Industrial Design
B1
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USER CENTERED DESIGN

Index

Save

Abstract
We envision Save, a product that consist out of 3 devices, a hologram, a keychain and an app. Save teaches children the value of money and helps them with saving through a playful learn environment. The hologram shows the child a simple and clear overview of their savings through a fun avatar. They can set their own goal on the box with a hologram. This will give them a feeling of control over their finances. The keychain is used by the child to pay with, so they can pay for their products themselves. This will also give them a feeling of control and cancels out the problems of cash. The app is used by the parents to give them a clear and fast overview of the expenses of their child. This way they are included in the learning process of their child and can intervene if necessary.

Authors Keywords
Save; Children; Live-Feedback; Payment; Money;

Introduction
In a rapidly changing world, teaching your children about managing money has never been more important. If children develop good financial skills from an early age they'll be ready for the financial challenges of adulthood. In a time of credit cards, internet banking and online shopping, children don't often see people buying products with physical money. Not seeing money exchanged for purchases makes it harder for kids to get their heads around what things cost. They might see this invisible money as an abstract and unlimited resource rather than real money coming in and out of their family's bank accounts.
This portfolio describes our design process from scratch to prototype through focusing on the user and the different tasks they need to perform. It contains descriptive images, decisive moments, feedback and self-reflective elements on our work. At the end of the document individual reflections and the appendix can be


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Chapter 1

STEAL

We used STEAL, STEAL stands for 5 methods:
Speech: What does the character say and how does he/she speak?
Thoughts: What is shown about the character through his/her private thoughts and feelings?
Effect: What effect does the character have on other people? How do they feel or react to him/her?
Actions: What does the character do? How does the character act in different situations?
Looks: What does the character's appearance say about his personality?

Speech

Speech
- children talk a lot
- have a small vocabulary
- high pitched voice

Thoughts

Thoughts:
- thinking about friends
- thinking about toys
- thinking about animals

Effect

Effect
- with their enthusiasm they can create a good environment.
- children can be chaotic. As a result they need a lot of attention and can create a stressful environment.

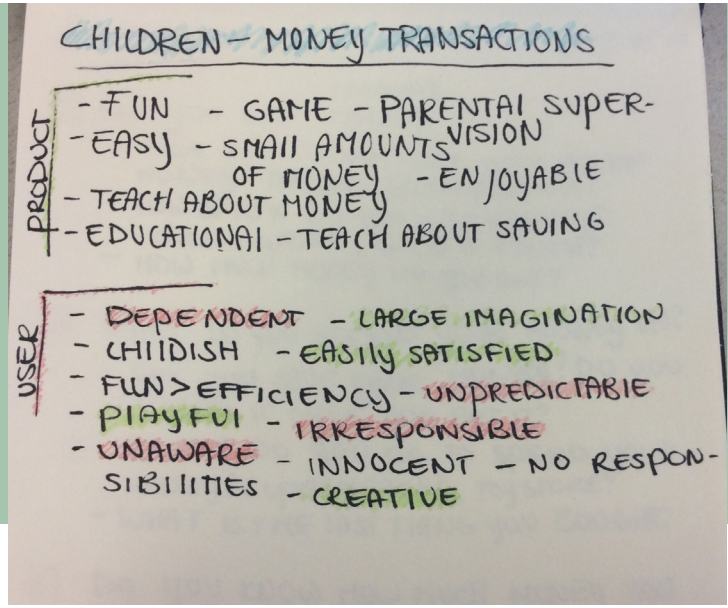
Actions

Actions
- Playful,
- hyper,
- easily distracted,
- want to play with friends,
- enthusiastic,
- fast learning

Looks

Looks
- Children of 6-12 years old
- Small hands
- length 110cm – 160cm
- Agile

The first brainstorm about the positive and negative characteristics of children & the desired characteristics of the product.



Capabilities and limitations

Relevant capabilities
- they are fast learners
- they are social
- they are impressionable

Limitations
- They have little experience with money
- Most of the necessities are paid by parents
- They are dependent
- They have small hands and they are short

Tasks, bottlenecks and stakeholders

Tasks/activities
- Kid walks up to the cash register
- Cashier tells kid how much he needs to pay
- Kid grabs wallet from pocket
- Kid searches for money
- Kid takes it out and puts it on the counter
- Cashier counts money and gives change
- Kid takes money and puts it back

Bottlenecks
- Taking wallet out of pocket takes time
- Searching for money takes time
- Counting the money takes time
- Putting wallet back takes time

Stakeholders
- Parents
- Bank company's
- Children

The reason we chose children

As explained in the introduction, it is incredibly important to teach children about the value of money. Teaching children how to safe will bring multiple future benefits. The reason for choosing the target group 'children,' is a combination of the fact that children still need to learn how to spend/safe their money wisely and the fact that children are still very impressionable. This golden combination is why we chose it. Our design could actually change the way children interact with money. As designers, this is one of the main goals when working on a project. Additionally, a large amount of children have a great imagination and fantasy. By interviewing them, we can let them inspire us with their somewhat inachievable ideas. For these children, the sky is the limit and everything is possible.

Notions of effectiveness, efficiency and satisfactions

Effectiveness

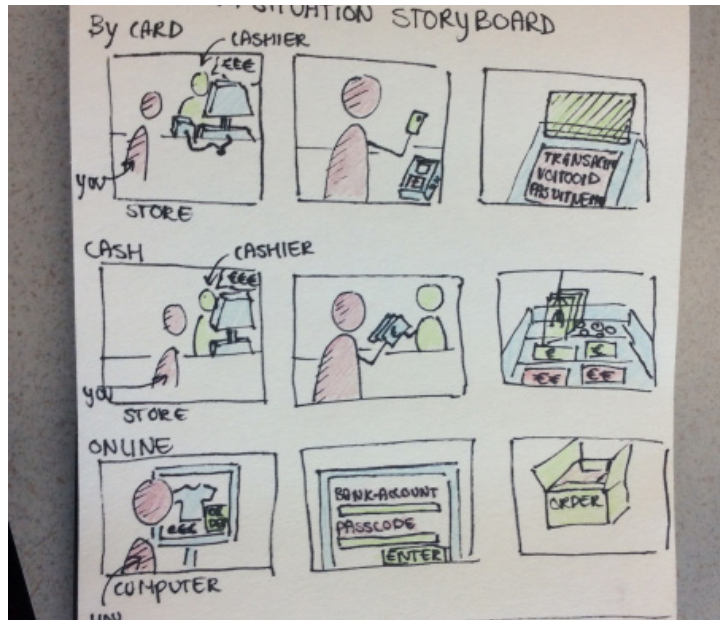
The way a product supports users in carrying out their task. Create a test where we measure how many mistakes children make before they understand the design. Our design should be easy to use. Although children learn quite fast and are comfortable with new techniques it should be a clear and easy design. We can easily test this by letting children use our design and see how many mistakes they make. If it turns out they make too many mistakes, we know we should adjust things to make it easier and simpler or give a better explanation?

Efficiency

How long it takes for children to pay, and for parents to see what the paying behavior of their children is. We need a combination of a functional requirement and an ease of learning requirement. Children get distracted easily, and although we want our design to be fun for children to use, it shouldn't have too many options and additional functions. The main goal is still paying and we should keep this easy and simple. We can test the efficiency by testing how long it takes for us to pay (we are the designers, we should be able to do it quickly) and then set an average time for children to do it. If too many testers have an higher time, we know our design isn't efficient enough.

Satisfaction

Does it make the user feel comfortable. We can evaluate this by questioning children after the test. They can tell us if they liked working with it and if it made them feel comfortable. We can also test this after a they used the method often. Does the satisfaction rate change? If 75 % of the children say they would want to use in the future, we know the design meets the satisfaction requirement.



Storyboards made by Sophie

Analysis of environment

Technical context

We envision our product to be compatible with NFC, electronic payment devices and WiFi. The technical limitations that could come across are WiFi failure or a lack of battery.

Organizational context

We need to involve banks, they need to deliver the services needed for our product.

Social context

Because we're working with money, the product needs to be save. We need to make sure users are aware of the fact that it's really save so they feel comfortable using it.

Physical context

We would like to use vibration and work with light in our future product because we think it's really clear and easy to use.

Experience goals

In the first brainstorm session we came up with quite a lot of experience goals. We came up with desirable goals and undesirable goals. We choose the 3 best ones as our final goals, the ones we want to work with and keep in mind during the process

First experience goals Enjoyable It needs to be enjoyable, otherwise nobody is going to use it for a long time.	Helpful This one is very important, without this there isn't really a reason to make the product.	Engaging If we make sure the product is engaging, people would want to invest time in it. For us, this is an important aspect because without this the product can't make a change.
Desired experience goals Motivating The product service must be motivating because it will make the user want to use the program.	Awareness We would like to make people (children) aware of money to make sure they know the value of it.	Child friendly We would like to have children as our target group. The product being child friendly is an big must.
Undesired experience goals Boring We need to make sure, the product isn't going to be boring, otherwise people will not start using it in the first place.	Unpleasant You want to make the user use your product/service. If it is unpleasant the user won't use it anymore.	Frustrating We need to make sure, people can easily use it and make it as less frustrating as possible. If the product is frustrating people aren't going to use it for a long time.

Finalized experience goals

Enjoyable

We think, especially for children, that this is crucial. We need to make sure to design something that will make children learn. If we want to accomplish this it really needs to be enjoyable, children learn through playing. If we don't make it enjoyable and fun children are not going to use it and we didn't achieve our goal.

Child friendly

Our target group is children so we need to make sure the product we are going to make is child friendly. Round corners, easy to use, unbreakable and colorful. Children will not be interested in our product if it is not and the parents will not buy it for their children. We need to make clear that we're designing for children so to keep this experience goal in mind is very important.

Awareness

We want to make children aware of the value of money, so the experience goal of awareness is important for us. It's really important to make children aware of the value of money. We are convinced that learning the value of money is really important when you are young.

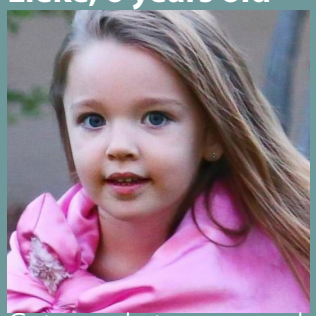
Chapter 2

Marvin, 10 years old

2 parents and a sister.
Parents have a normal-high income.

Marvin has his own Ipad on which he loves to play, but he also loves playing outside. He loves playing soccer and does this three times a week at his soccer club. He gets a few euros each month from his parents to buy something. He usually buys toys.

Lieke, 6 years old



2 parents and an adopted brother
Has 3 cats, a dog, 5 sheep and 10 chickens
Parents are farmers and have a normal income.

Gets pocket money, about 50 cents every week. She gets money for doing chores like getting the chicken eggs or milking the cows. She gets 50 cents for each chore and 5 cents per egg. She is saving for dogtoys, since Sinterklaas didn't get her any.

Original persona hypothese

Interview setup

Our goal for the interview is to interview 20 persons. The user group is aged between 8 and 12. In total, we interviewed 9 children and 2 parents. We asked the parents the same questions as we asked the children. We tried to mix boys and girls.

Our main questions where the following ones:

1. Do you get (pocket) money?
2. What do you spend your money on?
3. Do you know how much money you have right now?
4. Do you pay which cash or by card?
5. what kind of paying methods do you have with you?
6. How would like to pay in the future?

(The final list of main and sub questions is in the appendix.)

Ethnographic interview

We created interview questions to get more insight of children concerning their spending and saving behavior. To get data of the users we conducted interviews and made analysis of the interviews.

Goals of the interview:

With the interview we want to find out how the user spends, earns and deals with their money. With this information we want to create a design that fits the user's behaviour and goals. The pilot interview is needed to 'test' the questions and way of interviewing for the real interview.

The interview setup for pilots:

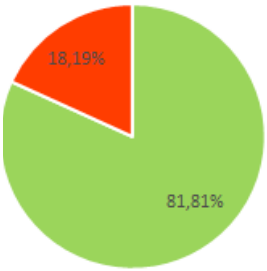
- Our target group are children of 6 to 12 years old
- Each member created their own list of question
- Each member conducted two pilot interviews (see appendix with questions and answers)
- We discussed our results

Based on the outcomes from the pilot interview, we changed a few things about the setup of the interview.

Our target group has changed from 6-12 to 8 to-12. We did this because we found out kids aged 6 & 7 do not know enough about money yet. Most of them do not receive pocket money either. We want to make a design for children that are aware of the value of money. We added more questions, we figured that we had not enough data, so we came up with more detailed questions.

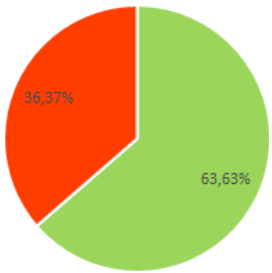
Results interviews

The answers from the taken interviews can be found in the appendix, as is the Excel document. In total, we had eleven participants. To analyse the data, we all came together and discussed the results. We talked about what we found the most important questions and answers and how it would influence our design. We tried to understand the behaviour of our target group. To make our data visible, we made a few graphs of the most important questions. Our interview gave us insight into the behaviour of children regarding money.



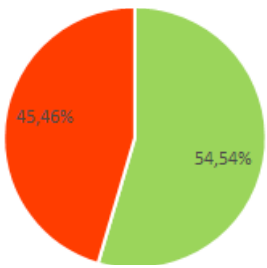
Would you like to have a bank card?

More than 80% of the children would like a bank card. Most of the reasons to want one were responsibility and it would be easier to use. The reasons to not want your own card were mostly that they thought it was annoying to remember a pin code and that they would lose their card.

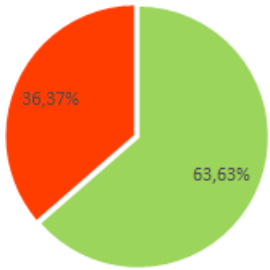


Do you know how much money you have currently?

For this graph, the children were asked if they knew how much money they had at the moment. More than 60% (said) they knew how much money they had.

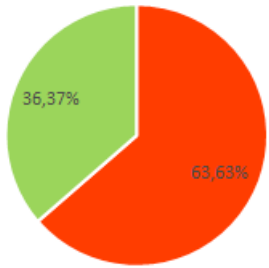


More than 50 % of the children are saving money for something particular. Children that were saving but did not know for what purpose yet, are in the "No" category.



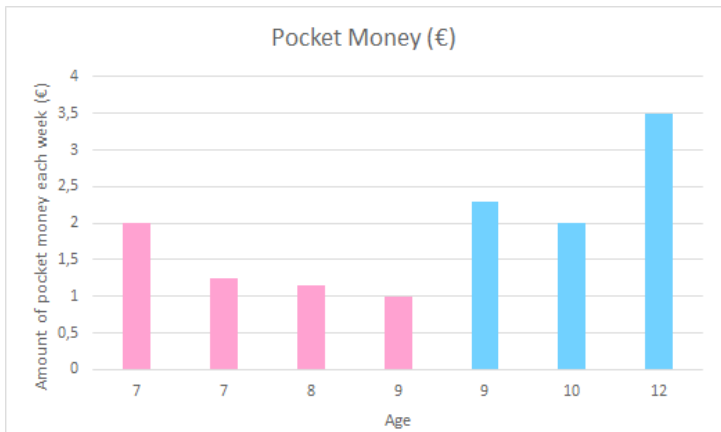
Do you get pocket money?

This figure shows the data that belongs to the question whether or not a child received pocket money on a weekly or monthly basis. The figure shows the result. More than 60% from the children gets pocket money.



Do you help in the house? (at least once a week)

This graph shows what percentage of the children help out in the house and receive extra money from that.



The 7 children that did receive pocket money were asked how much they got. The figure shows how much they got. Furthermore, pink indicates a girl and blue indicates a boy. There is no linear line.

Final personas

Emma, 10 years old

Character
Loves athletics and drawing. Calm and a bit shy with strangers.

Gets 1,50 every saturday. A few times a month she helps her parents doing chores (cooking, cleaning room) and earns extra money with this, about 50 cent per chore. Her grandparents give her extra money at her birthday and for good grades. She saves her money in a piggy bank. Doesn't really feel the need to buy a lot of things so she saves her money. Her parents want to open a bank account for her soon because she has a lot of cash money and they think she understands the value of money. In addition, they want her to learn how to deal with a bankcard and how to manage an account.

Marc, 8 years old

Character
Plays soccer 3 times a week. A social and smart kid.

Gets 5€ every month. He is impulsive and spends all of his money. He usually spends it on videogames and toys. He gets extra money on his birthday and for his rapport card, mostly given to him by his (grand) parents. His parents want to teach him the value of money, because he doesn't understand that money isn't free yet. They are going to let him do chores for money so that he sees that he has to work for his money.

Laila, 39 years old

Character
likes to shop. Very social and active lifestyle. Has a good relationship with her children.

Both her children get pocket money. The youngest gets 1 euro each week and the oldest 2 euros. They put this in a piggy bank. They often get money from their grandparents on special occasions. She and her husband know how much money they have and what they spend it on. The oldest one understands the worth of money. He wants a big and expensive present for Sinterklaas, so they let him pay as well to teach him you cannot get everything you want. If he is willing to pay extra, they know he really wants the present. The youngest doesn't understand it yet. She thinks it is something magical that comes out of the wall. She and her husband want to open an account for their son because they think it is easier to manage than cash and think he is responsible enough to deal with a card.

Requirements

Type of requirement: Functional

Description	The product should be able to teach children the value of money and should children learn how to manage money. Children lose things really quick, so one function should be that it's not too small and it's something they carry with them all the time.
Test case	We can test the product by giving children a prototype and let them test it for a month. After that we can interview the child and mainly the parents to find out if it is really as functional as we what it to be. The other requirement could we test through make sure our device can be attached to something.

Type of requirement: Look-and feel

Description	The product needs to be colorful, modern and fun so it will attract children. Children are easily bored and according to our survey really interested in futuristic ways of paying. We would be able to incorporate that into our design. It needs to have round corners and it has to be more or less unbreakable so it will be "kids proof".
Test case	We could test the first requirement by showing the product to a test group of children and asking them whether they like it or what we could improve. The second requirement could we test ourselves, we could throw it on the ground a few times to see if the product breaks. The child-friendly corners could we also test ourselves, we could touch the product and feel the corners.

Type of requirement: ease-of-use

Description	The product needs to be more or less self-explanatory. We need to make sure that is really clear what you can do with it, we can achieve this though big clear buttons or clear colors. Also children aren't good at remembering a certain pin-code and would prefer to pay by scanning their finger.
Test case	We can test this through let children use it a few days. Whilst usage we can observe if it is really as self-explanatory as we think and if they like the fingerprint scanner.

Chapter 3

Type of requirement: ease-of-learning

Description	The child needs to work with it fairly easy and needs to understand it after 1 or 2 times of use. It needs to be more or less self-explanatory. We can achieve this by giving direct feedback to the user, in that way he/she knows exactly what's going on.
Test case	The best way to test this, is to let a few children use the device for a few days and see if there is improvement. To test if the feedback is correct we could conduct a small user test. We can show the children a few pictures that represent the different screens. When showing these we could ask the children if they think it's clear.

Type of requirement: Performance

Description	The product we're going to design needs to work like it should, it needs to respond in a few seconds, it should not crash when pressing multiple buttons at the same time.
Test case	We can test this ourselves, by trying it out. Play with it a few hours, press random buttons and press different buttons at the same time. This way we could try to crash it and try to find bugs.

Perception, cognition and action cycle

Perception keychain

Seeing
The keychain will have lights to indicate if a payment didn't happen. When the child is paying with the keychain and a red light appears, the payment wasn't correct.
Hearing
We choose not to work with hearing, because our product is going to be used in a noisy room (a shop/supermarket). If we would work with sound it would be distracting and it wouldn't add any value.
Feeling
Our product will use vibrating, to indicate the amount of money the child is spending. When the keychain vibrates one time, the child has spent ten euro's or less. Two times vibrating means twenty euro's or less, three times thirty euro's or less, etcetera.

Perception hologram

Seeing
user has to use their eye to recognize the different steps, to work with the product, and to see the changes the avatar makes (the avatar can be happy or sad, depending on the expenses of the child).
Hearing
Like the keychain, the hologram will not have any sound. We don't think sound will add value to our device. We think that the visuals we've made are clear on itself and sound would only be an unnecessary distraction.
Feeling
For the hologram we aren't going to work with feeling. We think it isn't necessary to use vibration in the hologram and in the keychain because when doing so the children could get confused about the different meanings of every vibration.

Cognition

Understanding : how much money user has, gets, pays
Interpreting : symbols that have to be interpreted.
Making decisions: there will be multiple options with the device. Paying saving overview of the budget
Remembering : the user has to remember the symbols
Learning: the user has to learn to managing the product

Action cycle

Talking: the user has to talk to parents to use product
Paying with device: using the device to pay money
saving with the device: using the device to save money
Using a security code: Pushing buttons

The design of our product has to be simple/practical, fun and attractive.

Simple/practical:
the product has to use symbols that are known by children like $ or €, the product uses a simple menu
sounds/visuals that show if something is good or not
easily shown what to do to, pay or save money
Fun:
children have to like the product and have fun with it. otherwise they are distracted, we can create a game with the program, we want to let the parents be a part of it to stimulate the product
Attractive:
make the product available in different attractive colours
make the product in ergonomic shapes

Mapping, affordance and constraints

Mapping

Bad

A coffee machine at a tank station. The buttons for the specific coffee were drawn really bad, they all looked alike and it wasn't clear at all which button would give you which coffee.

The options on your phone. We now know how it works, but we think for a stranger who isn't used to the certain program doesn't really know what everything does just from the color and picture. Nowadays there are so many options and apps, it gets really complicated.

The oven in Sophie's student home. It is a combination of a microwave and an oven. It contains about 15 buttons and none of these clearly tell how to preheat the oven. After pressing every button the first time of usage, it turned out that the button which said: 'Forced air' was to set the temperature of the oven. It wasn't clear by just seeing the buttons.

