

# User centred design

## Group 57



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# Chapter 1

Every day a lot of people struggle with food intolerances or allergies. It is hard for them to know what they can and cannot eat without checking every single package and asking around at restaurants.

## **The users, their relevant capabilities and limitations.**

The users are children from 6 to 12 years old with food intolerances or food allergies and their parents. The relevant capability of the children is that they can go to the supermarket to buy food. The limitation they face is that they do not know what their food intolerance or allergy means and because of this, they do not know what product they can pick. The parents can read the ingredients and know what they can buy for their children. The limitation for the parents is that they have to look at every package and read through the ingredients to make sure it's safe.

## **Additional stakeholders and how they are involved.**

Because the user group will be children there are a lot of other stakeholders involved, most importantly their parents.

- The parents of the children with food intolerance/allergies.
  - They have to buy the food and prepare it for their children and have to make sure that the child does not eat the wrong meals. They also take responsibility for the child, and need to make sure he/she eats the right things when he/she is away from home.
- The supermarket owners
  - They have to make sure that there are products for people with food allergies/intolerances, as well as display them clearly.
- The food producers
  - They have to make sure that they mention every ingredient that is in the meal on the package, so people with food intolerances or allergies can pick the right meals.
- The restaurants
  - They have to make sure that everyone knows what is in their meals, and that they have options for people with intolerance or allergies.
- The brand owners
  - They have to make sure that there are options for people with intolerances or allergies and that these options are not too expensive.
- Other people shopping, without allergies or intolerances.
  - They have to understand that some people need other food supplies and they should not judge them for this.
- Friends
  - They might offer foods that someone with allergies or intolerances cannot have.

## The tasks/activities that should be carried out.

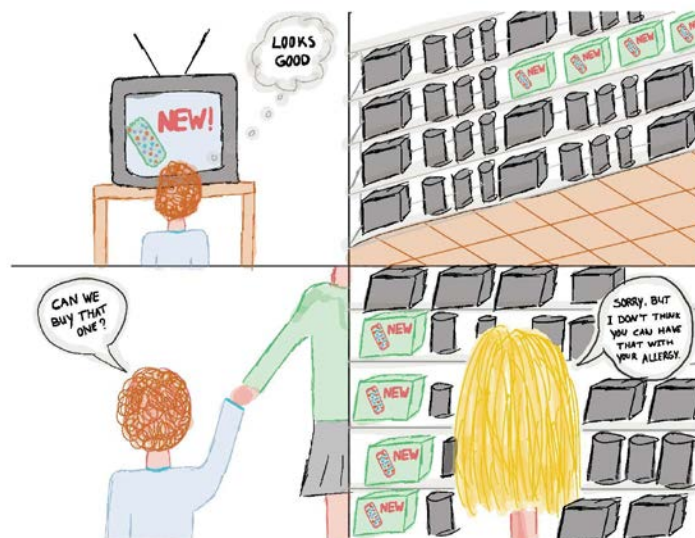
- There should be an easy way for people with allergies or intolerances to pick the right product. There should also be an easy way for a product to indicate whether it's safe to be consumed by an individual with allergies. This way, the people do not really have to search for what they can eat and for what they cannot eat.
- For the restaurant employees, it would be easier if the person with a food allergy or intolerance could give them more information/clear description of their allergies and what they can and cannot eat.
- A clear way to let the child understand what they can and cannot eat, so that they do not ingest harmful food.

## Bottlenecks in the way the tasks/activities are carried out currently

The ingredients are displayed in inconveniently small text, the E-numbers are hard to identify and while on vacation, it is hard to identify the ingredients because they are in another language. It is hard to remember (for the child and his/her parents/family/friends etc.) what he or she can and cannot eat.

## The physical, social, organizational and technical environment (to the extent applicable)

- Physical: supermarket, busy, potentially noisy, clearly lit, hurried.
- Social: parents, friends, other people in the supermarket
- Organizational: the supermarket aisles and advertisements.
- Technical: self-scanners, barcodes, smartphone cameras, online databases and id's.



## Experience goals

- Helpful: Our product should help the child to cope with their intolerance or allergy in a more easy way than the possibilities that there are now.
- Cognitively stimulating: It should give the child increasingly more knowledge about their intolerance or allergy for now and in the future.
- Engaging: Our product should be inviting for the child to use. It should make their life easier, otherwise the child would have no reason to use it.
- Less frustrating: The user should not have to look very thoroughly into the ingredients anymore to find whether they can eat the product or not.

## Application of notions of effectiveness, efficiency and satisfaction

**Effectiveness** → The user is a child that suffers from food intolerances or allergies, he needs a product that is easy to use and that does not have a lot of description and text. It is effective if every child from age of 8 to age of 14 can use it.

*Metrics:* The percentage of users that successfully complete the task. The percentage of users that can use the product without description.

**Efficiency** → It should not take a lot of time to understand the product. The time taken to Achieve the goal should be short, because these children will be distracted very fast. The time that it takes with the product should be less than the time that it took before, to do the specific task.

*Metrics:* Time to complete a task. Amount of steps that are needed to complete the task. Time until distraction takes over.

**Satisfaction** → The child should feel comfortable using the product, it should be adapted for children so the product is attractive for them to use.

*Metrics:* Percentage of children that keep using the product. Percentage that would recommend the product to other children with an intolerance or allergy.

# Chapter 2

Gathering information is vital in order to understand the problems and needs faced by the target group. This information can be used to build up persona's that can be very helpful in understanding the user.

## Joint persona hypothesis:

The roles of the personas are a child with a certain intolerance/allergy and the parent/caretaker of the child.

### ***Child***

The goals for the child are to know what he/she can safely eat. The child would also want to get the ability to develop independence from their parents in choosing their food without a large possibility in failing to pick the right food.

The behaviour of the child is how much they are motivated to be independent from their parents considering their intolerance or allergy.

The environments where the child would use the product are at home, in the supermarket, at school, at a friends home and when they are with relatives.

### ***Parent/Caretaker***

The goals of the parents or caretakers of the child are to make sure the child eats the right foods. They would also want the child to maintain a healthy, well-balanced diet. Besides these goals they would want to educate the child about his/her allergy/intolerance.

The behaviour of the parent is how much he or she wants to do to help their children with their food intolerance.

The environments that the parents or caretakers would use the product are at the supermarket and at relatives homes.

## **Process**

Everyone interviewed 3 people, we divided the interviews so that half of the participants would be parents and the other half would be children. We all asked children from 6 to 12 years old and their parents. The children have an intolerance and the parents have children with an intolerance. We all wrote during the interview so afterwards we could think about the answers and compare them.

## **Personas**

From the results of the interviews we concluded that most parents from younger children would like to have a device that helps them with picking the right products. This is because they are not very familiar with the intolerance and they want their child to understand their intolerance as they get older. They think a device could help them, as children can also go shopping on their own. The parents of older children would not want a device because the children are more familiar with the intolerance and they know what products they can eat. All the parents mentioned that eating outside of the house is hard, because they cannot be sure about the makeup of the products their child eats.

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The children would all like to have a device. The younger children want it because it would make them more independent. The older children now know what they can eat, but they mention that they would liked a device when they were younger, in order to understand the intolerance better.



**Child:**

Luke is 9 years old and goes to primary school. He is a good student, gets good grades and is very social with all the other children. He seems just an average child without any alarming trouble. Except when he has to eat. Luke has an intolerance for lactose and fructose. This means that he can't just eat whatever he wants. Every time his mom is going to cook a meal, she has to take a good look at the ingredients on the packages. Which takes up quite some time.

Luke himself is quite interested in his intolerances. He wants to know what it means and what he can and cannot eat. It's quite difficult to explain to him that he can't decide himself whether he can eat a certain product or not. He wants to help his mom with looking through the ingredients, but his mom is scared that he will make a mistake. So every time Luke wants to know if he can the product he has to ask his mom.

Everyday Luke goes to school from 9 to 3. When he gets out of his bed, his mom prepares a breakfast for him and makes a lunchbox ready for school. When Luke opens his lunchbox during lunch around his friends he notices that his lunch is different from the other's. His friends ask him a lot if he wants to try something they have got in their lunchbox, but every time he has to explain that he's not sure. That's quite difficult for him, because it all looks very tasty.

He can't wait to grow up and be able to know himself whether he can eat a certain product or not. He hopes that his mom then will trust him with checking the packages.



