

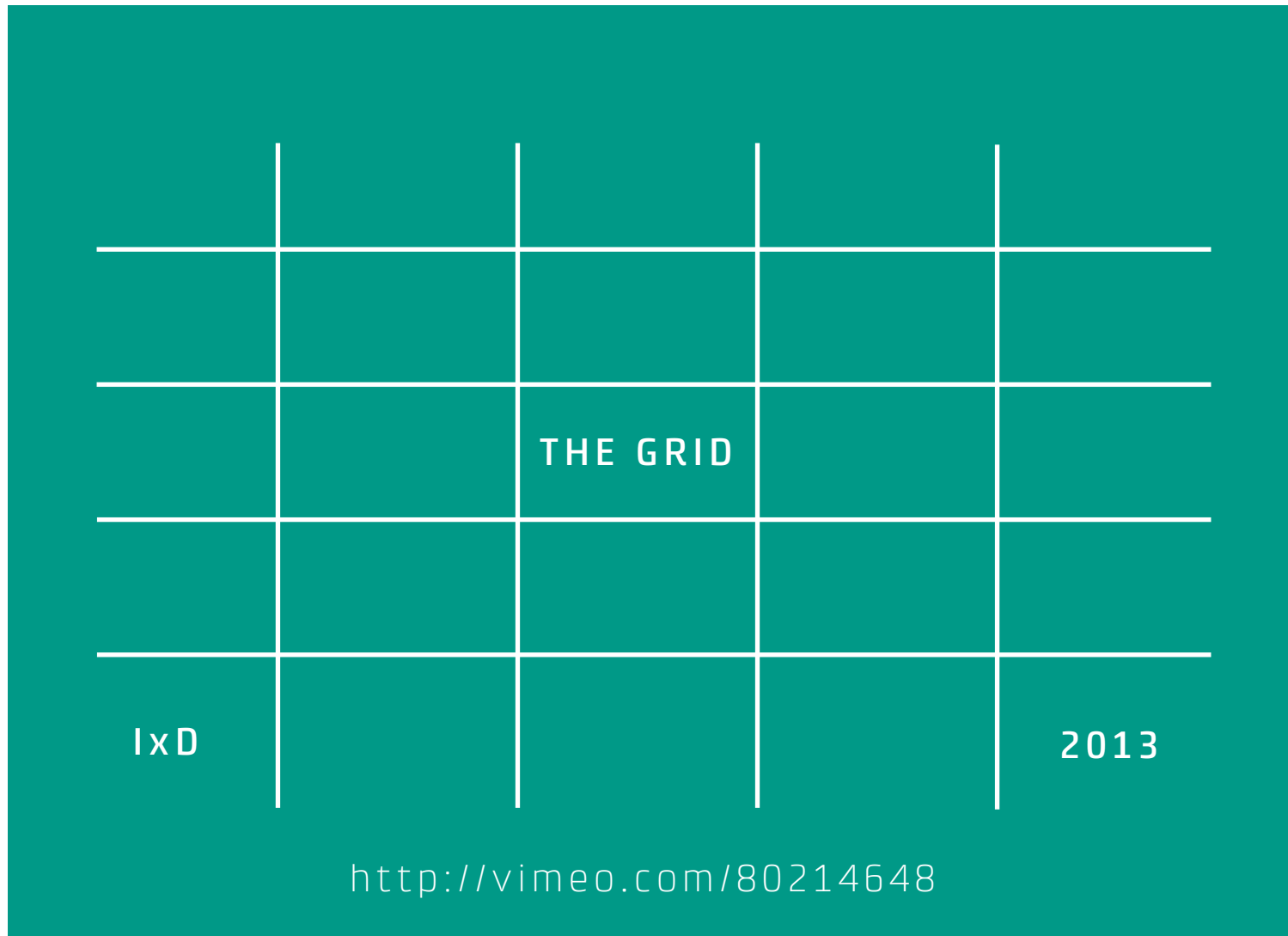
EXPLORE

RESEARCH

SKETCHING

PROTOTYPE

PRESENT



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Introduction	3	4. Communicating the concept	27
1. Finding a problem	3	4.1. What to communicate	27
1.1. Selecting a topic within intimacy	3	4.2. Video presentation	27
1.2. Field work	6	4.3. Exhibition	32
1.3. Choosing the Metro as spatial context	7		
2. Getting the right design	12	5. Further ideas	33
2.1. Ideation	12	5.1 The look of the grid	34
2.2. Exploring ideas and their potential	13	5.2 Functionality	34
2.3 Picking one idea	15	Context test	34
3. Getting the design right	16	Materials and sensors	34
3.1. Our concept	16		
3.2. Test	22		

## Abstract

This report is based on our process towards designing an interaction which creates an opportunity for intimacy. Our problem statement *How can a passenger engage with intimacy through interaction inside the Metro in 3 minutes?* covers three areas of our research. The spatial context in the Metro, time limited to three minutes and our themes interaction and intimacy. Through our research we learned that most people are willing to interact with each other if a situation calls for attention. Taking the initiative to start something, is not very common. We created a design that requires no physical contact with other people and no approach to strangers, but visually creates a bond between two people, a simple interaction with an opportunity for the actors to share an intimate moment. Be it a quick glance, intense eye contact or simply a smile.

## Introduction

With a design brief regarding the theme of intimacy we began the process of developing our concept. We understand intimacy as something that happens, or is created in a situation. It's a feeling - something very hard to describe, to conduct and to measure. Intimacy can exist in different relations. Intimacy within a group of people, intimacy between people, intimacy between a person and an artifact.

In the beginning of this project we worked with a broad perception of interaction in the search for the intimate moment. Towards the end we worked in a much smaller scale in order to find the moment that makes a situation intimate.

The following report is divided into four learning stages. The first is **Finding our problem**. Here we set a context for our research design and find our scope. In the second stage, **Getting the right design**, we explore the depths of our ideas to find the right one, where we can dig deeper and unfold. In the following stage, **Getting the design right**, we elaborate the chosen concept in order to refine it for a concise concept. In the last stage, **Communicating the concept**, we explain the presentation of our concept. The concept is presented in a video to visualise the idea and finally we presented the concept at 'the exhibition' where we were able to show and tell.

## 1. Finding a problem

In this chapter we will explain the process of the first phase of the project. We unfold the design brief with the theme "intimate interaction", explain our research design and, present insights and last but not least we develop an appropriate framing. To get the best scope for the further process we formulated a general opportunity statement which we used throughout the project as guidance.

### 1.1. Selecting a topic within intimacy

After getting the brief we discussed how to approach the first step of process. The method was a post-it brainstorm where we took 30 minutes to write down our personal associations with intimacy. We agreed to write down and lay each post-it on the table for all to see, without speaking to each other or communicating our thoughts. This created a flow where everyone could write their immediate thoughts while being inspired by the other's post-its and with no interruptions. We managed to keep the flow of thoughts for 30 minutes and had around 50 post-its.

We grouped the post-its by themes and named them afterwards: digital, abstract, physical and structure. (see illustration 1)

We started to get an idea of the scale of intimate interaction. It became clear that the thematization was too broad and instead we started to focus on topics in order to find a more concrete angle on the design brief.



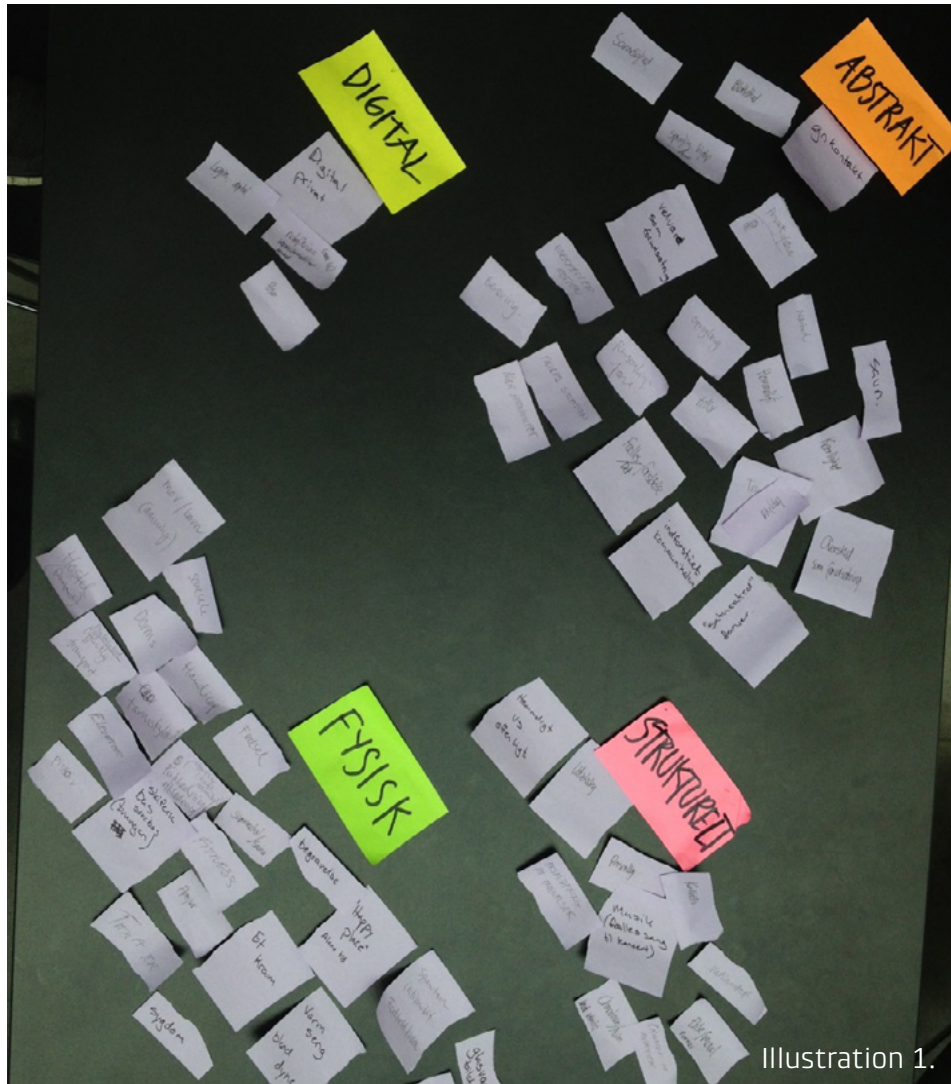


Illustration 1.

### 1.1.1 Five topics

Since the thematization was too general resorted the post-its into five topics: Unwritten rules, private intimacy, collective intimacy, world deafening and surveillance. All five topics had a potential for both digital and physical intimacy. We created five online mind maps (using fltspc.itu.dk - see illustration 2). Here we uploaded relevant images, links and thoughts from individual desk research. The mind maps served as our foundation for the five posters we presented at the following crit session with our teaching assistant (TA). After the presentation we decided that collective intimacy was the topic with most interaction potential. (see illustration 2).