Good

The number buttons the tv remote. They are in order from 1 to 9 and in the middle at the 5 there is a bump. This way you can put the right channel on without looking.

The coffee machine at the La Place building. It's clear how it works and what button will give you which coffee.

Sophie's shower. She has two sides she can turn, one on which the color changes from blue to red, indicating temperature, and one on which are lines growing in length, indication the force of the water. By just looking at it, Sophie can immediately see what to do and anyone could.

Affordance

Your phone has a lot of affordance principles. A few are calling, looking up information, entertainment, listening to music etc. A simple example of something it cannot to: You can't use it as something to drink with. You cannot brush you hair with it either. You also can't use it as a tool to cook with.

Constraints

Physical constraint

A physical constraint of a phone is the fact that different phones have different chargers. This means that it is difficult to borrow other people's chargers because they will not fit. Another physical constraint is that on different phones the turning on/off buttons aren't on the same place. So when you borrow someone else's phone you can't immediately turn it on because you don't know where the right button is.

Logical constraint

A logical constraint of a phone is the fact that the icon for Whatsapp and the icon for calling look similar. It could be confusing for people.

Another logical constraint is that when you press the moon icon on your phone, it will switch to night mode. If you press the sun icon, it will switch back to day mode. This is common-sense reasoning.

Cultural constraint

We learned how an old phone looks like, so that is why we know which button is to call with. If you don't know what an old phone looks like you may not know which symbol suggests 'calling'. Another cultural constraint is the fact that we have always been thought that red means bad/stop and green means good/go. If we are deleting something off our phone, the screen shows us red letters 'delete.' Indicating: 'Be careful.' People who do not know this/ have not learned this might not recognise these warnings.

Chapter 4

	Cube (holo-gram)	Key-chain	App
Awareness	2	1	3
Enjoyable	2	3	1
Effectiveness	3	2	1
Efficiency	2	3	1
Motivating	3	2	1
Child friendly	2	3	1
Helpful	3	2	1
Total	65	61	42

Save

Scenario and task description

Scenario (By Sophie Baars)

A child has been saving for a certain toy for months now. In his paying device he can see that the lion looks happy and that he has reached his goal of €50. He decides to go into the toy store and buy the lego set he had been saving for. He goes up to the cash register and gives the cashier the set. She tells him he has to pay €50, he puts his device on the pin scanner, finger scans his device and sees his balance dropping to €0. He can now take home his beloved lego set.
A month later he has set a new goal of €60, he is at €15, but this time he decides not to wait, but to buy candy in the supermarket for €15. After doing this, the Lion looks sad. His parents tell him that he can buy candy sometimes, but that it is important to has some money remaining. They know his actions through their app.

Task description (By Sophie Baars)

The system displays the achieved goal
The user takes the device to the store to buy something
The system displays the current balance
The user puts the device next to the scanner to pay
The system checks the balance
The system asks for validation
The user puts his finger on the scanner on the device
The system recognises the user's fingerprint
The system pays
The system displays the new balance
The user puts the device back on the keychain

QOC analysis

We chose these criteria because they are our desirables and we find these the most important.
We eventually chose for the cube, since this option had the most points. This is a combination of a cube, a keychain and an app for the parents. The cube scored best on several point, like effectiveness, motivating and helpful.

Descriptions design options

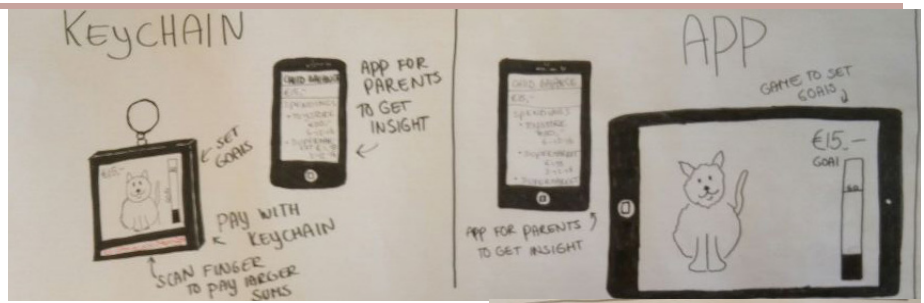
Cube (hologram)
A box that stays at home (probably the room of the children) that projects a hologram. The hologram will be an animal or avatar that looks happy or sad according to the expenses of the child or the distance until the savings goal.

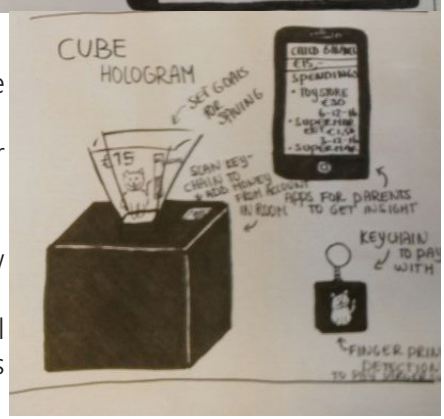
key chain:
The keychain is a device with a game. the user has to maintain a pet with their money spending habits. If the user is spending their money without setting goals or spending it by bad habits, the pet will be unhappy and will give feedback to the user how to deal with their money.

App:
With the app the user gets an overview of their balance. The app has a menu with the tabs: goals, balance and history. With the app the user sets goals. The goals that can be set are to save an amount of money. The app will give insight on the user it's screen how much the user have to save for their goal. The app is linked to their parent's account. The app will give an oversight of the user's balance, notifications of their progress and advice how to handle their account.

main question:
How can we teach the user (children age 8-12) about managing their money, saving money and the value of money?

sub questions:
how will the users know the value of money?
The token it will vibrate related to the amount of money it spends.
how will the user save their money?
the allowances of the user will be send to the cube and at the device the user can set goals to save its allowance.
how will the user pay with the device?
the user has an token. the user can put a certain amount of money on the token. with the token the user can pay wireless at the stores.
shows the progress of the users
-the user can see their effort in their savings.
stand alone device:
-shows the goals of the users.
-shows the progress of the users
-the user can sets the goals of the user
-can draw money from their savings with token
-the user can see their effort in their savings.



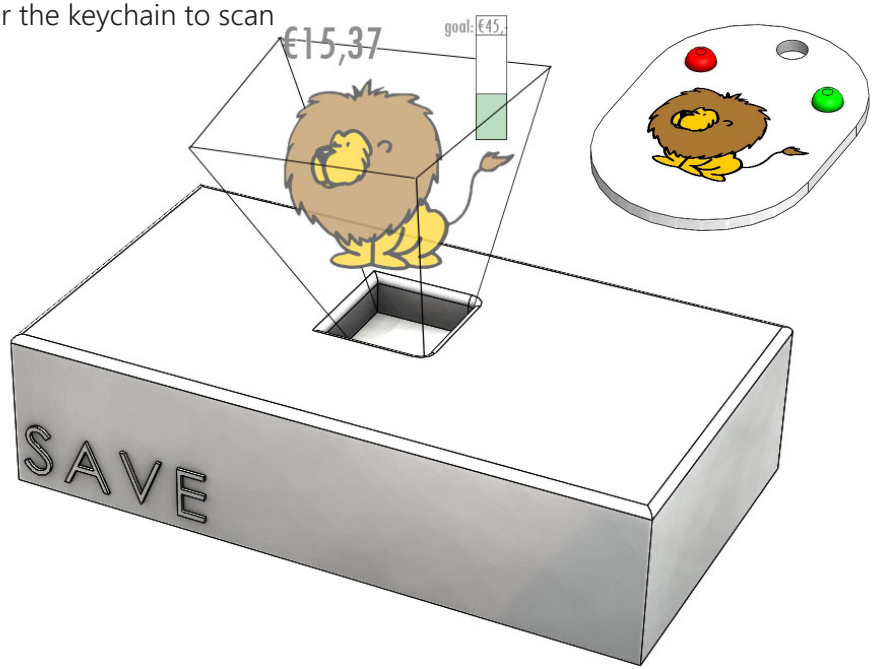


Token:
-the user can pay with token at the store
-the user can pay wireless
-for amounts above 20 euros the user will have to scan his/her finger
-token gives feedback after payment
-the user feels vibrations related to how much money he spends
-the token sends a GPS signal that will be shown at the app of the parent users
app parents :
-sees account, goals, savings,expenses .
-sees where the token is
-can give allowance to the users
-can set goal
-can block payment device/account

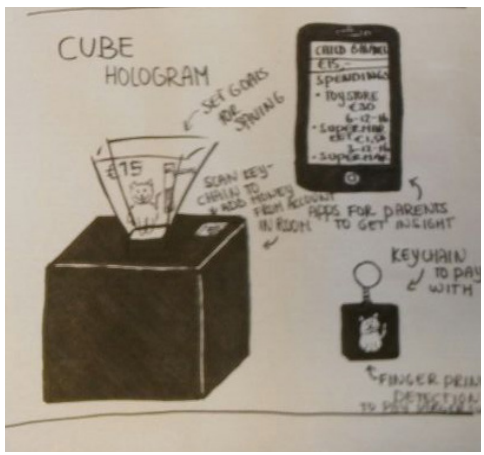
Chapter 5

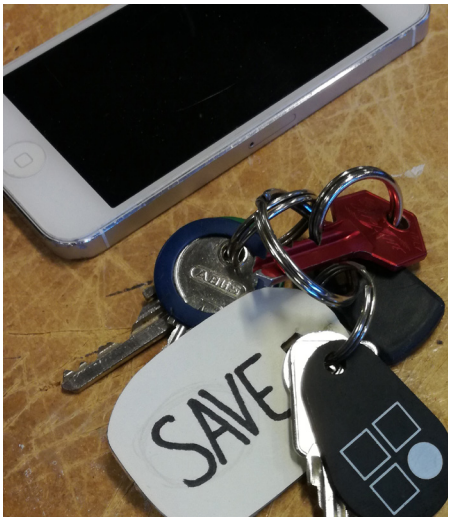
Paper prototype

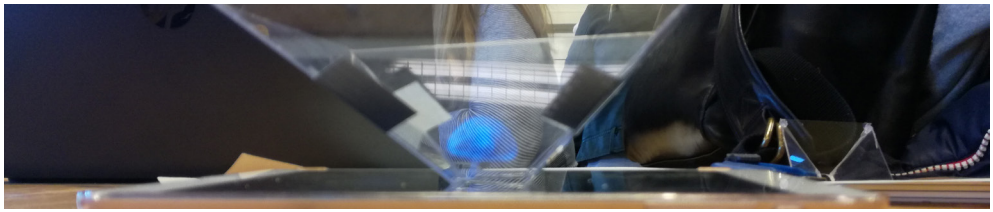
our design concept is the Cube hologram with a keychain and an app for the parents. as showed in the picture.
-the cube hologram needs a space for the keychain to scan
-the keychain needs indication lights for feedback
-the app will be linked to the keychain

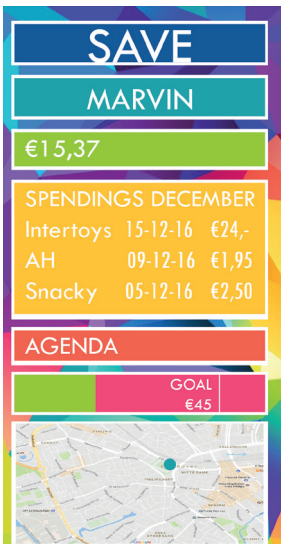


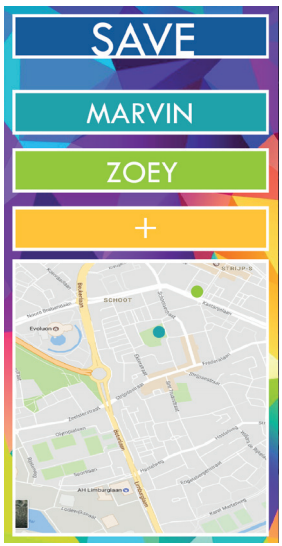
We designed our first prototype in the 3D design program SolidWorks. We made the box and the keychain using this program. We also designed the app.

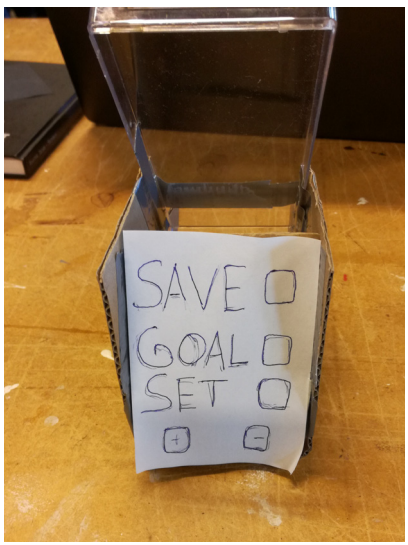


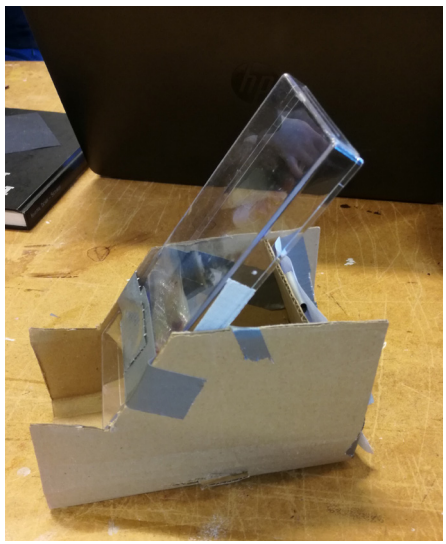












Revised scenario: (by Sophie Baars)
A 10 year old has been planning to buy something for a while. He has set his goal at €45,-. He checks the box in his room which says he has finally reached his goal. The lion is extremely happy. He goes to the store and buys the toy. He walks up to the cash register. She tells him the price and he puts his keychain up to the pin. The light turns green and the keychain vibrates 5 times. He has now paid and leaves the store with his new toy.
He goes back to his room, the lion now looks neutral and his goal is erased, his balance it set to €0,-. He sets a new goal for himself and continues saving.

Revised task description:
The user turns on the system
The system connects to the wifi
The user scans the keychain
The system displays the achieved goal, avatar, current balance (box)
The user takes keychain to the store.
The user puts device next to pin
The system pays (keychain)
The system lights up green (keychain)
The system vibrates (keychain)
The user takes items and keys home
The user scans the keychain on box
The system displays a neutral avatar and the new current balance.(box)
The user sets a new goal
The system displays new goal and happy avatar

Chapter 6

Expert evaluation: Cognitive walkthrough

Step 1: User sets goal
Is the effect of the current action the same as the user's goal?
Yes, the effect is 'learning to save,' the same as the goal of this device.
Is the action visible?
No
Will the user recognize the action as the correct one?
No
Will the user understand the feedback?
Yes, because a new goal will be shown in the hologram
Conclusion: Add buttons to set a goal.
Step 2: User pays
Is the effect of the current action the same as the user's goal?
Yes, with this device, the goal is to be able to pay, which is the effect of the current action.
Is the action visible?
No
Will the user recognize the action as the correct one?
No
Will the user understand the feedback?
Yes, by vibration and light
Conclusion: Add a sign which suggests this device is to pay with.
Step 3: Parent checks spendings
Is the effect of the current action the same as the user's goal?
Yes, because this way the parents can help the children reach their goal.
Is the action visible?
Yes, all actions are labelled.
Will the user recognize the action as the correct one?
Yes
Will the user understand the feedback?
Yes, it will give them the amounts of money spent, where it was spent and the date.
Conclusion: App for parents works.

Improvements after walkthrough:
Improvement 1:
We created a button on the hologram box to set the goal. We wanted to make this a button which you press to get out. Once the button comes out, you will be able to turn it. After you have reached the desired goal, you push the button back in to set your goal. This solves the problem in step 1 in the cognitive walkthrough of setting the goal.
Improvement 2:
We created a place on the hologram box on which you can put the keychain, this will turn on the box. We did not have a way to turn the box on before. We want to make the keychain connect to the box. This way, the box will also be able to display the information on the keychain.
Improvement 3:
We added the finger scan on the back of the keychain. This way it is safe to pay and no one will be able to steal the keychain. Alongside that, this way, it is now clear that kids should pay with this device.

Expert evaluation: Heuristic evaluation

The complete heuristic evaluation will be included in the appendix. This will only show the improvements we made after the heuristic evaluation.

Heuristic violated: #1 user control
Description:
The user does not know when the battery is empty (keychain.)
Possible causes: The device doesn't have an option to show it.
Expected consequences: User will be in store and the keychain does not work
because he/she was unaware of the fact that the battery was low.
Solution: The app will get a message saying the battery of the keychain is low and suggest to replace the battery. The hologram will show this as well.

Heuristic violated: #2 user control
Description:
The system (keychain) recognizes only one finger.
Possible causes:
This was the system setup.
Expected consequences:
If the user has a scratch on his/her finger, or burned his/her finger, the finger scan will not recognize the finger and will therefore not be able to pay.
Solution: At the bank, before getting the system. The user and their parents will have to scan 5 fingers. These will be the fingers the keychain recognizes.

Heuristic violated: #3 user control
Description:
The user does not know how the button on the hologram works.
Possible causes:
It is unclear that you have to press the button in before you can use it.
Expected consequences:
The user is confused, does not know how to set the goal.
Solution: We ar going to test if the user really does not understand how the button works. We will add an extra sign on button that indicates you have to push it in before you can use it. In addition the user will have to learn how to use the button.

Heuristic violated: #4 Visibility of system status
Description: the user doesn't always know the amount of money they have on their keychain.
possible causes: the keychain doesn't show the balance of their account. the standalone device give insight in the user's account .
expected consequences: the user will have to learn to work with the stand alone device and see their balance. by this we guide the user to set goals on the device

Difference Heuristic evaluation and cognitive walkthrough

A heuristic evaluation is a systematic approach whereby you review your design and compare it against usability principles. It should not replace usability testing, the problems you face are different than those found in a usability test. An advantage of using a heuristic evaluation is that you can obtain feedback early in the design process and you can use it together with other usability testing methodologies. It focusses on the way the system itself works.

A cognitive walkthrough is a way of user testing through the eyes of the user. You can see if the tasks can be performed in the correct sequence of actions they were designed in. It goes into details of the set of actions the user has to take. Does the user follow the actions in the way they were supposed to go?
The heuristic evaluation is more directed into the way the system works, whereas cognitive walkthrough focusses on the user.

Chapter 7

The complete text for the test and the voice recordings will be displayed in the appendix. The report will include DECIDE, our results, the improvements we have made and the comparison of the expert evaluation and the user evaluation.

DECIDE framework

Determine the goals

Our goal is to find new questions about our design that we haven't thought of yet. We want to get new insights of the users. While using the device, we hope they will notice things that we didn't notice before.

Explore the questions

The box:

How do you turn it on? → By putting the keychain on the designated spot.
How do you start choosing your new goal? → press the button with the arrow.
How do you set your goal to a higher number? → Turn that button.
And how do you set it now? → Push the same button.
What do you think the green bar means? → The amount of money you have already saved.
The lion is sad now, what do you think this means? → It means that you have very little money left.
Now he is happy, what does it mean? → You have reached your goal.
How do you turn it off? → Remove the keychain from the spot.

The keychain:

Imagine I'm the cashier, how do you pay? → Scan your keychain and scan your finger.
The light turns red, what do you think this could mean? → wrong finger, not enough money or it simply did not work.
And what would green mean then? → The transaction worked.
Do you understand why you should scan your finger? → For safety.
You just paid €20,- and it vibrated twice, what do you think this is? → The device vibrates at every 10 euros.
What do you think would happen if you were to pay €50,-? → it will vibrate five times.
Why do you think we do this? → To give direct feedback of spendings.

Choose the evaluation paradigm and techniques

We decided to go to a primary school to do the user tests with children. We made our questions as clear and simple as possible to adapt to the language children use. It would be best if we would be able to test the product with the children individually to actually see whether they understand it, but since the school only gave us two hours and we wanted to test the product with as many kids as possible, we decided to do tests in groups of 5.

Identify the practical issues

A practical issue during the interviews in week 3 was arranging a meeting with a primary school. Luckily, for the user test, Sophie set up a meeting with her old primary school. She arranged this in advance, so this time we had no troubles of meeting up with children. Another practical issue was be that all four of us had to go there, which was not convenient for everyone.

Decide how to deal with the ethical issues
It would be nice to take photo's and perhaps video's of the children. This, however, might not be allowed since we will be testing our product with children. We would need the approval of the parents and we will not be able to contact them all. Instead, we decided to voice record the tests. By doing this, we can still listen it back for the report but we will not have to ask for approval.

Evaluate, interpret, and present the data
To increase the reliability, we are going to make the sample size as large as possible. We want to test our product with as many kids as we can. We also wrote a text which Sophie was going to repeat during each test. This way, she will be as consistent as possible during the tests. This will give the test results more validity.
The children will probable influence each other however, this would mean that the test might be less reliable. We will eventually not present our results statistically but we will write down the conclusion we drew by finding improvements.

User evaluation and test

Do you have any questions?

-Do you have to charge the keychain?
-If batteries of the keychain die, does the device reset?
-What if you lose your keychain?
-What happens if they fake your fingerprints?
-Where do you "set" your finger scan?
-How do you know which keychain is yours? How do you recognize yours when two are laying next to each other?
-How do you turn the box off?
-What happens if you remove the plug from the box? Do you have to reset the box/goal when you plug it in again?
-Why is it the size it is right now?
-Can you choose your own colour?
-Will the device cost money?
-When will we be able to buy it?

Do you think we can improve on anything?

-Touch screen on the hologram box, easier to use.
-Being able to charge the keychain (wireless) instead of having to replace the battery.
-Put the keychain on a carabiner and keep it with you that way (you can attach the carabiner to your pants).
-Add name on the keychain so they recognize their own.
-Choose your own colour for individuality.

Do you have any comments?

-Some children didn't want their parents to see what they were spending their money on, others did want this.
-Some leave their keys in their bike when at school. The keychain has to be waterproof.
-They thought the holograms were cool.
-They enjoyed the test and liked the concept.
-They thought it would be a really useful device.