**Parent:**

Harry is a 38 year-old father of two. His youngest child Dylan (age 11) has quite some allergies, among which a deadly peanut allergy. When Dylan was 4, he had a life-threatening anaphylactic reaction, which was very stressful for Harry and his wife. They have been very careful since.

Harry has his own online business, while his wife works away from home. This means he does most of the grocery shopping. In the supermarket he is often in a hurry, but he does always try to carefully check whether the things he buys are safe for Dylan to eat by skimming over the ingredient list.

For some products, Harry can't find the ingredient list, or it is too small to read. In that case he

does not buy it. Harry's wife notes that the family might not have enough of a varied diet because of this.

Harry worries for when Dylan goes to high-school next year. He wants his son to become more independent, but recognizes that this will be harder because of some of his allergies that he will need to watch out for.

At the moment, Harry receives calls from time to time when Dylan is at a friends house asking whether he can eat a particular candy or meal. Also, when Dylan is at school, Harry can be confident that his teacher knows about his allergies, and will take responsibility.

By the time Dylan will go to highschool, Harry would like his son to become independent in recognizing which foods he can and cannot eat, and would like to help and guide him through this process.

## Chapter 3

It's very important to set requirements for the design before designing it. In this way you can look back at those requirements to make sure your design covers all the requirements that you have set in the beginning.

### Requirements

#### *Functional requirement*

A lot of people have multiple allergies and/or intolerances. It is important that users can dial in all of their dietary preferences.

**Description:** The product should have the function to choose from multiple allergies and/or intolerances for children to pick.

**Fit criterion:** There should be a complete list of choices for every intolerance or allergy and the child should be able to pick one or multiple - Run a test case using a representative sample of all possible intolerances/allergies (3%)

**Customer satisfaction:** 4

#### *Look-and-feel requirement*

The menu of the product should be easy to understand for children 8 - 14 years, with minimal steps. Should also be attractive to encourage use.

**Description:** The product shall have an easily accessible and attractive menu, with just a few steps for children to use.

**Fit criterion:** Usage of the device should result in a 70% drop in the instances where an individual consumes unsafe food.

**Customer satisfaction:** 4

#### *Ease of use requirement*

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The product should be simple. It should not take more than 3 actions to find out whether a food product is safe to eat.

**Description:** The product should be simple to use with a maximum of 3 actions to get to the result.

**Fit Criterion:** After having set dietary preferences, it should take a maximum of 3 actions to find out whether a food product is safe to eat, 95% of the time.

**Customer satisfaction:** 3

### ***Ease of learning requirement***

It is no problem if the product needs a bit of training/explaining before the child can use it on their own. It is okay if the parent needs to help the child the first few weeks.

**Description:** The product shall be able to be used independently by children of 7 years and older within 3 weeks.

**Fit criterion:** 80% of users should be able to successfully obtain a valid result and utilize the device as it was designed to be used, after 3 weeks.

**Customer satisfaction:** 3

### ***Performance requirement***

System/device should have minimum errors that are the fault of the device. It should also be responsive, and should quickly give feedback for inputs.

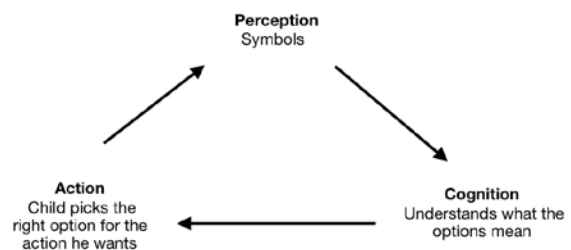
**Description:** The product shall provide the child and parent with accurate and reliable data.

**Fit criterion** Out of all the times the device is used, It should provide wrong results (due to the fault of the machine) less than 2% of the time. It should also take less than 2 seconds to provide feedback for an input from the user.

**Customer satisfaction** 5

## **Perception, cognition, action cycle**

There should be clear symbols so the child can use them easily. The menu should be clear with as little options as possible. The child should immediately know which button he or she has to push to get the action or result requested. Because of this clear overview the child understands in way what he/she has to use the product. Now he/she know what buttons he should push and how to select the right options.



## **Mapping affordance constraints**

### ***Mapping***

**Good:**

The tap with a red button for hot water and a blue one for cold. It is really clear what button you need to use to get the water the temperature you want.

**Bad:** Multiple doorbells for houses with one entry. It is not clear what bell to ring for the right level.

**Solution:** give every floor a letter and put that on the doorbell.

### **Affordance**

An iPhone has very clear turn on and off switches that looks like physical switches. You can swipe over the switches to turn them on or off as if you are doing it with a real switch. The switch even turns green after you turn it on. Green means in general on, good, ready, ect. so this immediately shows the user that his/her action has the intended result. This is an example of Material Design.



### **Constraints**

**Physical:** The battery loader does not fit in the earbuds hole of an iphone. This constraint makes sure that you use the right hole because it will not fit in the other.

**Logical:** You can call with the phone app but not with the text app. You can conclude it without really thinking about it.

**Cultural:** Swiping on a phone can be thought of as a cultural constraint. If a person who had no prior experience was handed a phone, they would probably not know how to interact with a UI that requires an innate understanding about swiping elements (swiping away notifications from the notification drawer in Android).

## Chapter 4

Before we know what the design of the product will be, we need to know in what situations it will be used and in what way. In this way we can fit our design in het environment in which it will be needed.

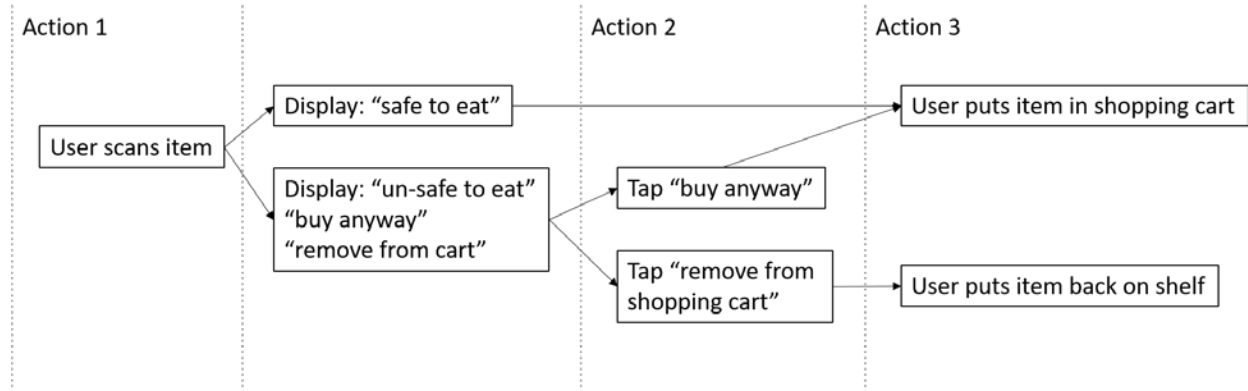
### **Scenario of use**

Anna (38) has a daughter Rory (12). When Rory was a baby Anna found out that Rory didn't respond well to certain food. Rory has a lactose intolerance, she gets stomach aches. Anna knows a lot about Rory's intolerance and knows exactly what she can and cannot eat, but she would like Rory to become more independent considering her intolerance. That's why Anna now has a small device in her hand and shows it to Rory whilst they are in the supermarket. At home they made a profile for Rory, so the device knows which intolerance(s) Rory has. The device

asks Rory to scan a product in the supermarket. She grabs a package which contains yogurt. She scans the barcode on the package and the product tells her that it's not safe to eat this product because it contains lactose. Now Rory can check whether she can eat a product without asking her mom.

## Task description

The task we described down here is the task you perform in the supermarket, before this task comes the task you do at home as a preparation. It's creating your profile with all the specific information about your intolerances and/or allergies.



## Joint QOC analysis

**Problem:** The interaction problem the device has to address is that the user can have multiple intolerances and that these can differ in intensity.

1. **Question:** How can a user tell the product about his/her intolerances/allergies and their intensity?
2. **Options:**
  1. Create an online profile of preferences on a desktop computer, that the product uses.
  2. User inputs their intolerances every time they use device.
  3. Based on the ingredients the device scans, it outputs every single intolerance that is linked to them. The user then has to identify whether any of the listed intolerances correspond to what they have.
3. **Criteria:**

|                                       | <i>Option 1</i> | <i>Option 2</i> | <i>Option 3</i> |
|---------------------------------------|-----------------|-----------------|-----------------|
| <b>Efficiency</b>                     | 5               | 2               | 1               |
| <b>Effectiveness</b>                  | 4               | 3               | 2               |
| <b>Learnability</b>                   | 5               | 4               | 3               |
| <b>Flexibility</b>                    | 3               | 5               | 5               |
| <b>Support multi-users situations</b> | 4               | 5               | 5               |

|            |    |    |    |
|------------|----|----|----|
| <b>Sum</b> | 21 | 19 | 16 |
|------------|----|----|----|

The first option scored 5 on efficiency because it will not take a lot of time or effort to use the product.