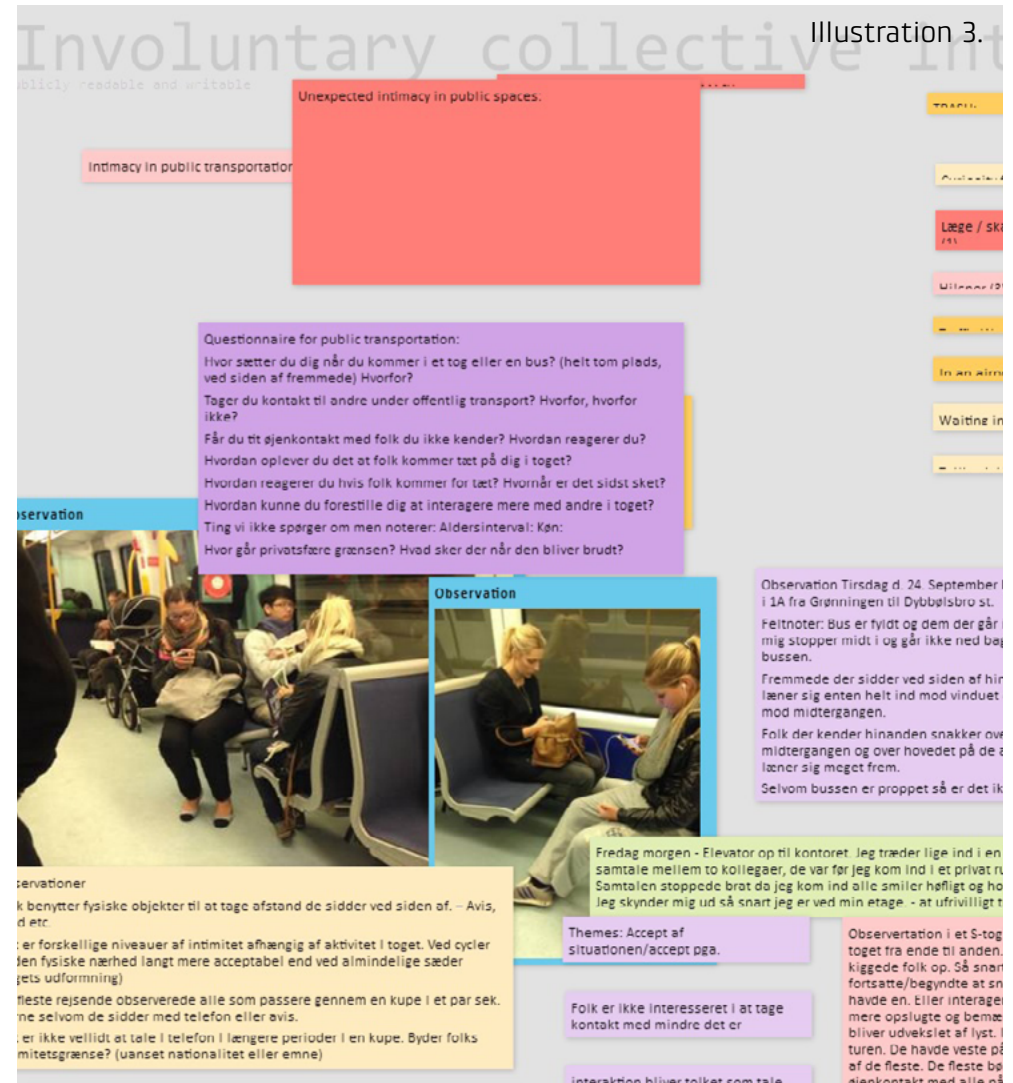


Illustration 2.

### 1.1.2 Narrowing down the focus - Involuntary intimacy

We discussed the five topics thoroughly and looked to see if any of them could fit into each other or if one would actually bring out some interesting aspects of the others. We ended up choosing a new topic ‘involuntary intimacy’. This emerged from some aspects of the topics: collective intimacy, unwritten rules. We were interested in a involuntary situation, as it could create an intense situation and bring something new into the light. We also thought that involuntary intimacy could put some of the unwritten rules into perspective. We wanted to understand what is okay to do and say in a situation in relation to intimacy. If an action does not happen purposely can inappropriate behaviour then become appropriate? We thought the involuntary intimacy was interesting because it is not necessarily understood negatively, but can be perceived as a more neutral feeling.

We talked a lot about the aspect of unexpected intimacy/interaction. This could put some of the unwritten rules into play. When a context creates a situation where people are not fully in control things can happen where unwritten rules can be reshaped due to inappropriate behaviour that is caused unexpectedly. For example when the bus turns fast people in the bus touch each other. Everyone knows not to ‘touch’ other people without a reason, that is an **unwritten rule**, but is it ok if they did not mean to? (see illustration 3.)



## 1.2. Field work

To do our research we narrowed down our field to public places. We looked for involuntary intimacy created by unexpected situations. With this scope we were ready to conduct our first round of data by looking at general behaviour, interaction and intimacy that might occur in public places.

### 1.2.1 Observations and interviews in public transportation

We started out by doing 15 short structured interviews and making observation in S-trains, regional tog, Metro and busses. We wanted to go deeper into the situations that plays out in public spaces to see when there is some kind of interaction and how this might lead to some kind of intimacy. We asked the following questions to open up a dialogue about interaction in the these places. We didn't use the word intimacy because it could be too intimidating. Instead we focused on the interaction by assuming that it would lead us to some kind of intimacy.

- Where do you usually sit when you get into a bus or a train? (an empty row, right next to someone?) Why?
- Do you take contact to your fellow passengers during public transportation? Why/Why not?
- Would you ever ask about something that could start up a conversation? Why/Why not?
- Do you often get eye contact with people you don't know?
  - How do you react if that happens?

- How do you feel when someone gets close to you on the train? What if they get too close?

Besides interviewing people we observed commuter's behavior in public transportation. We did this to get an idea of people's private sphere in public transportation. We were looking for signs that could help us understand when the line of the private sphere was crossed and how people reacted when it happened.

### 1.2.2. Findings

**Insights** from the interview showed that most of our respondents preferred to have some time alone in public transport. They did not mind being asked about the time or help if anyone approached them. They tended to avoid physical contact if possible.

The **observations** made it clear that people tended to distance themselves from the content by interacting with some kind of object like a smartphone, laptop, newspaper or a book. They barely recognized the other passenger, if only for a quick glance.

We wanted to find out where and when intimacy was present in order to find a focus for further research. We also wanted to find out when the interaction was voluntary and when it was involuntary. The purpose was to understand how people reacted in these situations.

We used the word interaction to describe what we were looking for. At this moment we did not know how or when (or if) intimacy was present, and if it was something that only some people felt. Before we could



narrow down the presence of intimacy, we used interaction as a way of getting there. This being said, we still had intimacy as our goal, but we simply could not use it as something that was for sure present or as if it was something that was the same for everyone.

### 1.3 Choosing the Metro as spatial context

For our crit session on september 30th we presented the Metro as our spatial context. We made this decision based on the observations and interviews we have done in the first round of research. The main issue was that passengers and their perception of interaction with other passengers was very different depending on their transportation methods.

There were some practical issues to take into consideration when narrowing down the physical scope. Research from the regional trains showed that we would have difficulties observing all areas and different locations of the passengers' routines. The S-train would be within the geographical and economical realistic research area for this project, but the network varies depending on the line and duration of the journey. The Metro on the other hand has a much smaller network and is very easily accessible. This was part of the reasons why we looked closer into the pros and cons for using the Metro as our spatial context for this interaction project. (see illustration 4)

When digging deeper into the opportunities the Metro has to offer, we realized that the relatively short lifespan time of the Metro could be beneficial for our concept due to the fact, that there have been few behavioral campaigns in the Metro compared to the S-trains. The physi-

cal appearance of the Metro, with its neutral clean design and spacious architecture, offers good possibilities for interaction design. After understanding the benefits of the Metro we discussed how to investigate and understand passengers' perception of interaction. During the crit session we were advised to take an opposite form of transportation and use this in our qualitative interviews. We therefore discussed the matter and decided that it would be beneficial for us to understand how and why we feel more inclined to interact. For example the situation of talking to a taxi driver instead of a fellow passengers in the Metro. This combined with the results of the "why"-practice in class lead to the question guide for our second of research. We then did 6 interviews in the Metro which gave us ground for our insights, problem statement and opportunity statements.



Illustration 4.

### 1.3.1 Intimacy in the Metro

The insights we got from our second round of research was focused on getting to know why people did not feel any need to take contact to their fellow passengers. It seemed that this only happens if a situation calls for certain engagement or attention. We started out by asking people about their habits in the taxi and work our way down the interview to unveil their perception of interaction in the Metro. We dissected our interview data into ten main insights and then extracted problem statements and opportunity statements from these. Below is listed the five most relevant insights with their respective problem and opportunity statements. (see illustration 5)

Insights	
Problem statement	Opportunity statement
<b>In a taxi, you interact with the driver</b>	
You feel obligated because you are only two people.	The passenger feels more like a customer in the taxi
Both parties have a clear role in a taxi.	
<b>In the subway, you feel no obligation to interact because you are a part of a larger context.</b>	
When you are a part of the a bigger context you are more anonymous	Increased personalization is an option.
You are alienated in the metro	Breaking larger context
There is a fear of meeting drunk or crazy people	We can help users to maintain anonymity on the subway
<b>The metro trip is for some people an option for the small time gaps in everyday life where you can be yourself and unwind.</b>	
The need to be private limits physical interpersonal interaction	It is possible to do a reverse quiet zone.
	You can help people unwind.
<b>Passenger experience time as a limitation of interaction.</b>	
Deep conversations and networking cannot be done in the metro	What can we do in 3 minutes?
Time constraints associated with stress	How can you turn the perception of time limit to opportunity?
	Sayings on time
<b>People generally like to take care of itself, but is still open to contact if it occurs.</b>	
Each man's struggle to remain isolated.	There is a possibility of forming community and intimacy without people approaching each other.
No one is mad at each other on the subway.	
Fear of freaks.	

Illustration 5.

### 1.3.2 Personas

To prepare our concepts to a wide range of users, we made personas. By creating personas we were able to understand extreme users and user scenarios. By doing this, it was possible for us to reflect on different aspects of the concepts. Furthermore the personas could help us develop our concepts further by relating it to characterizations of potential users. We made two personas. The first one is an everyday Metro user, who is not interested in technology and does not have any interest in interacting with other passengers during a Metro ride. The second one is a casual user, who is very interested in design and technology. This person is very curious and loves disassembling electronics. We decided that our interactions concepts should be working for both types of users, and the personas were later used to test and challenge our final concept.

