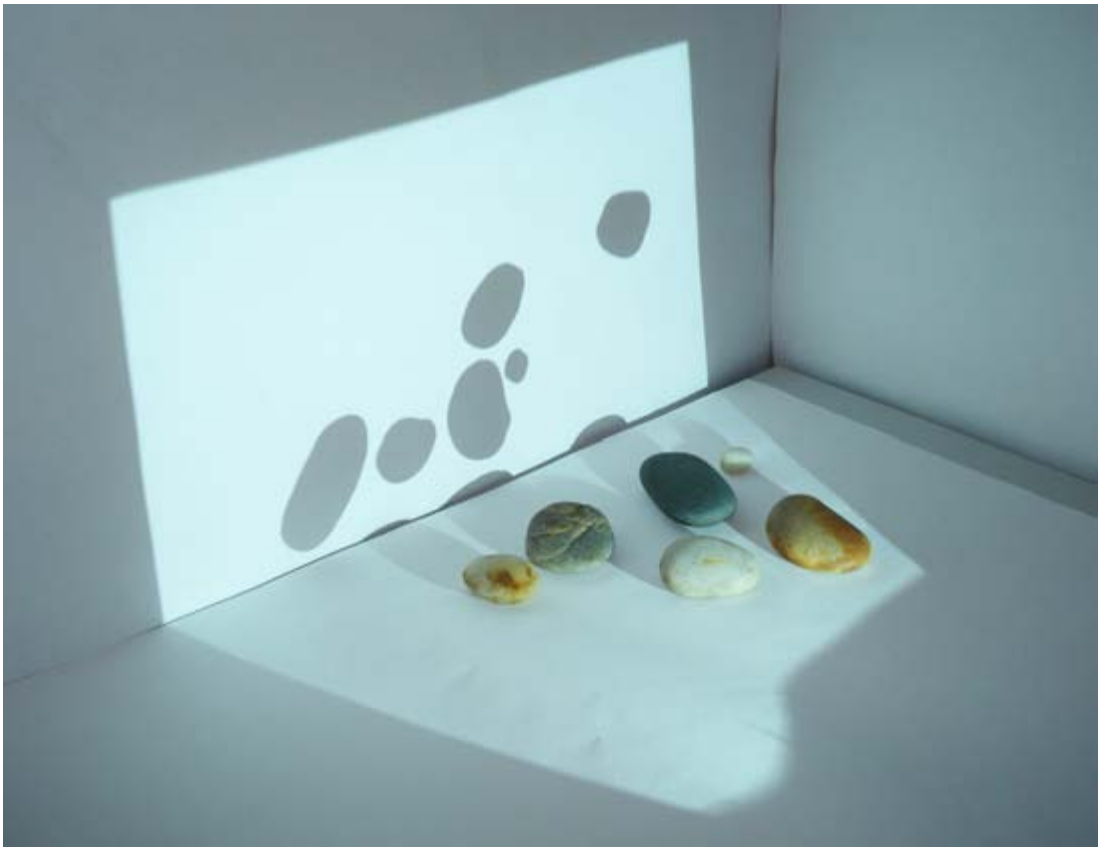
Figure 49: Working Shadow Prototype
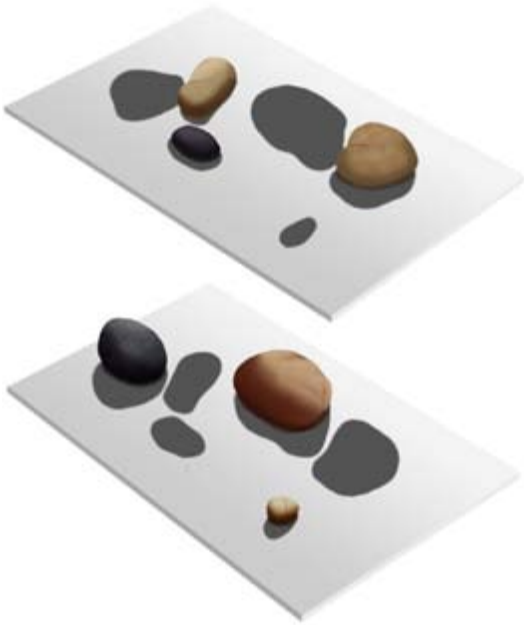
Figure 50: Final Design Iteration 2 - Scenario Person A & B

Interim Exhibition

During the interim exhibition, I focused on presenting my process and how I came to my idea. Within this process, the missing link brainstorm was particular important. Therefore I pinpointed this brainstorm and my research findings in my presentation for several coaches and other students.

For my idea explanation I used both prototypes and visuals that could represent my final design. And explained them to the audience by use of a physical model and flash on my laptop.

The exhibition stand can be seen in a picture below.

Figure 51: Interim Exhibition Stand

Exhibition Feedback

In general the feedback that I have got was focused on improvements that I could do within this design and points that I have to keep in mind during the next iteration.

People thought that this concept was not pinpointed at contextual information exchange specifically. This could therefore be a focus point during the next iteration.

Also they were wondering how people keep their attention with the product and how you could enhance this attention.

A clear user group is also missing and maybe I could investigate that to come to a more user specific design.

Now the design focuses on intentional design, instead of unintentionally exchanging of contextual information. This has also be changed for the final design. I also got some advice about in what kind of situation this design can be used. It can for example be used over distance where two people live in different time-zones and can via this leave a mark of attention to the other person.

Another person was wondering if this design could be used in a work environment, because then people are more forced to use the design and more focussed on different visuals.

And another interesting point was how this device would react with multiple (more than two) users.

Specific feedback about the use of the stones was that these stones form a good contrast between the old and the new, the old stone and the virtual use of the shadows to communicate information. The use of stones give the design a poetical influence and the own interpretation of the stones gives a new dimension to the own perception. This could lead to a new form of communication via arrangements.

Another point of attention is how I could create shadows in my final prototype without using explicit background light. And when I would like to use a specific interaction of interference with the user, how I can bring this to the fore.

Research

Literature Study

Social Communication

Existing Products
- feather/scent
- shaker
- intentional presence lamp
- white stone

Face-to-face Communication
- eye contact
- facial expressions
- postural movements
- tactile links
- spoken language
- voice tone
- combination

Distant Communication
- video
- words (hand or type)
- voice
- combination

Social Belonging Connectedness

Communication Goals
- practical
- social
- emotional
- attentive

Physical Presence
- tactile links
- movements
- temperature
- smell
- breathing
- foot steps
- shadows

Attentive Goal

Visual Context

Vision

Problem Definition

"How can we share the attentive experience of physical presence via contextual information exchange?"

Ideation

Missing Links Brainstorm

Brainstorms
- drawing Brainstorm
- brute thinking
- incubation

Idea Selection
- experience
- exchange
- physical presence
- feasibility
- attentive

Attention Item

Living Shadow Stone

Physical Pillow

Distanced Sounds

Moving Rings

Figure 52: Process Iteration 2

Conceptualization

Concept Evaluation

↓

Stone Investigation

↓

Brainstorms

- stone brainstorm
- shadow brainstorm

↓

User & Experience Definition ← Literature Study

- two people (close friends, family, loved ones)
- using physical presence to feel connected