The first option scored 4 on effectiveness because it is really easy to use when you have an account you only have to click on it once.

The first option scored 5 on learnability because it is really easy to learn how to use the product with an account the user does not have to click on the allergies again.

The first option scored 3 on flexibility because it takes some effort to change your profile of preferences.

The first option scored 4 on support multi-users situations because it has a provision to load multiple user profiles, but it takes a few extra steps to toggle between multiple users.

The second option scored 2 on efficiency because it would be very time consuming to input your intolerances every time, especially if an individual has multiple intolerances.

The second option scored 3 on effectiveness because the system does give an accurate result, but this is based on the input of the user. If the user forgets a single intolerance at the time of input, the device will return a wrong result.

The second option scored 4 on learnability because a user has to learn that s(he) has to input their intolerances every single time.

The second option scored 5 on flexibility because if the allergies/intolerances change over time, you can readily change what you tell the device from time to time.

The second option scored 5 on support multi-users situations because every time you use the product you first have to pick which intolerance or allergy, so if you have used the product to check a certain food, you can give it to another person with another intolerance or allergy without having to change many options.

The third option scored 1 on efficiency because it takes a lot of time and effort to go through a whole list of ingredients and allergies to find the ones that are specific to you.

The third option scored 2 on effectiveness because you have to scroll through a long list of intolerances and allergies, if you have multiple intolerances or allergies, it's quite easy to forget one.

The third option scored 3 on learnability because every intolerance or allergy has a different color which is visible at the end of an ingredient to see that you can't eat this product with that intolerance or allergy. You have to learn what all the colors mean before you can use it. This can take up quite some time.

The third option scored 5 on flexibility because it shows the entire spectrum of intolerances and allergies related to a product.

The third option scored 5 on support multi-users situations because everyone can use the same device because it is not tied to a specific profile.

## Conclusion

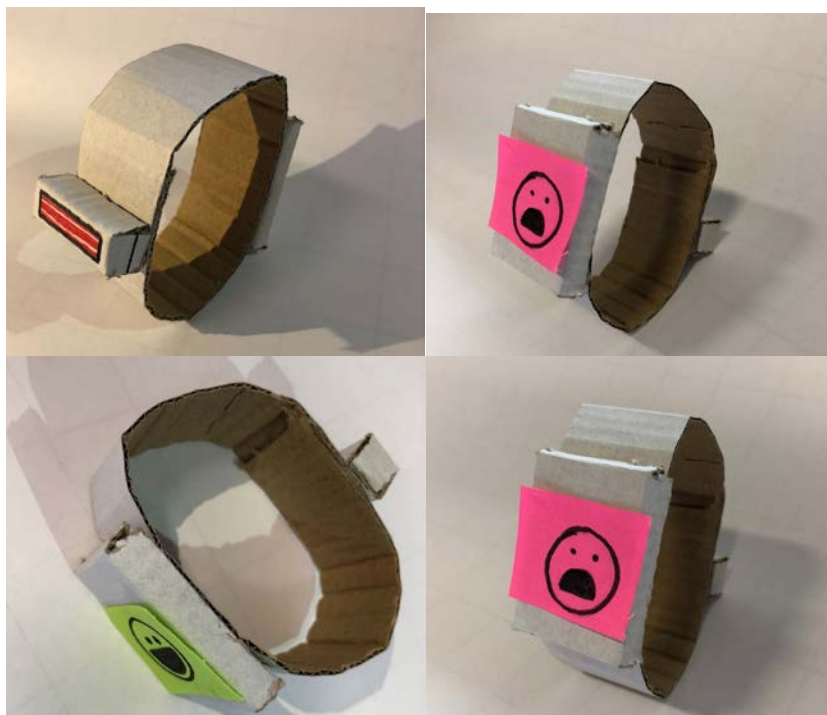
We have chosen option 1 because we think the efficiency, effectiveness and learnability are the most important criteria. Because a child should use it the criteria learnability is very important, it should be easy to get to know how to use it. The flexibility is not the most important but it is good if the product is a little flexible. Support of multi-users can be important if the device would be in the supermarket and everyone with an allergy or intolerance can use it. The first option scores highest on these criteria so this will be the best option.

## Chapter 5

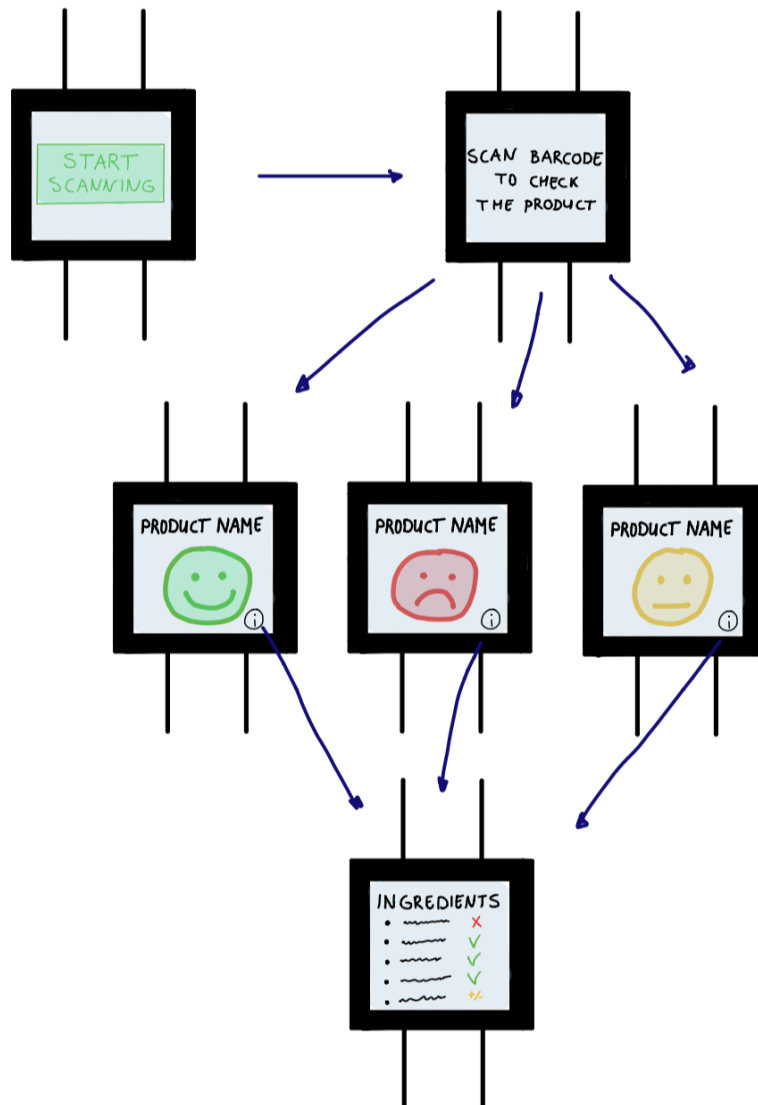
Prototypes are used to give a tangible form to an idea, and to gain a better understanding of how it would work in real life. A low fidelity prototype was created in order to decide on the form and positioning of elements, as well as the dimensions of the device.

### Prototype

It is a barcode scanning bracelet that looks like a smartwatch. This prototype shows the ideal dimensions necessary, as well as the positioning of elements (look/feel). As we designed this watch for an adult, for a child it has to be a little smaller. The scanner from the third picture is on the bottom of the wrist so the user does not have to turn his or her hand while using the bracelet.



The picture underneath shows what the screen will look like during the use of the bracelet. This picture shows really clearly how the interaction will go and this can be used to evaluate the prototype.



## Task description

The user selects his account on the desktop computer.  
The user presses the button on the watch.  
The watch scans the barcode from the computer.  
The user goes to the store and picks a product.  
The user presses the button on the watch

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The watch scans the product.  
 The watch shows a happy or a sad face.  
 The user can press a second button  
 The watch shows the ingredients and highlights the ones the user cannot have.

## Chapter 6

Heuristic and Cognitive walkthroughs are used to go through a user-flow and try to find areas where the interaction could be ambiguous, or refuses to achieve the goal intended.