#### The everyday user

Søren, 45 years, lives in a house in Amager with his wife and two children. He is a lawyer and works at an office in the center of Copenhagen. Søren generally refrains from driving his car as there is too much traffic to drive through town at rush hour twice a day. The Metro is two minutes away from his house and his work place is five minutes away from Kongens Nytorv Metrostation. The Metro ride is approximately five minutes, which he uses to go through his work calendar on his phone. He does not notice which campaign that are present in the Metro and he doesn't talk to the other passengers because he does not like to interact unless it is necessary.

Søren has a commuter pass as he uses the Metro twice a day on average and therefore a Rejsekort is not an optimal solution. Furthermore he feels that the Rejsekort is too inconvenient as he has to remember to check out. When he renews his monthcard, he visits the office at the main station Hovedbanegården. The employees there always tells him that he is able to renew the card online but he thinks it is too much trouble, even though he has not tried it. Søren does in general not have an interest in computers. At work the IT- department solves his technology problems and at home his son Marcus is in charge of such things.

#### The casual user

Pernille, 27 years old, lives alone in Nørrebro and studies at the Royal academy of arts.

Pernille bikes to and from school, as it is the fastest and cheapest. Also because there is no direct connection to public transportation. Pernille likes to stay fit and that is also a reason why she bikes everywhere.

Pernille has a Rejsekort because once in a while she visits her family in Roskilde. Compared to normal tickets the Rejsekort is cheaper for her as a student to use.

Pernille uses the Metro a couple of times every month. She lives 7 minutes walk from Nørreport, and uses the Metro when she has to go to the airport because it is much faster. Some of her friends lives at Frederiksberg, and in the weekends they often get together for brunch and shopping or exhibitions in the center of the city. Sometimes they use the Metro, whenever one of them did not bring their bike. They are never

busy or in a hurry, and they always have time to stop at look at something interesting.

Pernille always takes a lot of pictures of her friends when they get together. She is curious and loves gadgets and trying new things. Whenever she gets the chance to disassemble some piece of technology she does so.

### 1.3.3 Involuntary intimacy - appropriate frame?

Until now in our process we have been focusing on involuntary intimacy. To understand intimacy in the Metro we have been framing the topic as a duality of appropriate vs. inappropriate behavior. It kept the project linked to one of the initial topics of unwritten rules, but we were struggling in the process: The research did not give us a clear idea of which type of interaction, users of the Metro, found appropriate or inappropriate. Nor did it help us understand how intimacy existed in this field. The fear of basing our concepts on a need that was not rooted in our research made us frustrated. It was clear that we needed to look at our problem in a different way and kill some darlings.

### 1.3.4 The new framing

Instead of focusing on the duality of appropriateness we started discussing how intimacy was possible in the Metro. The insights from our research made it clear that people understand intimacy as interaction between people in the same space at the same time (usually only two people). We realized that this is one type of intimacy, but not the only one. Intimacy could also relate to people outside the physical context.

For example a phone call. Here the interaction would be to through some kind of device. This opened up for a broader understanding of intimacy in the Metro. We asked ourselves if intimacy could be understood from the person to the room. Since none us of could exclude this idea, we started creating a framework where the passengers' attachment to other people or the room was in focus instead of the appropriateness. The following table displays the new framing.

(see illustration 7)




	Attachment to people in context	Attachment to contextual space	Attachment to remote context
<b>Relation</b>	Creating new ties	Mixed	Maintaining existing ties
<b>Intimacy in situation</b>	With personalities	With room	By yourself
<b>Contact</b>	To people	To room	Through device
<b>Commitment</b>	Obligation to presence	Choice of commitment	Possibility of escaping
<b>Action in time</b>	Synchrony	Mixed	Asynchrony
<b>Illustration</b>			

Illustration 7.

The three frames above illustrate intimate interaction related to time and space in three different ways. One specific insight creates the problem statement that time is limited in the Metro. We could use the limited time as a framing and turn it into an opportunity statement instead. This framing made it possible for us to start the ideation phase grounded in our insights. We refined our general opportunity statement to fit the new framing: *How can a passenger engage with intimacy through interaction inside the Metro in three minutes?*



## 2. Getting the right design

We have found our problem and narrowed down the field to a frame that makes us able to go further with the project. In this chapter we will describe how we have sketched to unfold opportunities within the framing to explore our design space. From this pool of ideas we wanted to elaborate on the opportunities that each idea embody and select one idea that will be the base of our concept.

### 2.1. Ideation

Our ideation process began with each group member sketching five sketches for each of the three frames: attachment to people in context, to contextual space and to remote context. We had one constraint to the ideas we were sketching; a time limit. It should be possible for the user to complete the interaction within three minutes. Sketching separately gave us the freedom to sketch when and where we felt inspired. Some were sketching at home and others while driving in the Metro. The reason for using time as a limit and creative twist had the purpose of changing the commuter's perception of three minutes as a waste of time into useful time.

(see illustration 8)



Illustration 8.

When we met up again we presented the 75 sketches and explained our ideas. We compared and grouped our ideas and related them to our opportunity and problem statements in order to validate and justify the ideas to our research. Afterwards, we rated the degree of intimacy and interaction and discussed how it was at stake. The ideas with less intimacy and interaction were cut out and we ended up having 12 ideas that we wanted to continue to work with and develop further.

## 2.2. Exploring ideas and their potential

12 ideas was still too many, since the goal was to find the best idea. We discussed the potential for further development again. The Metro as the physical context was crucial to keep in mind in the selection, since the concept needed to solve an actual problem. Finally, we selected seven ideas which we presented on the poster used for the mid crit.

### 2.2.1 Mid crit

For the mid crit we were to present our seven concepts on a poster in a seven minute presentation.

(see illustration 9)

We created a poster that illustrated our process so far in a simple form. We summed up our insights in the following phrase: *Intimacy in the Metro is in danish culture understood as unnecessary until a situation calls for interaction.* This was meant as a teaser calling for an interaction concept. Our insights were elaborated in five bullet point (see illustration 5). The framing was introduced to show our process of understanding

intimacy in the Metro. The general opportunity statement of our project was presented as the link between our research and our ideas: *How can a passenger engage with intimacy through interaction inside the Metro in 3 minutes?* The seven concepts were explained with a brief title, the most important opportunity statement from the research (we chose one for each, even though the concepts all match several opportunity statement) and a short list of pros and cons to explain the potential.

# Intimacy in the Metro

*Intimacy in the Metro is in danish culture understood as unnecessary until a situation calls for interaction.*

## Fieldwork:

5

Observation sessions in the Metro.

15

Initial interviews in public transportation.

7

Focused interviews in the Metro.

## Some interesting insights:

1. You don't feel obligated to interact with people in the metro because you are part of a bigger context.
2. A metro ride is for most people a small time warp where they can relax.
3. Passenger experience time as a limit for interaction.
4. People want to be alone as a starting point but are willing to interact if an unexpected opportunity happens.
5. Pauses are perceived as waiting time. Often 3 minutes at a time.



## 3 frames on intimacy in the metro:

	Attachment to people in context	Attachment to contextual space	Attachment to remote context
Relation	Creating new ties	Mixed	Maintaining existing ties
Intimacy in situation	With personalities	With room	By yourself
Contact	To people	To room	Through device
Commitment	Obligation to presence	Choice of commitment	Possibility of escaping
Action in time	Synchrony	Mixed	Asynchrony
Illustration			

## How can a passenger engage with intimacy through interaction inside the Metro in 3 minutes?

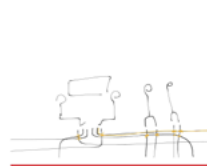
### #1 Lines on the floor

"People can participate in a common context without physical contact."

#### +/- Aspects:

The interaction is optional and can easily be avoided.

The interaction is not physical

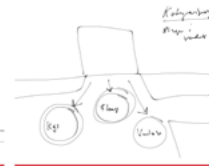


### #2 Destination circles

"This creates an opportunity for creating mutual intimacy without people engaging physically"

#### +/- Aspects:

There is a risk that people don't understand what the circles are for. The circles should react fast for people to get that their position in the circle affects the circle.



### #3 Digital soccer

"There is room for creative and playful exploration in the metro."

#### +/- Aspects:

This could make people pass the time faster. It could increase intimacy for two or more people.

If one passenger does not engage, the situation could be awkward.



### #4 Eavesdropper

"Increased personalization is an opportunity and it can help the passengers to maintain anonymity"

#### +/- Aspects:

The interaction is optional.

The listening is private.

You can recognize people you know by their voice.



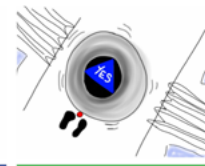
### #5 Magic 8ball

"Increased personalization is an opportunity."

"There is room for creative and playful exploration in the metro."

#### +/- Aspects:

Won't work during rush hour. Can bring people together if the 'magic' only works when people work together.



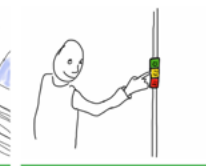
### #6 Mood status

"There is a need for a change of Metro behavior."

"Change of culture creates a change of behavior."

#### +/- Aspects:

The collective feeling could affect others to have a better or worse day.



### #7 Virtual speaker

"You feel obliged to the interaction because only a few people present."

#### +/- Aspects:

No interaction between the passengers occur so the situation gets weird.

Passengers interact and create a sense of togetherness apart from the driver/speaker.



Illustration 9.

### 2.2.1.1 Reflection on presentation and feedback

After presenting our ideas and poster to the class, teachers and TAs we received a lot of useful feedback that helped us in the further process of choosing the one idea we would develop into a concept that could contain all the aspects of the assignment. The best feedback we got was a “Coca Cola campaign”-test. The idea is that if the concept can be used as a gimmick for branding a company then it might lack the depth of interaction. After the mid-crit we had a feedback session with group 6, where we discussed and gave feedback on each other’s concepts from our presentations. Here the feedback was to consider the speed and decoding of the concepts. They advised us to choose the idea with the best immediate understanding of the concept and a fast pay-off due to the feeling of time pressure in Metro.

## 2.3 Picking one idea

After the mid-crit and the feedback session, two concepts seemed to have the most potential of intimate interaction: 1) An interactive floor where people could interact with the room with a chance of interaction with others. This was relevant due to the fact, that it was fast and easy to interact with. The possibility of opting out of the interaction makes it optional. One of our personas would assumably prefer that. 2) The other idea was circling around the concept of adding a button (known from busses) as a trigger for some kind of interaction calling for interpersonal connection. We rated and discussed the two ideas one last time.

It became clear that the affordances of the button was a component already included first concept. A button usually triggers something in a static way. A concept focussing on turning things on and off seemed to be lacking the depth of interaction. With the button the interaction only called for single feedback in the system and required an active action from the passengers. The line in the floor on the other hand, opened up for the unexpected interaction as soon as you stepped into Metro. It took us quite an amount of time to realize this. Maybe due to the fact what we had been through a long process of designing all the concepts. However we were happy when we managed to kill some of our darlings and devote ourselves to one concept and get that right.