Design

Shadow Stone Concept ← User Evaluation

Prototype 1   Prototype 2   Prototype 3 ← Technology

↓

Interim Exhibition

↓

Feedback

↓

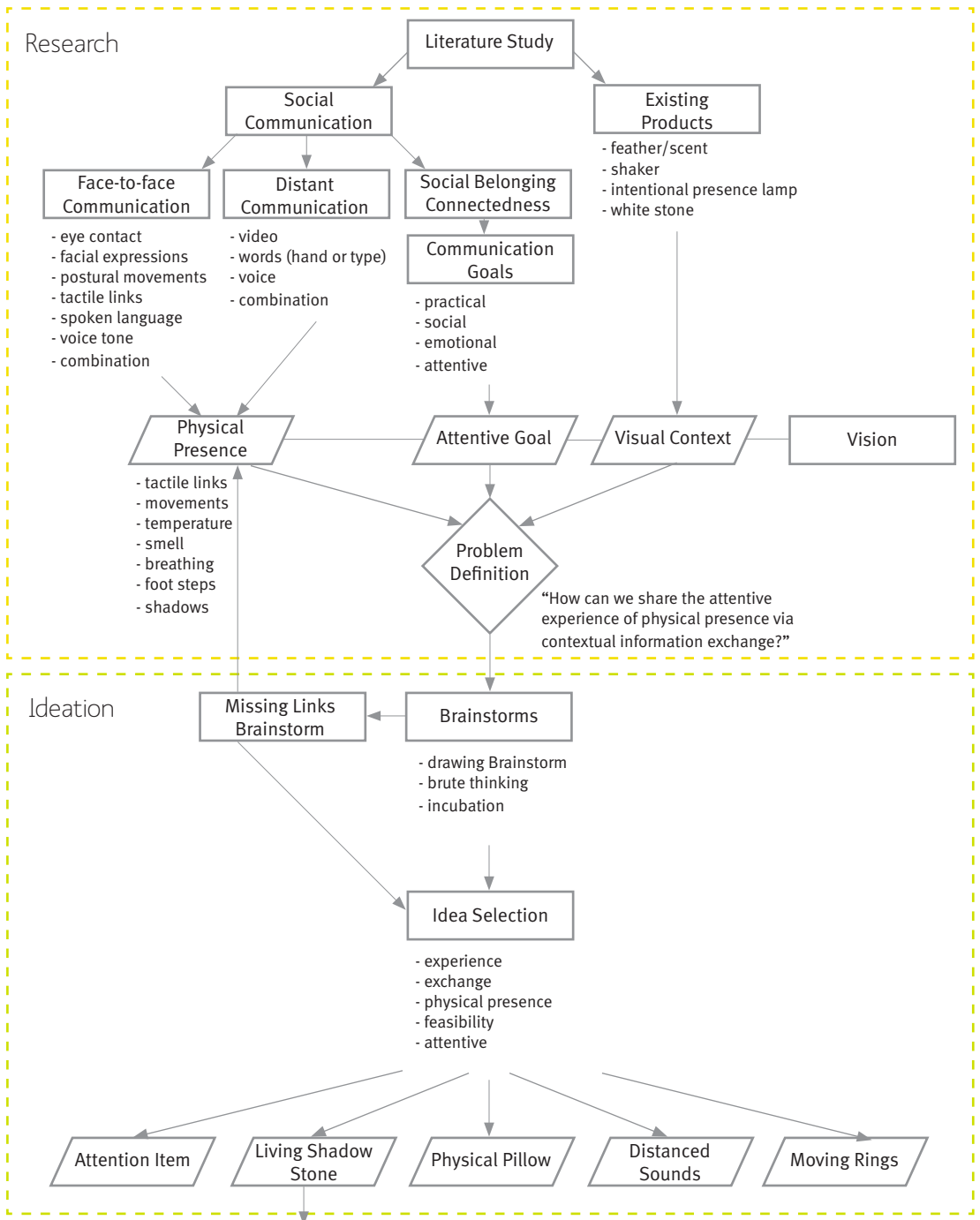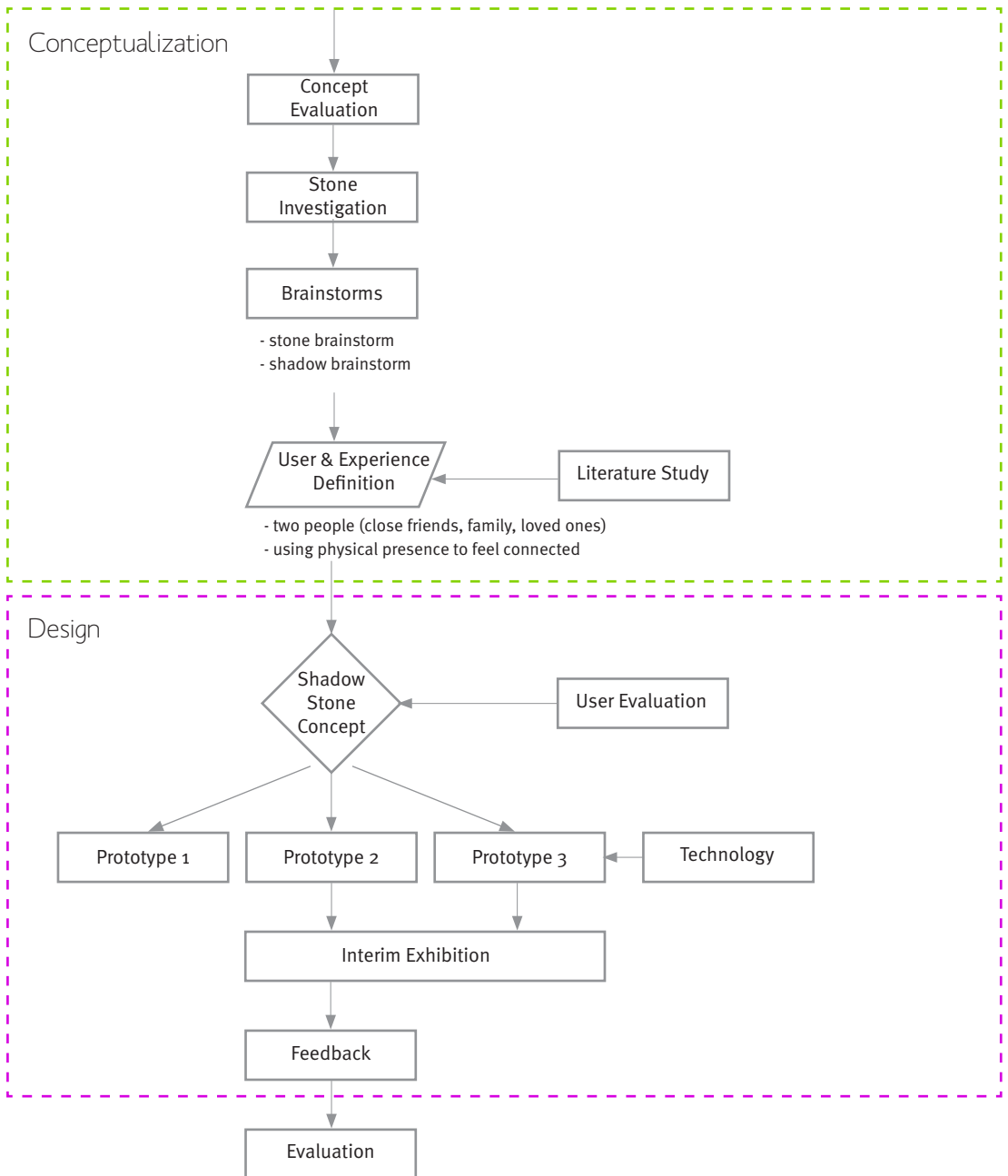Evaluation

Evaluation

During the process of the second iteration of this project, I used different methods to gather ideas and to structure the knowledge. To know if these methods worked better than the methods used in the first iteration, I evaluated these steps in this evaluation (*figure 52*).

Research

The broad research about social communication formed for me a solid base to work on during the idea generation. Particular the research about social communication formed an input for the missing link brainstorm to evaluate the differences between face-to-face communication and distant communication. Due to this research about social communication, you can clearly see in the end product that there is less focused on contextual information exchange and more on social communication. Therefore in the next iteration more research about context can be done.

Ideation

During this iteration phase the ideation took more time than expected. This was particular because it was difficult for me to focus on a specific aspect and be concrete in my idea. Also because of a lack of requirements at the beginning and during the selection phase.