### Heuristic evaluation and cognitive walkthrough.

#### *Evaluation:*

|   |
|---|
| Heuristic violated: # 9 Help users recognize, diagnose, recover from errors         |
| Description: when an error occurs because the system does not recognize the product |
| Possible causes: there is no button yet to go back to the main menu.                |
| Expected consequences: the user has to start the system again every time            |

A solution would be to put in a button to go back to the home menu, also when the user has scanned the product this button could be used to go to the home menu and it would not go automatically what provides the user with more time to read the ingredients.

|   |
|---|
| Heuristic violated: # 7 Flexibility and efficiency of use   |
| Description: the user cannot switch to another user when he is in the store   |
| Possible causes: the user has to scan the code from the computer when he wants to change the user   |
| Expected consequences: in a family who has multiple members with intolerances or allergies everyone has to have their own watch because switching profile in the store is not possible. |

A solution would be to be able to select multiple main users that can be selected at the main menu, the computer would now only be used to change one's profile.

|  |
|--|
| Heuristic violated: # 10 help and documentation  |
| Description: when an error occurs the user cannot ask anywhere                                   |
| Possible causes: there should be a way that the user can ask for help when the user has an error |
| Expected consequences: the user has to go home to get help via the computer                      |

A solution would be to add a button for help, the user would have to have access to the internet because otherwise the button would have no use.

|  |
|--|
| Heuristic violated: # 2 match between system and real world  |
| Description: when the yellow screen pops up the child cannot decide for himself if he can eat a certain food |
| Possible causes: children are not as responsible as adults   |
| Expected consequences: the user eats the food that he might not be able to eat.                              |

A solution would be a screen between the yellow screen and the ingredients that asks the parent if the child can eat it.

### ***Walkthrough:***

**The user touches the button that is on the display and hovers the bracelet over the barcode of the product to be scanned.**

1. Conceptual model: Do they know what they need to do? Can the customer be expected to try to do this action?

As this is the biggest button, and it is displayed on the screen, they can be expected to know that they should press this one.

2. Visibility: Is the control for the action visible? Can they see what they need to do?

Yes. It is on the screen, facing the user.

3. Labelling: Is there a strong link between the control and the action?

No. The button is on top of the bracelet and the scanner under the bracelet. Maybe the button should have a clear icon of the underside of the bracelet scanning... Maybe the button should be moved from the screen to be a physical button on the underside of the bracelet (where the scanner is).

4. Feedback: Will the user understand the feedback?

Probably. When the scanner is on, it will shine a red light. This is clear to see, and familiar to the user as a scanner.



**The scanner presents (a) a green screen, with a smile. The user puts the item in their bag and continues shopping.**

**(b) a red screen, with a frown. The user puts the product back on the shelf and continues shopping.**

**Additionally, there is a button that, if pressed, leads to a screen showing the ingredients that the user cannot eat that are in the scanned product.**

1. Conceptual model: Do they know what they need to do? Can the customer be expected to try to do this action?
  - (a) Yes, there is not really any further actions needed from the user.
  - (b) Yes, it is the only button. The user might accidentally press it, trying to get back to the 'neutral' screen, that is shown before scanning.
2. Visibility: Is the control for the action visible? Can they see what they need to do?
  - (a.) Not applicable. No action needed.
  - (b.) Yes. It is on the screen, facing the user.
- (3) Labelling: Is there a strong link between the control and the action?
  - (a) Not applicable. No action needed.
  - (b) Only if the button has a proper icon.
- (4) Feedback: Will the user understand the feedback?

Yes. Green means go and red means no. We expect this to be universally clear.

## **Changes of the prototype on the basis of the results of the expert evaluation**

According to the evaluations, we discovered that we missed a screen to select a user. We also missed a button that could bring the user back to the beginning, after scanning a product and reading the ingredients. Between the yellow face and the ingredients there has to be a screen that asks the parent if the child can eat a certain food or not. The evaluation showed that there should be a help button, the device should show a menu that helps the user how to use the device. It also has an option that makes this guide go away. Besides this we had to make a prototype of the screen that the user uses to make a profile. We made a new prototype with everything we learned. Underneath are the pictures of the new scanner, the improved screen and the screen of the profile.



The improved prototype



Name:

Age:

Do parents need to give an ok when the label is yellow

When choosing yes the next screen appears:

Fill in phone number of parent:

Choose

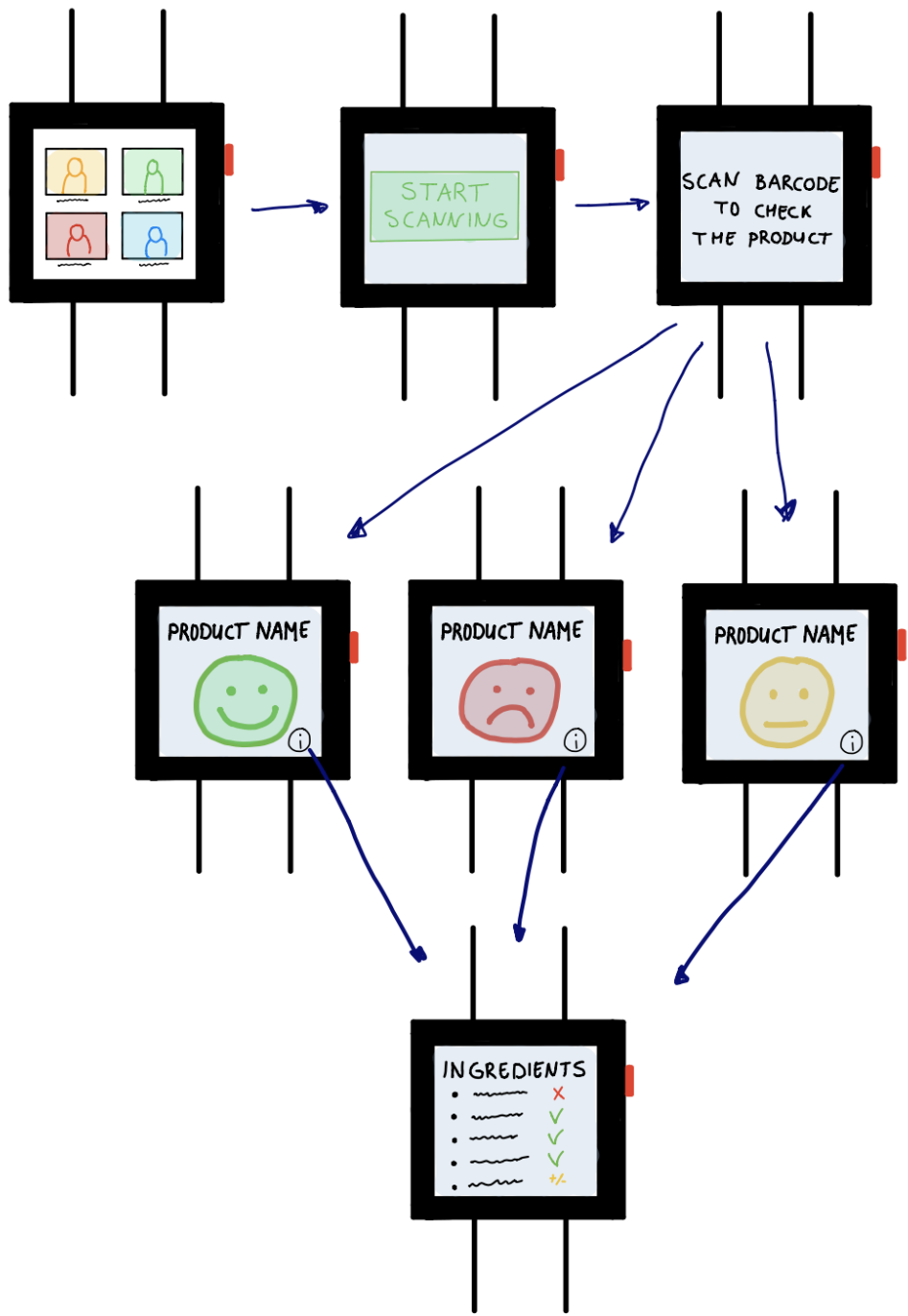
choose what sort of food:

choose the amount that you can eat:

When choosing a little a new bar appears where you can fill in how much of the food you can eat.

gram

The computer screen to make the profile.



interaction the user has to do to get to the end result.