### 3. Getting the design right

After a long process of finding a problem and getting the right design we were ready to define details, explore limits and test all aspects of the idea in order to refine the our concept. In the following we will explain the concept, our tests and present results from these tests.

#### 3.1. Our concept

The lines in the floor is an interaction design concept that makes people connect by creating a situation that calls for interaction. In less than three minutes passenger can engage with intimacy voluntarily in a fast and easy way. The concept is based on the commuter's existing behaviour when standing inside the Metro. This was very important since the research made it clear that a situation of interaction needs to be started unexpectedly.

##### 3.1.1 How the interaction works

Our concept is a grid (lines) that covers the floor inside the Metro. (see illustration 10) Only the areas intended for standing passengers are covered. The grid can be activated by the actors' feet. When activated a line lights up and creates a connection between two actors. This connection between two actors creates the possibility of eye contact and a moment of intimacy.

Passengers can also choose not to interact with the grid by stepping of it or by standing on it with both feet.

(see illustration 11)

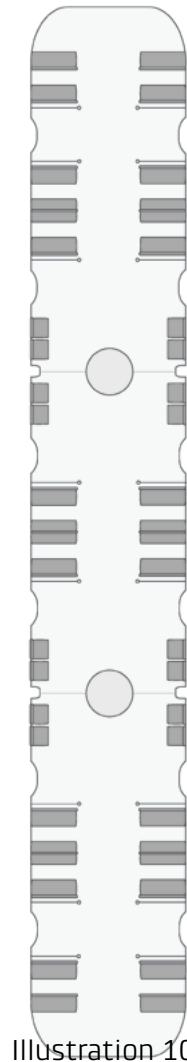


Illustration 10.

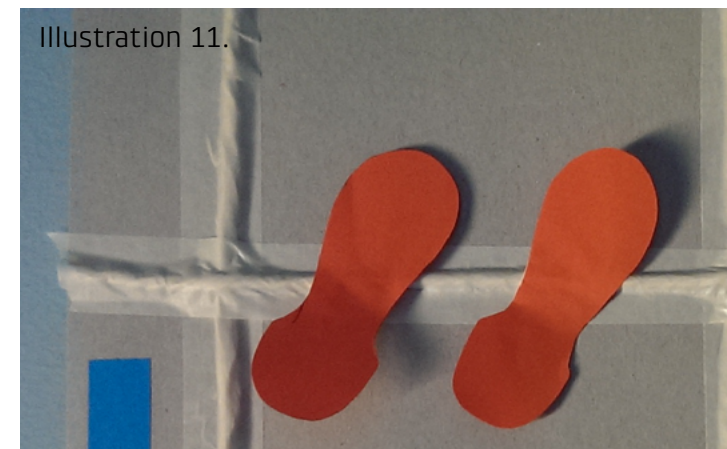
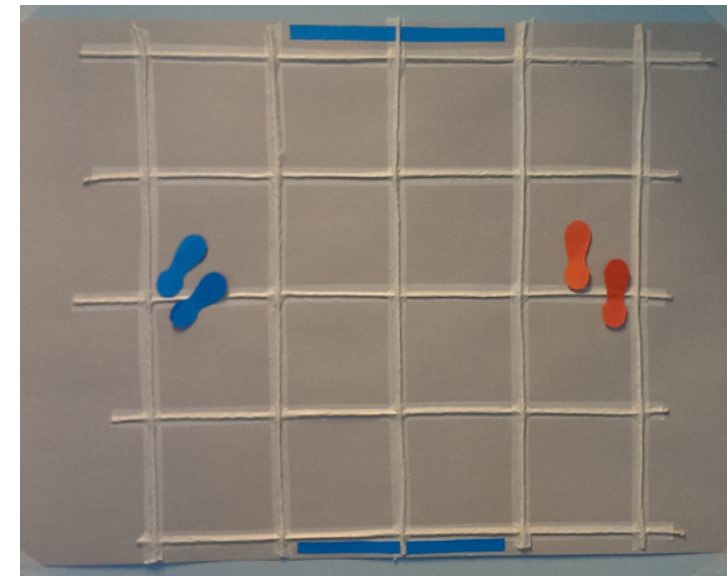


Illustration 11.



### 3.1.1.2 Functionality and rules

To demonstrate the possible actions in the system we have created an illustration of the possibilities of interaction. All actions are leading to the same outcome - to the state of *safe* (see illustration 12). If the actor do not follow the successful path, he or she will have the potential of getting there due to the rules of the system. The basic rules can be summed up like this:

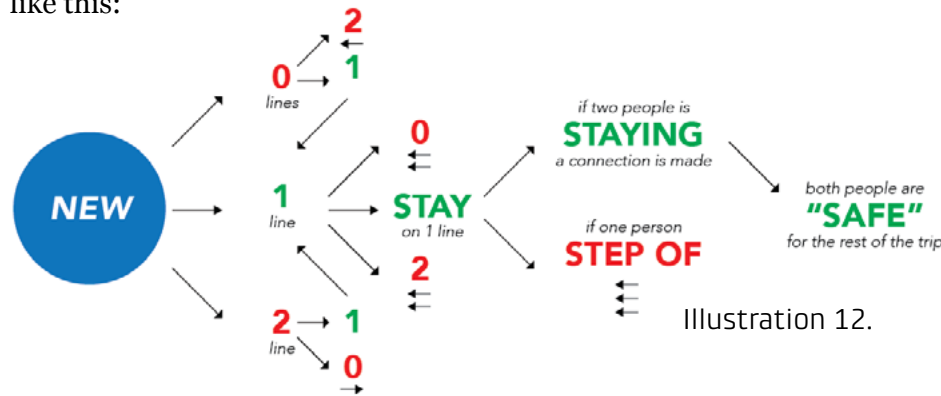


Illustration 12.

- 1. One foot input:** Only one foot can be touching the grid to activate the system. This rule is required in order for the system to be able to recognize a single actor. Otherwise the system cannot distinguish actors from each other. For example: Two feet touching the lines can represent one or two actors.
- 2. Range limit:** In the extreme of rule number one, the system only allows one foot touching a line in the whole system, which do not support the intended interaction between people. Therefore we need to set a range limit to identify actors from each other. The distance

is determined by three factors. 1) The normal distance between a person's feet. 2) The adequate distance for people to see the light between them and other people. 3) the appropriate physical closeness of people. By looking at our observations, and simulating a ride in the Metro, the distance was set to 50 cm. The distance allows the system to sense connections with a free range of 50 cm around it as single actors. If two actors are touching lines within a distance of 100 cm the rule based on the appropriate physical distance justifies the inactivity (since both actors needs a free range of 50 cm). Now the grid can have several active actors and start connecting the two closest to each other. The test of appropriate physical distance resulted in a sub-rule: If actors are further away than five meters they will not connect since the possibility of eye contact is too low.

- 3. Selection of users to connect:** As displayed in the action chart and the flow chart (see illustration 13) the actor needs to *stay* on one line for two seconds to become *active*. As soon as two actors are at this state their lines will start connecting. When a connection is started, the two actors are locked to each other, and they are not in the pool of active actors. Their connection can primarily be disrupted by the actors involved. If one actor disrupts the connection by stepping off or touching two lines this actor will go back to the state of a *new* actor. The other actor (standing with one foot one line) will go back to the state as *active* and be able to connect with other actors right away. In the complex context actors do not have full control of their state as *activity*, since other passengers can disrupt another actor's

activity by touching lines within their range due to rule number two.

4. **Speed of the connection:** The speed of the light connecting actors, will always have the same pace. By testing the adequate time a person needs to pay attention to something 'moving' on the floor in combination with the appropriate tension building up over time, we decided the light to be moving at a pace of 0,5 meter pr. second. Since the light will be moving from two ends, a distance of three meters will take three seconds to make. The flow chart includes a formula to calculate the speed of a connection. The fastest connection can be made in three seconds from that state *new* to *safe* at a distance of one meter (minimum distance - see rule number two). The slowest connection can take six seconds + time of disruptions by a distance of five meters (maximum distance).

5. **Successful connection:** When two lines have merged a successful connection is made and the actors enters the state *safe*. Afterwards the light turns off and the touch of the two users stay locked until they step off. When the actor steps off he or she returns to the state of a *new* player. (see illustration 13)

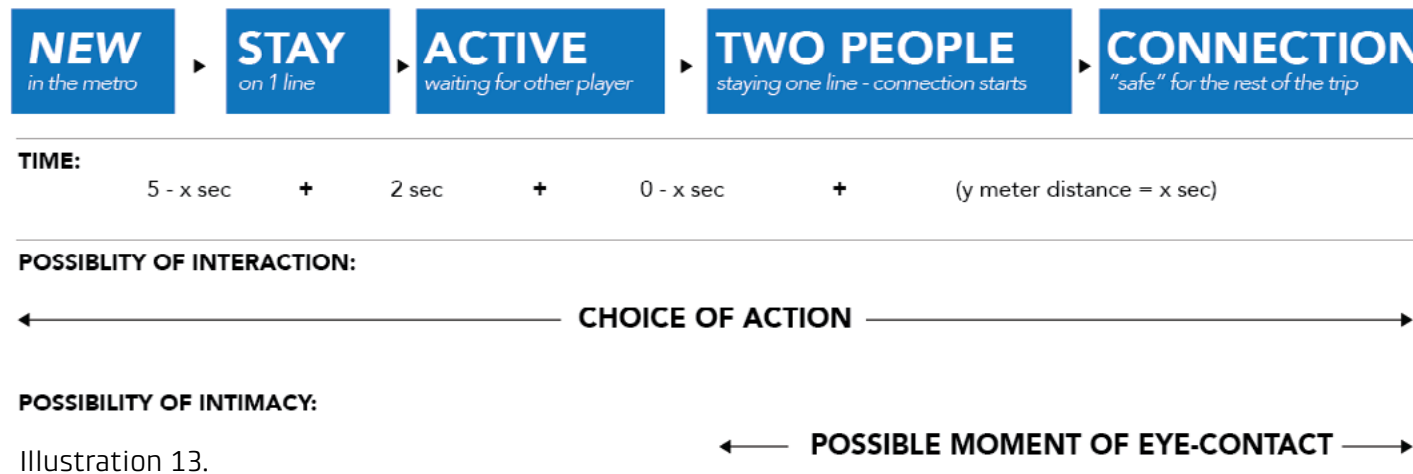


Illustration 13.

### 3.1.1.3 Look and feel

So what should the grid look like?

We intentionally had a rough sketch from the first ideation round, where we sketched three different frames. The concept was not very detailed, but in this sketch the lines were organic.

When we started unfolding this concept we drew a linear and squared grid on the floor as we thought this would be a simple version to work with from the start. We kept in mind a more organic and illustrative version, but for this phase we kept the simple rigid grid.