The missing link brainstorm formed a solid base for my further development during this iteration because it pointed out my focus in this project; find ways to combine the virtual and the physical world to communicate over distance. This led to the problem definition of: "How can we share the attentive experience of physical presence via contextual information exchange?"

I also used that brainstorming within a group helped me to come to ideas more easily because you can then brainstorm further on other ideas and are forced to come to ideas quicker and do not criticize them at the start.

This is my main problem in brainstorming, because I am forced to come to a good idea that represents me during this project, and therefore I criticize all my ideas.

Eventually I chose the five best concepts with use of requirements and decided to work further on the living shadow stone.

Conceptualization

Within the conceptualization phase I went further with the living shadow stone concept. My idea behind it was to use shadows to communicate context over distance. Instead of focussing on this, the focus in the conceptualization was on the use of stones and their arrangements to communicate over distance. The initial focus was lost and therefore it was difficult to come up with new concepts regarding the living shadow stone concept. I used literature as a basis for bringing back the focus in the conceptualization phase by defining the experience and the target group for my design. Eventually I think that I had to focus more on communication via shadows instead of communicating via stones during this phase.

Design

The design phase was particularly focused on working out the concept and experimenting with different possibilities in technology and materials. User evaluation formed an input for the rest of the design but was not valuable for these prototypes already.

To be of a higher value I have to do more user evaluation with clearer analysable questions and tasks, so that I can use the outcomes of the tests for the development of my design.

Prototyping was valuable for the design phase because this gave me insight in the function and working of my concept and gave me the opportunity to test this. I also concluded from the first prototype that this idea was not working and therefore used the technology of this in my latter prototype.

General Conclusions

In general I have to focus more on communication via shadows during the next iteration. Focus on a specific target group and interaction and implement specific contextual information exchange in my design.

Iteration 3

April 2009			
17	Research		
20	Ideation		
23	Ideation		
24	Ideation		

May 2009			
27	Conceptualization		
4	Conceptualization		
7	Conceptualization		
8	Design		
11	Design		
14	Design		
15	Design		

18	Design		
25	Design		
28	Design		
29	Design		

June 2009			
4	Evaluation		
5	Evaluation		
8	Identity Week		
9	Identity Week		
10	Identity Week		
11	Exhibition		
12	Exhibition		

Figure 53: Planning Iteration 3

In the third iteration of the project, I would like to focus on contextual information exchange and create clear requirements. I would like to work further on the problem definition I stated during the second iteration:

"How can we share the attentive experience of physical presence via contextual information exchange?"

But I do not want to go further with the shadow stone concept. Instead of this I would like to use the positive points of this concept to implement in the third iteration. I mainly would like to use these points as clear requirements for the idea selection within this iteration phase.

At the end I would like to deliver a working prototype, therefore I decided to shorten the research and ideation phase.

I noticed from last iteration that I am interested in creating tangible interfaces, and therefore I started with research about physical communication.

Research

This research is less extended than the former research, because in the final iteration phase I would like to focus on a working prototype.

We nowadays live between two realms, our physical environment and cyberspace. The absence of seamless couplings between these two leaves a great divide between the virtual and physical world.[2] A way to connect both worlds is via tangible interfaces. Tangible interfaces stand closer to the real world than graphical user interfaces, because in the physical manipulation of a tangible interface, touch and physical manipulation play a key role, just as in understanding and affecting our own (physical) environment.[1]

Tangible interfaces give the opportunity to manipulate objects into a physical environment with multiple persons at the same time.[1]

In the survey of 'Tangible Bits: Towards Seamless Interfaces between People, Bits and Atoms', they said that the metaphors which bridge the physical and digital worlds are particular interesting. In this survey they found the metaphor of light, shadow and optics in general compelling for interfaces spanning virtual and physical space. In one of the designs they used 'digital shadows'. They stated that in physical space, illuminated objects cast shadows reflecting their physical substance. In augmented space, they reasoned, physical objects might also cast digital shadows which project information pertinent to their virtual contents.[2]

The use of these shadows is the other way around of the use of shadows in the second iteration; respectively using physical objects with virtual shadows. They used virtual objects with 'real' shadows. This could be an interesting aspect to use within the brainstorm.

Mood board
To give an impression of the atmosphere I would like to create with my design, I created a mood board. This mood board was also meant for giving inspiration for creating a new product within this project. Categories with inspiring pictures were created, respectively:

- Shadows
- Light
- Forms
- Reflection
- Environment
- Nature

These categories were derived from the former iteration and can form an inspiration for this iteration.

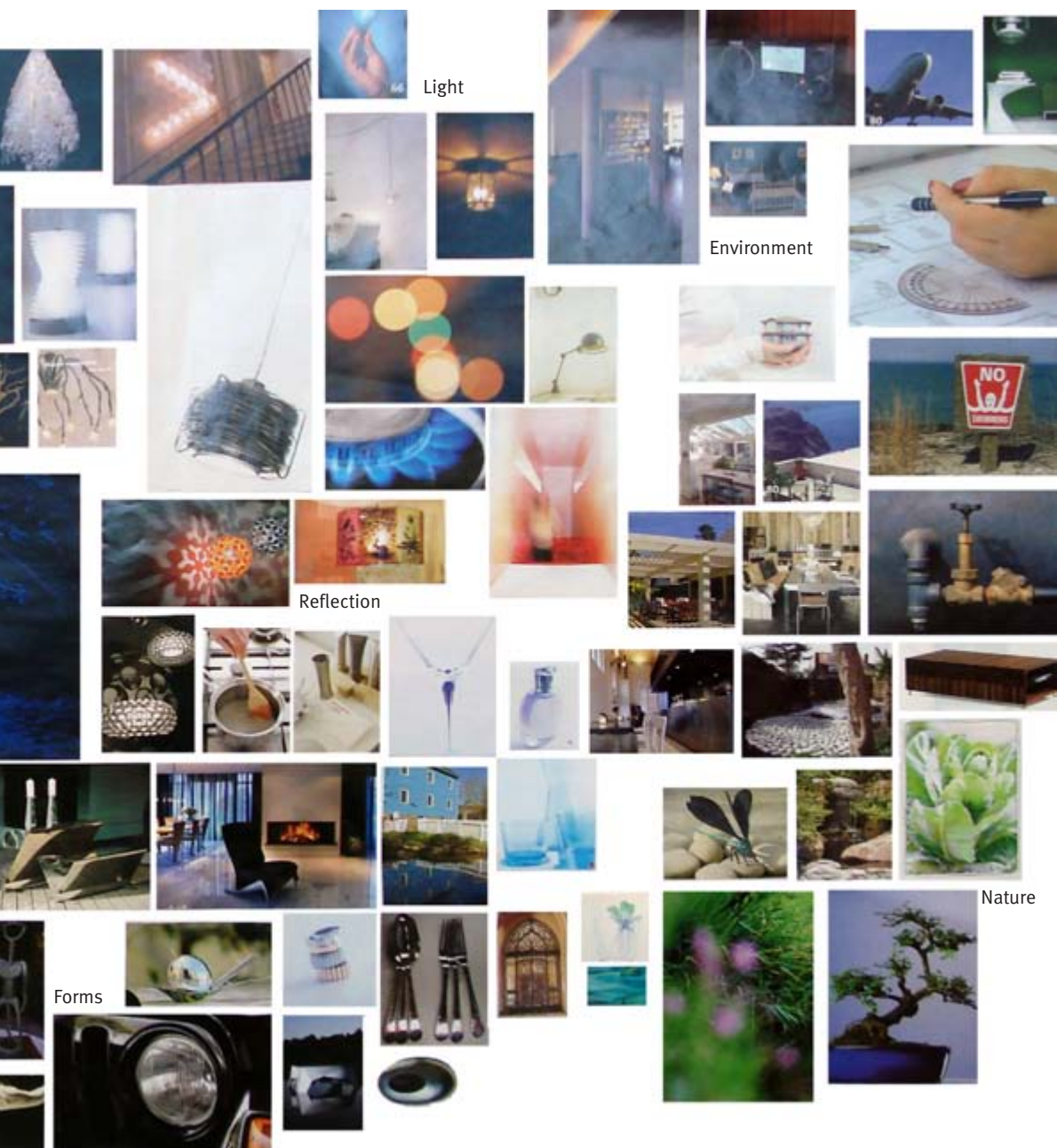The mood board can be found in picture 54, on the next pages.