The



The screen of the scanner

## Discussion of differences between heuristic evaluation and cognitive walkthrough

The evaluation and the walkthrough have identified different, as well as similar problems. The evaluation showed the problem with the different users and the lack of a return button. The walkthrough showed no major problems, but it showed that it might not be clear what the buttons mean and what their link is.

# Chapter 7

To finalize the design, it's important to get feedback from the target audience to see the little mistakes that you miss if you look at your own design.

## **DECIDE framework:**

1. Decide on goals and questions for user test

Goal: If people would use the product

Questions:

Would you use the device?

Do you understand the device?

Do you miss anything?

How much time does it take you to understand the device?

Do you think it will help you?

2. Phrase at least three tasks (check evaluation purpose)

Try to scan a product.

Try to understand the result.

Try to fill in a profile.

3. Write an instruction/explanation for the user to explain what you expect from the user (Only provide the overall task (no description in steps!) to the user)

This device is for children and parents of these children who have an intolerance or allergy to food. The device should help them decide if they can eat something or not.

4. Prepare a short informed consent form for users to sign

See appendix.

5. Define what can you will observe and measure

The time that it takes to understand the device, the time that it takes to scan a product and get a result and the amount of failures.

6. Do a quick-and-dirty pilot evaluation with another student group

The other group said that it would be unhandy if the child has to ask the parent but the parent does not have time to answer right away.

7. Reflect on process and adjust if needed

We do not change our process because we think it works good this way.

Everyone tested 3 people each. 2 people tested 2 children and 1 parent and the other 2 people tested 2 parents and 1 child. Totally, we got results from 6 parents and from 6 children.

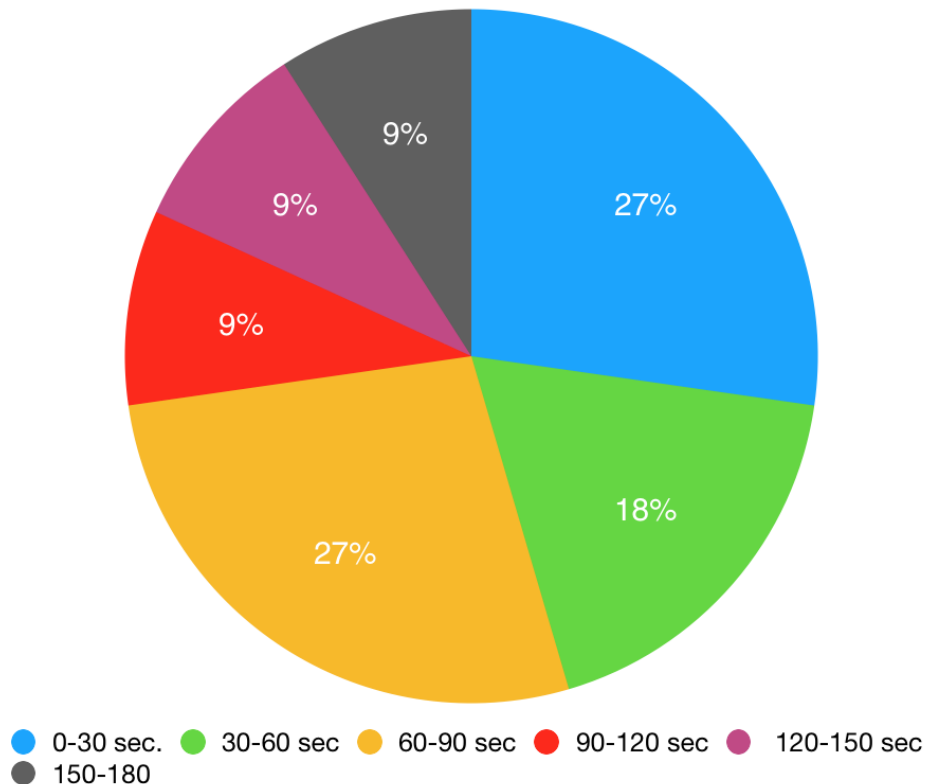
We conducted the analysis of the data by looking at what behaviour our participants showed during the tests. We looked at how many times the participants did not understand what to do, how many times they asked for help and how long it took them to fully understand the device. We wrote this down so we could discuss it later. We timed how long it took the participants to

understand the device during the tests. Using this data, we created a graph that helped us understand the data better.

## Results

What we noticed is that the parents took longer to understand the device than the children. The children were also quick to notice what the device is for, sooner, and without any instructions. They did really see the intention of the usage. The parents were more concerned with what the next steps after the button would be, while the children just started pressing the buttons. One problem we noticed during the user tests was that some younger children did not understand how a barcode works. We asked the participant if he/she could tell when they thought that they understand the device, and based on whether they could successfully navigate the user flow, we noted the timings.

How long did it take to understand the product?



## Conclusion

The group of test participants that understood the function of the product fastest were mostly the children. This is our main target group, so we were happy with this outcome. The parents did need some more explaining to understand the concept, so that's why we decided to add an introduction walkthrough to the product to make them understand the use of the product in a better way. Also the younger children need some explanation on how a barcode works so they can understand the purpose of the device better. Most people said that they liked the device and that they would use it, after the test the parents also said that the device could help them while shopping and that it could help their children understand the intolerance they have. We also asked the children if they think they would understand their intolerance better while using the device and they said that they thought they would. All in all, we can say that our product is understandable and easy to use for our target group.

## Comparison

We did get a different outcome from the user-test then from the cognitive walkthrough, as critic as we tried to be, there are still little mistakes that you won't see because we totally understand the product and know how everything should work. Besides that, our target group are children from 6 to 12 years old, it's quite hard for us to think as children from that age.

## Re-design

We found a few areas in the app where the users struggled to continue, or had to ask a question before proceeding.

- The blue button with the exclamation mark proved to be confusing as people weren't sure about its function. We have decided to replace it with an information 'i', considering it leads to a screen with more information.
- The prototype had almost no pause between the 'ask' screen, and the 'result' screen - this proved confusing, as it was abrupt switch. We decided to place a loading screen in between to give a more realistic flow.
- 'Hello' screen should automatically switch to the next screen - No clear indication that it needs to be tapped to proceed.
- The fact that the faces should be tapped, in order to proceed to the scanning screen, is not very clear - We decided to put in some small text that says 'DONE' to prompt the user to press it.
- The 'Ask'/yellow face should have a flat mouth, in order to keep up the theme of human like faces
- Tracking how much of something has been bought/consumed.
- Option for parent to send short message.



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## Individual reflections

*Aabharan Hemanth*

With this course, my aim was to learn how to design for the user. I hoped to learn how to center everything around the user and design without making assumptions. I learnt a lot over the past couple of weeks regarding this.

It was interesting to see how the course took the concept of designing and testing and scientifically broke it down. It was great learning techniques that really boiled down tasks to their essence, and simplified the process of making decisions. Things like the QQC analysis and the DECIDE framework were very powerful in helping my group to come up with an effective solution.

Initially, it felt like the course was going too deep, and it seemed like there was a scientific way or tool to do everything. It was a bit overwhelming at first, and I didn't really see a need to use a predefined tool or framework for everything we did. But when we were trying to develop our design case, I realized just how effective these tools are. I especially found it very useful to learn the techniques involved with user testing, what frameworks to use and how to really get effective data.

It was also interesting to learn just how much of an important role user testing plays in the development of a product. Even after we thought through a certain process a lot, and we assumed we had perfected it, putting it in front of users always exposed some flaw that we had totally missed. From that I learnt that user testing is always necessary before you finalize on something.

During the duration of the course, I personally stumbled a lot on the deadlines. I also struggled a bit with some of the tasks as I realized I hadn't understood a concept as well as I thought I had.

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I've learnt that time and task management is something I need to take more seriously, and I really need to ensure I have understood a concept - when it is taught. I should make sure I'm certain about everything, and I shouldn't wait to revisit a topic I'm not certain about.

Overall, I feel that the course went by pretty smoothly. I was also happy to be in a group with exceptional people, and we were able to complete all the tasks and come up with a solution effectively. Everything I learned from this course, I can use going forward. I now fully understand that these tools that we learnt about are very important in a designer's life, and using them effectively helps to create good solutions.

*Jeanine de Leeuw*

My learning goals for this course were to get to know how to design something for a specific target audience and take their insight to improve the product. I wanted to see if my first impression of what the user will think and do is the same as what the user actually thinks and does. The reason the above were my goals is that I wanted to understand the user better so the product or idea is suited for the target audience.