Improvement after the user test / suggestions redesign
Based on the results we got from the user test, we decided to make a few adaptions to our design.

Improvement 1: For some children it was not directly clear what the button on the box stood for. That's why we added the word goal on the button. This way it's easier for them to find out that they have to use the button to set/ change the goal.

Improvement 2: One comment we got is that some children leave their keys in their bike, therefore we need to make sure our keychain is waterproof and does not get damaged by rain or cold.

Improvement 3: A lot of questions we got were about the charging thekkeychain and the hologram box. They were wondering how it worked. Some commented that we shouldn't use batteries. That's why we decided to use wireless charging. When you put your keychain on the hologram box, your keychain will charge. This is done by using an electric current field. We keep the function that when the battery of the keychain is almost empty (the child forgot to charge the keychain), there will be a red flashing warning light on the keychain. Children will probably keep their hologram boxes in their room, and to prevent them from sleepless night (if they leave their keychain on the box, the hologram will appear and they might not be able to sleep due to the light), the hologram will disappear after 5 minutes.

Improvement 4: Another frequently asked question was about recognizing your keychain. We added some options for individuality. Children can choose their own colors on the keychain. They can only choose this once when requesting the keychain. They can also add their name or signature to distinguish their personal keychain.

Improvement 5: One participant asked how to put the box 'off'. The display turns off after five minutes of displaying the avatar. This will be explained in the guidelines.

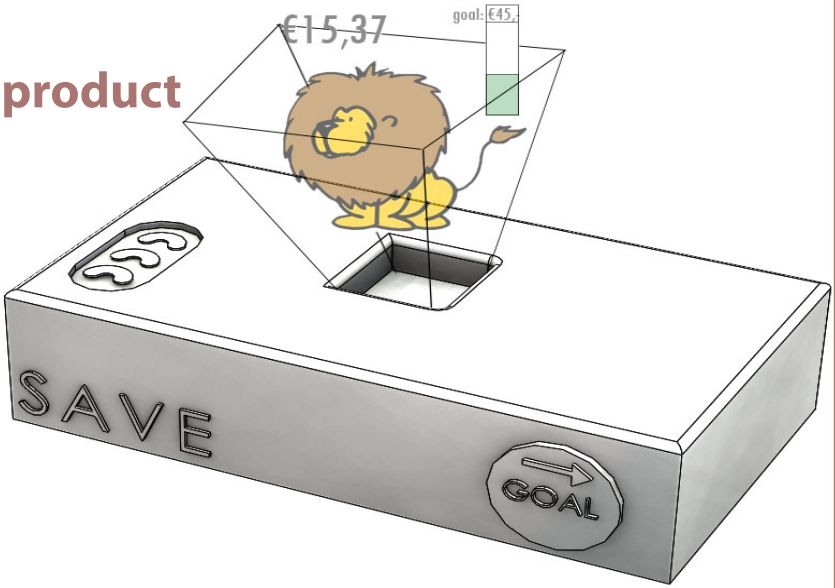
Unanswered questions:
The device (keychain/box) does not reset once it turns off.
The finger print is safe, people will not be able to fake it.
The child can set the print at the bank.
The current size is big enough for it to contain electronics but also small enough to stay comfortable as a keychain.
We do not yet know whether the device will be paid for by the bank or the user has to pay for it themself.

Difference user evaluation and expert evaluation

expert evaluation
with the expert evaluation the designer will evaluate the design. the evaluation is a checklist for the designer to detect possible flaws in the design and make a simple workflow for the design.
the expert evaluation is less time consuming than the user evaluation. with the heuristic evaluation and the cognitive walkthrough it is easier to plan when to take the evaluation and the designer will get straightforward answer and valuable results. it is more structured than the user evaluation.

user evaluation
With the user evaluation will be a verification moment if the design works. the designer wants to know how the user will react on their design. will the user understand the design, will the user use it in their lives and will the user give appreciation and get satisfaction out of the design. the user don't know the design and has to learn from the start. By the user evaluation test the expert will see how the user reacts on the workflow and navigation.
with the user evaluation the designer will discover new insights that the designer did not thought of in the expert evaluation.

Final product



SAVE is made for children between the ages of 8 and 12. At this age children will have a first encounter with money. Our goal is to teach children how to save their money for different goals. We want to let these children experience the value of money. With SAVE, these children will be able to set a saving goal and save for their desired products. After a certain period, they will understand that to save for more expensive products, they will have to put more effort into earning money.
SAVE will help these children reach their goals and gives them clear insight into their budget.
Since children are not as independent as they might believe, we also involve the parents in the saving process. SAVE is linked to an app controlled by the parents. They will be able to get an insight into their child's location, expenses, savings and goals.
SAVE is appealing to children because of the futuristic hologram and their own personalized items Their own SAVE avatar stimulates the child to reach their goals. The keychain makes it possible to pay wireless. This will give them direct feedback. This creates insight into the value of money.

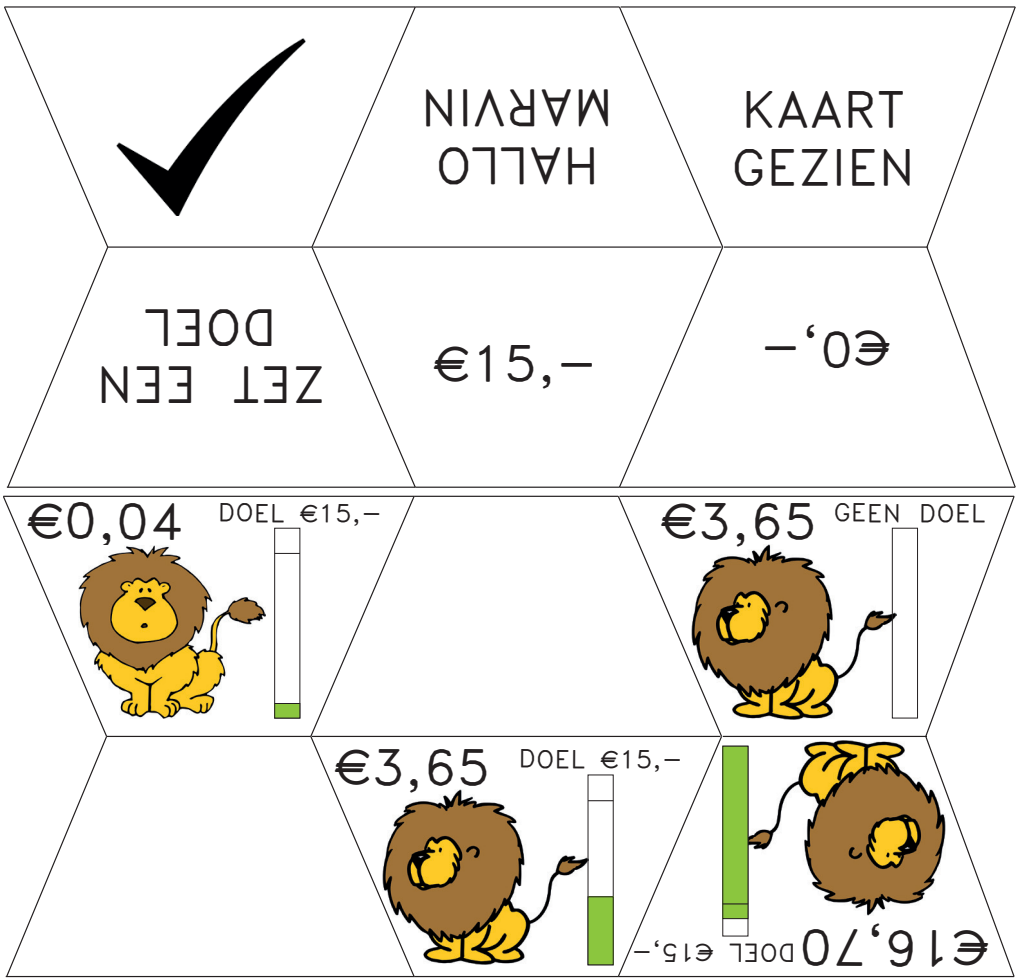
The Box:
During the user interviews, one child came up with the idea of using holograms. We noticed children wanted something futuristic. We decided to incorporate that into our final product. The hologram displays the avatar, the current balance and the goal, once the child scans his keychain on the designated spot on the left. To set a new goal, the user will simply have to push, the button, turn it untill it reaches the desired amount and push it back in to set the new goal.
This box will be plugged into a socket and will be in the child's room at all times. Furthermore, the place for the keychain is also a wireless charging spot.to reach their goals. The keychain makes it possible to pay wireless. This will give them direct feedback. This creates insight into the value of money.

Chapter 8

Scenario final product:
A 10 year old has been planning to buy something for a while. He has set his goal at €45,-. He checks the box in his room which says he has finally reached his goal. The lion is extremely happy. He goes to the store and buys the toy. He walks up to the cash register. She tells him the price and he puts his keychain up to the pin. Additionally, he scans his finger on the keychain for safety. The light turns green and the keychain vibrates 5 times. He has now paid and leaves the store with his new toy.

He goes back to his room, the lion now looks neutral and his goal is erased, his balance it set to €0,-. He sets a new goal for himself and continues saving.

Task description final product:
The user turns on the system
The system connects to the wifi
The user scans the keychain
The system displays the achieved goal, avatar, current balance (box)
The user takes keychain to the store.
The user puts device next to pin
The system asks validation (keychain)
The user scans his finger.
The system recognises fingerprint
The system pays (keychain)
The system lights up green (keychain)
The system vibrates (keychain)
The user takes items and keys home
The user scans the keychain on box
The system displays a neutral avatar and the new current balance.(box)
The user pushes the goal button
The user turns button to desired goal
The system displays the amount.
The user pushes button to set goal
The system displays new goal and happy avatar



The keychain:
The child uses the keychain to pay with. He will be able to scan his keychain at the cash register and pay wirelessly. He will have to scan his finger for safety reasons. If the payment was succesful, the green light turns on. If the payment was unsuccessful, the red light turns on. This means that either it was unsuccessful or the fingerprint is incorrect. If the payment was successful, the keychain will vibrate once for every 10 euros spent. By doing this, the keychain creates awareness of the amount of money spent since this is removed when digitalizing payment methods.

The app:
The app is designed for the parents to use, they will have to choose which child they want to look into. After that, the parent will be able to view the current balance, the expenses for every month and the goal. They will also be able to find the location of the keychain since children often loose their things.

Individual work
Lonneke: Made a storyboard about a problem with money, wrote down the most important experience goals and read chapter 1 of the book Interaction Design. Koen:I created a storyboard of the current situation. I made the story board to compare paying with: cash, card, phone and online. I read chapter 1 of interaction design to make a list of the experience goals I found relevant. For the case I applied the notions of effectiveness, efficiency and satisfaction. Lisa: Created a storyboard of. the current situation. Read chapter 1 of Interaction Design. Decided on most desirable experience goals and the notions of effectiveness. Sophie: This week we all created a storyboard. I made three, one for cash payment, one for payment by card and one for online payment. I wrote down which activities are done when paying. Furthermore, I also wrote down the experience goals I found most important and the notions of effectiveness. Finally I also read chapter 1 of Interaction Design.
Lonneke: Made a persona hypothesis, created a setup of an ethnographic interview and conducted 2 pilot interviews. After that, I reflected on my quetions and came to the conclusion my interview was not that great. Koen: This week I read the chapters 4 and 5 of the book "about Face" created questions for the interview we are going to execute. furthermore I made a persona hypotheses of the target user. I found good user data for the case. But we decided with the group not to use it. Lisa: I created a persona hypotheses, made interview questions and conducted two pilot interviews on my old sports club. I also made two persona skeletons. Sophie: I made a persona hypotheses of how I expected children to act/be. I started creating a pilot interview and called about 15 primary schools to make an appointment. We could not get an appointment with a primary school in Eindhoven. I talked to my nephew of 8 and conducted the interview with him.
Lonneke: Wrote down the requirements of the design case and looked at mapping, affordance and constrains. Koen: in this week I started with assignments A and C. I made examples of the requirements about our device. Furthermore I investigated good and bad mapping, affordance and constraints. Lisa: I wrote down the five requirements and worked on the mapping, affordance and constraints assignment. I went to my old sports club again and conducted the interviews. Made a start at writing out the data. Sophie: I made assignments A and C individually.
Lonneke: I wrote a scenario and made a task description about it. Koen:in this week I made drawings of possible devices of the design. to discuss the how the device should work and look like. We chose another concept. Of the concept I wrote two scenarios. One scenario about the overall concept and the other one about a specific task. Lisa: I wrote down a scenario and a task description about our design at that time; Sophie: I wrote a scenario about our first concept, the keychain with a virtual pet. I also formulated a task description for the same concept.

Team work	Feedback coach meetings	
We compared all our individual work and wrote a chapter for the rapport with our combined work. We mostly discussed what we had done individually.	-UCD interactive systems designing -Think about the Usefulness, Usability effectiveness, efficiency, satisfaction -Make a good characterization of the user -Specified the user and their goals -Take in mind the learnability and memorability in the design	Week 1
We compared and discussed the pilot questions and interviews, we found some improvements after having done the interviews. We created the final questions and planned for Lisa to do the interviews this week at the athletics club. The rest all made appointments with people they know.	-The pilot interviews are for the questionnaire to cancel out the bad questions -We are free to choose our goals -Explain, give quality and defend the goal	Week 2
we discussed assignments A and C and came to a conclusion. We also made assignment B together.	-People with the ideas have to stay involved -Give the Usability special attention -Describe the requirements SMART -Effectiveness: how many mistakes -Efficiency: how much time it takes	Week 3
We had three concepts, an app, a keychain and a box with a hologram and keychain. We wrote down seven criteria and gave each concept 1, 2 or 3 points. The box had most points and won. We mostly focused on the user interface of these concepts.	The main questions - The children have to learn how it is to manage their money - How can we inspire children to save their money -Use for the QOC -Explain the Key and main points - What for design explain why -Why not something else? -Report - Individual assignment in the appendix - Team assignment as chapters of the week	Week 4

Individual work
Lonneke: I reflected on my task description and made some adjustments. Koen:In this week I made a prototype at home But we chose a other prototype. For the prototype I made a scenario about a task description. Lisa: I changed some small things of my task description and added a few steps. Sophie: I wrote a new scenario for our chosen concept along with a new task description. I also made an online 3D prototype on SolidWorks. Additionally I made a template for the app in Illustrator.
Lonneke: Made an expert evaluation. Koen: with the expert evaluation I did the heuristic evaluation. The answers leaded to the IPR. I compared the two evaluations methods Lisa:I did the heuristic evaluation, filled in the templates and tried to come up with solutions. Sophie: I did the cognitive walkthrough from the expert evaluations.
Lonneke: Made a beautiful presentation. Koen: I did researched about the two methods user and expert evaluation. With the research I compared the two methods. Lisa: Worked on the report along with the others. Sophie: I went to my old primary school and did the user tests. I tested our product with 5 groups of 5 children and checked whether they understood the product, had any comments and whether they had any questions or improvements. Additionally, I recorded them and listened them back to work out the results. I improved my 3D designs to fit the new improvements we made after the expert and user evaluations. Furthermore, I made the report in inDesign.

Team work	Feedback coach meetings	
We built a few different prototypes. We sketched the product, made one prototype from cardboard, and one from wood. We made the box with the hologram, the key-chain and the app. (Not our previous ideas, but the keychain and app that belong to our final idea.)	-	Week 5
We made more prototypes so the actions would be visible (feedback last week). Lonneke and Sophie made a user test format. They wrote an introduction and made the setup for the user evaluation. Lisa and Koen compared the outcomes for the heuristic evaluation. As a group we came up with improvements on our design and worked on the report.	-Give an indication of the interactions - explain how the user will interact -Evaluate the test of the user -Document the features - How the actions go- What he user does - What the machine does - What happens (for example it will vibrate if it is done) -Are the lights red or green good for the indications? -Validate at the user if it is working -Let the user explain if it is useful -What is the connection of the standalone device and the token	Week 6
Sophie and Lisa discussed the user test and came up with improvements. We created our final design, made the presentation and worked on the report.	1. Do the expert evaluation before testing. Find what is the difference between them 2. You will score on iteration - How did develop the prototype' - What were the insights, - How is it impacting the design 3. Describe the process - Show your understanding why and how you did this. 4. The presentation takes 10-12minutes - Practice before	Week 7

Sophie Baars

Individual excersizes

Week 1:

Experience goals:

This picture shows the experience goals I found most important. I want the product to eventually:

-Be fun to use
-Be easy to use
-Be enjoyable
-Teach children about money/how to save
-Be educational
-Give parent an insight into their children's spendings.
-Be safe (be able to only spend small amounts of money)

Notions of effectiveness, efficiency and satisfaction:

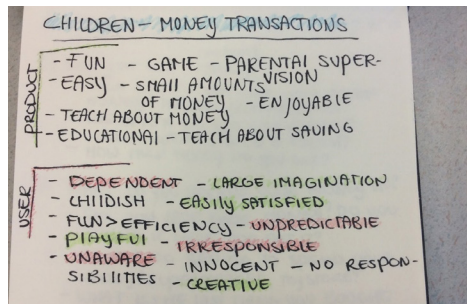
Effectiveness: It should be effective in the way that the product should actually work. It should be able to pay money and teach children about saving. If it is not able to pay, children will not be able to use it at all, since that is what it is supposed to do. If it does not teach children anything, the product is almost useless, because they could simply use cash or a card.

Efficiency: If the product eventually is not efficient, children will get easily bored and they will not continue using the product. We want children to continue using the product so that they will eventually learn how to save money. Efficiency is also important for the store. If paying takes too long, other customers waiting in line to pay might get annoyed because of the large amount of time it takes for the child to pay.

Satisfaction: If the product does not satisfy the child, the child will not continue to use the product. Children are generally bored easily, we want to create something that will satisfy their needs so that it will keep them entertained for a longer period of time.

Storyboard:

These are the different storyboards I made of the current situation. I made one for paying by card, one for paying with cash and one for paying online. I also wrote down the activities done when paying with cash.



Week 2

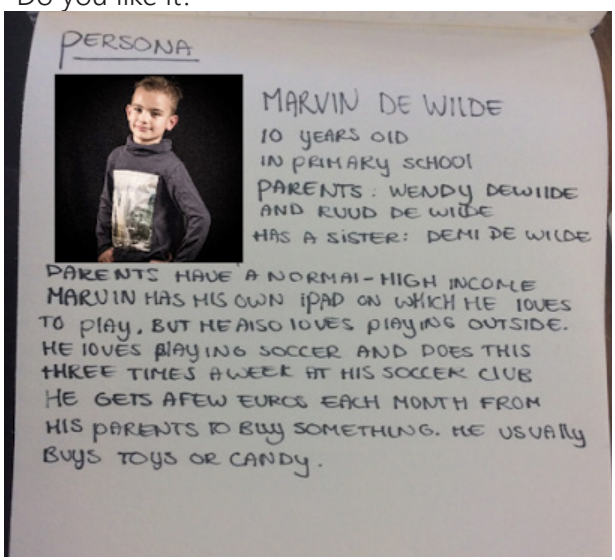
Persona hypothesis:

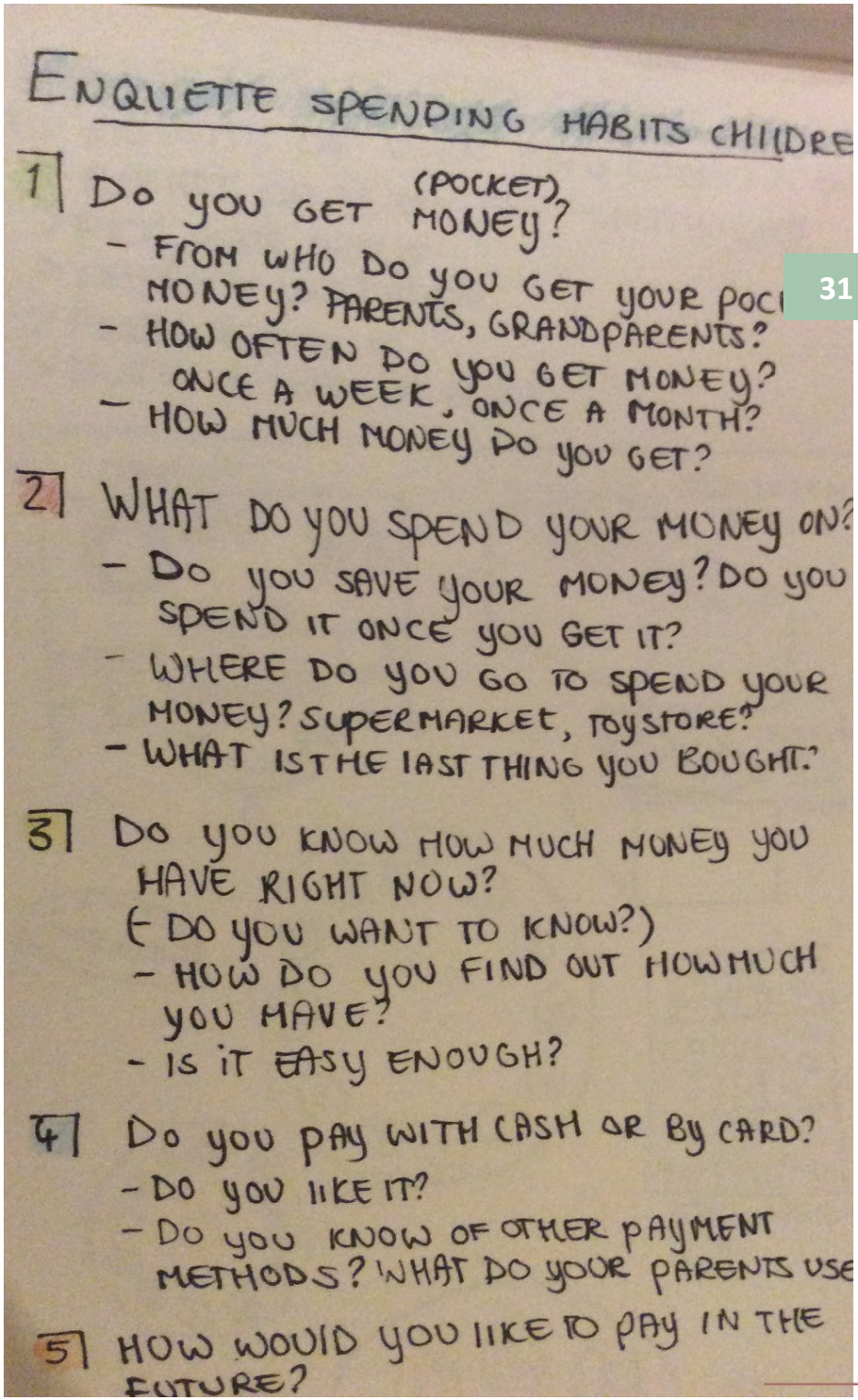
Marvin de Wilde, 10 years old, in primary school, has 2 parents and a sister.