The grid should be visible on the floor so the passengers could easily interact with it or avoid it. This is one of the advantages we presented at the mid crit - *the interaction is optional and can easily be avoided*.

(see illustration 14)

In order to elevate the interaction we conceptualized the line so that the commuters could feel the difference between the floor and the line. Observations showed that Metro passengers are not aware of the floor. We therefore found it relevant to add an incentive for doing so. By giving the lines in the floor a texture that could be felt by a shoe, the passenger would be more inclined to look down and notice. The texture also acts as a feedback for the user in all stages of interaction.

### 3.1.2 People using the grid

We used our personas to create user scenarios. User scenarios were a good way to explain how our concept works in different situations and how a moment of intimacy might be achieved.

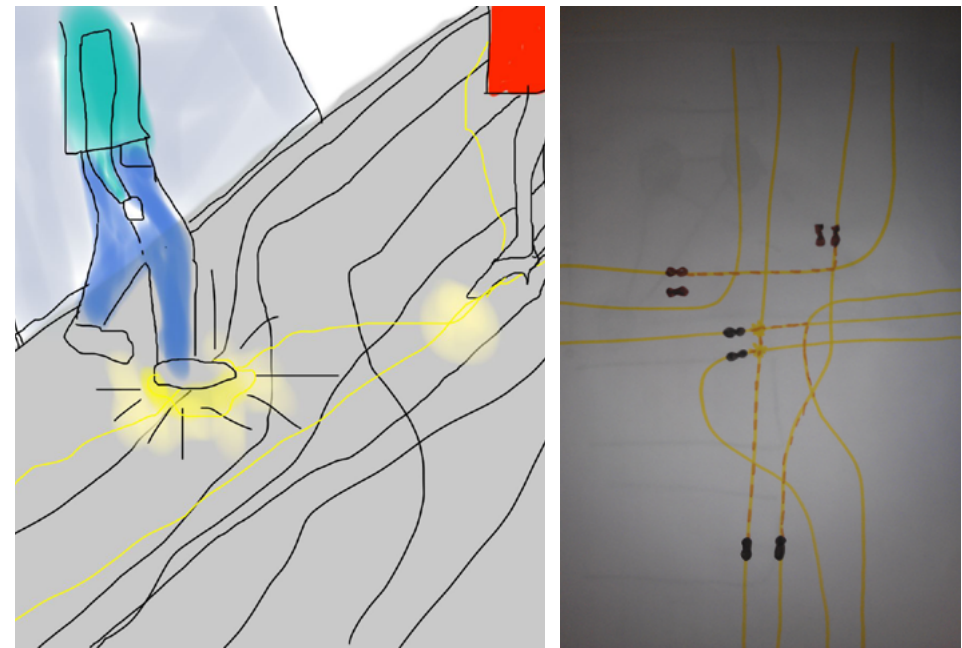
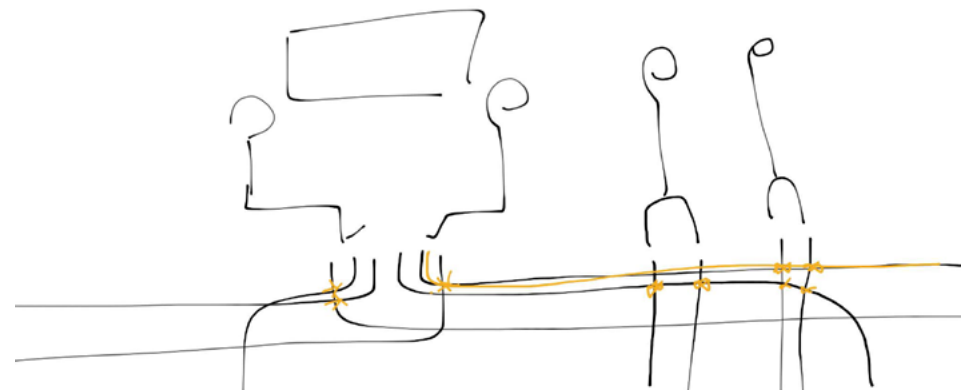


Illustration 14.





### User scenario of the everyday user

Like every other day Søren enters the Metro on his way to work. Right after entering he grabs his phone and starts checking today's calendar. During the journey he stands by the doors on the opposite side from where he entered. Suddenly, from the corner of his eye he notices something moving by his right foot. When looking down he sees a light which is moving from under his foot following a grid in the floor. The line gets longer and longer. He can't help following the illuminating line, which suddenly meets another line. At the end of the other illuminated line is a girl who seems just as surprised as Søren. Their eyes meet and they share a smile. Søren lifts his foot from where the line started to move and the line immediately breaks. He then places his foot next to the line to prevent it from lighting up again. He then continues looking at his calendar until he has to get off.

Because of Søren's habits he usually never interacts with other passengers during the short journey. Today was different. He had a different Metro ride. No words were exchanged, but they got eye contact and shared a smile.

### User scenario of the casual user.

It is Saturday and Pernille has just had brunch with her three girlfriends at Frederiksberg. Now they are on their way to an exhibition in the center of the city. They decide to take the Metro because it is raining a bit. The Metro arrives at Frederiksberg station and they enter the train.

There are not enough seats available for them to sit together, so they decide to stand up the short journey. They are talking facing each other. Suddenly, from two of the girls' feet a light begins to move across the floor towards each other. Pernille notices this right away and moves directly on to the line with both her feet. The line between her two girlfriends meet and they start talking about how that happened. They move around and the line breaks as soon as one of them steps off the line. Pernille removes one foot from the grid and suddenly a light starts moving from the foot still on the grid towards one of her girlfriends who is also standing with one foot on the grid. Pernille starts stepping on and rubbing the line with her shoe to see if it is pressure sensitive. At this point of the interaction Pernille is clearly more interested in interacting with the grid, than with her friends.

Creating user scenarios was a good way to test and challenge the concept before testing with real people. The imagined user test gave rise to some problematics and reflections, which we talked about e.g. what happens if a user tries to disassemble it? What if it rains?, or a person does not want to create contact with other people?

### 3.1.3 How intimacy is achieved

Intimacy is possible through eye contact with fellow passengers. It is not necessarily achieved every time the grid is activated, but there is a possibility of eye contact which can lead to a moment of intimacy. It is also possible that some actors want to test the floor in order to figure

out the applicable rules and regulations which the grid acts under. For example how to activate the lines, and it is possible that they will find the interaction with the grid more exciting than interaction with the other actors on the grid. Interaction and intimacy with the contextual space, the grid, is therefore also a possibility.

Our third framing, attachment to remote context, was not included in the final concept, because the interaction and intimacy is very much situated inside the Metro.

### 3.1.4 Contextual and technical limitations

In the process of conceptualizing the artifacts we saw both contextual and technical limitations. As we have chosen a public place we must also consider the vast variety of people that potentially could interact with the artifact. For instance dogs and strollers must be accounted for as potential input sources even though this is not intended. A potential disruption of the grids should also be accounted for. This could happen in weather situations that cause the passengers to bring in pieces of ice or water from footwear. To solving this we discussed using a one piece waterproof linoleum like floor. By thinking of this as our floor we would be able to minimize possible malfunctions caused by external factors. As no water should be able to enter through the coated surface of the grid. In the development of the grid we discussed alternative ways of sensing potential interaction. (see illustration 15)

Motion detection sensors or heat sensors with the ability to pick up movement or temperature could be a possible and realistic solution.

Such sensors are already used in the Metro when counting passengers. There is a need for extensive programming of the rules of interaction. The grid is activated when two people are standing on the grid. Rush hour challenges the grid because people are standing very close together. However, the programming ensures that the grid is inactive in these situations. This is a design decision made on a technical limitation and an aesthetic choice. Technically it would be difficult to calculate with the many inputs rush hour will create on the grid. Also, thinking aesthetically the lines' distance would be very short and abrupt.



Illustration 15.

## 3.2. Test

At this stage in our process we had a clear idea of our concept. In order to get the design right and validate the outcome, we had to test the functionality and get feedback on the experience by the users. We divided the test into two stages: 1) Test of basic functionality in floor interaction. 2) Test of extended interaction between people.

### 3.2.1 Usertest of interactive floor

Since a lot of technology and programming is required to make the interactive floor respond to people's actions the way we wanted, we have to simulate the lights on the floor. To select the appropriate simulation tool we defined some relevant design parameters based on the desired user experience of the functionality. Technological transparency and clear visible feedback from the simulation was important for the user's experience. It needed a switch so that it could be visible and invisible. The speed of the light simulation needed to be appropriate to imitate the real situation. Of course the tool had to be realistic in terms of performing the test. The following table lists the simulation technologies and their scores.(see illustration 16)

Laser pointers turned out to be the best tool for the test. Since the tool is a replacement for lights triggered by the input sensors in the floor, we expected some noise in user's perception. (see illustration 17)

Illustration 16.

	Technologica 1 transparency	Clear visibility of feedback	On/off	Appropriate speed	Realistic
Laser pointers	8	8	10	8	10
Strings	2	9	4	4	7
Drawing	3	8	1	2	8
Projection	7	8	7	10	1
Tape	3	8	3	2	6

As a replacement for the sensors placed in the interactive floor we created a grid on the floor with tape(see illustration 10). Underneath the tape there was strings for the users to be able to feel the grid without looking at it. The tape didn't have the same color as the floor. Therefore we expected some noise here as well.

Illustration 17.



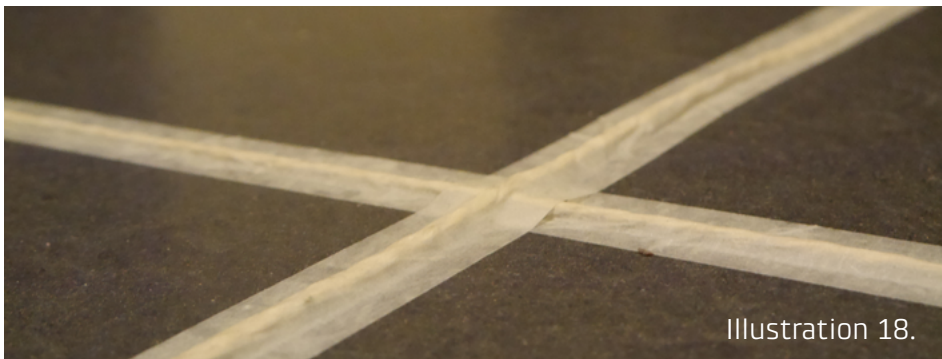
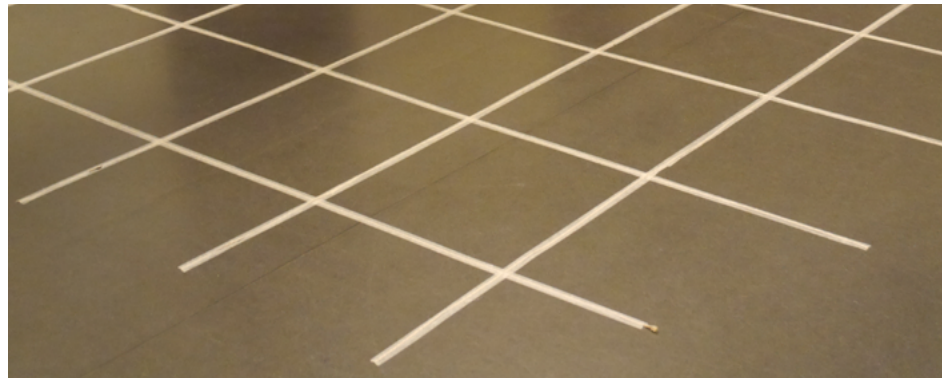


Illustration 18.