To do this I looked through the presentations and tried to see the connections in the assignments to make more sense of them. This helped me understand why certain assignments had to be made. Especially at the end when it was really clear that the first idea we had was good but had to be adjusted a few times to make it better suited for the user.

The course really helped getting to know new ways to use the user making the product or idea suited for a user. The problem we picked was very interesting and the users wanted to have a solution for it, this made the project interesting. The course would be harder when the problem would not really need solving. Personally I like helping people and that was partially in this course. This made the course fascinating to me because I want to do that as a job, this course made me be more sure about that. I have learned that sometimes what you think the user needs is not what he needs at all and the user can bring new insight because they have a whole different point of view. I will use this knowledge in a following project, the user is very important and can be very helpful. On the other hand, the user is not always available and cannot always help on short notice. It was hard to find users for this course because it had to be done within 8 weeks.

In the future I would try to find users more in the beginning of the project. Besides this I would like to get to ask more users because that will probably give a more diverse insight.

*Emma Driessé*

User-Centered Design is the second 'design'-course that I have had since I started the study Industrial Design in September. I did not have a lot of expectations from the course in the beginning. From the name I could guess that the user would play a big role in this course. So I hoped to learn a lot about how to find out what the user of the product I'm going to design wants, what kind of person he/she is and what problems he/she encounters. I did think that the course would be quite theoretical, but it turned out to be much more practical. Because the whole course was shaped around a small project.

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Every new week started with a lecture about a subject related to User-Centered Design. Starting with the first stages of the process and building onto that every week. At the end of the lecture we would get a very straight forward assignment on which we would work with our group that week. Because these assignments were so straight forward, there wasn't really a way in which we as a group could set the assignment to our own hands. Because of that to me it didn't feel like I was inside a design process, every week we focused on the assignment of that week, instead of having the feeling that this assignment was part of a greater process. The big lines were quite unclear to me. If the project was less structured I think I would have got a lot more out of this course. But at the end I did see that with user-centered design it is very important to take small steps and to look back at to user after every single step. That's why at first it looked like we did more work than needed, but further into the process it became clear that if you do not look that closely to the user in the beginning, you will not be able to keep the focus on the user.

I did really like that the way of approaching the design challenge was a lot different from the way we used at the course From Idea to Design. Concentrating on the user gave a whole new view on designing. During this course I wondered a lot if with a different approach, we would have got a totally different product as our end product or not. This also was a big obstacle, it was very hard to stay with the user instead of just designing whatever you like. Fixing certain criteria for the product at the beginning of the process, definitely helps to keep to focus on the user. It's important to often look back those criteria during the process to keep to focus on the user. This is definitely something I would apply in my project next semester. If there's a specific user group, I think it's very important to study this group before brainstorming about products, to make sure that the product is always usable for that certain user.

I really liked that the theory we got during the lectures were immediately applicable in the project, in this way you have to understand the theory really well before you can apply it in a real design assignment. I think this also makes it easier for me to apply it in the next semester.

I did think that it was quite hard to keep the focus on the user because the time you actually spend interviewing the user is very short. We mostly had a time period of approximately 5 days before we had to use the results for the next assignment.

All and all I did learn a lot about the user and can definitely use the theory I have learned in upcoming projects.

*Thijs Baselmans*

At the start of this course I imagined I would learn a lot about user needs. About what users want to get out of a product and how to make the product best fit the users' needs. I learned that, but I think the course was about more than just that.

One thing I hadn't expected to learn was the scientific side of users. I initially thought user research would be a bit vague, abstract, and a lot of guesswork, but the opposite was true. I learned to boil down qualitative information from a (somewhat) large group of user interviews to hard, quantitative data that we could work with while designing our product. The notion of working with persona's I found very useful, and I will definitely try to implement this in future projects.

The most interesting topic in this course I found the week we talked about affordance and mapping. From that week on I started looking at utensils in everyday life very differently. It was like I became more skeptical about how everything was mapped onto a certain product. I got creatively engaged in coming up with ways to map the controls that would make more sense.

Group work was great within our team. We got along quite well and had everything finished on time. There was not much stress because we were always on schedule. This created a very good atmosphere. I think it was good to see that we had some opposites in the team, but that those opposites were able to learn from each other. In the previous group project (From Idea to Design), I think this might also have been the case, but back then I wasn't able to identify this as much as I did at the end of this project. Jeanine often pushed me to work harder and more seriously, and like Aab, I maybe should have stayed more active and engaged more in group discussions. During the next group project I will try to identify these learning goals within my group members more quickly so that I can also do something with them faster.

Overall I think I have learned a lot. User research is more important than I initially thought (even during the very last user tests, test subjects were still able to identify flaws we had missed during all that time we had worked on the project). There have definitely been some very valuable tools offered to me that make doing user research more effective.

## Group reflections

### Peer evaluation Form for Group Work

Use the results from the tables to answer the following questions:

1. How effectively did your group work?

Our group worked pretty effectively, we finished our work on time and were on the same page most of the time. With finishing our work before the meeting with our tutor we were able to ask the questions that we needed and keep on schedule. We were also happy with the quality of work we were able to produce. All in all we can say that our group worked effectively and that we are proud of the work we delivered.

2. Were the behaviors of any of your team members particularly valuable or detrimental to the team? Explain.

Sometimes Aabharan and Thijs did not make the homework but it did not held us back from creating a good report. Most of the time when the work was finished by all of the team members we would look back and see if that work was better and had to be in the report. This way we optimized the quality of the work in the report. Jeanine often took different approaches than the rest of the team, she completed the tasks and sometimes set deadlines that were a bit restricting to the rest of the team. At the same time, Jeanine often took the lead during the meetings, and kickstarted the discussions.

Where Thijs and Aab would sometimes not take the work serious enough, and Jeanine maybe a bit too serious - Emma has found a midway.

Peer evaluation Form for Group Work

*Aabharan Hemanth*

|  | Aabharan | Emma | Jeanine | Thijs |
|--|----------|------|---------|-------|
| Attends group meeting(s) and arrives on time.            | 3        | 4    | 4       | 4     |
| Contributes meaningfully to group discussion.            | 4        | 4    | 4       | 4     |
| Completes group assignment on time.                      | 2        | 3    | 4       | 2     |
| Prepares work in a quality manner.                       | 3        | 4    | 4       | 4     |
| Demonstrates a cooperative and supportive attitude.      | 4        | 4    | 3       | 4     |
| Contributes significantly to the success of the project. | 3        | 4    | 4       | 3     |
| TOTALS:  | 19       | 23   | 23      | 21    |

*Emma Driesse*

|   | Aabharan | Emma | Jeanine | Thijs |
|---|----------|------|---------|-------|
| Attends group meeting(s) and arrives on time. | 2        | 3    | 3       | 3     |
| Contributes meaningfully to group             | 3        | 4    | 4       | 3     |

|  |    |    |    |    |
|--|----|----|----|----|
| discussion.  |    |    |    |    |
| Completes group assignment on time.                      | 2  | 4  | 4  | 2  |
| Prepares work in a quality manner.                       | 2  | 3  | 3  | 3  |
| Demonstrates a cooperative and supportive attitude.      | 3  | 4  | 2  | 3  |
| Contributes significantly to the success of the project. | 3  | 4  | 4  | 3  |
| TOTALS:  | 15 | 22 | 20 | 17 |

*Jeanine de Leeuw*

|  | Aabharan | Emma | Jeanine | Thijs |
|--|----------|------|---------|-------|
| Attends group meeting(s) and arrives on time.            | 3        | 4    | 3       | 4     |
| Contributes meaningfully to group discussion.            | 3        | 4    | 4       | 3     |
| Completes group assignment on time.                      | 2        | 4    | 4       | 2     |
| Prepares work in a quality manner.                       | 2        | 4    | 4       | 3     |
| Demonstrates a cooperative and supportive attitude.      | 3        | 4    | 4       | 3     |
| Contributes significantly to the success of the project. | 3        | 4    | 4       | 3     |
| TOTALS:  | 16       | 24   | 23      | 18    |

*Thijs Baselmans*

|  | Aabharan | Emma | Jeanine | Thijs |
|--|----------|------|---------|-------|
|--|----------|------|---------|-------|

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|  |    |    |    |    |
|--|----|----|----|----|
| Attends group meeting(s) and arrives on time.            | 3  | 4  | 4  | 4  |
| Contributes meaningfully to group discussion.            | 4  | 4  | 3  | 3  |
| Completes group assignment on time.                      | 3  | 4  | 4  | 2  |
| Prepares work in a quality manner.                       | 4  | 4  | 4  | 3  |
| Demonstrates a cooperative and supportive attitude.      | 3  | 3  | 2  | 4  |
| Contributes significantly to the success of the project. | 4  | 4  | 4  | 4  |
| TOTALS:  | 21 | 23 | 21 | 21 |

## Appendices

### Appendix week 1

#### Experience Goals

These User Experience Goals were chosen keeping in mind the most important aspects that would help a user gain information. The system should effectively deliver information regarding products (that are safe to be consumed for people with intolerances) to the user.