Marvin has his own Ipad on which he loves to play, but he also loves playing outside. He loves playing soccer and does this three times a week at his soccer club. He gets a few euros each month from his parents to buy something. He usually buys toys.

Pilot interview:

1: Do you get pocket money?
-From who do you get your pocket money?
-How often do you get pocket money?
-How much money do you get?
2: What do you spend your money on?
-Do you save your money or do you spend it all at once?
-Where do you go to spend your money?
-What is the last thing you bought?
3: Do you know how much money you have right now?
-(Do you want to know?)
-How do you find out how much you have?
-Is it easy enough?
4: Do you pay with cash or by card?
-Do you like it?





Conducted interviews Demi & Mark
Demi (12 years old)
1. Do you get (pocket) money
Yes
-From whom do you get your pocket money? Parents, grandparents etc?
from my parents
-How often do you get money? Once a week, once a month?
I get my pocket money when I need it, not at a certain moment.
-How much money do you get? Does it change or is it always the same?
It changes all the time
Do get extra money on special events/occasions? Sinterklaas, when you played
a big game or when you help cooking/cleaning e.g?
Yes, for my birthday or for my rapport card, sometimes during the holidays.
Do you know where money comes from?
Yes
2. What do you spend your money on?
Whenever I see something I like, I buy it.
-Do you save it? Do you spend it once you get it?
I'm saving my money
-Where do you go to spend your money? Supermarket, toystore?
Sometimes in the supermarket, but also in other stores.
-Do you save money for something at the moment?
Yes, a new cap for horseback riding.
3. Do you know how much money you have right now? (Do you want to know it)
Yes, €80,-
- How do you find out how much you have?
It is on my bank account, so I check that sometimes.
- Is it easy enough?
Yes, I think so.
- Do your parents know how much you have?
Yes
4. Do you pay with cash or by card?
By card mostly.
- Do you like it?
Yes, because cash is heavier and that is annoying
- Do you know of payment methods? What do your parents use?
I think they pay by card.
5. what kind of paying methods do you have with you?
A bank card and some cash
- do you have a wallet with you?
Yes
- do you have a bank card with you?
Yes
6. How would you like to pay in the future?
By card
What would be most fun?
Via someone else (?)
What would be easiest?
If you would not have to pay
Would you like it to be a game or something serious?
I would like to pay with a game.

Mark(8 years old)

1. Do you get (pocket) money

No

-From whom do you get your pocket money? Parents, grandparents etc?

-

-How often do you get money? Once a week, once a month?

-

-How much money do you get? Does it change or is it always the same?

-

Do get extra money on special events/occasions? Sinterklaas, when you played a big game or when you help cooking/cleaning e.g?

Yes

2. What do you spend your money on?

Mostly toys like playmobile

-Do you save it? Do you spend it once you get it?

both, it depends

-Where do you go to spend your money? Supermarket, toystore?

Mostly at the toystore

-Do you save money for something at the moment?

Yes, for playmobile

3. Do you know how much money you have right now? (Do you want to know it)

Yes, €40,-

- How do you find out how much you have?

I sometimes count the money I have

- Is it easy enough?

Yes, I think so

- Do your parents know how much you have?

Yes

4. Do you pay with cash or by card?

With cash

- Do you like it?

I don't know

- Do you know of payment methods? What do your parents use?

I think they pay by card.

5. what kind of paying methods do you have with you?

cash

- do you have a wallet with you?

Yes

- do you have a bank card with you?

No

6. How would you like to pay in the future?

By card

What would be most fun?

By card

What would be easiest?

By card

Would you like it to be a game or something serious?

I would like to pay with a game

Week 3

Assignment A:

A Functional requirement:

Children often lose their things. So a functional requirement would be to have the product attached to a keychain so that they won't lose it. We could test this by giving a few of the keychains to children and after a week, ask them whether they can still tell us where it is. That way we know whether they can easily lose it, since we don't want that to happen.

A Look-and-feel requirement:

The device should look modern and fun. Children are easily bored and according to our survey really interested in futuristic ways of paying. We would be able to incorporate that into our design. It should also be nearly unbreakable, since children often drop things/break things. We could test the first requirement by showing the product to a test group of children and asking them whether they like it or what could improve. The second requirement we could test ourselves, we could drop it a few times and if it does not break, it fits our requirement.

An Ease of use requirement:

Most children are not good at remembering a certain pin-code and would prefer to pay by scanning their finger. We think this is a feasible and safe design and would like to incorporate this too. Again, this would be 'futuristic' and children really enjoy that. The device would be able to recognize their fingerprint. We could check this by adding our own fingerprints and try to pay with it ourselves, but that might be difficult to realize eventually.

An Ease of learning requirement:

Learning how to save money is a very important aspect of our design. Learning this should be fast and easy and we want to achieve this by giving direct feedback to the child as he pays. This way he immediately knows what is on his bank account. We would also like to incorporate a game aspect so that saving becomes associated with fun. The best way to test this, is to let a few children use the device for a few months and see if there is any improvement.

A Performance requirement:

If the device does not work, a child will be easily annoyed/ bored and he/she won't use it anymore. We need to make sure that it does not break and that it will always work. We can test this by trying out all functions ourselves and checking whether they all work without any glitches.

Assignment C:

Mapping:

A bad example of mapping is the oven in my student home. It is a combination of a microwave and an oven. It contains about 15 buttons and none of these clearly tell me how to preheat the oven. After pressing every button the first time I used it, it turned out that the button which said: 'Forced air' was to set the temperature of the oven, so that I could preheat it. I would have never thought of this by just seeing the buttons. It is very unclear.

A good example of mapping is my shower. I have two sides I can turn, one on which the color changes from blue to red, indicating temperature, and one on which are lines growing in length, indication the force of the water. By just looking at it, I can immediately see what to do and anyone could.

2. Affordance: You can immediately see some of the things you can do with your phone without even turning it on. E.g. Calling, texting taking pictures etc. But from just looking at your phone, you don't necessarily know that you can also set an alarm for example.

3. Physical constraint:

A physical constraint of a phone is the fact that different phones have different chargers. This means that it is difficult to borrow other people's chargers because they will not fit.

Logical constraint:

On the iPhone, the icon for whatsapp and the icon for calling are very similar, meaning that it could confuse some people. For most people who use the phone regularly, it is logical which means which, but for people who never use it, it might be confusing.

Cultural constraint:

We have always been thought that red means bad/stop and green means good/go. If we are deleting something off our phone, the screen shows us red letters 'delete.' Indicating: 'Be careful.' People who do not know this/ have not learned this might not recognise these warnings.

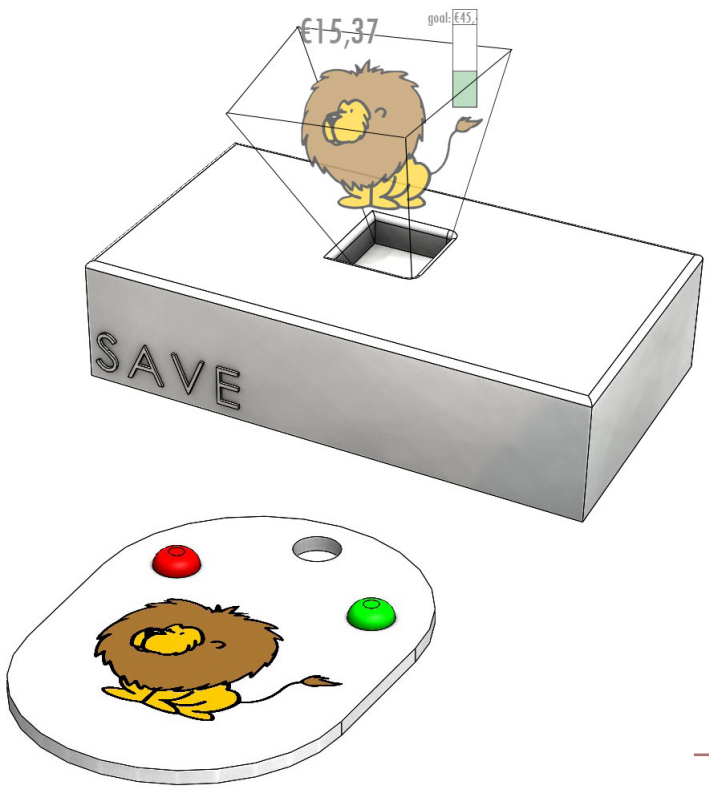
Week 4
Scenario:
A child has been saving for a certain toy for months now. In his paying device he can see that the lion looks happy and that he has reached his goal of €50. He decides to go into the toy store and buy the lego set he had been saving for. He goes up to the cash register and gives the cashier the set. She tells him he has to pay €50, he puts his device on the pin scanner, finger scans his device and sees his balance dropping to €0. He can now take home his beloved lego set.

A month later he has set a new goal of €60, he is at €15, but this time he decides not to wait, but to buy candy in the supermarket for €15. After doing this, the Lion looks sad. His parents tell him that he can buy candy sometimes, but that it is important to has some money remaining. They know his actions through their app.

Task description:
The system displays the achieved goal
The user takes the device to the store to buy something
The system displays the current balance
The user puts the device next to the scanner to pay
The system checks the balance
The system asks for validation
The user puts his finger on the scanner on the device
The system recognises the user's fingerprint
The system pays
The system displays the new balance
The user puts the device back on the keychain

Week 5
Revised scenario:
A 10 year old has been planning to buy something for a while. He has set his goal at €45,-. He checks the box in his room which says he has finally reached his goal. The lion is extremely happy. He goes to the store and buys the toy. He walks up to the cash register and puts down the toy. She tells him the price and he puts his keychain up to the pin. Additionally, he scans his finger on the keychain for safety. The light turns green and the keychain vibrates 5 times. He has now paid and leaves the store with his new toy.
He goes back to his room, the lion now looks neutral and his goal is erased, his balance it set to €0,-. He sets a new goal for himself and continues saving.

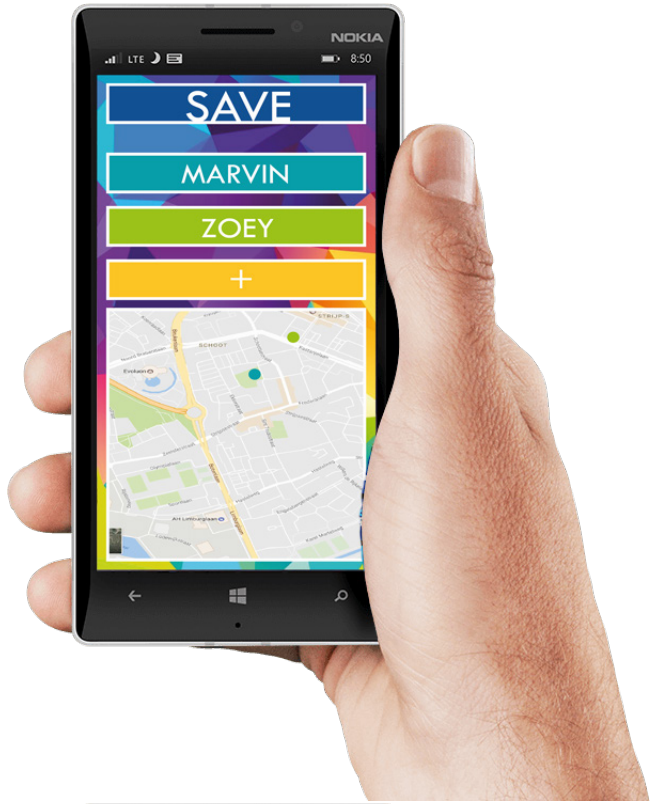
Revised task description:
The system displays the achieved goal, the happy avatar and the current balance (box)
The user takes the keychain to the store to buy something
The user puts the device next to the pin
The system asks for validation (keychain)
The user scans his finger.
The system recognises the user's fingerprint (keychain)
The system pays (keychain)
The system lights the green button. (keychain)
The system vibrates the right amount of times. (keychain)
The user takes the new product and his keys and goes home
The system displays a neutral avatar, the new current balance and a newly set goal. (box)



Online prototype:
I created an online prototype in SolidWorks to visualize the idea.
The first picture shows the box out of which the hologram shows. The hologram will show the state of the avatar (happy/neutral/sad), the child's goal and his current balance.
The second picture shows the keychain the child will carry with him. It shows the same avatar on it and two different lights. If the child spends his money on something he is not saving for, the light will turn red, if he spends it on the thing he is saving for, the light turns green.
If the child spends more than 20 euros, he will have to scan his finger. The keychain will also vibrates according to the amounts money the child spends. If he spends under 10 euros, it vibrates once, under 20 euros, twice, under 30, three times, and so on.

App template:
The app is meant for the parents. This way, the parents have an insight into the child's spendings and savings.
In the first picture they get the option of choosing which child's spendings they want to look into. They can also add an extra child if desired. Furthermore they can check where the keychain is at the moment, this way, if the child loses its keychain, the parents will know where it is.

The second picture will be what is shown if you press one of the children. It shows the amount of money he currently has, his spendings during the last month, the agenda, which makes it possible to check the spendings during the rest of the years, his goal and where the keychain is.



Week 6
Expert evaluation:
Cognitive walkthrough:
Step 1: User sets goal
Is the effect of the current action the same as the user's goal?
Yes, the effect is 'learning to save' which is the same as the goal of this device.
Is the action visible?
No
Will the user recognize the action as the correct one?
No
Will the user understand the feedback?
Yes, because a new goal will be shown in the hologram
Conclusion: Add buttons to set a goal.
Step 2: User pays
Is the effect of the current action the same as the user's goal?
Yes, with this device, the goal is to be able to pay, which is the effect of the current action.
Is the action visible?
No
Will the user recognize the action as the correct one?
No
Will the user understand the feedback?
Yes, by vibration and light
Conclusion: Add a sign which suggests this device is to pay with.
Step 3: Parent of user checks spendings
Is the effect of the current action the same as the user's goal?
Yes, because this way the parents can help the children reach their goal.
Is the action visible?
Yes, all actions are labelled.
Will the user recognize the action as the correct one?
Yes
Will the user understand the feedback?
Yes, it will give them the amounts of money spent, where it was spent and the date.
Conclusion: The app for the parents works.

Week 7
User evaluation:
I made an appointment with my old primary school to do our user tests. I went there by myself and asked the exact questions listed in the appendix to every group. I did not give them any extra information about the product. I also showed them our prototype and voice recorded the tests. These are the mos important results we conducted from the user tests.
Do you have any questions?
-Do you have to charge the keychain?
-If the batteries are empty and the keychain dies, does the device reset?
-What if you lose your keychain?
-What happens if they fake your fingerprints?
-Where do you "set" your finger scan?
-How do you know which keychain is yours? How do you recognize your keychain when two are laying next to each other?
-How do you turn the box off?
-What happens if you remove the plug from the box? Do you have to reset the box/goal when you plug it in again?
-Why is it the size it is right now?
-Can you choose your own colour?
-Will the device cost money?
Do you think we can improve on anything?
-Wanted touch screen on the hologram box, thought it would be easier to use.
-Being able to charge the keychain (wireless) instead of having to replace the battery.
-Put the keychain on a carabiner and keep with you that way (you can attach the carabiner to your pants).
-We can add their signature/name on the keychain so they will recognize their own keychain.
-Choose your own colour for individuality.
Do you have any comments?
Some children didn't want their parents to see what they were spending their money on, others actually wanted this.
The keychain smelled funny. like anise(?)
Some leave their keys in their bike when at school. The keychain has to be waterproof.
Thought the holograms were cool.
Enjoyed the test and liked the concept.

Reflection

During the last quartile I followed the course User Centered Design. Together with my group, I designed a Payment system for children including a box with a hologram on which the user could set their saving goal and view his balance, a keychain that gave direct feedback and with which the user could pay and an app for their parents to check the user's expenses, location and balance. The main goal of the course was to learn how the user can be involved in all aspects of the design process. To achieve this goal, we conducted interviews, tried to put ourselves into the user's perspective and tested our final product.

I quickly suggested to choose children as our user group. I enjoy working with children and babysit once a week, but this was not the only reason for my interest in this group. Children are still incredibly impressionable and by designing something for them we could actually teach them something. Additionally, children have a massive fantasy and could think of ideas we had never even considered. During the user test this became especially clear. When we asked the question 'How would like like to pay in the future?' We got responses like: 'With drones, games and holograms.'

During the course, I discovered how much I enjoyed the user aspect of the design process. I enjoyed conducting the interviews and especially doing the user tests. This is mainly because I simply enjoyed the actual contact with the user, when I showed them our product, their main question was: 'when will we be able to buy it?' Their inexperienced and positive outlook motivated me.

Not only did we get positive feedback from the user, but also from our assessor. Furthermore, the environment in our group was also positive. I noticed that this motivated me even more and added to how much effort I put into the course. This did means that in my opinion I spent a lot more time working on the product than the others, since I did the user tests made the 3D models and templates, and made the report in inDesign, I also corrected a lot of the English in the report and the things I thought could be done better. In that aspect, I am too much of a perfectionist and would like to learn to let go of several things in the future and trust my groupmembers with the work. They over all delivered great quality work. Despite the fact that it was a lot of work, I did not mind doing it, since I enjoyed it so much.

I had never worked with inDesign and SolidWorks before and can now make entire reports and 3D models. For me, these are very valuable new skills. Other things I have learned were how to get in contact with the user, and how to incorporate the user's feedback into our own design. Both were much more difficult than expected.

I started to learn from rejection, since I called 15 different schools of which none were interested in working with us on the projects. Eventually, I contacted my old primary school and luckily they were interested. Next time, we should start contacting different users as soon as we get the assignment. We were quite early, but apparently not early enough.

Nevertheless, we eventually managed to do everything and reach great results, in my opinion. I am really proud of the work we have done which did not feel like work at all since we had so much fun together.

In the future I would definitely like to continue learning about the user. I am even contemplating following a course at the faculty of psychology and technology to actually get into the head of the user even more. All and all I found this course incredibly valuable for my personal development as a designer.

Peer review

Your name: Sophie Baars
Write the name of each of your group members in a separate column. For each person (including yourself), indicate the extent to which you agree with the statement on the left, using a scale of 1-4 (1=strongly disagree; 2=disagree; 3=agree; 4=strongly agree). Total the numbers in each column.

Evaluation criteria	Koen Spijkers	Lonneke Lardinois	Lisa Frissel	Sophie Baars
Attends group meeting(s) and arrives on time.	4	4	4	-
Contributes meaningfully to group discussion.	2	3	3	-
Completes group assignment on time.	3	2	4	-
Prepares work in a quality manner.	2	3	4	-
Demonstrates a cooperative and supportive attitude.	4	3	4	-
Contributes significantly to the success of the project.	2	3	3	-
TOTALS	17	18	22	-

1. How effectively did your group work?
I personally think our group worked quite effectively. Now and then, some people did not finish their work on time which meant that we had to postpone the group work. (A discussion of our different individual excersizes.) The overall effectiveness of our group however was positive. I must admit that I enjoyed working with this certain group which meant that I also enjoyed talking to my group members about things outside of the course. This can create less effectiveness in some groups, but in my opinion, this actually made working together more fun and helped towards a better final result.
2. Were the behaviors of any of your team members particularly valuable or detrimental to the team? Explain.
Every group member had stronger and weaker points. Koen is a nice person to work with because of his seriousness, during the meetings he contributes a lot to the work. The quality of his work on the other hand is a bit lower. His English level is not too high which made it difficult for him to write a lot of the report. Lonneke delivers great quality work but has handed in a few of the group assignments too late, which did not necessarily bother me too much. Lisa demonstrates a cooperative and supportive attitude and delivers great work too. I found her contribution particularly valuable.