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1. Tangible Interfaces for Remote Collaboration and Communication, 1998, S. Brave, H. Ishii, A. Dayley
2. Tangible Bits: Towards Seamless Interfaces between People, Bits and Atoms, 1997, H. Ishii, B. Ullmer

Shadows

Figure 54: Mood board

Light

Environment

Reflection

Nature

Forms

Requirements

With the mood board and the former iteration as inspiration, requirements were made. For the requirements, the must, should might technique is used. This means that three stages of requirements are made with each their own level of importance. The *must level* contains the most valuable requirements, the *should level*, contains requirements of less value than the must level. And the might level consists out of the requirements that are not obliged to use.

All the requirements come forth out of iteration two, the research of iteration three, the mood board and my own vision.

Must requirements:
- Combine physical with virtual
- Contextual information transfer
- Attentive contact
- Not obtrusive

Should requirements:
- Shadows as metaphor for physical presence
- Magic experience
- Tangible interface
- Information exchange
- Own identity user
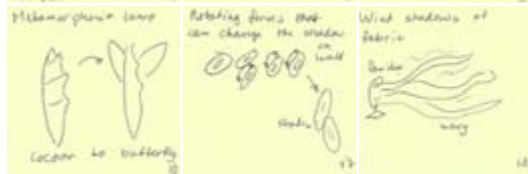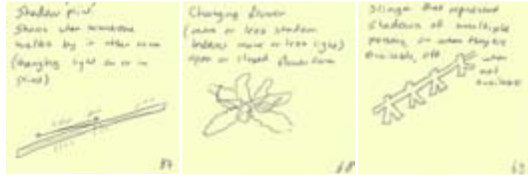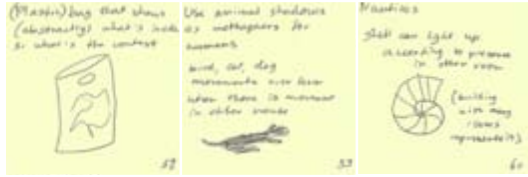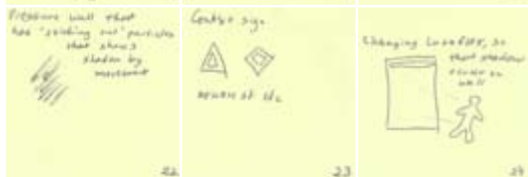
Might requirements:
- Nature as inspiration
- Multiple persons
- Intentional control of user (at start)
- Status detection (busy, available)
- Wearable senses (use of fabric)

Ideation

The ideation phase was based upon the research, mood board and requirements and started. This ideation resulted in many ideas which can be seen in figure 55.


Figure 55: Brainstorm ›

Conceptualization
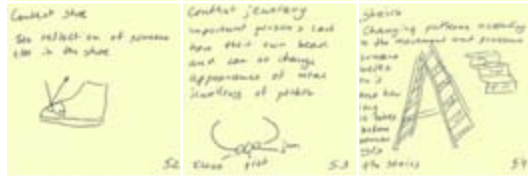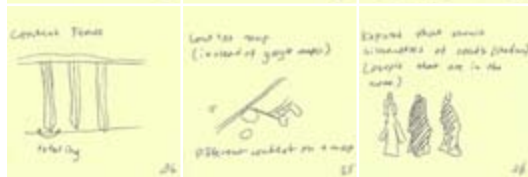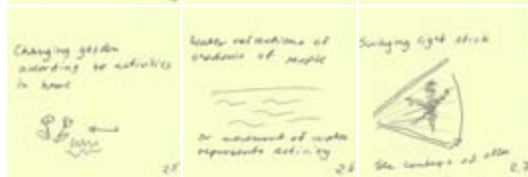
Out of the ideation phase, I chose to work on the shape shifting lamp. Because this suited my requirements best, and I could implement my other findings from the former iteration and research.

Picture Research

Research was done to existing shape shifting lamps, and other design lamps. These lamps and light installations formed an inspiration for the rest of the conceptualization phase. Particular to see what is already done in the field of communication through light and how movement can be transferred using a light object or device.
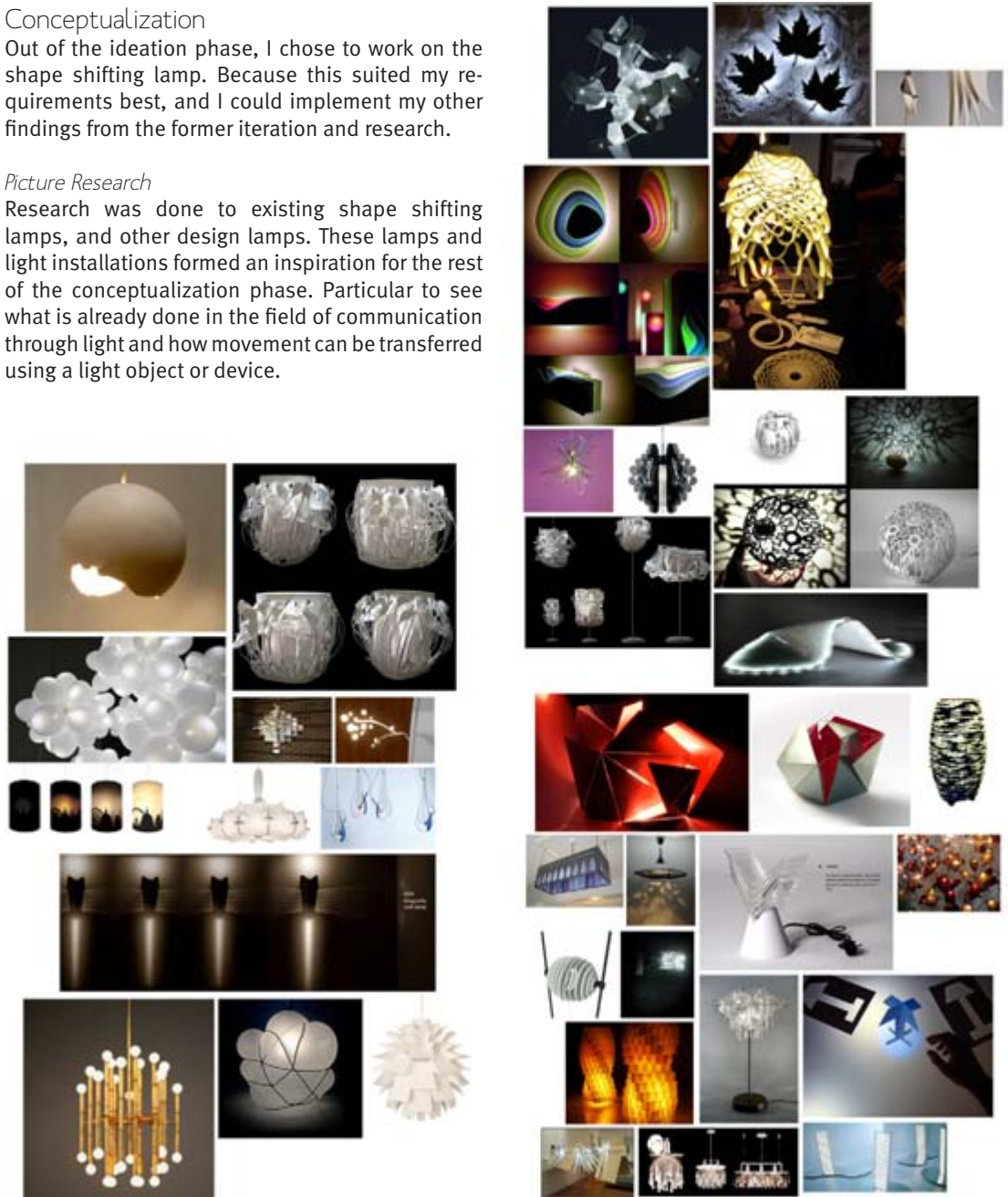
Figure 56: Sketches Shape Shifting Lamp