#### *Aabharan Hemanth*

Desirable aspects:

**Engaging** → The system should engage the user and should allow the user to get the information s(he) requires. Should place the user in a state of flow until the end of the interaction.

**Satisfying** → The system should satisfy the user's needs and expectations. The information provided to the user should be of value and the user should end the interaction with a sense of satisfaction.

**Helpful** → The system should be helpful - it should add some value to the user. It should successfully answer the queries of the user and allow them to fulfill their goal.

*Emma Driesse*

Desirable aspects:

**Helpful** → Our product should help the child to cope with their intolerance or allergy.

**Engaging** → Our product should be inviting for the child to use. It should make their life easier, otherwise the child would have no reason to use it.

**Motivating** → Our product should motivate the child to cope with their intolerance independently. And motivate them to deal with their intolerance or allergy instead of avoiding situations.

**Cognitively stimulating** → It should give the child increasingly more knowledge about their intolerance or allergy for now and in the future.

Undesirable aspects:

**Frustrating** → The product should be very easy to use, it should not make their daily tasks more difficult and time consuming. It should do the opposite.

**Childish** → The child shouldn't feel like the product is made easier than necessary.

**Patronizing** → The child should know that having an intolerance doesn't make him or her any different or less than all the other kids. The product isn't made to punish but to enhance freedom.

*Jeanine de Leeuw:*

**Satisfying** → the user should feel satisfied by using the product otherwise it would not be used

**Helpful** → the user wants to know what he can eat and what not so the product should be helpful to find this

**Enhancing sociability** → the product will make it easier to find what a user can eat and what not so the user does not have to look really long at packages and other people won't judge anymore.

**Cognitively stimulating** → the child would learn more about his or her food intolerance.

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**Less frustrating** → because the user does not have to look really hard anymore to find the ingredients they cannot eat.

**Not feel stupid** → because the user does not have to look at the ingredients the fellow shoppers are not judging him.

Thijs Baselmans:

Desirable aspects:

**Helpful** → The product should provide help to the user in finding out whether a product is safe to eat.

**Satisfying** → The user should be satisfied with the service the product provides. And should feel confident in using the product again.

**Trustworthy** → The product should provide correct information in 100% of cases. The user should have full trust in the device and the information it provides.

**Cognitively stimulating** → Because the device will be used by children they should learn about what they can and cannot eat.

**Comprehensive** → The product should include a wide range of allergies and intolerances, to make our target audience as big as possible.

Undesirable aspects:

**Frustrating** → Using the product should instead be easy and quick to learn and use and cause the user minimal frustration.

**Gimmicky** → The product should instead feel solid and professional.

**Making one feel stupid** → The user should not be made to feel insecure or stupid about their allergies/intolerances.

### Application of notions of effectiveness, efficiency and satisfaction

*Aabharan Hemanth*

**Effectiveness** → Are users able to achieve the intended goal?

Metric: Percentage of times people achieve the intended goal, Percentage of times people fail achieve the intended goal

**Efficiency** → Are users able to achieve the intended goal in a better/faster/simpler way than they did before?

Metric: Time taken to achieve the goal, number of steps before the goal is achieved, Percentage of goal achieved with no prior knowledge on how to use the system

**Satisfaction** → Does the result provided by the system match what the users expected from the system?

Metric: User experience ratings from the user, result ratings from the user, Does a user recommend the system over the current scenario.

*Emma Driesse*

**Effectiveness** → In my opinion effectiveness means that the product delivers a positive value to the user. It makes a task easier and/or quicker. It is more attractive to use the product for the task than to not use it.

**Efficiency** → It should make the daily tasks faster and better. It is easier to do the tasks with the product than without the product. It should be simple and quick to use in various situations. The product should totally fit in the situations for which it is supposed to use.

**Satisfaction** → The user should get a positive feeling after using the product. The user should feel helped by the product and should enjoy using it. Which means that everytime the user has to do a specific tasks her or she will want to use the product during this task.

*Jeanine de Leeuw*

**Effectiveness** → The user is a child that suffers from food intolerances, he needs something that is easy to use and that does not have a lot of description and text needed.

Symbols would work best.

It is effective if every child from age of 4 to age of 10 can use it.

matrix: percentage of users that successfully complete the task. Percentage of users that can use the product without description.

**Efficiency** → It should not take a lot of time to understand the product also when knowing how to use it the time of usage should be short because these children will be distracted very fast.

Matrix: time to complete a task. Numbers of keys pressed. Time until distraction takes over.

**Satisfaction** → It should be attractive otherwise the child would not use it.

matrix: percentage of users that keeps using the product. Percentage that would recommend it.

*Thijs Baselmans*

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**Effectiveness** → : Are users able to achieve their goals?

Metrics:

- Number of false positives
- Number of false negatives
- Percentage of users who are able to operate the device successfully without instructions.

**Efficiency** → The resources spent on achieving the goal.

Metrics:

- Time it takes to find out whether a product is safe to eat.
- Time it takes to dial in all your dietary preferences/needs.

**Satisfaction** → The comfort a user experiences from using the product.

Metrics:

- Percentage of users who would recommend it to a friend after two hours of use.
- Percentage of people who would rate the product “more satisfying” than the status quo.

## Appendix week 2

### Persona hypothesis:

*Aabharan Hemanth:*

Roles:

Children with intolerances/allergies

- Goals: Eat foods that do not trigger/escalate intolerances/allergies
- Behaviors: Drawn to foods that their friends eat, things that look good, things that taste good
- Demographic: 1 to 14yrs (?)
- Environments: Stores, schools, parties, home, outdoors

Caretakers of children

- Goals: Make sure the child eats only foods that do not trigger/escalate intolerances/allergies
- Behaviors: Constantly need to check what food the child is consuming, constantly worrying about child's allergies/intolerances getting triggered, has the final say in what a child can eat
- Demographic: 18 - 80yrs (?)
- Environments: Stores, schools, parties, home, outdoors

Friends

- Goals: Eat foods that look good and taste good, shares food with friends

- Behaviors: Drawn to foods that their friends eat, things that look good, things that taste good, offers foods to friends
- Demographic: 1 to 16yrs (?)
- Environments: Stores, schools, parties, home, outdoors

*Emma Driesse:*

Roles:

- Children with an intolerance
  - Motivation: They want to avoid the symptoms of eating food that they are intolerant to. Ability to be develop independence from their parents in choosing their food without a large possibility in failing to pick the right food.
  - Behaviors: They would use it on a daily basis to check every meal before eating it. This could be at the supermarket or at school if a friend wants to give you some sort of candy. Also at home, at friends or in restaurants.
- Parents of children with an intolerance
  - Motivation: They feel responsible for their children's health. But it takes a lot of time and knowledge understanding all the ingredients on the packages.
  - Behaviors: Parents would use it primarily with grocery shopping to make sure that everything that is bought is suitable. And when eating out.
- Nutritionist for children with an intolerance
  - Motivation: To give a good and clear advice to children with an intolerance and their parents. And to enlarge their knowledge in an easy way.
  - Behaviors: They would use it to advise and enlarge their knowledge of certain products to different children. Not on a daily basis probably.
- Cook for children with an intolerance
  - Motivation: To be able to adjust their menu and give clear information about the ingredients and for which intolerance it is suitable. To enlarge their target group.
  - Behaviors: They could use it to check whether the ingredients that he is going to use are suitable. Or make it more easy to provide information on the menu.

Goals and needs: It's important that the child doesn't eat food that he/she is intolerant to. People in the life of those children want to help avoiding this and make it more easy for them to choose food based on the ingredients. Besides that a cook for example has a goal to give clear and right information about his meals, which at the end will lead to more visitors of that certain target group. The goals vary from personal, to economical, knowledge and advisory needs.

*Jeanine de Leeuw:*

Roles: Everyone with a food allergy or intolerance. But because the use is really easy children will use it too.