Koen Spijkers

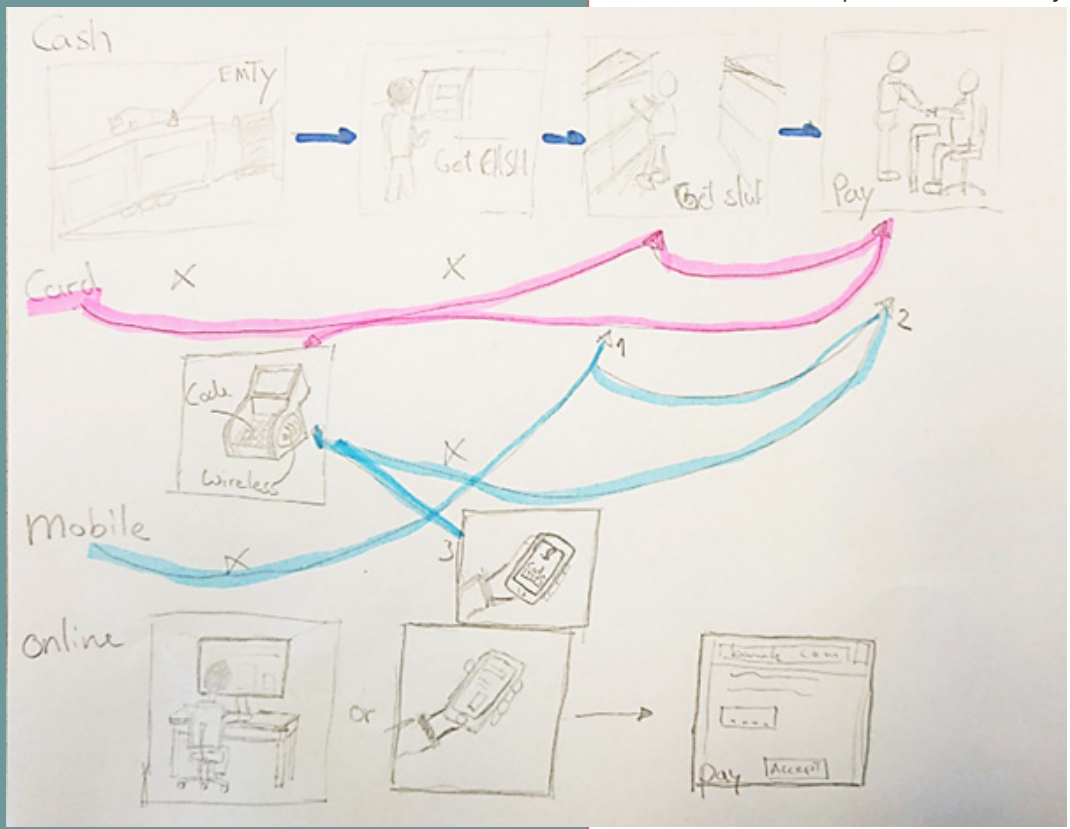
Individual excersizes

week 1

the story board is about paying with 4 methods

with the lines you see the difference steps the person has to go through to pay. Cash need 4 steps, card need 2 steps, mobile need 2 steps, online need 2 steps

the storyboard tells that it is much easier to pay digitally. but there is also a downside on it. because paying will be much easier and if the customer pays a small or big amount there will be no difference in paying if the customer will pay digitally. So the customer will spend their money much easier and don't notice the amount of money by paying.



5. Individual: List relevant experience goals (see ch. 1) and motivate why you chose these ones.

The device has to learn children about saving their money for goals. The user has to learn how to cope with money and understand the value of money. With challenges and goals the user can save money for a goal.

Satisfying/Rewarding: The device has to be rewarding for the user. If the user reach a goal the device must give a satisfying and a rewarding experience. Also the device has to remind the user of the goals it has achieved.

Helpful: the device has to help the user with controlling their saving and spending of the money they earn. The device has to make a clear overview of the users budget. About what they earn and their spending habits.

Motivating: with the device you can set goals. the device has to motivate the user to reach their goals. the device will show their achieving and the user will see how much they have achieved with saving and spending.

Enjoyable: the user group are children. This will be their first encounter with money. So for the users it has to be enjoyable to learn to cope with money. They have to enjoy to spend their money well and save their money for goals.

7. Individual: Apply the notions of effectiveness, efficiency and satisfaction for the case (i.e., write contextualized definitions)
Effectiveness
The device will have short commands so goals can be set easily without pushing a lot of buttons or going through a lot of menu's. the design will be easy to use. We will test our design and let children test our design on how much mistakes the users make to get our goal. The mistakes has to be a maximum of 1 per assignment. On the device there will be mapping such as guidelines to guide the user with achieving their goals. Guidelines such as a word or icon on a button to say what the button does.
Efficiency
The device has to be an easy to use product. to measure the efficiency we will test the product on the target group and see how long it takes to set goals or pay with the device. If it takes too long the target group will be distracted and the device wouldn't be used. The device has to have a simple menu, instant feedback and fast connection. The main goal is paying and this has to be easy and simple.
satisfaction
The device has to stimulate the children to work with it. The device has to be rewarding for the user. If the user reach a goal the device must give a satisfying and a rewarding experience. Also the device has to remind the user of the goals it has achieved. We will test if the children like working with it and if they want to use it in the future

week 2
Persona hypothesis:
Johan grootjes
Personal profile
Age: 7
Gender: male

Background
Johan has a brother of 9 and sister of 5. He lives in Geldermalsen with his parents. He sit in group 6 of highschool beside school he plays soccer and computer games. He also like to play outside with his friends. He likes the family dog Guso. He gets allowance of his parents and put is in his saving box to buy toys or candy
Behaviors
Johan is social shares his toys with his friends brother or sister. He likes to help his sister. His understanding of the value of money is not really clear to him. If he wants something expensive he asks his parent if he can have it.
attitudes
johan is eager to learn
likes sports
can be stubborn
needs
simplicity and ease-of use
planning tools
learning tools
guidance

Enquette kinderen en omgang met geld
inkomsten
- Krijg je zakgeld van je ouders, hoe vaak?
- Hoeveel zakgeld krijg je, en op wat voor manier?
- Heb je andere inkomsten dan alleen zakgeld?

uitgaven
- Spaar je jouw geld voor spullen of dingen die je wilt gaan doen?
- Waar geef jij jou geld aan uit?

budget
- Heb je geld achter de hand of maak je alles op?
- Weet je hoeveel geld jij op het moment hebt?
- Waar bewaar je jou geld? Heb je een speciale plek?
- Heb je vaak geld op zak?
- Heb je een eigen bankrekening?

Manier van betalen
- Wat voor manier vind je makkelijk om te betalen?
- Waar betaal je mee in de winkel?

Marlies
10 jaar oud
Houd van zingen en met vriendinnen afspreken. Daarmee gaat ze vaak skeeleren en speelt ze ook spelletjes op de computer.

inkomsten
- Krijg je zakgeld van je ouders, hoe vaak?

Marlies krijgt elke week zakgeld van haar ouders.
- Hoeveel zakgeld krijg je, en op wat voor manier?

Marlies krijg 2 euro per week en dat krijg ze contant in haar spaarpot
- Heb je andere inkomsten dan zakgeld van je ouders?

Ze krijgt nog geld als ze klusjes thuis doet. Zoals de vaatwasser opruimen, of met haar kamer opruimen. Ook krijgt ze geld als ze een goed rapport heeft van haar opa en oma. Meestal een euro als ze mee opruimt.
uitgaven
- Spaar je jou geld voor spullen of dingen die je wilt gaan doen?

Marlies spaart meestal. Maar soms doet ze de helft sparen en de helft uitgeven aan leuke dingen.
- Waar geef jij jou geld aan uit?

Marlies geeft geld uit aan spullen om mooi te maken, speelgoed en soms wat lekkere snoepjes.
budget
- Heb je altijd geld achter de hand of maak je alles op?

Marlies heeft geld in haar spaarpot en op haar bankrekening nummer staan
- Weet je hoeveel geld jij op het moment hebt?

Marlies weet nu niet hoeveel ze precies heeft
- Waar bewaar je jou geld? Heb je een speciale plek?

Marlies heeft geld in haar spaarpot en op haar bankrekening nummer staan
- Heb je vaak geld op zak?

Marlies neemt alleen geld mee als ze iets wilt gaan kopen.

- Heb je een eigen bankrekening?

Ja marlies heeft een bankrekening
Manier van betalen
- Wat voor manier vind je makkelijk om te betalen?

Marlies betaald nog wel alles kontant
- Waar betaal je mee in de winkel?

Marlies betaald nog wel alles kontant
Marlies is nog niet echt bezig met geld. Ze wilt soms duurdere spullen kopen en dat vraagt ze dan aan haar ouders of ze dat mag en haar ouders betalen dan vaak voor Marlies wat ze wil.

week 3
Assignment A

Functional requirement: our target group has a first encounter with money. The will have to learn how to manage money and the value of money. The device has to help the user to manage their budget. the device will give an oversight of the user it savings on a display(fysical) and with the device the user can set goals. with setting the goals the user will need to save an amount of money for a goal. If it is expensive it will take long to achieve the goal. With this setting the user will learn the value of expensive and cheap in saving time.

Look-and-feel requirement: the device has to be interesting for the children because children are easily distracted. With the survey we noticed that the children are interested in futuristic ways of paying. the product shall be attractive to the user group by using these new ways of paying on our device. Also the device will have futuristic features by using a hologram. The product has to be child friendly.

an ease of use requirement: the product has to be minimalistic and show only the user goals and budget. The user can go to another menu by clicking on buttons on the device. Also setting goals with these buttons. With the token the user uses it's fingerprint to pay. So it will be easier to use than to pay with an code.

an ease of learning requirement: the device will show how to use it and give tips what to do. So the user can learn how to work with the device. The avatar of the device will ask if the user want to set an goal with their earned money. Also there will be an manual of the device. So the parents of the children can learn them how to us the device

A performance requirement:
The device has to be a solid device. If it isn't working properly the target group will be distracted and won't use the device. The device is also for paying in the real world so it has to be save without glitches. The device will have to give feedback if the user does something or there goes wrong. The device first has to thoroughly test before putting it on the market

Assignment C

week 4

Exercise A: scenario (individual) Considering the chosen concept of a product/service to "solve" your design problem, your persona's and your requirements: Write a scenario (about 150 words) that explains the overall chosen concept, describes the interaction between the user with your design, and illustrates the user experience. Choose your user(s), the setting, and describe a sequence of actions and an outcome. Focus on personal motivations, reasons for using the device, and capabilities of users. Scenarios emphasize experience...

The user is a child that gets allowance from his parents or get money by doing chores. With the digital world it is difficult to understand the value of money it is not physical any more. Therefore the user wild spend their money easily and won't notice the consequences. The design will show their goals and how much the user has saved. The users will notice how much work they have put in their goals and will get insight/understanding of their spending.

Johan sees a nice toy in the toyshop and is excited to buy it. It is 50 euros. He goes home to his device and looks on the device how much money he has. But the device shows he doesn't has enough money. He has 30 euro's, so with the device shows he has to wait 4 weeks because he gets 5 euros a week. But he wants to have the game now. So now he wants to do extra chores to earn money for the toys. After doing a lot of chores in a week he gathered 20 euros and sees on his device how much he worked for it. He wants to draw the money and buy the game. With the device he notice that for the work he has done it is a expensive game. because of the device he is more aware of the value of money.

Exercise B : Task description USE CASE (individual) Formulate a specific task that users can perform with your chosen concept and scenario. Use the format of a use case Make a clear task description of the envisioned use. A task is a sequence of actions to fulfill a goal (something that a user wants to achieve in the context, e.g. ask information, input data, etc.). Formulate this goal and specify multiple subtasks: describe all necessary interaction steps to achieve the goal and accomplish the task in the format of a USE CASE. Use cases focus on interaction details...

The children have to learn about the value of money.
The user has a device/service that give an overview of their money. The user has as goal to buy a game. With the device it can earn the money it needs(from it parents) by doing challenges. The user sees what amount of money it earns and how much more work it has to do to finish its goal. If the user want to get its goal then it will show the user how much work he has put in it.
The user gets the money on an account on the device(digitally). The user has to type in what amount of money it wants from the device. The device will show how much the user has and will ask if the user is sure. It will print barcode's/chip of a max amount of 10 euro's

week 5 prototyping

The user has a device/service that give an overview of their money. The user has as goal to buy a game. With the device it can earn the money it needs(from it parents) by doing challenges. The user sees what amount of money it earns and how much more work it has to do to finish its goal. If the user want to get its goal then it will show the user how much work he has put in it.
The user gets the money on an account on the device(digitally). The user has to type in what amount of money it wants from the device. The device will show how much the user has and will ask if the user is sure. It will print barcode's/chip of a max amount of 10 euro's. the user can handover the barcode's/chip in the store and then buy what it wanted to buy.

week 6

assignment

1. Visibility of system status

Is status feedback provided continuously (e.g., progress indicators or messages)? (network connection, battery status etc.)
The Standalone device is giving feedback continuously, the user sees what their goals are and what their spending's are. Also the standalone device is connected with the wifi and that is visible. The device is on net power 230v

Are warning messages displayed for long enough?
The warning messages of connection will display 15 seconds. After that you will see a wifi icon with a red line through it. With setting the goals the user will get a notification if the goal isn't set.

Does the user receive full and continuous feedback about the results of his actions? 2. Match between system and real world
With the stand alone device the user will get the feedback if he links his token with the device. The device will show the user it's goals and balance on their token.

2. Match between system and real word

Are the words or symbols used familiar to the user?
We will use the familiar symbols that are well know. Such as the $ for dollar and € for euros. Also the main icon for wifi will be used.

Is information presented in a simple, natural and logical order?
The interface of the standalone device is simple and minimalistic. The user will quickly understand what means what. With the token we use the colors red and green. So If a finger recognition failed the red light will blink.

Are important controls represented and is there an obvious mapping between them and the real controls?
We are using a navigation wheel on the device. If you push this the button will come out and you can turn the wheel to set your goals. For the first time it will be searching for the button

3. User control and freedom

Are users able to undo unwanted actions?
The user only can set goals with the navigation wheel. so the action are minimum

Can operations taking a long time be cancelled?
no, If the button of the wheel is pushed back the device will ask if it has to be canceled and if you don't push back the operation will be cancelled.

4. Consistency and standards

There will be a main template where the interface is built on. With this templated it is already decided where the buttons and similar icon should be on the interface. So there will be no inconsistencies.

5. Error prevention

Is user confirmation required before carrying out a potentially 'dangerous' action ?
If the user want to set a goal the device will ask an confirmation if the goal the user wants to set is wright.

Does the system prevent you from doing undesired actions in accidents?
if the user is setting its goals and accidental pushes the wheel button back in the device it will ask if the user is sure to cancel the operation

Are the options given in dialog boxes obvious?
If the navigation wheel is out, the interface will show set goal! And if you turn the wheel the user can set the amount of the goal.

Is the system robust and safe enough for its surroundings?
The system is very compact and simple build.

6. Recognition rather than recall
Is the functionality of the buttons/icons obvious from their labels?
the navigation wheel is hided in the device. If you push the navigation wheel it will come out of the box and you can turn it. but there is no guide line for the button.

Is the relationship between controls and their actions obvious?
It is obvious that the navigation wheel is for setting the goals because it stands above it.

Is it possible to search for information rather than entering the information directly?
Token: on the token the fingerprint symbol will be used. To immediate show that you have to use your finger.
Standalone device: there will be guide words to see where to push to set goals or hold your token

Is the functionality of device controls (e.g., thumbwheels) obvious?
see ohter comment

7. Flexibility and efficiency of use
Does the system guide novice users sufficiently?
The platform is simple. The user can set goals.

Is it possible for expert users to use shortcuts?
no

Is it possible to access and re-use a recent history of instructions?
no
Is it possible to replace and restore default settings easily?
no

8. Aesthetic and minimalist design
Orderly organization of interface elements?
The interface is minimalistic

Functional use of colours?
For the token we are using red for failed and green for confirmed

9. Help users recognize, diagnose, recover from errors
If the goals isn't confirmed a message will show up, "the goal isn't confirmed yet. Are you sure you would like to proceed?" if the user push again the goal isn't set. If the user turns the
wheel the user will be back at the goal screen.

10. Help and documentation
The device will be provided with a user manual.

Reflection

What did I expect
I want to make designs that will make people's lives easier. In order to do so it is important to know what the people need. With the elective User Centered Design I wanten to learn more about creating a design that works for the target user.
I hope to learn methods to collect information about the user that is really valuable and crucial for the design. I also wanted to learn how to create a solid base plan based on what the user needs and integrate this information into the design. Learning these skills will be a crucial part of designing and are very helpful in the future.

What have I learned
In the first week I learned about the main usability subjects: effectiveness, efficiency and satisfaction. These three subjects are central and contibute to the question if the product is going to work or not.
To create a design it is important to specify the context of use. To know its perceptual, cognitive, communicative and physical abilities and limitations. Using this information I will better understand the target group which can be used in your design.
Creating a storyboard is important to translate the situation of the subject on paper. I made storyboards of the current situation and the future situation. By making these storyboards I am analyzing the current situation and creating guidelines for the situation I want to go to.

In the second week we created personas to get a better understanding of the user. With these persona's I noticed it is easier to create ideas for the design. Because it is easier to talk about the needs, actions and characterizations of the user.

After creating the persona hypothesis we continued with an interview setup for our target group to get information about their handling, which comes back in the implementation of the design. The interview setup is a guideline for the information that is required, but it is important to let the user tell their story about their experiences. With this new data the goals for the definite personas are created.

In the third week we started with brainstorming, using the new data, about the requirements of the design. We noticed that it is important to be specific, for example, making clear what we mean by ease of use or the ease of learning. By making it specific we got a better understanding of our product, but also a better understanding how the product should look.
An example was that we had to make the symbols and use of interface recognizable.
By looking at the "perception – cognition – action" cycle I learned more about how the interactions with the user and the device should be and how to make a device that has logical constraints.

In the fourth week we came up with a couple of ideas and we created scenarios and task descriptions. With the scenarios I learned how to integrate our concept in to the users life, describing the interaction and the experiences of the user. Out of the ideas we selected 3 of them for our concept and tested them with our experience goals by using the QOC analysis. Next we used our persona's on our concept

In the fifth week we started creating our low fidelity prototype. Because we first wanted to look if it was possible to create a hologram. After this was confirmed we continued with the design. The shape of the hologram device and the keychain had to be simple and helpful. We created a box which is simple and recognizable. The box will project the hologram if the user will hold its keychain against the box. To show the interactions we made cardboard holograms and we used the action cycle to see what the card-

board models had to show on it. For the keychain we also created more prototypes to show the interactions.

For week six I did the heuristic evaluation and it is very helpful because it will guide you through the functionality of your device. It will give you a fine guideline throughout the system you are developing and will ask important questions about the system. I learned that the heuristic evaluation is more directed into the way the system works and that the cognitive walkthrough will focus more on the user. With the heuristic evaluation I also noticed that designing less interactions for one solution and to making the interactions more specific for the design improves the overall experience.

The seventh week was very interesting because all the work, the analysis, concept design and implementation will be tested by the user. I was looking forward to the reactions of the user, to see if the low fidelity prototypes worked properly and getting valuable feedback back from the user.
With the results it was interesting to see how the user interacts with your design, learning about the strong points and the weak points of the design according to the users. Out of the user test there were new insights. Things we didn't thought of and preferences the user liked more. For example about the user prefers to load the battery wireless instead of changing it.

peer review

1. How effectively did your group work?
The start of the project in the first week was a little slow. But at the week that follow up the groups work was going better. Al the group members were on time at the appointments or they communicated that they are later then we planned. We all contributed ideas about how the design should look like and made big effort for the end results. At the meetings we were sometimes disturbed by other people and then the focus was gone. But at the end we worked focused on the final result. At the end I am happy with the end result.

2. Were the behaviors of any of your team members particularly valuable or detrimental to the team? Explain.
At the end we had to compute the user test. Sophie had managed to do the test at her primary school what was very helpful. Because it was very difficult to test a large group of our target group(children 8 – 12). She is working hard for good results and does a lot of work. Lisa is very helpful and gives a positive input with in the team. She is a real team player and wants to get a good result. Lonneke had valuable input with designing the presentations and creating useful drawings for the report.

Evaluation criteria	LIsa Frissel	Sophie Baars	Lonneke Lardinois	Koen Spijkers
Attends group meetings, arrives on time.	3	3	3	-
Contributes to group discussion.	3	3	3	-
Completes group assignment on time.	4	4	3	-
Prepares work in a quality manner.	4	4	4	-
Demonstrates a cooperative and supportive attitude.	4	4	4	-
Contributes significantly to the success of the project.	4	4	4	-
TOTALS	22	22	21	-

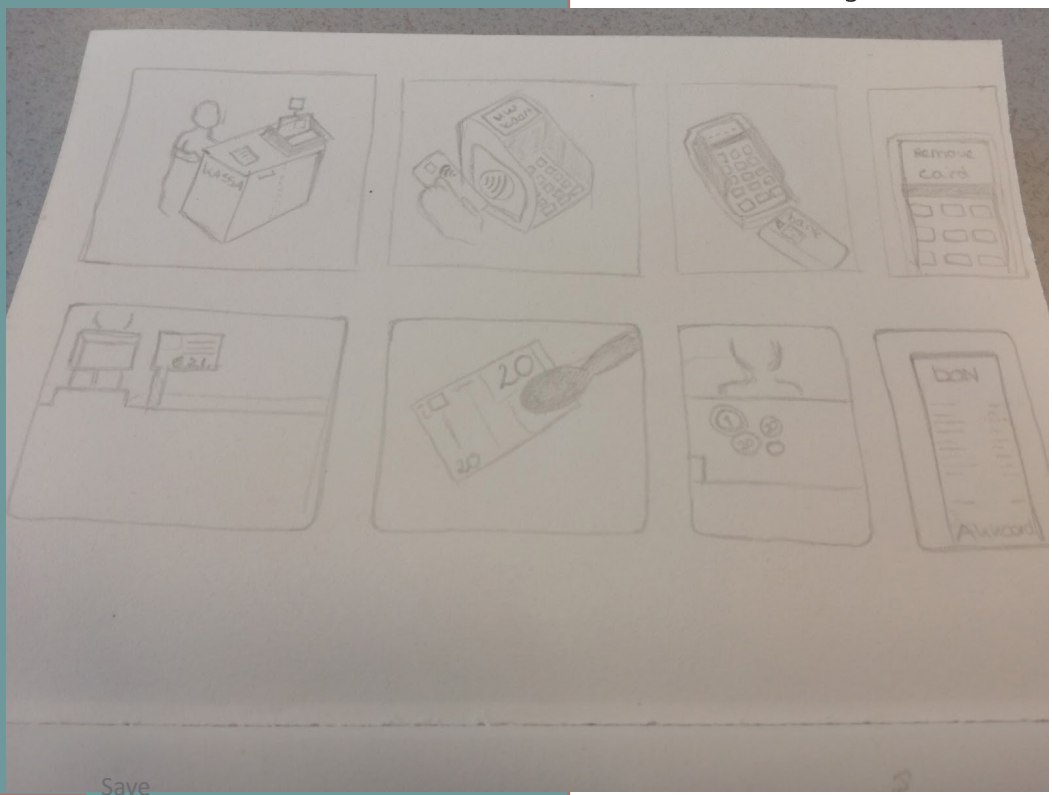
Lisa Frissel

Individual exercises

Week 1:

Storyboard for the design case

This is the storyboard I made. It describes the current situation of paying. The upper row describes paying with a card and the bottom row paying with cash.