Sketching

The shape shifting lamp resulted in drawings and sketches to work this concept out. In the first stage of the sketching, the focus was on a standing lamp that could change shape according to the shadows in the environment. After that the lamp became a wall piece that also reflects is own shadow and is manoeuvrable by the users itself. This evaluated in a chandelier with changing form.
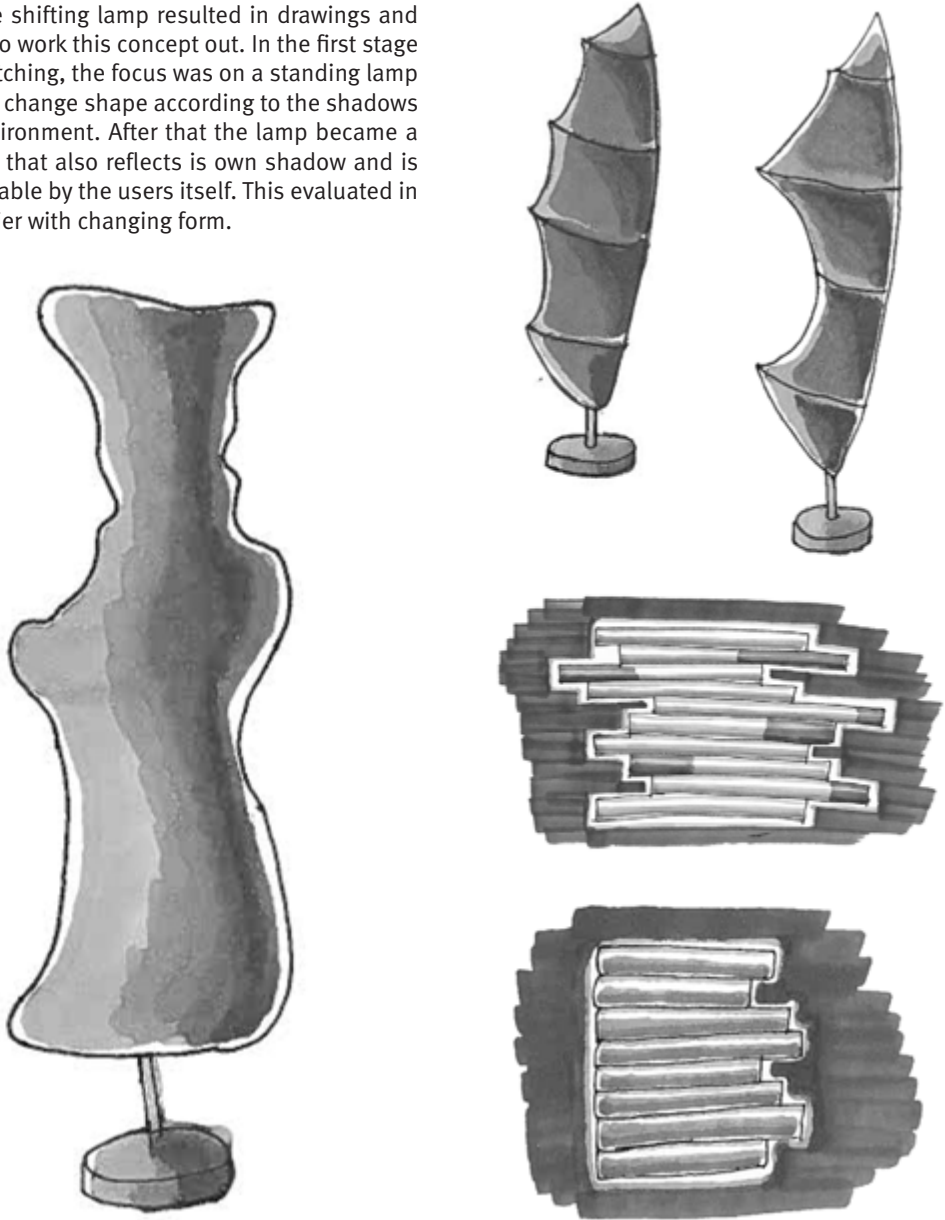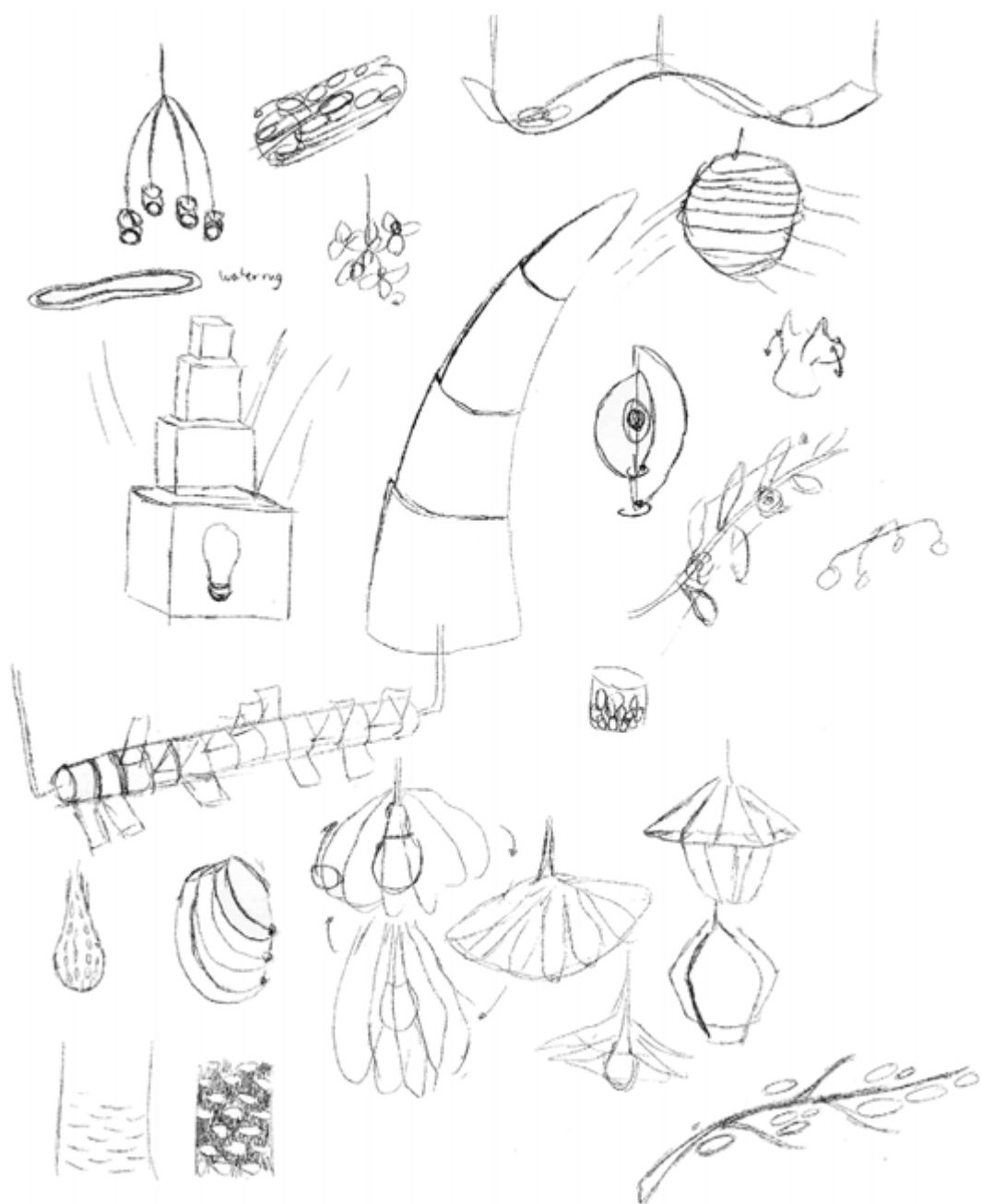
Figure 57: Sketches Shape Shifting Lamp

watering

Combining

Inspired by the research, that stated that digital shadows could represent physical objects, that could project their virtual contents.[2] In this case, this means that a lamp (or object) could show shadows of a virtual space (or in this case the context on another place).