### 3.2.1.1 Test of basic functionality in floor interaction

The purpose of the first stage was to test single users interaction with the floor. We tested six people at this stage, we developed and refined our test method gradually as we received feedback from the people interacting with the floor.(see illustration 18)

We started out by asking people to explore the grid. The only information they got was that the floor was able to do ‘something’, but it was their task the figure out what and how. The first two users were tested this way and here is what we learned:

- A chess grid of straight lines makes people stick to the fields and not the lines, which is a problem since the lines are the activators.
  - As a solution to this problem a more organic grid was suggested. The test users expressed that this would make the lines more appealing.
- The grid is very visible on the floor. Users feel it a bit frightening to touch the lines.
- The feedback simulated by the laser pointer got interpreted in a wrong way - people thought that they had to follow the light.
- The learning curve with no instructions was to steep. None of the two users figured out the functionality.
  - The delay of two seconds was too complicated to figure out.
  - Is is not logical for people that both of their feet are in play at first.



At this point we were kind of frustrated because what seemed logical to us seemed too complicated for the users. We therefore decided to change the test design, so that the complexity wasn't perceived as complicated but instead as acceptable complex.

In the second round of this test we refined the method. Instead of asking people to explore the grid on their own, we gave them 12 clear instructions of where to place their feet (see illustration 12) and changed the feedback from a visible sense (laser pointer) to an audiotive sense (a noise for as long as they were activating the line with one foot) with no delay.

#### Test instructions

1. Stand in a field
2. Place both feet on the lines
3. Put one foot on a line and one on a field (= feedback)
4. Put one foot on two lines
5. Place both feet on lines
6. Stand in a field
7. Place one foot on a line (= feedback)
8. Lift the foot on the line
9. Place both feet on lines
10. Remove one foot from the lines (= feedback)
11. Stand in a field
12. Put one foot on a line (= feedback)

Illustration 19.

(see illustration 19)

When testing this way the users had a chance to hear the possible actions and the feedback. After giving the instructions the users were told to explore the grid like before, and were told that the feedback now was light instead of sound. This test design made the learning curve acceptable. All four users figured out how the system generally worked and were able to interact with it and expect outcome. This effective way of testing the basic functionality was used on the rest of our test users. Even with successful interaction we got some useful insights from observing and interviewing the users:

1. The square grid makes people want to stand straight on the lines, which makes it harder because the strings under the tape requires balance. Again a more organic grid was suggested to make the line more appealing to touch on and not stand on.
2. When the lines are leveled higher than the floor there is a risk that users are afraid of falling or think it is something you are not supposed to step on. No one felt that the grid offered stability as intended.
3. The users were focused on their visual embodiment displayed in the floor and had fun 'playing' with it.
4. Even when the users knew that only one foot is activating the system, they became unaware of their other foot. This caused errors because they disrupt the activity by accident.

After some iterations and adjustments we succeeded in testing basic functionality. During this stage it became clear that our way of explain-

ing the concept was extremely important. Instructions became the key in understanding the functionality. We came up with this idea by looking in our research. Here we learned that people in the Metro are aware of other people, and we can therefore likely assume that they can get an idea of the principles of the system by eavesdropping others actions.

### 3.2.1.2 Test of extended interaction between people

With the basic functionality tested by single users, we moved to stage two where we tested the interaction between two people. Since stage one was a predecessor for stage two (the users had completed stage one before getting to stage two), we decided to test without delay and keep the square grid. We were afraid that if we changed what they thought they had figured out, the likelihood of them focusing on the changes would be too great. At this stage the grid offered interaction determined by both participants. As before, we gave feedback when one foot was touching a line. When both users were active in the system the lights (simulated with a laser pointer for each person) would start finding each other. If a person became inactive (stepping off or touching lines with both feet) his or her light turned off and the other persons light went back to that person's foot - indicating that this user was still active. The lights would start connecting as soon as both users were active again.

One of the goals of this test stage was to test if the users could figure out how the lights could connect and test if and how they were willing to let it happen. We tested two sets of people at this stage. In both tests the users managed to establish several connections and disrupt some as well.

The other purpose of this stage was to test how and if the users explored intimacy in the system. Instead of asking the users directly about their experience of intimacy we made a scorecard where intimacy can be explained more practical. We asked them if they got eye contact with each other, to rate the degree of physical presence of others and to rate the degree of mental presence of others. Illustration 20 shows the result of this scorecard for the four users tested at this stage. The parameters in the table were not explained in detail due to the fact, that we wanted the users to explain what they experience instead of forcing them to validate our assumptions. This means that we cannot conclude a high or a low degree of intimacy. However the results gives us an idea of what is going on.

	Eye contact	Physical presence of others (scale from 1-10)	Mental presence of others (scale from 1-10)
Test user #3	No	3	5
Test user #4	No	3	5
Test user #5	Tried	4	6 (potential for more)
Test user #6	No	5	6 (potential for more)

Illustration 20.

Afterwards we interviewed the users to have them explain their experience of the interaction and intimacy. We got following insights from this test stage:

It is clear that the experience of interacting with another person was different from interacting with the floor alone.

When the users extension in the floor started moving they felt connected to 'their' dot.

They were curious and wanted to explore the functionality of the grid.

This lead to several disruptions on purpose.

The users felt empowered by the system. They experienced their actions as controlling more than just their own embodiment.

Some users react emotionally to having their interaction disrupted by others.

Users felt connected to other users when the connection was made.

When a connection was made it needed to stay visible for a while. The users wanted to stay in power. If the system automatically disabled users connection they perceived it as an error. A fading of the line was suggested as an appropriate solution to symbolize the connection afterwards.

### **3.2.2 Conclusions of test (refined concept)**

The insights supported our hypothesis of the grid offering a possibility of interaction related to intimacy by optional and emotionally attachment. However the insights makes it clear, that the concept can be developed and tested in several iterations to make the system as functional and intuitive as possible and to minimize errors and misconceptions. Due

to the limits of this project we decided to stop the phase of "Getting the design right" here and refine the concept based on the insights of stage one and two:

#### **Look and feel (2.0)**

- The grid needs be more organic. An alternative is suggested in the video.
- The grid needs to be neutral and accommodating.

#### **Functionality (2.0)**

- Delay needs be minimized.
- The light needs to stay on after the connection is made.

#### **3.2.2.1 Further testing**

Since we did not test the concept in an environment close to the context, further testing is needed to validate the results and challenge the design decisions made so far. A test in the Metro with people more representative to our context, would make limitations of the complexity more obvious. Our constructed test environment offers an ideal situation that seems hard to find in the meto. The positive attitude of exploring the interaction and the existence of intimacy might be caused by our constructed test environment. However all our test persons expressed a positive attitude towards the idea of having the concept in the Metro.

## 4. Communicating the concept

In communication our concept the main focus is to show it and don't tell it. Our extensive knowledge and all the small details and rules of the concept has been cut away to leave the concept as clean and simple in the outsiders' perception.

### 4.1. What to communicate (the core of the concept)

In our 2 minute video it was important to cut away noise and leave the viewer with as few questions as possible. This meant that only the very relevant technical details of the concept are shown, but not explained. We went through our concept description and created a narrative, which lead to the question; "what is the climax?". The answer came quick – intimacy through eye contact. The entire purpose of our concept is to create eye contact and through this intimacy, between actors. From here we needed to set the scene -> what needs to take place for eye contact to happen? -> two actors will have to stand on the grid to connect the light in the floor. This gave way for our need to explain to the viewer that we have placed a grid in the floor that lights up when you stand on it. And then we had to set the scene, both for the project, main insight and key problem, but also for the physical frame the Metro. We discussed if the video should show a failed connection and how many, if any, of the the rules. But we judged that this was noise rather than informative in the eyes of an outside viewer. This would also have

taken focus away from the real objective of eye contact and make the video a technical reenactment of a set of rules that might leave more questions than answers.

For our presentation of the concept we decided to let people test it out themselves and treat them as test persons. These aligned with the general communication of "show, don't tell" as we lead our fellow students test our prototype grid and started a dialog around our concept based on their experience. Technical details and rules of interaction with the grid became very relevant in the context of the exhibition, but only because we had given people a chance to understand and test the core of the concept.

### 4.2. Video presentation

#### 4.2.1 Storyline (actant model) + identifying the main points

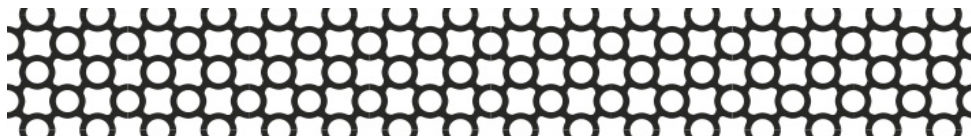
To tell the best story, that both describes the function of our solution as well as the intimate situation, the solution will create, we have developed a storyline to set the scene of the Metro and the context for the perfect interaction that will create a short intimate moment between two passengers in the Metro.

The first scene will introduce the project, insights and goal for the concept. After the introduction we will set the environment for where our interaction will take place by filming our main character getting down to the Metro platform and into the train where she then discovers the grid. We first see her on the escalators and then waiting alone on the platform.



She is looking at her phone and waiting not interacting with anyone - this is inspired by the statements from our second research interviews where passengers expressed their routine and behavior in the Metro. When she steps into the Metro she notices the grid, we see a surprised expression on her face and then zoom down to her feet where we for the first time see the cause for this surprised face. She is no longer looking at her phone but testing what the floor does. She is now interacting with the floor. Our second character then walks into the metro. He is also noticing the floor and before they know of it the light around their feet starts to form lines. This illustrates the main function of the concept. We then see that our first character notices the line and follows the line with her eyes. The second character does the same. As the lines meet their eyes meet and they look up at each other. They have a short moment of eye contact. We see our characters smiling and she then walks out of the Metro still smiling.

As a small technical element we tried to get a closer and closer zoom on our characters to show that the situation has moved from a single person riding the Metro to two people interacting. The last frame shows the first user on the stairway reflecting on her experience. The purpose of this scene is to make the viewers identify themselves with a situation they know.