Experience goals

Motivating - I think this is a really important experience goal. How do you make children motivated to save money for instance? How do you make parents motivated to support their children learning how to deal with money on a young age? If we can get users motivated in the right way, our notions of satisfaction and effectiveness will be high.

Helpful - In the end we want to create a design that combines the benefits from electronic paying and paying with cash money. So it should help our users making paying easier. If our design doesn't help our users in some way, the design would be useless.

Easy to use - Our target group is going to be children. Every child is different and they grow up at different speeds, therefore we need to design something easy and simple that all children can use, while is still does it's job.

Application of notions of effectiveness, efficiency and satisfaction for the case.

Efficiency : How good a product is at doing what it is supposed to do. How long it takes for children to pay, and for parents to see what the paying behavior of their children is. Children get distracted easily, and although we want our design to be fun for children to use, it shouldn't have too many options and additional functions. The main goal is still paying and we should keep this easy and simple. We can test the efficiency by testing how long it takes for us to pay (we are the designers, we should be able to do it quickly) and then set an average time for children to

do it. If too many participants have an higher time, we know our design isn't efficient enough.

Effectiveness : The way a product supports users in carrying out their task. Create a test where we measure how many mistakes children makes before they understand the design. Our design should be easy to use. Although children learn quite fast and are comfortable with new techniques it should be a clear and easy design. Again, we can test this easily by letting children use our design and see how many mistakes they make. If it turns out they make too many mistakes (what is to many?) we know we should adjust things to make it easier and simpler.

Satisfaction: does is make the user feel comfortable. We can evaluate this by questioning children after the test. They can tell us if they liked working with it and if it made them feel comfortable. We can also test this after a they used the method often. Does the satisfaction rate change? If, for example 75 % (?) of the children say they would want to use in the future, we know the design meets the satisfaction requirement.

Week 2:

Persona hypotheses

What different sorts of people might use this product? Beginners. Our target group is children. We want to design a system/product for them to pay with. They haven't learned yet how to pay (without cash) and don't really know the value of money yet.
How might their goals, needs and behaviors vary? Every child is different. Some learn really quickly while others take some time to learn things or grow up. Also, the child's education differs from parent to parent. Some children want to buy everything they see and don't save any money, while other don't feel the need to spend a lot of money. These are all things to take into account.
What ranges of behavior and types of environments need to be explored? Like described above, some children save a lot of money in order to buy something big (or they don't know yet what to buy), while others are very impulsive and want to buy something the moment the see it. The environments can change as well. Some children grow up in a family whom have more money to spend then some other families.

Product: System/product to pay with
Roles: child, parents and bank
Child
Goals: paying on their own. Saving money.
Behaviors: use few times a week, impulsive
Environments: friends who buy stuff as well, parents look out over them.
Parents
Goals: Teaching child how to deal with money
Behaviors: frequency of use
Environments: Amount of money they earn, way they grew up themselves
Bank
Goals: Earn money, get clients to use their system/products.
Behaviour: Motivated
Environment: Have a lot of money and a lot of clients.

We all did a separate pilot interview and made the questions separately. After everyone conducted a pilot interview we are going to review and discuss our interview set up.

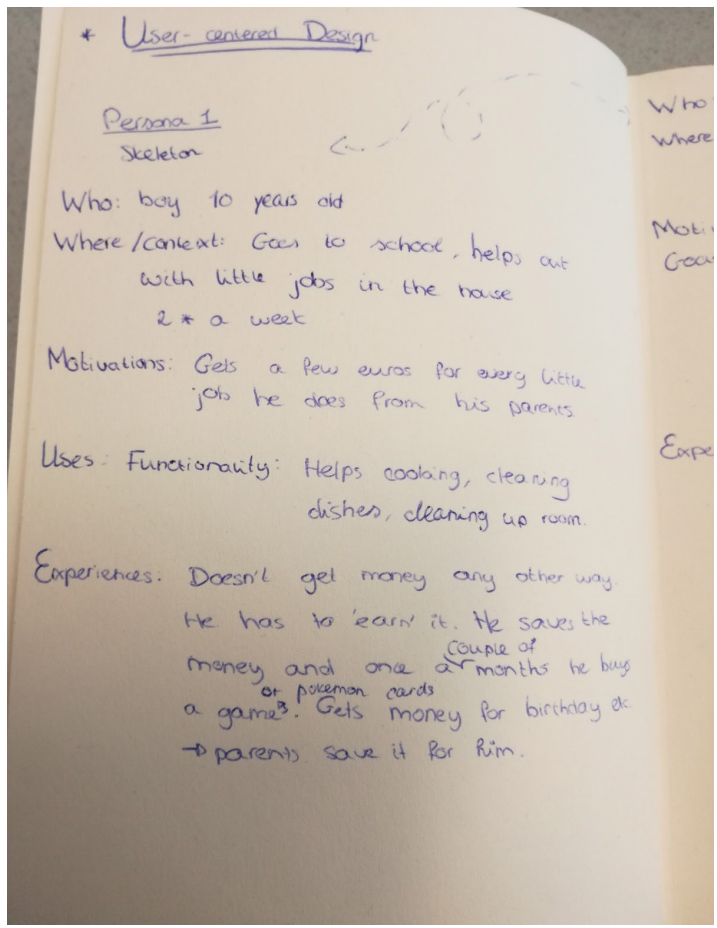
Pilot interview 1

Mother
Has a 10 year old son
How much money does your child get?
We give him 2 euros every week and he gets money from his grandparents on his birthday. They also often give him candy or trips to the zoo or something when they visit.
Does your son know where money comes from? Or what the value of money is?
Yes he does, he knows he can't buy everything he wants. He really wants to have job so he can spend extra money, but he is too young right now.
Do you and your husband know when and where he spends money?
We do know when he is going to buy something big, but we do not know exactly when is buying candy. Sometimes I find empty chips backs in his backpack, but I think

that's okay, he is a child after all.
Does your child buy things on his own?
Yes, he sometimes buys food on his own, but we live really close to a supermarket so we know it is safe. He is not allowed to go to the village on his own to buy things.
Would you consider giving him a bank account and a card?
Yes we want to do that, but not until he goes to high school. We don't think he is responsible enough yet to be carrying a card with him all the time. Knowing him, he would lose it all the time or spend his money way too easy.
Do you and your husband agree on money with relation to your child?
Yes, we do.

Pilot interview 2
Girl 6 years old
Do you get pocket money and how much money do you get?
I get 50 cents every week.
Do you receive money on other occasions? Like birthdays or SInterklaas?
Yes, on my birthday I sometimes get money on my birthday.
And how much do you get?
I do not know. My parents keep the money I get on my birthday.
Where do you spend your money on?
I save it in a wallet and sometimes I buy something. For example Ice Cream or toys.
What do you do when you want to buy something, but you do know have any money?
I do not know, I usually go to my mother and ask for it.
Do you think you have enough money?
No. I would like to have more money so I can buy more things.
Do you ever go to the store alone and buy something?
Uhm, no. But i buy ice cream on my own sometimes with my brother.
Would you like to have you own card?
Yes, because then I can buy everything I want.
How much money do you have at the moment?
I do not know.
Do your parents know how much money you have?
I thinks so.
Is there something else you would like to say about money?
No, not really.

Here I made two persona skeletons.
The first one describes a 10 year old boy and his mother. He has to earn his money by doing chores or helping out in the house. He has a realistic view on money.
The second one describes a 8 year old girl and her mother. She's very impulsive and her mother spoils her a little bit. She has no realistic view on money.



Who: mother 41 years old

Where/context: Has a job and takes care of children & house together with husband.

Motivations/ Goal:
- Gives child a few euros when they help with something in the house
- Thinks it's important for a child to learn money doesn't come for free but lets the kid decide what to do with the money.

Experiences:
- Sees other children growing up with no realistic image of meaning of money and wants to ~~learn~~ give her child some experience.
- Saves (big) money from birthdays etc for later.

Persona 2

Skeleton

Who: Girl age 8

Where/context: Gets 0,50 cent every week

Uses: Functionality: Not a good saver, buys stuff as soon as she's got money.

Motivations: Hasn't learned yet/doesn't want to learn that you can save money and buy something bigger in the end.

Experiences: Cries when she wants to buy something she cannot afford and then gets it from her parents. Buys candy, nail polish, things for in her hair.

Who: Mother aged 35

Where/context: Part time job, does a lot in house, loves her ~~child~~ only child

Uses: Gives her child pocket money every week + buys a lot of extra things like magazines and games.

Motivations: Doesn't see the point of letting her child save money. Likes to spoil her child.

Experiences: Didn't have a lot of things when she grew up, so wants to give her child everything.

Week 3:

A functional requirement : Children lose things really quick, so one function should be that it's not too small and it's something they carry with them all the time. Children don't have any phones or wallets with them. Maybe a bracelet or watch or something on their clothes that they won't lose or forget. Also, children like games and colors and stuff like that, but we need to make it functional and not get distracted by the side 'functions'.

A look-and-feel requirement: A design that feels comfortable in children hands (size varies), provided it's something you can hold, and looks nice. Maybe children can customize it or choose between colors. Usually they also like animals/cars/flowers etc. Use design's that can change because they often change their mind. They'll get bored or want to buy a new one otherwise. You can test this simply by making a few design and let children choose which ones they like and why.

An ease of use requirement: A lot of children had as a complaint that a pin code would be difficult to remember. We have to design something that's really easy, though still save for robbery. In addition, the action itself should be simple, children don't want something too complicated or long. Why have the action of holding your pass/phone against a scanner, why not just press a button on something you're wearing for example.

An ease of learning requirement: Although children are flexible and get used to new techniques easy, we need a design that's easy to learn. I think it is part of the ease of use requirement and the functional requirement. The action should be simple and clear, without to many options and additional buttons or crazy stuff, this will also make it easier for children to learn. I think we can test this really well and make sure children get it right within a certain time period or within a few times trying. They should remember it afterwards as well.

A performance requirement: Children aren't usually as smart as we are. If something doesn't work they'll don't know what to do or how to fix it (talking about advanced technology). We don't want them to panic or cry or dislike our design. So we need something from which we are sure it works and has a high performance rate. Testing this a lot and perfecting it is part of this. Say we use a hand scanner for example, and it doesn't work because their hands are really dry or wet. We need to prevent them for panicking and make sure they either know what to do or make sure our design works in those cases.

Mapping:

During the lecture, we got an example of a map of turning a stove on and off. I think that was an example of bad mapping. A few days ago, I wanted to buy coffee at a tank station along the road, but the buttons for the specific coffee were drawn really bad, they all looked alike and it wasn't clear at all which button would give you which coffee. Another mapping example that I don't really like are the options on your phone. I know how it works because I already knew from previous phones or because of trier and error. I think for a stranger who isn't used to the certain program doesn't really know what everything does just from the color and picture. Nowadays there are so many options and apps, it gets really complicated. Good mapping is for example the coffee machine at my parents home. It's clear how it works and what button will give you which coffee.

Affordance:

Your phone has a lot of affordance principles. A few are calling, looking up information, entertainment, listening to music etc. A simple example of something it cannot to: You can't use it as something to drink with. You cannot brush you hair with it either. You also can't use it as a tool to cook with.

Constraints:

Physical constraint: There are many different phone sizes. If you've got a less popular phone, it's hard to find a case you like. This is a physical constraint, you can't just use someone elses phone case.

Logical constraint: For me it's logical that if I press the moon icon in my phone, it will switch to night mode. If I press the sun icon, it will switch back to day mode. This is common-sense reasoning.

Cultural constraint: When you've missed a call, it will be

red. I grew up learning that red usually indicates warnings or stop signs. Therefore I know it is a call i missed, and not a call that I made myself.

Week 4:

Scenario

It's saturday. The father of Tom (10 years) transfers 20 euro's to the bank account of Tom. He does this through a "normal" already existing app or online. Tom comes back from his guitar lesson and sees his box on his desk. The box projects a happy, dancing dog and the number 120. The number stands for the amount of money he has got on his bank account at the moment. The dog is smiling and dancing because he has reached his saving goal. That afternoon he goes to the toy store with his mum. He takes the oxboard he wants to the cashier and takes out his key chain. He puts the keychain against the pin scanner and puts his finger on the device for an extra finger scan (the amount of money is too high to only use the device). The green light shines for a couple of seconds indicating the transaction was approved. The key chain gives direct feedback, it vibrates and $4,04 appears. When he comes home his projected dog looks natural and is sitting still, it is time to set a new savings goal. His parents can do this through the app or he can do it by turning the button on the box.

Task description

The user goes to check-out and wants to pay.
The user holds keychain next to the paying device.
The user holds finger against the back of the keychain.
The system denies the transaction (didn't recognize fingerprint).
The system turns on a red warning light
The user holds finger against the back of the keychain again.
The system recognizes the finger and approves the transaction.
The system will vibrate a few times, according to the money spend
The system shows new bank balance and the avatar with a certain expression.

Week 5:

The task-description stayed quite the same as the one I made in week 4. I added a few more details.

The user goes to check-out and wants to pay.
The user holds his/her keychain next to the paying device.
The user holds his/her finger against the back of the keychain.
The system denies the transaction (didn't recognize fingerprint).
The system (keychain) turns on a red warning light
The user holds his/her finger against the back of the keychain again.
The system recognizes the finger and approves the transaction.
The system (keychain) show a green light.
The system (keychain) will vibrate a few times, according to the money spend (1 vibration every 10 euros)
The system (hologram) shows the new bank balance and the avatar with a certain expression.
the system asks the user to set a new goal.

Week 6:

Heuristic evaluation

A heuristic evaluation is a systematic approach whereby you review your design and compare it against usability principles. It should not replace usability testing, the problems you face are different than those found in a usability test. An advantage of using a heuristic evaluation is that you can obtain feedback early in the design process and you can use it together with other usability testing methodologies.

1. Visibility of system status

The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.
Is status feedback provided continuously (e.g., progress indicators or messages)? (network connection, battery

status etc.)

Keychain: No, our device vibrated and works with two lights, but it doesn't day how much battery is left. It also does not indicate if the nfc connection works or not (the key chain itself could be broken as well for example).

Problem: The device works with a battery but doesn't show when the battery is empty.
Solution: The app will get a message saying the battery of the keychain is low and suggest to replace the battery. The hologram will show this as well.

Hologram: No, there is no status feedback given.
App: Yes, the device on which the app will be, will show how much battery there is left. It can also say where the keychain is at the moment and where there has been paid.

Are warning messages displayed for long enough?
Keychain: Yes, our main focus was to give direct feedback, this will be only a few seconds. This is enough time for the feedback.
The light will be shown 2 seconds + vibrating depending on the amount of money paid.
Hologram: Yes, the avatar will be happy or sad until the amount of money or the goal changes.

App: Yes, although there are no warning messages. The app can send messages giving direct insight in the spending/savior behavior of the owner of the keychain. When opening the app, more information will be given, so the display time is not important.

Does the user receive full and continuous feedback about the results of his actions?
Keychain: As soon as the user has paid with the device, it will respond (vibrating and light). It is related to the amount of money spent and the goal of the user. The device does not say how much money is left on the bank account though and when the device is not used, there will be no feedback.
Hologram: Yes, there is feedback. The device shows exactly how much money the user has on his/her bank account and how close to the saving goal he/she is. According to the spending behavior and how close the user is to the saving goal the avatar in the hologram will smile or be sad. It is not, however, necessarily direct feedback. The hologram is designed to stay at home, so the user will only see it when he/she is home (assuming one pays outside the house).
App: Yes, the app will always display how much money is left on the account, where has been paid, etc.

2. Match between system and real world
The system should speak the users' language, rather than system-oriented terms.

Are the words or symbols used familiar to the user?
Yes. The amount of money that is on the bank account is clear for our target group. Same goes for the way the app is designed. The keychain will have a red and green light. We assume it is clear that green is a positive feedback and red is negative / gives a warning. The Wi-Fi sign on the keychain is clear and the button on the hologram (to set a goal) is a familiar way of setting things.
Is information presented in a simple, natural and logical order?
Yes.
Are important controls represented and is there an obvious mapping between them and the real controls?
The design doesn't have important controls.

3. User control and freedom
Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.
Are users able to undo unwanted actions?
The keychain hasn't got any specific "choosing" functions, so an exit isn't necessary. When the user has paid, however, there is no option to undo the action. This has

no much to do with the design, as this is the way we pay. The only option on the hologram is to set a goal, if this goes wrong, they simply have to reset the goal. A "emergency" exit won't be necessary here. The app gives insight in the spending behavior of the user, the only "choosing" function on it is setting a goal as well. We don't need an emergency exit for this, as you can reset the goal again.
Can operations taking a long time be cancelled?
No.
Is the app usable with larger font sizes?
No. Should we add an option to adjust the font size?

4. Consistency and standards
Interfaces should have similar operations and use similar elements for similar tasks. Users should not have to wonder whether different words, situations, or actions mean the same thing.
Our app interface is straightforward and clear.

5. Error prevention
Even better than good error messages, is a careful design which prevents a problem from occurring in the first place.
Is user confirmation required before carrying out a potentially 'dangerous' action ?
Partly yes. For a transaction less than 25 euros, no confirmation is required, the keychain only needs to be placed against the paying device. Above 25 euros, a fingers can is required for safety reasons.
Does the system prevent you from doing undesired actions in accidents?
Partly. Turning the button on the hologram too far, past the "stop" point can break the button to set goals. We do already have a "stop" point, on which the user should not be able to turn the button any further.
Are the options given in dialog boxes obvious?
We don't have dialog boxes, but the options in the app are pretty clear.
Is the system robust and safe enough for its surroundings?
Yes. Our target group is children so we made sure the keychain has no sharp edges and doesn't break easily.

6. Recognition rather than recall
Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.
Is the functionality of the buttons/icons obvious from their labels?
WiFi sign and fingerprint scan are both clear. Button on hologram should be clear as well, but we are going to test this. (problem?)
Is the relationship between controls and their actions obvious?
Yes.
Is it possible to search for information rather than entering the information directly?
No. (Maybe in the app an extra page with all the information or something?)
Is the functionality of device controls (e.g., thumbwheels) obvious?
Yes.

7. Flexibility and efficiency of use
Accelerators -- unseen by the novice user -- may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.
Does the system guide novice users sufficiently?
No. The device itself hasn't got any guidelines on it, but it will be thoroughly explained when they receive it from the bank. Beginners might also get guided by their parents the first few times.
Is it possible for expert users to use shortcuts?
No.
Is it possible to access and re-use a recent history of instructions?
No. We can set up a page in the app with instructions?
Is it possible to replace and restore default settings eas-

ily?
Partly. In the app it is easy to reset settings. With the key chain itself it is not, as it is connected to the user's bank account and handling that is not part of our design.

8. Aesthetic and minimalist design
Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.
We don't have any dialogues.
Functional use of colours?
The colors green and red for the keychain work really well. The colors for the app match with the background and have a happy, but calm appearance. The fond is easily readable.

9. Help users recognize, diagnose and recover from errors.
Error messages should be expressed in plain language (no codes), precisely indicate the problem and constructively suggest a solution.

10. Help and documentation
Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out.
Keychain:
User goes to shop and chooses whatever he/she wants. User goes to check-out. When the user has to pay, he/she holds the keychain in front of the paying device so that the money will get transferred from his/her bank account. The transaction will only be succeeded when the user scans his/her finger on the back of the key chain. This while the keychain is still in front of the paying device. They have to "set" the finger scan onces in the beginning, how many fingers etc? When the payment has succeeded the user gets the receipt and can leave the shop.

Hologram:
The user pushes the button at the side so it comes out. The user can now set a goal by turning the button. To the right is making the goal higher and turning left is lowering the amount of money. To set the goal, the user presses the button in again.
App:
The uses (parents in this case) have to add the children and connect the account to the bank account of the children. (Bank could do this as well?). They can set a goal through the app, but this can also be done by the child and the hologram. To find the keychain, the user clicks on the map in the app. To get more insight on the spending behavior, the user clicks on "agenda".

Heuristic violated: #1 user control
Description: The user does not know when the battery is empty (keychain.)
Possible causes: The device doesn't have an option to show it.
Expected consequences: User will be in store and the keychain does not work because he/she was unaware of the fact that the battery was low.

Solution: The app will get a message saying the battery of the keychain is low and suggest to replace the battery. The hologram will show this as well.

Heuristic violated: #2 user control
Description: The system (keychain) recognizes only one finger.
Possible causes: This was the system setup.
Expected consequences: If the user has a scratch on his/her finger, or burned his/her finger, the finger scan will not recognize the finger and will therefore not be able to pay.

Solution: At the bank, before getting the system. The user and their parents will have to scan 5 fingers. These will be the fingers the keychain recognizes.

Heuristic violated: #3 user control
Description: The user does not know how the button on the hologram works.
Possible causes: It is unclear that you have to press the button in before you can use it.
Expected consequences: The user is confused and does not know how to set the goal.

Solution: We are going to test if the user really does not understand how the button works. We will add an extra sign on button that indicates you have to push it in. In addition the user will have to learn how to use the button.

Reflection

This second quartile, I followed the course User-centred Design. The aim of this course is to learn about the user-centered design process. We designed a system that teaches children how to manage their money, how to save their money and a product with which they can pay electronically themselves.

For me it was a new way of tackling a problem. Whereas From Idea to Design focused more on how to generate ideas, select tools and define concepts, this course really focused on the user. It was really interesting to approach a design from a different side, I learned the importance of involving the users in all phases of the design process and how to do this.

There were some things I found difficult though. In the first few weeks we did not know yet what our final design would look like, we did however have to do a lot of assignments. Sometimes I found it quite hard to do these assignments, because it felt a bit vague for me. I think it is easier to go into details and explain things when I know what our final design is going to be. I like solving problems, so naturally that was the first thing I wanted to do when receiving our design 'goal'. Sometimes I struggled a bit to take it easy and focus on our requirements and desirable experience goals first. I do understand why it is important though and I'll make sure that during my next projects I'll really focus on our valuables and goals and work with these in my mind.