Therefore I combined this result from the research with my sketching ideas (*fig. 58*), and created a lamp that can project shadows that represent people and their amount of activity (speed of movement) (*fig. 59*). This is the other way around, than first intended (peoples shadow changes the shape of the lamp, now it is that the peoples shape and activity change the shadows generated by the lamp.) The conceptualization phase ended with the final concept of the 'Movow' .

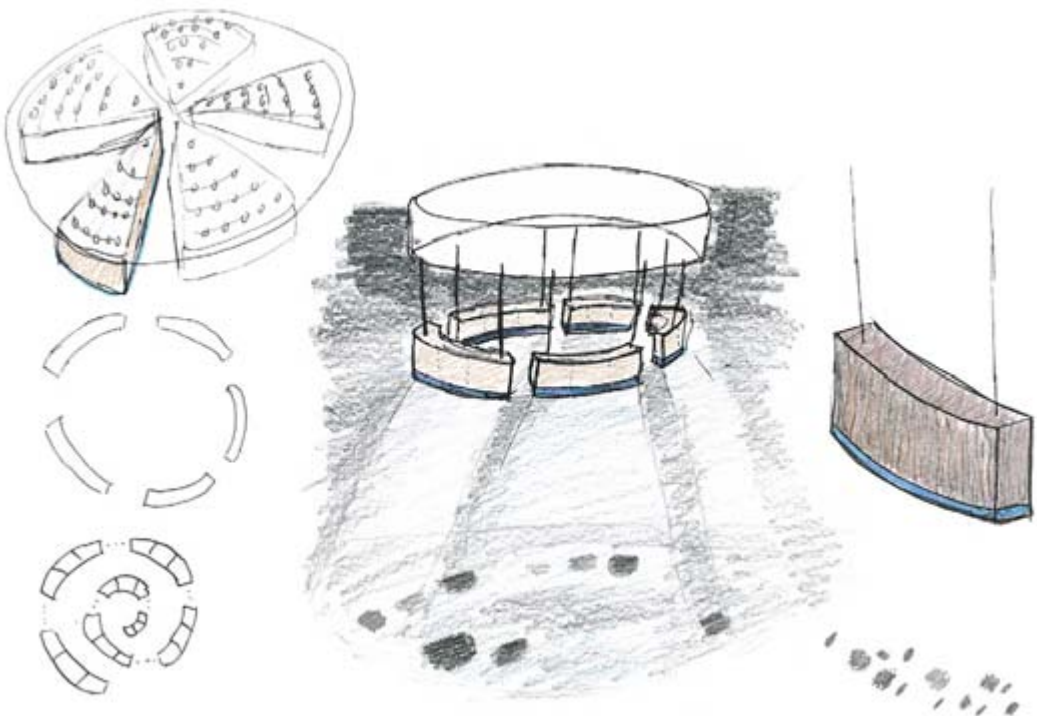*Figure 58:* Spiralling Lamp

Figure 59: Combining the sketching ideas with the virtual shadows

Design
The final design of the third iteration, the 'Movow', which stands for movement and shadow; is based upon the investigations of the former iterations and adjusted to create information exchange that is dealing with the context. In this chapter the final design is discussed.

Movow
The 'Movow' (*fig. 58*) is a light and darkness device which focuses on communicating physical presence over distance. This communication uses movement and activity (amount of people that walk by) as an input for a the device in another room, where the 'Movow' is placed. The 'Movow' communicates the movement and activity by creating shadows on the walls and floor. This is inspired by the shadows that are created by humans when they walk by.

The light and darkness device contains out of three egg-shaped rings. The lower ring shows physical presence in another room. When there are more people in the room, the second ring is turned on, and with even more people the third ring is also turned on. These rings show that amount of people in another room. The context information is virtually 'growing'. The shadows created by these rings move according to the amount of movement of people that walk by.

Form
Inspired by nature and a spiralling movement of the annual rings of a tree (*fig. 61*), different forms for the lamp are generated in a form study. From a spiralling movent (*fig. 58*), to a spiralling wires, to circular rings (*fig. 60*) and finally to egg formed rings (*fig. 61*).

In my former iteration I used stones as an inspiration of communicating in shadows. Because a stone is an live less object, I looked into living objects of nature as an inspiration for my third iteration. I looked into the presence of a tree. When a tree is only present, he is small and not so big. But when there is more activity, catching more sunlight and getting more vitamins the tree grows, as well as in width as in height. I linked this growth to the communication of social status over distance.

Figure 60: First Rhino model of the 'Movow' Lamp

Figure 61: Rhino Model of the 'Movow' Lamp

Prototyping Plan

The goal of creating a prototype for this concept is to experiment with use of shadows and movements and show the moving shadows that can be created by the final design. Therefore is decided that the focus would be on the illuminating part of the prototype and extra care was taken to create the electronics part.

Test

To test if the LEDs can create enough light, different small mock-up models (*fig. 62 & 63*) were created to test the shadow creating factor of LEDs in a dark room. For this test, three different LEDs are used to see what leds give the best shadow result. As a test room, the dark container at the Grey space was used. Eventually the super flux LEDs gave the best shadow capacity.

Figure 62: Shadow Capacity LED Test
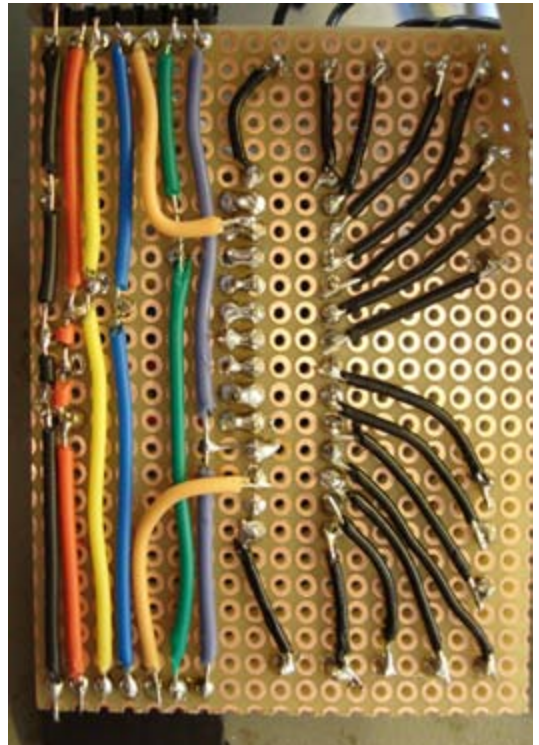

Figure 63: Assembly example to test shadows

Figure 64: Back soldered print

Technology

Due to these test, I decided to use multiple superflux LEDs to change the shadows that are created by the device (*fig. 64*).

These LEDs are connected through the tlc590 led drivers to an Arduino. This Arduino switches with use of these four led drivers each LED on and off and is able to change the light intensity of each led through PWM. Different test programs are written in processing. The program showed at the exhibition was able to rotate all three rings with a fading light.