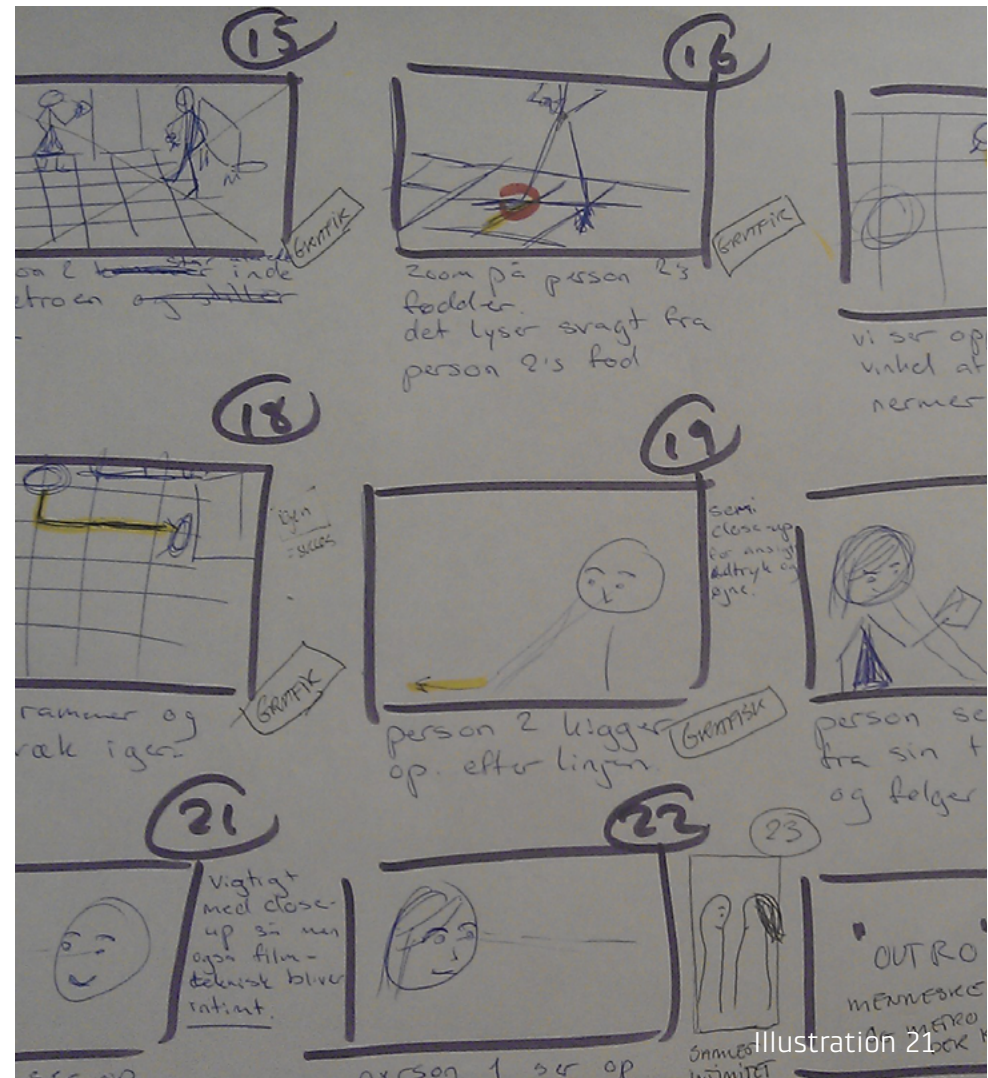
### 4.2.2 Storyboard

In order to ensure a structured process during the filming, we created a storyboard and a playbook. By doing so we had an exact idea of which shots were necessary in order to communicate the concept and aesthetics in the best possible frames. (see illustration 21)

The process of creating a storyboard was ideated and evaluated in several phases.

First a low fidelity sketch (1.0) was made on paper. This was done in order to create a mutual understanding within the group of how the concept should be communicated in the video. By discussing each frame we ensured that the basic structure of the story was present, as well as the plot presentation of the two characters. Also, frames that caused miscommunication would then be altered to fit in a storyboard 2.0.

The video setting was in the context of our project. In the Metro there is a lot of people and a lot of movement since it is a public space. Therefore we had to plan the execution carefully and factoring the restrictions of physical space and other people by deciding the angle and frame of each shot in the storyboard. (see illustration 22)



The storyboard 2.0 (see illustration 22) is a high fidelity version consisting of sketches made as digital drawings. Each frame has a description from the playbook indicating the purpose of the shot as well as the angle to film in. By having a storyboard we were able to very easily gain an overview of what shots we needed to film 'on set' in order to clearly communicate our concept in the video.

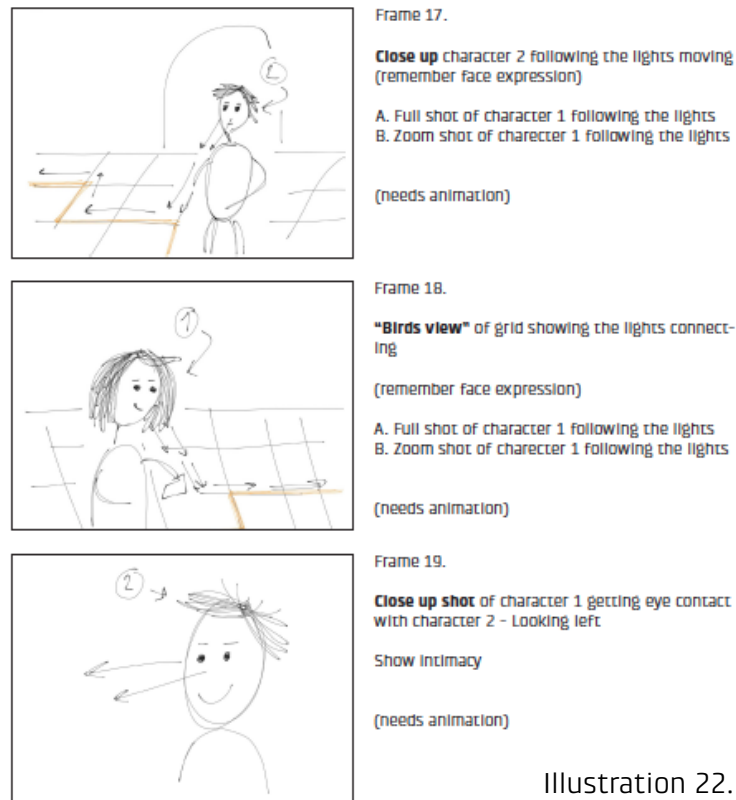


Illustration 22.

### 4.2.3 Simulation of interactive grid

The grid presented in the video is based on tests as well as feedback from previous phases.

In order for the viewer to understand how the grid functions we have produced a very high-fidelity version of the grid. As the interactivity of the grid should be decoded with ease, the images are shown in a slowed motion, when showing the functions and premises of the grid.

The grid in the video is simulated using a pattern on the floor. An illustration of the grid is merged to an image using photoshop and thereafter imported into the iMovie.

The organic shape of the grid noticeably differs from the square grid used in earlier tests. In shaping the aesthetics of the video we decided that by forming a more organic looking grid, we would present a more aesthetically pleasing solution.

The color of the light in the grid is yellow in the video. While this choice is not definite it is based on referencing a natural light. The color section also eases an integration to the metro's existing color scheme.

### 4.2.4 Production

With a tight deadline for our video production we allocated roles from the beginning. (see illustration 23) As some members of the group had skills in video editing and others in creating graphic content we separated tasks based on skills. The film editing was done in iMovie while graphics were created in Photoshop and imported to the film in the form of stills to create a stop motion effects.



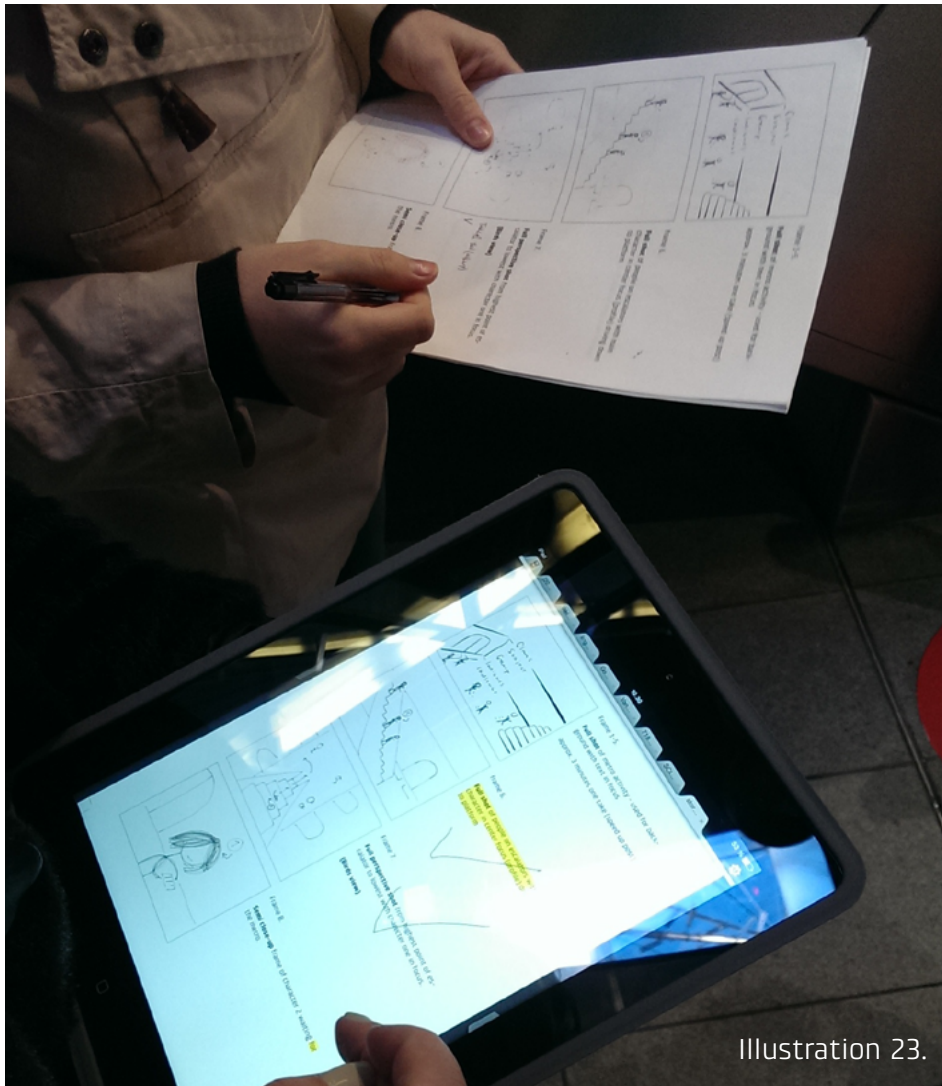


Illustration 23.