We changed and improved quite some details about our design after the heuristic evaluation and cognitive walkthrough, and I see now how important those things were. Evaluating lets you see your design from another perspective. It surprised me that, although we changed some things, we still had a lot of things to improve after the user test. You'd think you would know how your design works, but it turned out we did not think things through enough.

As for my vision, I am really interested in the behavior of people. I think that the changing behavior of people has a huge impact on design and I would like to go into depth in this area. This course fitted my vision really well for that reason. Although I do not particular want to work with children (our target group), it was really interesting to see all the ideas and comments they came up with during the user test. For me it was a confirmation of how interesting people in general are and how they change throughout their lives.

As for my individual role in the group, I tried to contribute where I could. I conducted most of the interviews in week 3, helped defining our final design and worked on the report. Our group work was evenly divided and everyone put more or less the same amount of time in the project, except for Sophie, who was very committed and valuable. During my next project, I would like to learn how to work with InDesign. This could have been a good opportunity, as we had to write a chapter every week and I could have really spent some time learning the program.

In short, I learned how to apply a user-centred design process. In my future projects I will make sure that the outcome of the design process will be easy to use for the target group.

Evaluation criteria	Koen Spijkers	Sophie Baars	Lonneke Lardinois	Lisa Frissel
Attends group meeting(s) and arrives on time.	4	4	4	4
Contributes meaningfully to group discussion.	2	4	4	3
Completes group assignment on time.	3	4	2	3
Prepares work in a quality manner.	2	4	4	3
Demonstrates a cooperative and supportive attitude.	3	4	4	4
Contributes significantly to the success of the project.	2	4	3	3
TOTALS	16	24	21	20

1. How effectively did your group work?
I think working together with this group was really pleasant and I felt very comfortable. Most of us are quite open-minded and social persons. This is very nice of course, but it sometimes resulted in group meetings that were not very productive. Especially at the beginning, we could have done more. The second part of the course, however, everyone was quite effective. We balanced our time of working on our design and our breaks more evenly. Especially the last few weeks, we worked quite hard. The feedback we got from our assessor was mostly positive and our participants in the user test were enthusiastic as well.

2. Were the behaviors of any of your team members particularly valuable or detrimental to the team?
We did not have so much of a leader in our group, but I think Sophie was very valuable for us. She did a lot of tasks and was very committed. She did some things that were very time-consuming, but also high in quality. She also did extra things next to the individual assignments like using SolidWorks to create a prototype. Lonneke is, just like Sophie very motivated and pleasant to work with. She was definitely useful in the group. Some individual assignments she could have delivered earlier, but that did not really have a negative impact on our work.
I noticed that Koen was quite motivated as well, he worked serious and really wanted us to do well. He would remind us of working when we got distracted. However, he did not understand all the assignments correctly and the quality of the work he delivered wasn't too high. Overall, I think this was a motivated and creative group and we did our best.

Lonneke Lardinois

Individual exercises

Week 1:
I made a storyboard of the current situation. In these frames you can see the problem of paying with coins in a supermarket.
Relevant experience goals
Enjoyable
I think it is very important that our product is going to be enjoyable. That way, it is more likely being used for a longer period of time. Especially because we decided to design for children. Children learn the best through a playful learn environment, so it is really important that we create such environment. Because of this we need to make sure children are going to enjoy the product, otherwise the product isn't being used and more importantly, has not got the ability to change something.
Helpful
Our design case is based off problems with payment that need to be solved. Because of that, the product needs to be helpful, otherwise there is no need for making it. It needs to be able to help children with money issues they come across in their daily life.
Awareness
We decided to make a product which teaches children the value of money, so basically "to make children AWARE of money". Because of that, awareness is a very important goal. We choose this goal because we believe that learning about the value of money at a young age can be beneficial for the child in a later stage of his/her life.

Notions of effectiveness, efficiency and satisfaction
Efficiency
The product needs to respond quick and it needs to do everything it needs to be doing without any unnecessary options. It needs to respond in a few seconds and needs to be clear. Children can be distracted fairly easy, we need to make sure this does not happen. We need to keep the children's attention and make sure the product is as engaging as it possibly can be. The actions need to be clear so a child can understand them and is able to do the tasks themselves. It is really important to let them do the tasks themselves, this will give them a feeling of control over their finances.
Effectiveness
The product needs to teach children something, in our case it needs to teach the children the value of money and the way you

need to save. To achieve this goal, we need to make sure children are willing to use the product often. We can achieve this goal by making the tasks easy to perform and the product clear to use.

Satisfaction

The product needs to be engaging and fun to play with to satisfy the children. As I mentioned earlier, children can be distracted easily so to make a product which is fun to use for children is one of our main priorities.

Week 2

Persona hypothesis

Roles Children and their parents

Children

Goals Knowing what money is

Behaviors Unknowing, unpredictable, irresponsible, distracted easily

Environments at school, at the shop

Children's parents

Goals Teaching their children the role of money and what it implies

Behaviors Nurturing, teaching

Environments At home, at the shop

Setup of ethnographic interview

The question marks are placed at the questions that I thought weren't needed/useful for the target group.

Children

Goal questions

Opportunity Do you know the value of money?

Goals ?

Priorities ?

Information Do you pay for things yourself often?

System questions

At this moment, we don't have a product yet so I can't make any system questions

Workflow questions

Process If you pay things, do you use cash or pin?

Occurrence How often do you pay things yourself?

Diversity Do you only pay things if you are alone? Or do you also pay if your parents are around?

Exception Do you always pay with cash/pin (answer of question process)

Attitude questions

I think that the attitude questions aren't question you need to ask a child so I only made attitude questions for the parents.

Children's parents

Goal questions

Opportunity Do you want to learn your children the value of money?

Goals Are you able to teach your children the value of money already?

Priorities ?

Information Do your children pay things on their own often?

System questions

At this moment, we don't have a product yet so I can't make any system questions

Workflow questions

Process Have you ever tried teaching your children the value of money? If yes, how did you do this?

Occurrence If yes, how often do you do this?

Diversity Does your child pay things on his/her own when you aren't around or also when your around?

Exception ?

Attitude questions

Aspiration What would be the ideal way to teach your children the value of money?

Avoidance What do you prefer not to do?

Motivation ?

Pilot interview

Child

Male 10 years old

Do you know the value of money?

I think so

Do you pay for things yourself often?

No, not really most of the things I get from my parents

If you pay things, do you use cash or pin?

I only pay by cash, because I don't have a card

Do you only pay things if you are alone? Or do you also pay if your parents are around?

If I pay things myself it's always when my parents aren't around

Parent
Female 45 years old, mom of 1 child
Do you want to learn your children the value of money?
Yes, I think it is really important
Are you able to teach your children the value of money already?
I think so, I am trying
Do your children pay things on their own often
No not really, we pay most of the things.
Have you ever tried teaching your children the value of money? If yes, how did you do this?
I once tried to explain why you need to work, I did this through examples
If yes, how often do you do this?
Not that often
Does your child pay things on his/her own when you aren't around or also when your around?
Yes, he buys candy for himself when we're not around
What would be the ideal way to teach your children the value of money?
I do not know, isn't that your job? hahah

Reflect on questions
Some of the questions weren't right for the target group, for example the question I asked the children "do you know the value of money?". This question was way to straight forward and the child I interviewed didn't really know what to say. The question "What would be the ideal way to teach your children the value of money?" was also not a good one, because I asked the person to be the designer. I need to make sure that does not happen at the final interview. The interview is not complete yet and needs to be adjust in some places to become the perfect interview.

Week 3
Requirements for the design case

Type of requirement: Functional
Description: The product should be able to teach children the value of money and should children learn how to manage money.
Test case: We can test the product by giving children a prototype and let them test it for a month. After that we can interview the child and mainly the parents to find out if it is really as functional as we want it to be.

Type of requirement: Look-and-feel
Description: The product needs to be colorful, so it will attract children. It needs to have round corners and it has to be more or less unbreakable so it will be "kids proof".
Test case: We can test this through let children play with it for a day, throw it on the ground a few times and feel if the edges are round.

Type of requirement: Ease-of-use
Description: The product needs to be more or less self-explanatory. We need to make sure that is really clear what you can do with it, we can achieve this through big clear buttons or clear colors.
Test case: We can test this through let children use it a few days. Whilst usage we can observe if it is really as self-explanatory as we think.

Type of requirement: Ease-of learning
Description: The child needs to work with it fairly easy and needs to understand it after 1 or 2 times of use. It needs to be more or less self-explanatory (ease-of-use).
Test case: (same as the ease-of-use test)

Type of requirement: Performance
Description: The product we're going to design is meant for children, so we don't think the performance is a really big issue. It needs to work like it should, it needs to respond in a reasonable time, and it should not crash when pressing multiple buttons at the same time.
Test case: We can test this ourselves, through trying it out.To play with it a few hours and looking for problems and bugs

Mapping

Good mapping

An example of good mapping are the number buttons om my tv remote. They are in order from 1 to 9 and in the middle at the 5 there is a bump. This way you can put the right channel on without looking.

Bad mapping

An example of bad mapping is my shower. My shower has different places where water is coming out of. The buttons to activate this are on a illogical place and next to each other while the different places are on top of each other.

Affordance

When my mobile phone is off, there is not really a way to see what you can do with it. It is just a black screen and buttons without explanations on the sides.

Constraints

Physical

An example of a physical constrain at different phones is that the turning on/off buttons aren't on the same place. So when I borrow someone else's phone I can not immediately turn it on because I do not know where the right button is.

Logical

My old gaming device had 3 different cables which you needed to put into the television. The 3 different cables had 3 different colors, a red one, a yellow one and a green one. When I looked at the television I found out it had 3 holes in it, all with a different circle around it. A red one, a yellow one and a green one, so immediately knew where to put the cables.

Cultural

We learned how an old phone looks like, so that's why we now which button is to call with. If you do not know how an old phone looks like you maybe not how to call on a smartphone. Phones these days do not look like that anymore so that can be a problem for younger people.

Week 4

Scenario

Save

A child goes to the store and buys candy with his keychain, he tries to pay and gets a green light in response. So he is happy, because the transaction worked, and he goes home. When at home he goes to his room and sees his Save. He notices the lion, he looks sad, and the child becomes sad because of that. The child sees that, because of the candy, he is even further away from his goal then he used to be. He now knows that if he wants to receive his goal as soon as possible he needs to save his money and does not need to spend it on candy.

Task description USE CASE

The user is going to buy something other than his goal
The user places his keychain next to the paying machine
The system makes contact and analysis the transaction
The user looks at his keychain
The system shows a green light
The user knows he has payed and goes home
The system shows a sad lion because the money is spend on the "wrong" thing
The user sees the sad lion and knows that what he did wasn't beneficial for his goal

Week 5

Task description

The task description I made for week 5 is more or less the same as the description I made for week 4. I only made some adjustments to make it more detailed.
The user is going to buy something other than his goal
The user gets his/her keychain out of his pocket
The user places his keychain next to the paying machine
The system makes contact and analysis the transaction
The user looks at his keychain
The system shows a green light
The user feels at the same time a vibration
The system vibrates to indicate how much money the user just spend
The user knows he has payed and goes home
The system shows a sad lion because the money is spend on the "wrong" thing
The user sees the sad lion and knows that what he did wasn't beneficial for his goal

Week 6

Expert evaluation

The hologram, user sets a goal

Is the effect of the current action the same as the user's goal?

The action is setting a goal, the same as the main goal

Is the action visible?

No

Will the user recognize the action as the correct one?

No

Will the user understand the feedback?

Yes, because when done, the new goal will be shown

Conclusion

We need to make button or something like that so the user can set a goal. Right now the user can not set a goal at all, we have not thought about the way the input needs to be done. When setting the goal we need to make visuals to show what is happening. Eventually we need to make sure the user knows that he/she did a good job resetting the goal and the changes are saved. Right now we have not made visuals yet, so we need to make sure these are clear. Maybe it is convenient to do an expert evaluation at the end to check if we did everything the correct way.

The keychain, user pays

Is the effect of the current action the same as the user's goal?

Yes, the keychain is used to pay, the same as the goal of the device.

Is the action visible?

Yes, we made a light to show that the action has been successful/unsuccessful.

Will the user recognize the action as the correct one?

Yes through lights and vibration.

Will the user understand the feedback?

For us the feedback is really clear but I think we need to test this.

Conclusion

We need to make sure are assumptions are right by doing an user test. If the user test results are not what we expect them to be then we need to change the keychain. If that is the case, I think that a new expert evaluation is necessary.

The app, parent of user checks expenses

Is the effect of the current action the same as the user's goal?

Yes, the goal is to make sure the parents are involved with the expenses form their child, the app allows the parents to see this.

Is the action visible?

Yes, the app is really clear because the meaning of every button is on the button itself.

Will the user recognize the action as the correct one?

Yes, because, when pressing a button the next frame will open on the screen. If this is the frame the user wants to see, he/she knows right away that what he/she did was right.

Will the user understand the feedback?

Yes the feedback is really clear and shows the parents the expenses of their child in an easy list

Conclusion

The app is done.

Reflection

During my last quartile I followed the course User-centered Design. The goal of this course was to learn more about the user, to design for the user and to know how you can check if things are really important for the user. So basically we learned how to design with, in the center of our process, the user. We achieved this through conducting interviews, making task descriptions, using expert evaluations, making user test and much more.

In this course we worked in teams, 4 people in our case. We needed to choose a target group and design something money related. We chose children, children are young an can be thought a lot. In the world of today, they barely see cash money, their parents and everybody around them is paying with a magical card. We wanted to give money value and teach children how to save. We did this through designing multiple devices; a hologram, which gives the child a visual guide; a keychain, which helps children to pay contactless in a safe way; and an app, which gives parents the tools to keep track of their child.

In this course I learned about the importance of the user. In earlier courses the user was not the main target of the process. Because of that, this was a new, exciting and different way of approaching a design case. In the beginning of the course I found it difficult and really vague. We did not have an idea, a plan or an product yet. We had a target group and a problem and with those two things we needed to do research, make interviews and conduct them, without really knowing which direction we were going to take. I was a bit lost. I am a really pragmatic and problem solving person, this was really out of my comfort zone. I would never choose this way as an ideal way of starting a project, but that made me thinking. Because this was a path I would never have taken on my own, I learned a lot from it. I learned the importance of a broad and deepened research on the target group with interviews, valuables and goals. Because of this the rest of our design process went smoother, more focused and more useful than in the other courses I have had. This is definitely something I would like doing in my next project.

When we were more or less done with the research about our target group we could start with the, for me, fun part. We came up with ideas, chose the best ones and made prototypes. This part I recognized from my earlier course "From Idea To Design". Even though this part was not as new and exciting as the first part, I liked doing it and learned about a new way to choose an idea. We made a kind of algorithmic formula and tested all the ideas. The best one won and we could start making it. This way of choosing an idea was really easy and fun, I will definitely do this again.

The last part, the expert evaluation, the different walkthroughs and the user evaluation. This were methods we could use to test if our assumptions were right and if our product was clear for the user. This were methods I really learned from, I would never have thought we missed so much important things in our first prototype. These methods learned me to look at our product through different eyes and in a different way. This made me realize how important evaluation and reflection is and how your product can benefit from it. These methods are certainly going to be used by me in the future and I am really glad to know them now.

Overall "User-centered Design" has learned me a lot, and helped me in becoming the designer I would like to be. It learned me that I really like designing with the user as main priority, it gave me insights in how to approach things better and gave me ways and methods to make my product as good as it possibly can be.
I look back at this course as a success, we made beautiful products, had great teamwork and I have learned a lot.

Evaluation criteria	Koen Spijkers	Sophie Baars	Lisa Frissel	Lonneke Lardinois
Attends group meeting(s) and arrives on time.	4	4	4	-
Contributes meaningfully to group discussion.	2	4	3	-
Completes group assignment on time.	4	4	3	-
Prepares work in a quality manner.	2	4	3	-
Demonstrates a cooperative and supportive attitude.	3	4	4	-
Contributes significantly to the success of the project.	2	4	3	-
TOTALS	17	24	20	-

1. How effectively did your group work?
I was very fortunate to be placed in this group. I really liked working together with my teammates and I have the feeling everyone felt comfortable and could speak his/her mind. At the beginning of the course the meetings were not as productive as they could be. When we met, we did not only speak about the course but also about other things we experienced. When the course developed our meetings became more serious. This does not mean we only talked about the course the whole time, but for me this was not a problem at all. I liked our meetings to be that way. This contributed to a fun working environment for everyone and helped us to really work as a team.
2. Were the behaviors of any of your team members particularly valuable or detrimental to the team?
As I look back to our team, we did not really had strict roles. Everybody did everything. But this does not mean everyone was evenly valuable to the team.
Koen really spend a lot of time in the beginning at looking for scientific articles. He really wanted to look for the facts and I think this represents him well. He is really serious and tries very hard to complete everything. But unfortunately the quality of his work is questionable. He often does not understands things completely, which results in redoing the assignments.
Sophie works really hard and is determined in everything she does. This is a great quality of her and made it pleasant to work with her. She also did extra things for the group, for example making a digital prototype.
Lisa was, like Sophie, easy to be around and a great member of the team. She did her assignments and contributed a lot during the meetings.
Everyone had, of course, his strong points and his weak points and some were more comfortable with this course then others. But together we pulled it off.

Appendix

Interview questions

Survey spending habits children

For Children:

1. Do you get (pocket) money
- From whom do you get your pocket money? Parents, grandparents etc?
- How often do you get money? Once a week, once a month?
- How much money do you get? Does it change or is it always the same?
- Do get extra money on special events/occasions? Sinterklaas, when you played a big game or when you help cooking/cleaning e.g?
- Do you know where money comes from?

2. What do you spend your money on?
- Do you save it? Do you spend it once you get it?
- Where do you go to spend your money? Supermarket, toystore?
- do you save money for something at the moment?

3. Do you know how much money you have right now? (Do you want to know it)
- How do you find out how much you have?
- Is it easy enough?
- Do your parents know how much you have?

4. Do you pay with cash or by card?
- Do you like it?
- Do you know of payment methods? What do your parents use?

5. what kind of paying methods do you have with you?
- do you have a wallet with you?
- do you have a bank card with you?

6. How would like to pay in the future?
- What would be most fun?
- What would be easiest?
- Would you like it to be a game or something serious?

For Parents:

We noticed that some children did not really know what to say on the spot, we decided to also ask their parents so that their answers would be more honest.

1. Does your child get money
- From whom does he get money?
- How often does he/she get money?
- How much money does he/she get? Does it change or is it always the same?
- Does he/she get extra money on special events/occasions or when doing chores?
- Does he/she know where money comes from?

2. What does he/she spend his/her money on?
- Does he/she save it?
- Where does he/shego to spend his/her money?
- does he/she save money for something at the moment?

3. Do you know how much money they have right now?
- How do you find out how much they have?
- Is it easy enough?
- Do they know how much they have?

4. Do they pay with cash or by card?
- Do you trust it/think it is safe?

5. what kind of paying methods do they have with the,?
- does he/she have a wallet with them?
- does he/she have a bank card with them?

Interview results

Children

Girl aged 9

She doesn't get any pocket money, but does chores in the house and gets money from that. This is about 1 euro a chore. She normally does 1 chore a week. She save this in a piggy bank but often lends it out to her brother. He buys food from it, but afterwards she never gets the money back (but she does get food sometimes). At the moment, she is saving for a video game. She never carries any money with her when going somewhere. She writes down how much money she has at the moment but she doesn't know it right now. She says her parents know how much money she has (I doubt it personally). The last time she spent any money she gave it to her brother who bought food with it. When she receives money, it's cash, but she'd love to have her own account because it seemed more grown up. She'd like to have/ earn more money in general. Once in a while she and a few neighbor children make lemonade and sell it to passengers and neighbors. One half of the income goes to charity and the other half then can keep themselves.
In the future she would like it to pay just like a pizza delivery(?). So you first choose something in the store, take it home and then a drone comes to you. You put your finger on the drone and it scans your finger. The scanner recognizes who you are and which bank account belongs to you.

Girl aged 9,5

Receives 1 euro every week. On birthdays she gets extra money, but she doesn't exactly know how much. Her sister got a phone for her birthday, which is a lot of money. So she got a lot of extra money as well, to make it fair. She saves for something big. She doesn't know how much money she has at the moment, nor do her parents. She never carries money with her when going somewhere (except sometimes she has random 10/20 cent in her pocket). She gets her money cash. Her sister is two years older and gets 2 euros a week. Her sister got her own bank account and card. Personally, she wouldn't want her own card and bank account, she things it is way too complicated. She would always forget her card and not remember her pin code. She doesn't have an opinion about the future. She things it's okay the way it is and doesn't want cash money to disappear.

Boy aged 10 year

Doesn't receive any pocket money, but receives money on his birthday and when he does chores. He tries to do chores as often as possible. He couldn't say how often this was. 'Just' when he had time. He, for example, helps his dad with carrying wood. If he does this well, he gets 5 euros. If he does it really good, he receives 10 euros. Once a while he does chores in the house, he earns 1 à 2 euros with this. He is saving his money, he'd like to have an oxboard (he wanted one that was 600 euros). He gets cash money and know how much he's got right now: 505 euro. His parents know this as well. He is very honest and doesn't really get why children get pocket money. He things they should earn it, just like he does. He talks about it often with his parents. He hasn't got his own account but also doesn't really want it. He things a pin code is annoying and things cash money is safer because you can steal less at once(?). He doesn't really think much about the future, but wonders why money exists. Years ago, they used to trade things, why aren't we doing that anymore? His grandma, for example, used to trade bread for vegetables, he thinks that is a nice system.