In total 32 LEDs are used for the upper ring, the middle ring contains 16 LEDs and the lower ring consists out of 8 LEDs (*fig. 65*).

For this prototype (IR) sensors can be attached; but these are not yet implemented in the presented prototype at the final exhibition.
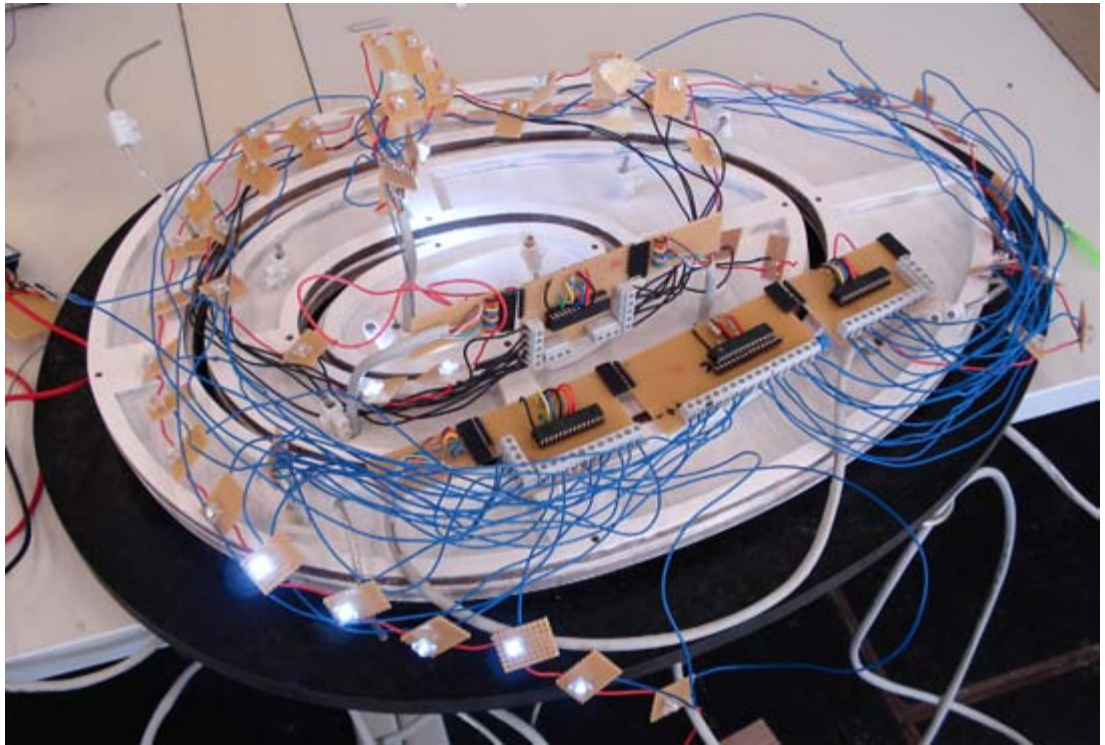

Figure 65: Circuit with shadow effect of its own wires

Figure 66: Electronic Components

Final Prototype

A working prototype is created using 9mm lasercut MDF plates. Three layers are cut in the shape you can see in figure 66. These models are created in Adobe Illustrator for the lasercutting machine.

These three MDF plates, and one plate of transparent 3mm vivak are attached with 4mm diameter wooden sticks.

Holes are drilled for later attachment of wires for connecting the four tlc5940 chips and for attachment to the ceiling.

On the vivak, leaf shaped forms are glued with use of white adhesive foil.

Wood and trees were one of my inspiration factors during this iteration. I therefore also decided to enhance this idea with use of veneer.

Veneer enhances the feeling of social presence, because on a distance the lights in the lamp are visible through the veneer. This way, when the shadows are not that bright in a light room, physical presence can be noticed in a subtle way.

Figure 67: Top Cover Plate (Vivak & MDF)

Figure 68: Top Plate

Figure 69: Lower Rings
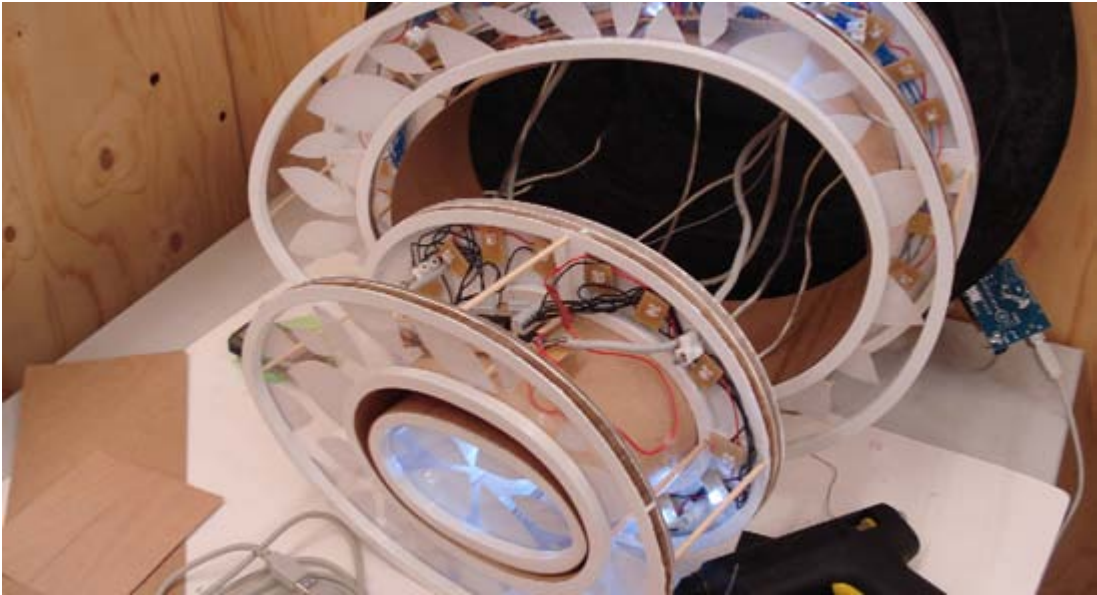
Figure 70 Close-up Leaf Pattern on Vivak

Figure 71: Partly Finished Prototype

Final Concept

The final concept consist out of a growing light and darkness object that projects moving shadows on the ground.

The amount of shadows corresponds with the amount of people that walk by a sensor, the movement of the shadows correspond with the speed people walk by different sensors in the wall.

The object can growth in height, which means that the lower ring will always stay in the same position, the other two outer rings can move upward, which corresponds with the growing context of the other room. The final growth is not implemented in the prototype at the exhibition.

Figure 72: Prototype

Figure 73: Prototype Close-up

Final Exhibition

During the exhibition the focus was on explaining my concept and getting feedback about my concept. To explain my concept better, a prototype was created to show the projected shadows on the floor.

The interim exhibition contained a (partly) working prototype, a poster, teasers and the project report.

Exhibition Feedback

The main feedback I have got was how the form of the lamp related to the context on the other side of the room. One person asked why I have not chosen to make a rectangular lamp, since most rooms are rectangular.