The editing of the movie was done in iterations. First a rough cut was assembled based on the high fidelity storyboard, assuring that the needed components were present in each frame in order to tell the story. After this each shot was edited in finer detail. Here creating greater continuity and considering framing and communicating of faces and artifacts. Lastly, filters music, and text was added for final effects and aesthetics. (see illustration 24)



Illustration 24.

### 4.2.5 Look and feel

The group made several considerations in deciding the look and feel of the concept video in order to communicate interaction and intimacy. Because the story entails a display of feelings in both characters it was necessary to include frames displaying the emotions of each character when interacting with the grid. This was done in the form of close-up shots. By doing so we wish to establish an emotional bond with the viewer, as they are able to decode the characters facial expressions. The feeling of intimacy is established in several ways: The music is chosen based on the ability to create an continuously evolving soundscape for the viewer, though still letting the visuals be the main focus point. For the same reasons the audio does not contain vocals.

Furthermore the frames contain an effect filter in order to attain the same visual aesthesis throughout the video - A blue tone overlay effect. Though blue might be considered as a cold tone, it here creates a calming effect on the setting and adds a focus to the characters.

### 4.3. Exhibition

The final of the course and the project was to present our concept to our fellow students, TAs and teachers. We procured a space in the atrium that allowed us to recreate the grid from our test phase with tape, string and laser lights. (see illustration 25 & 26)

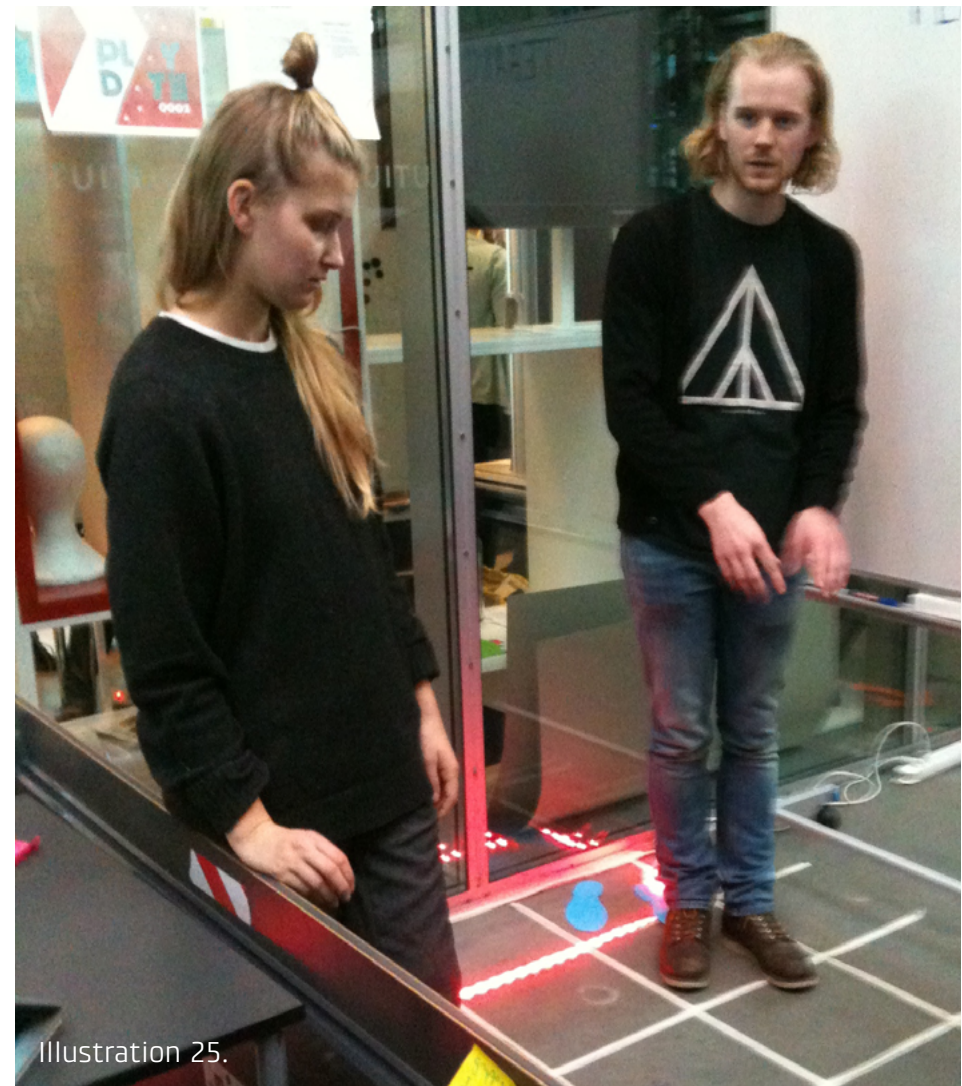


Illustration 25.



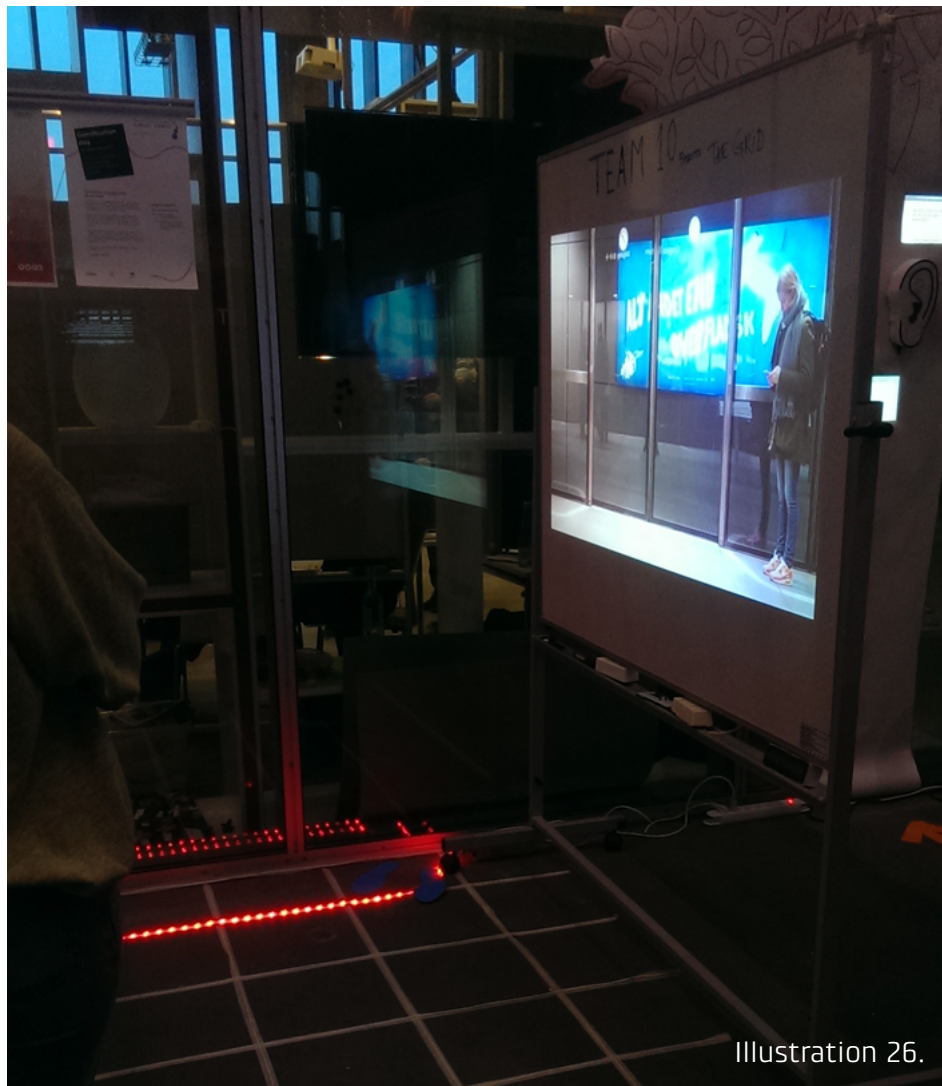


Illustration 26.

We played the video on a whiteboard with a projector and let people feel and test the grid with us interacting with lasers as the light in the floor. Every time we had people on the grid we regarded the situation as our tests and did not explain the rules, after the initial test we explained the rules and then let people try out the grid again. These approaches to demonstrating our concept lead to a lot of really useful feedback and discussions regarding our final conclusions shown in the video. Many were critical regarding the romantic aspect of our video and asked what we would expect to happen if it was two men connecting. We also discussed the conclusion to have a visible grid vs. an invisible grid that would take people by surprise. Many of these discussions and questions made us more aware of the process we as a group had gone through, and put our conclusions to the test.

## 5 Further ideas

When reflecting on our concept in its entirety, we believe that we have accomplished what the brief set out to do. We have created an opportunity where intimacy can happen between two or more actors in the Metro.

Throughout the process several discussions occurred. Some decisions were validated by test and feedback. Others complicated the decisions even more. In the following section we present some of the further ideas that would be relevant to explore if this project was extended.

## 5.1 The look of the grid

The pattern of the grid has been altered several times and in revising the look of the grid, it can be developed in more ways. Instead of lines, several rounded fields around each actor could make connections too. Considering aesthetics and usability, giving the grid different colours could emphasize both usability and aesthetics. With each actor having a different color, it could be easier to decode each foots input. Another consideration was two colours merging into one, before fading.

## 5.2 Functionality

The sections in this report, regarding functionality, presents rules defining how the actors are able interact with system explained by states. By testing functionality and by suggesting different possibilities of the structure grid, our rules constantly got challenged. A lot of parameters in the system are at stake. Therefore the functionality of the system could be developed in several iterations from now. It is important to remember that every development causes a bunch of “if”-questions that requires new rules of the system.

## Context test

As mentioned in our test section we did several tests in constructed circumstances. Further iterations of this stage is necessary to refine and improve our design. A ‘Wizard of Oz’ test in the Metro with a high fidelity prototype floor and unknowing actors would shed light on the aspects we

cannot approach at the stages we have been through.

## Materials and sensors

The further development of our prototype should include a higher degree of technicality.

A TA mentioned that heat detection is often used to identify people vs. objects. This new insight may be a valid technical solution for our grid to react to only human interaction and not bikes or trolleys in the Metro. We know that the Metro already uses heat sensors to count passengers, so this technique is already implemented. If we were to develop the concept further this technology should be examined.

Throughout the process we have encountered different challenges relating to more technical aspects. While it was not expected of us to look into and even solve these issues it has been frustrating as we have felt a need to include some more knowledge in these areas.

While the process has been both frustrating and rewarding at times, constructing this report made us realise the extent of interaction design’s complexity.