Girl aged 7

Receives 2 euros a week. She saves this in a piggy bank. She doesn't know exactly how much money she has and also doesn't really know what she's saving for. She waits until she sees something she likes. She receives her money cash, but she'd like the have a bank account and card. She never carries any money with her. She almost never buys anything, her grandma gives her candy and her parents buy her games etc. Once in a while she does chores, she helps cooking. She gets about 0,50 cents. In the future she'd like it if you could pay by scanning your hand.

Girl aged 8

She receives pocket money every month, but it differs every week how much that is. Around 5 euros a month.

She spends this on money and tools. She doesn't know how much money she has at the moment. She would love to have her own card because she thinks she can buy more that way(?) and it seems useful to her. She gets extra money when doing chores, like washing the car (about 3 euros). On her birthday she also gets a lot of extra money from friends and family. In the future she'd like a system that recognizes your voice. You say who you are and the money gets transferred automatically.

Parents
Mother (I interviewed the mother while the children were standing next to it/playing, so we could ask them questions once in awhile. It had no connection to the interviewed children above)
She has to children. They receive allowance every Saturday
Daughter 7 years old à 1/1,50 euros week
Son 10 years old à 2 euros a week
They put this in a piggy bank / little wallet. They often get money from their grandparents on birthdays, holidays, sport matches etc. she and her husband know how much money their children got and when and what they're going to buy with it. The youngest has about 40 euros and the oldest one around 150 euros. The oldest one spends his money on (electronic) games and pepernoten (there is no English translation?). He understands the value of money quite well. He wants a big present from Sinterklaas, but he does have to pay some money as well. If he is willing to pay some extra money himself, they know for sure he really wants it. The youngest has no idea about the value of money or where it comes from. If her mother says something is too expensive for example, she says that "mommy just has to ask some extra money from work". Or she should "take some extra cash from the wall". She thinks a card is something magical. They are planning to open a bank account for the oldest one because it is easier to deal with than all the cash money.

Dad
He has two children.
Son 9 years old à 10 euros a month
Son 12 years old à 15 euros a month
In addition, they get extra money from their grandparents at birthdays and as a reward for good grades. He and his wife know where they spend their money and what they buy from it. The two children are really different.
The oldest one always saves his money and never uses it. He is always pleased and never feels the need to spend money. He has his own bank account for a while now, because his parents think it is safer this way. He had a lot of cash just lying in his room (which he also showed his friends). They also thought he was old and responsible enough to learn how to use a card.
The youngest is really different, he is really impulsive and spends a lot of money. He buys candy and games at the Intertoys. Especially electronic games are a weakness for him. He spends about 20-100 for them (I do not know in what time range or how often this happens). He knows where money comes from and understands the value of money, but just likes to buy things and is impulsive. His father thinks it is a good idea to let children deal with a card and a digital system from a young age. It is easier and he also expects cash money will disappear slowly. When I said a lot of children find a bank card complicated, he said we should make it easier.

Demi (12 years old)
1. Do you get (pocket) money
Yes
-From whom do you get your pocket money? Parents, grandparents etc?
from my parents
-How often do you get money? Once a week, once a month?
I get my pocket money when I need it, not at a certain moment.
-How much money do you get? Does it change or is it always the same?
It changes all the time
Do get extra money on special events/occasions? Sinterklaas, when you played
a big game or when you help cooking/cleaning e.g?
Yes, for my birthday or for my rapport card, some-

times during the holidays.
Do you know where money comes from?
Yes
2. What do you spend your money on?
Whenever I see something I like, I buy it.
-Do you save it? Do you spend it once you get it?
I'm saving my money
-Where do you go to spend your money? Supermarket, toystore?
Sometimes in the supermarket, but also in other stores.
-Do you save money for something at the moment?
Yes, a new cap for horseback riding.
3. Do you know how much money you have right now? (Do you want to know it)
Yes, €80,-
- How do you find out how much you have?
It is on my bank account, so I check that sometimes.
- Is it easy enough?
Yes, I think so.
- Do your parents know how much you have?
Yes
4. Do you pay with cash or by card?
By card mostly.
- Do you like it?
Yes, because cash is heavier and that is annoying
- Do you know of payment methods? What do your parents use?
I think they pay by card.
5. what kind of paying methods do you have with you?
A bank card and some cash
- do you have a wallet with you?
Yes
- do you have a bank card with you?
Yes
6. How would you like to pay in the future?
By card
What would be most fun?
Via someone else (?)
What would be easiest?
If you would not have to pay
Would you like it to be a game or something serious?
I would like to pay with a game.

Mark(8 years old)
1. Do you get (pocket) money
No
Do get extra money on special events/occasions? Sinterklaas, when you played
a big game or when you help cooking/cleaning e.g?
Yes
2. What do you spend your money on?
Mostly toys like playmobile
-Do you save it? Do you spend it once you get it?
both, it depends
-Where do you go to spend your money? Supermarket, toystore?
Mostly at the toystore
-Do you save money for something at the moment?
Yes, for playmobile
3. Do you know how much money you have right now? (Do you want to know it)
Yes, €40,-
- How do you find out how much you have?
I sometimes count the money I have
- Is it easy enough?
Yes, I think so
- Do your parents know how much you have?
Yes
4. Do you pay with cash or by card?
With cash
- Do you like it?
I don't know
- Do you know of payment methods? What do your parents use?
I think they pay by card.
5. what kind of paying methods do you have with you?
cash
- do you have a wallet with you?
Yes
- do you have a bank card with you?
No
6. How would you like to pay in the future?
By card
What would be most fun?
By card

Full heuristic evaluation Lisa Frissel

A heuristic evaluation is a systematic approach whereby you review your design and compare it against usability principles. It should not replace usability testing, the problems you face are different than those found in a usability test. An advantage of using a heuristic evaluation is that you can obtain feedback early in the design process and you can use it together with other usability testing methodologies.

1. Visibility of system status

The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

Is status feedback provided continuously (e.g., progress indicators or messages)? (network connection, battery status etc.)

Keychain: No, our device vibrated and works with two lights, but it doesn't day how much battery is left. It also does not indicate if the nfc connection works or not (the key chain itself could be broken as well for example).

Problem: The device works with a battery but doesn't show when the battery is empty.

Solution: The app will get a message saying the battery of the keychain is low and suggest to replace the battery. The hologram will show this as well.

Hologram: No, there is no status feedback given.

App: Yes, the device on which the app will be, will show how much battery there is left. It can also say where the keychain is at the moment and where there has been paid.

Are warning messages displayed for long enough?

Keychain: Yes, our main focus was to give direct feedback, this will be only a few seconds. This is enough time for the feedback.

The light will be shown 2 seconds + vibrating depending on the amount of money paid.

Hologram: Yes, the avatar will be happy or sad until the amount of money or the goal changes.

App: Yes, although there are no warning messages. The app can send messages giving direct insight in the spending/savior behavior of the owner of the keychain. When opening the app, more information will be given, so the display time is not important.

Does the user receive full and continuous feedback about the results of his actions?

Keychain: As soon as the user has paid with the device, it will respond (vibrating and light). It is related to the amount of money spent and the goal of the user. The device does not say how much money is left on the bank account though and when the device is not used, there will be no feedback.

Hologram: Yes, there is feedback. The device shows exactly how much money the user has on his/her bank account and how close to the saving goal he/she is. According to the spending behavior and how close the user is to the saving goal the avatar in the hologram will smile or be sad. It is not, however, necessarily direct feedback. The hologram is designed to stay at home, so the user will only see it when he/she is home (assuming one pays outside the house).

App: Yes, the app will always display how much money is left on the account, where has been paid, etc.

2. Match between system and real world

The system should speak the users' language, rather than system-oriented terms.

Are the words or symbols used familiar to the user?

Yes. The amount of money that is on the bank account is clear for our target group. Same goes for the way the app is designed. The keychain will have a red and green light. We assume it is clear that green is a positive feedback and red is negative / gives a warning. The Wi-Fi sign on the keychain is clear and the button on the hologram (to set a goal) is a familiar way of setting things.

Is information presented in a simple, natural and logical order?

Yes.

Are important controls represented and is there an obvious mapping between them and the real controls?

The design doesn't have important controls.

3. User control and freedom

Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.

Are users able to undo unwanted actions?

The keychain hasn't got any specific "choosing" functions, so an exit isn't necessary. When the user has paid, however, there is no option to undo the action. This has no much to do with the design, as this is the way we pay. The only option on the hologram is to set a goal, if this goes wrong, they simply have to reset the goal. A "emergency" exit won't be necessary here. The app gives insight in the spending behavior of the user, the

only "choosing" function on it is setting a goal as well. We don't need an emergency exit for this, as you can reset the goal again.
Can operations taking a long time be cancelled?
No.
Is the app usable with larger font sizes?
No. Should we add an option to adjust the font size?

4. Consistency and standards

Interfaces should have similar operations and use similar elements for similar tasks. Users should not have to wonder whether different words, situations, or actions mean the same thing.
Our app interface is straightforward and clear.

5. Error prevention

Even better than good error messages, is a careful design which prevents a problem from occurring in the first place.
Is user confirmation required before carrying out a potentially 'dangerous' action ?
Partly yes. For a transaction less than 25 euros, no confirmation is required, the keychain only needs to be placed against the paying device. Above 25 euros, a fingers can is required for safety reasons.
Does the system prevent you from doing undesired actions in accidents?
Partly. Turning the button on the hologram too far, past the "stop" point can break the button to set goals. We do already have a "stop" point, on which the user should not be able to turn the button any further.
Are the options given in dialog boxes obvious?
We don't have dialog boxes, but the options in the app are pretty clear.
Is the system robust and safe enough for its surroundings?
Yes. Our target group is children so we made sure the keychain has no sharp edges and doesn't break easily.

6. Recognition rather than recall

Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.
Is the functionality of the buttons/icons obvious from their labels?
WiFi sign and fingerprint scan are both clear. Button on hologram should be clear as well, but we are going to test this. (problem?)
Is the relationship between controls and their actions obvious?
Yes.
Is it possible to search for information rather than entering the information directly?
No. (Maybe in the app an extra page with all the information or something?)
Is the functionality of device controls (e.g., thumbwheels) obvious?
Yes.

7. Flexibility and efficiency of use

Accelerators -- unseen by the novice user -- may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.
Does the system guide novice users sufficiently?
No. The device itself hasn't got any guidelines on it, but it will be thoroughly explained when they receive it from the bank. Beginners might also get guided by their parents the first few times.
Is it possible for expert users to use shortcuts?
No.
Is it possible to access and re-use a recent history of instructions?
No. We can set up a page in the app with instructions?
Is it possible to replace and restore default settings easily?
Partly. In the app it is easy to reset settings. With the key chain itself it is not, as it is connected to the user's bank account and handling that is not part of our design.

8. Aesthetic and minimalist design

Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.
We don't have any dialogues.
Functional use of colours?
The colors green and red for the keychain work really well. The colors for the app match with the background and have a happy, but calm appearance. The fond is easily readable.

9. Help users recognize, diagnose and recover from errors.

Error messages should be expressed in plain language (no codes), precisely indicate the problem and constructively suggest a solution.

10. Help and documentation
Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out.
Keychain:
User goes to shop and chooses whatever he/she wants. User goes to check-out. When the user has to pay, he/she holds the keychain in front of the paying device so that the money will get transferred from his/her bank account. When it is above 25 euros, the transaction will only be succeeded when he/she scans her finger on the back of the key chain. This while the keychain is still in front of the paying device. They have to "set" the finger scan onces in the beginning, how many fingers etc? When the payment has succeeded the user gets the receipt and can leave the shop.
Hologram:
The user pushes the button at the side so it comes out. The user can now set a goal by turning the button. To the right is making the goal higher and turning left is lowering the amount of money. To set the goal, the user presses the button in again.
App:
The uses (parents in this case) have to add the children and connect the account to the bank account of the children. (Bank could do this as well?). They can set a goal through the app, but this can also be done by the child and the hologram. To find the keychain, the user clicks on the map in the app. To get more insight on the spending behavior, the user clicks on "agenda".

Heuristic violated: #1 user control
Description: The user does not know when the battery is empty (keychain.)
Possible causes: The device doesn't have an option to show it.
Expected consequences: User will be in store and the keychain does not work
because he/she was unaware of the fact that the battery was low.
Solution: The app will get a message saying the battery of the keychain is low and suggest to replace the battery. The hologram will show this as well.

Heuristic violated: #2 user control
Description:
The system (keychain) recognizes only one finger.
Possible causes:
This was the system set-up.
Expected consequences:
If the user has a scratch on his/her finger, or burned his/her finger, the finger scan will not recognize the finger and will therefore not be able to pay.

Solution: At the bank, before getting the system. The user and their parents will have to scan 5 fingers. These will be the fingers the keychain recognizes.

Heuristic violated: #2 user control
Description:
The user does not know how the button on the hologram works.
Possible causes:
It is unclear that you have to press the button in before you can use it.
Expected consequences:
The user is confused and does not know how to set the goal.

Solution: We ar going to test if the user really does not understand how the button works. We will add an extra sign on button that indicates you have to push it in. In addition the user will have to learn how to use the button.

Koen Spijkers

1. Visibility of system status
Is status feedback provided continuously (e.g., progress indicators or messages)? (network connection, battery status etc.)
The Standalone device is giving feedback continuously, the user sees what their goals are and what their spending's are. Also the standalone device is connected with the wifi and that is visible. The device is on net power 230v
Are warning messages displayed for long enough?
The warning messages of connection will display 15 seconds. After that you will see a wifi icon with a red line through it. With setting the goals the user will get a notification if the goal isn't set.
Does the user receive full and continuous feedback about the results of his actions? 2. Match between system and real world
With the stand alone device the user will get the feedback if he links his token with the device. The device will show the user it's goals and balance on their token.

2. Match between system and real word

Are the words or symbols used familiar to the user?

We will use the familiar symbols that are well know. Such as the $ for dollar and € for euros. Also the main icon for wifi will be used.

Is information presented in a simple, natural and logical order?

The interface of the standalone device is simple and minimalistic. The user will quickly understand what means what. With the token we use the colors red and green. So If a finger recognition failed the red light will blink.

Are important controls represented and is there an obvious mapping between them and the real controls?

We are using a navigation wheel on the device. If you push this the button will come out and you can turn the wheel to set your goals. For the first time it will be searching for the button

3. User control and freedom

Are users able to undo unwanted actions?

The user only can set goals with the navigation wheel. so the action are minimum

Can operations taking a long time be cancelled?

no, If the button of the wheel is pushed back the device will ask if it has to be canceled and if you don't push back the operation will be cancelled.

4. Consistency and standards

There will be a main template where the interface is built on. With this templated it is already decided where the buttons and similar icon should be on the interface. So there will be no inconsistencies.

5. Error prevention

Is user confirmation required before carrying out a potentially 'dangerous' action ?

If the user want to set a goal the device will ask an confirmation if the goal the user wants to set is wright.

Does the system prevent you from doing undesired actions in accidents?

if the user is setting its goals and accidental pushes the wheel button back in the device it will ask if the user is sure to cancel the operation

Are the options given in dialog boxes obvious?

If the navigation wheel is out, the interface will show set goal! And if you turn the wheel the user can set the amount of the goal.

Is the system robust and safe enough for its surroundings?

The system is very compact and simple build.

6. Recognition rather than recall

Is the functionality of the buttons/icons obvious from their labels?

the navigation wheel is hided in the device. If you push the navigation wheel it will come out of the box and you can turn it. but there is no guide line for the button.

Is the relationship between controls and their actions obvious?

It is obvious that the navigation wheel is for setting the goals because it stands above it.

Is it possible to search for information rather than entering the information directly?

Token: on the token the fingerprint symbol will be used. To immediate show that you have to use your finger.

Standalone device: there will be guide words to see where to push to set goals or hold your token

Is the functionality of device controls (e.g., thumbwheels) obvious?

see ohter comment

7. Flexibility and efficiency of use

Does the system guide novice users sufficiently?

The platform is simple. The user can set goals.

Is it possible for expert users to use shortcuts?

no

Is it possible to access and re-use a recent history of instructions?

no

Is it possible to replace and restore default settings easily?

no

8. Aesthetic and minimalist design

Orderly organization of interface elements?

The interface is minimalistic

Functional use of colours?

For the token we are using red for failed and green for confirmed

9. Help users recognize, diagnose, recover from errors

If the goals isn't confirmed a message will show up, "the goal isn't confirmed yet. Are you sure you would like to proceed?" if the user push again the goal isn't set. If the user turns the wheel the user will be back at the goal screen.

10. Help and documentation

The device will be provided with a user manual.

User test format

-we will write this format in Dutch and in English, this way we will have the English version to hand in and the Dutch version to actually do the test with at the primary school.-

English version:

introduction:

Hello i'm Sophie Baars, i'm 18 years old and when I was your age I also went to this school. Now I'm studying at the university of Eindhoven. I study industrial design, that means I want to make designs and develop products to help people. Right now, I'm working on a project to teach children to save their money. Later on I will explain what the design is about. It is very important to us to see if you like our design and if you will use it. Actually, I am here to check whether what we've made can be improved.

Explanation:

Actually, we designed three things, an app, a small box and a keychain. The app is meant for your parents, so we won't be testing that today. The keychain is like a bank card, you can scan it at the cash register and that is how you pay. For safety, you should also scan your finger. When you have paid, a light will flash and the keychain will vibrate, while testing I'll ask you what you think it means. The box is made so that you can set a saving goal. It has a hologram and this shows you an animal and how much money is on your bank account right now. It also shows your goal. I will also ask you about this later.

Test:

Let's start off with the box.

How do you turn it on?
How do you think you should set your goal?
Correct → and what do you do now?
What do you think the green bar means?
The lion is sad now, what do you think this means?
Now he is happy, what does this mean?

Let's continue with the keychain

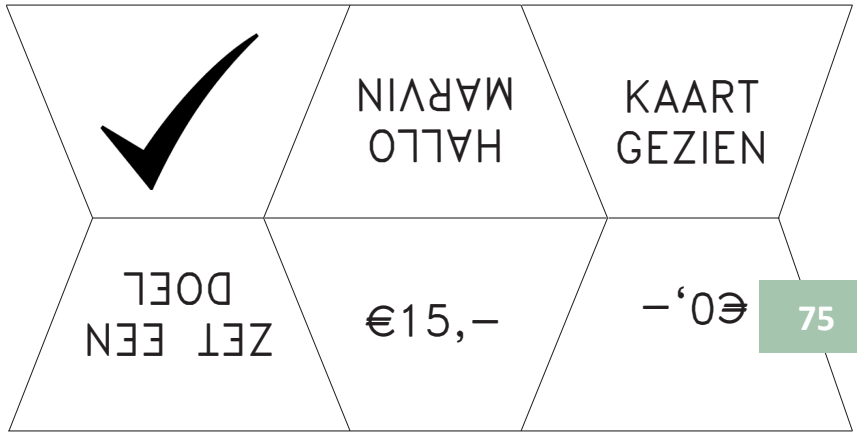
Imagine I'm the cashier, let's try to pay.
The light turns red, what do you think this means?
And what would green mean then?
Do you understand why you should scan your finger?
You just paid €20,- and it vibrated twice, what do you think this is?
What do you think would happen if you were to pay €50,-?

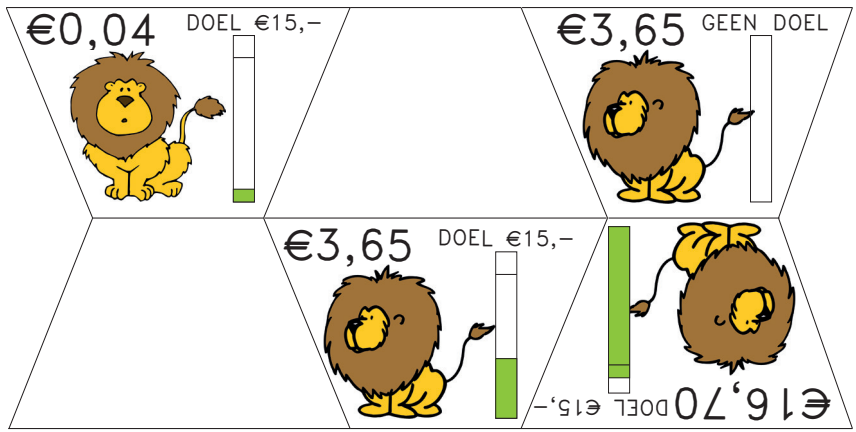
Do you have any questions?
-Do you have to charge the keychain?
-If the batteries are empty and the keychain dies, does the device reset?
-What if you lose your keychain?
-What happens if they fake your fingerprints?
-Where do you "set" your finger scan?
-How do you know which keychain is yours? How do you recognize your keychain when two are laying next to each other?
-How do you turn the box off?
-What happens if you remove the plug from the box? Do you have to reset the box/goal when you plug it in again?
-Why is it the size it is right now?
-Can you choose your own colour?
-Will the device cost money?
-When will we be able to get it ourselves?

Do you think we can improve on anything?
-Wanted touch screen on the hologram box, thought it would be easier to use.
-Being able to charge the keychain (wireless) instead of having to replace the battery.
-Put the keychain on a carabiner and keep with you that way (you can attach the carabiner to your pants).
-We can add their signature/name on the keychain so they will recognize their own keychain.
-Choose your own colour for individuality.

Comments?
-Some children didn't want their parents to see what they were spending their money on, others actually wanted this.
-The keychain smelled funny. like anise(?)
-Some leave their keys in their bike when at school. The keychain has to be waterproof.
-Thought the holograms were cool.
-Enjoyed the test and liked the concept.
-Thought it would be a really useful device.

(The actual voice recordings from the user test will be included in the email we will send including the report.)





This is the box we used during the user test. The cardboard cutouts with the pictures on them represent the hologram. We also used the keychains displayed in the picture on the left. On one side of the keychain is the fingerprint scan and on the other side is the avatar along with the lights. To pictures in the top right are the pictures from the cardboard cut outs. They are in Dutch since the children we interviewed do not speak English. When the user pressed the right button during the user test. we put in a different picture. For example. At first it shows the avatar without a goal, after the goal is set we show the picture of the avatar with a set goal.

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