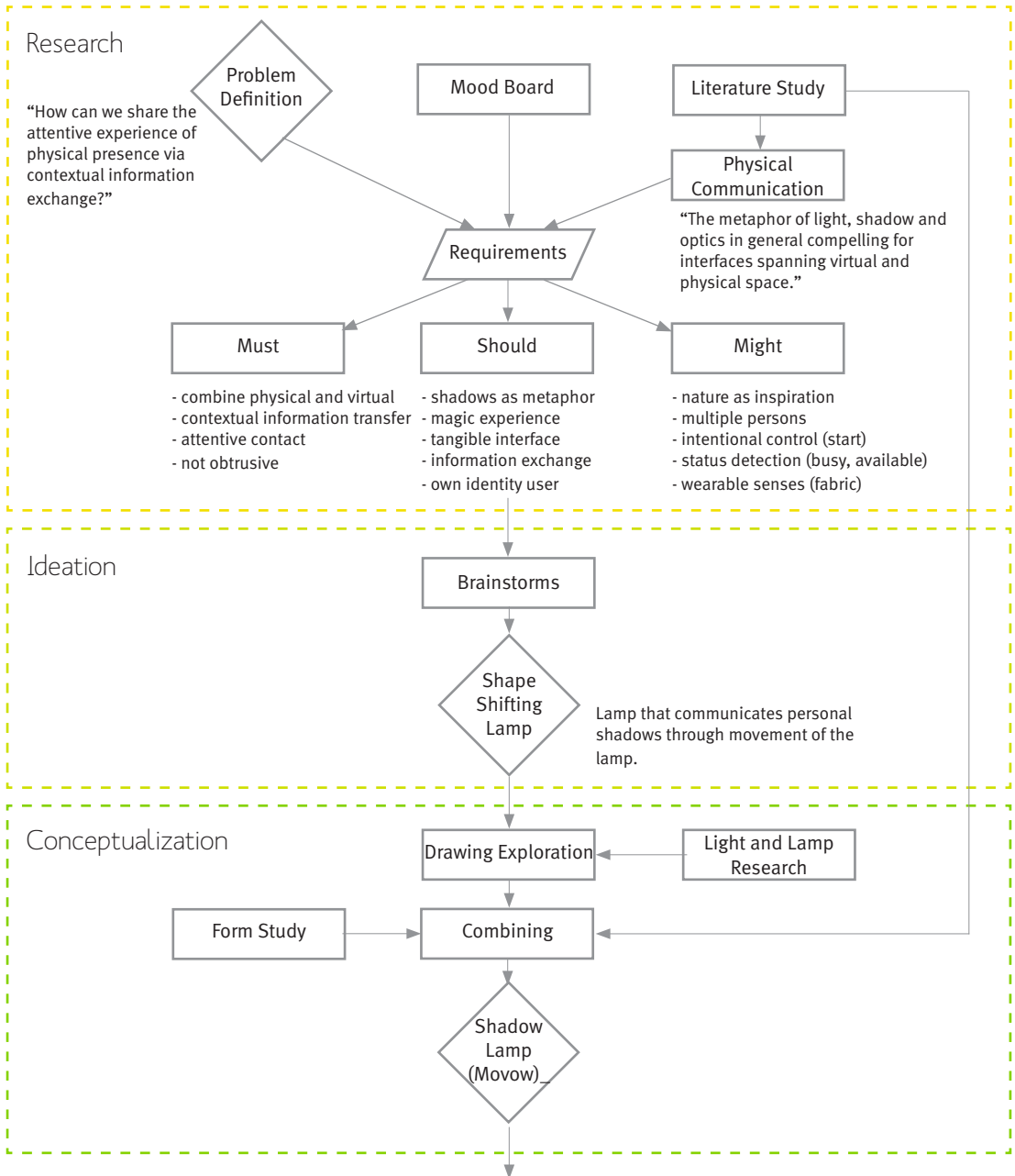Another comment was how the sensors would look like, these could add extra value to the interaction with the device itself.

The growing tree link to the growing context could be multiple interpretable, which can cause misinterpretations about the communication over distance.

I also received comments about the finishing of the prototype, especially the veneer and the wires.

Figure 74: Exhibition Stand

Research

Problem Definition

"How can we share the attentive experience of physical presence via contextual information exchange?"

Mood Board

Literature Study

Physical Communication

"The metaphor of light, shadow and optics in general compelling for interfaces spanning virtual and physical space."

Requirements

Must

- combine physical and virtual
- contextual information transfer
- attentive contact
- not obtrusive

Should

- shadows as metaphor
- magic experience
- tangible interface
- information exchange
- own identity user

Might

- nature as inspiration
- multiple persons
- intentional control (start)
- status detection (busy, available)
- wearable senses (fabric)

Ideation

Brainstorms

Shape Shifting Lamp

Lamp that communicates personal shadows through movement of the lamp.

Conceptualization

Drawing Exploration

Light and Lamp Research

Form Study

Combining
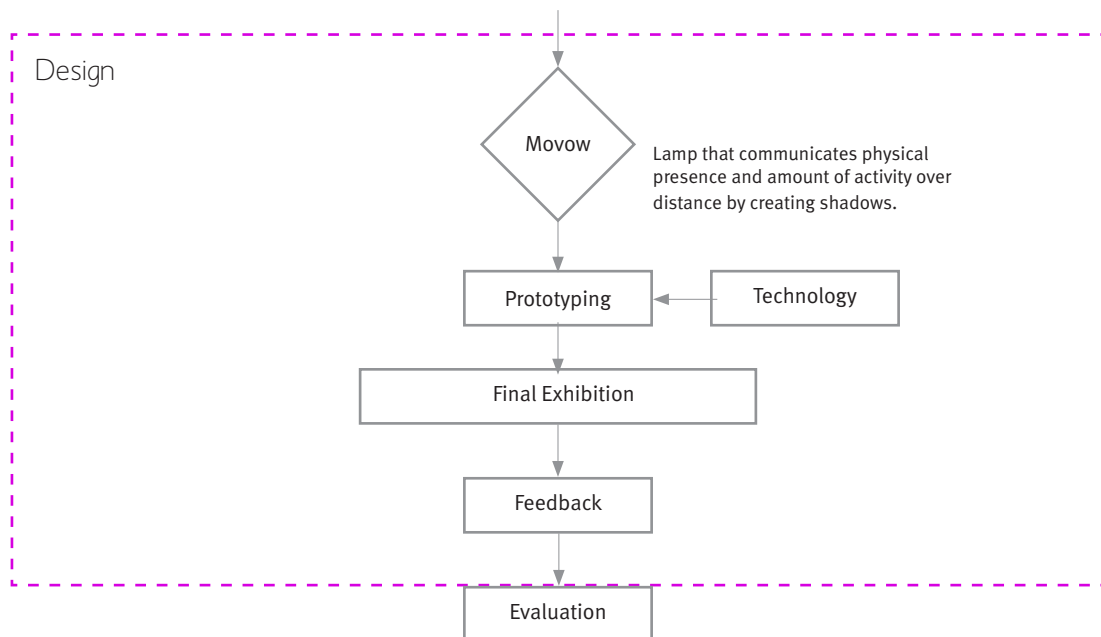
Shadow Lamp (Movow)_

Figure 75: Process Iteration 3

Evaluation

During the process of the third iteration I used the research and idea generation of the second iteration. In the third iteration the focus was mainly on prototyping. You can see the whole process in figure 75.

Research

The research in the third iteration was mainly a conformation that I was on the right track with using shadows to communicate context over distance, and together with the research and investigations of the other iteration phases this formed a solid base for requirements. I noticed that it worked better for me to work with requirements; because you I work to the goal of reaching (at least a couple of) these requirements.

Ideation

Not criticising my ideas at the start helped me to gather much input for the selection phase. This led to an already strong concept of the beginning of the third iteration.

Conceptualization

The conceptualizing phase mainly existed out of sketching. I noticed that the concept from the ideation phase did not meet all the requirements and through idea sketching I modified the concept to the final concept.

I noticed that drawing and investigating pictures can give me a lot of inspiration for continuing with a specific concept. I was pushed to a certain direction with the concept.

During the exhibition I got the comment that the inspiration of a tree should be less strong in the final design, because this can cause misinterpretations. Therefore I think the conceptualization phase had to last a bit longer during this process, so that more abstraction could be applied to the concept.

Design

The final design phase, implementing the technology and building the prototype took longer than expected. Particular implementing the electronics, the electronics broke down while putting into the prototype. Therefore during a next iteration I have to start earlier with prototyping, so the prototype will be totally finished.