- The goals for them are that they will be able to know what they can eat and what not. Children want to eat what their friends eat but they cannot so they have to deal with disappointment, their environment has to help them to not eat what they cannot eat.

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- The behaviour is that it is easier to avoid foods that the person with an allergy cannot eat.
- The environment is mostly in the supermarket.

*Thijs Baselmans:*

Roles: Child with allergy/intolerance, parent/guardian,

Child with allergy/intolerance:

- Goals: social equality, eat popular foods.
- Behaviors: frequency of use, user-friendliness, duration of use
- Environments: supermarket, home, school, indoor, outdoor

Parent/guardian:

- Goals: healthy diet, balanced diet.
- Behaviors: planning, user-friendliness, acquaintance with technology
- Environments: supermarket, indoor

**Joint persona hypothesis:**

Roles: Child with an intolerance/allergy, parent of child with intolerance/allergy.

Child:

Goals:

- Know what he/she can eat and what not.
  - Ability to develop independence from their parents in choosing their food without a large possibility in failing to pick the right food.

Behaviour:

- Drawn to foods that their friends eat, things that look good, things that taste good

Environment:

- Home.
- Supermarket.
- Away from home
  - school
  - friends house
  - relatives

Parent/caretaker:

Goals:

- Make sure the child eats the right food.
- A healthy, well-balanced diet.
  - Educate the child about his/her allergy/intolerance.

Behaviour:

- Does most of the grocery shopping.
- Responsible for checking whether something is safe.
- Frequency of use
- Ease of use

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Environment:

- Supermarket
- At relatives

**Final list of questions:**

Parent:

- What role do you play in the child's intolerance?
  - How do you fulfill this role?
- In what way do you conclude whether the child can eat something or not? - Is this a convenient way for you?
- What is one pain point in dealing with the child's intolerance?
- How long do you estimate it takes you to decide which product to buy, if you are unsure about which one the child can and which ones he/she cannot eat?
- Do you find it difficult to see on the packages of the foods that your child can't eat that he or she can't.
- Are you willing to pay for a device that will make it easier to see which food the child is able to eat?
- What intolerance does your child have?
- How old is your child?

Child:

- In what way do you conclude whether you can eat something or not? - Is this a convenient way for you?
- What happens when you are unsure whether you can have something?
- Do you find it difficult to see on the packages of the foods that you can't eat that you can't.
- Would you like a device that can help you decide if you can eat a certain food?
- What intolerance do you have?
- How old are you?

**Pilot interviews:**

*Aabharan Hemanth:*

What is a major pain point in finding food that is safe for you to eat?

Standing in the supermarket and trying to read the ingredients/google the product and see if its safe. It gets annoying.

What are the steps you take when identifying if something is safe for you?

Basically pick it up, take a quick look at the ingredients, looking for any red flags. And then I also do a quick google search, to make sure its safe.

What do you wish was easier?

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I guess i wish there was an easier way to be a 100% sure about something, quickly. Like I always have to end up googling and making sure that something is safe.

What do you do when you're eating prepared food (restaurants/homes)?

I usually notify them in advance about any allergies I have. And I hope and pray they took me seriously. If I'm ever uncertain, I just don't eat it. I've missed out on so much food because of this.

Would you pay for a device that would help you identify what you can eat in a supermarket, quickly?

Depends on the price. Probably not because I wouldn't trust it as much as I trust myself and it's not that much of a hassle to look through ingredients.

*Emma Driesse:*

Is there a lot of need for clarity about ingredients for a cook in a restaurant?

Yes, there is. More and more people want to know what ingredients a certain dish has. I think there are more and more intolerances and people that are allergic. And people are more critical and want to know what they eat, what they buy.

In what way do you fulfill this need at the moment for people who want more clarity?

I am very aware of the food I buy, the ingredients. I only use products from which I am certain what ingredients they have. So I can give information to my clients.

So you know yourself what ingredients you use and what ingredients the products have, or do you have to look it up?

Yes, a lot of times I have to look it up on the internet or in a book or ask the producer.

Does it take a lot of time to do that?

Yes, it's a lot of work.

Is your goal to give more information about food you prepare or also prepare specific meals for an intolerance?

Well, there are certain intolerances that you come across more often. And that's when I decide to try to prepare a meal without a certain ingredient to be able to put that on a menu. So I try to understand which intolerances are the most common among my clients. Then I try to accomodate them by preparing meals without these ingredients.

*Jeanine de Leeuw:*

Do you find it difficult to find foods that you can eat? And how does this come?

Yes because all the packages have different names.

Do you find it difficult to see on the packages of the foods that you can't eat that you can't?

Yes because it is always very small on the packages and the names of the food differ.

How many times per week do you suffer from this inconvenience?

Every time I go shopping

Do you wish that there would be an easier way to see if you can eat the food?

Yes especially in the beginning when I just knew I had an intolerance it was really hard to find foods that I could eat.

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Are you willing to pay for a device that will provide a solution in this?

Not anymore but at the beginning i was.

*Thijs Baselmans:*

Do you find it difficult to find foods that you can eat? And how does this come?

Yes, it takes a long time to read and compare ingredient lists of foods about which I am unsure whether I can have them. Some products I know I can't have, but there's some products that are less clear and depend on the brand whether I can have them or not.

Do you find it difficult to see on the packages of the foods that you can't eat that you can't?

Not really, I can clearly read most ingredient lists. The allergies I suffer from are often even highlighted in a bold font within the list.

How many times per week do you suffer from this inconvenience?

Whenever I am at the supermarket or when I receive food from someone else. Differs from week to week, but probably about once or twice.

Do you wish that there would be an easier way to see if you can eat the food?

Yes, that would be great.

Are you willing to pay for a device that will provide a solution in this?

Depends on how expensive and how useful the product would be, but I probably would to some extend (say... €40,-).

### ***Ethnographic interview:***

*Aabharan Hemanth:*

Questions:

Children with intolerances/allergies

- What sort of foods do you like to eat?
- Do you know what sort of foods you're not supposed to eat?
- How do you decide if you can't eat something - Is it hard for you to make that decision?

Caretakers of children

- How do you make sure that the child only consumes foods that are safe for her/him?
- How do you decide whether a certain food is safe for the child to consume? - is it hard for you to make that decision?
- What would you change to make that decision easier ?
- What is one pain point in dealing with the child's intolerance?...

Friends

- Do you know about x's intolerance to certain foods? Do you know what that means - what s(he) can't eat?
- Do you think x feels uncomfortable when everyone else is eating something s(he) cannot eat?
- How do you deal with x's intolerances? (very open ended)



*Emma Driesse:*

- Children with an intolerance
  - What kind of intolerance do you have?
  - What does that mean for you, what ingredients should you avoid?
  - In what way do you conclude whether you can eat something or not?...
  - Is this a convenient way for you?
- Parents of children with an intolerance
  - How do you cope with the intolerance of your child?
  - What role do you play in his/her intolerance?
  - How do you fulfill this role?
  - Is this a convenient way for you?
- Nutritionist for children with an intolerance
  - In what way do you advise children with an intolerance and their parents?
- Cook for children with an intolerance
  - Is there a lot of need for clarity about ingredients?
  - How do you know whether your meal is suitable?
  - Do you prepare specific meals for an intolerance?
  - Is your goal to give information about the food that you prepare?

*Jeanine de Leeuw:*

In the supermarket

Do you find it difficult to find foods that you can eat? And how does this come?

Do you find it difficult to see on the packages of the foods that you can't eat that you can't.

How many times per week do you suffer from this inconvenience?

Do you wish that there would be an easier way to see if you can eat the food?

Are you willing to pay for a device that will provide a solution in this?

*Thijs Baselmans:*

Topics:

Choosing foods, allergy/intolerance, responsibility, user-friendliness.

Questions:

- Who chooses what you eat?
- How do you go about choosing what to eat?
- Are you concerned about having a healthy diet?
  
- When did you learn about your (child's) allergy/intolerance?
- How did that impact the choices you made on what to eat?
- When do you think about what you(r child) can and cannot eat? How often does this happen?
- Does your (child's) allergy/intolerance cause you discomfort? In what way?
- Are there any tricks you learned, that make it easier to find things that you(r child) can eat?

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- How do you discover new things to eat?
- What happens when you(r child) are (/is) unsure whether you(r child) can have something?...
- Is there ever a time when you don't need to mind your (child's) allergy/intolerance?
- Can you(r child) eat anything that is in the house?
- When in the supermarket, do you often use the self-scanning devices? Why/why not?
- How long do you estimate does it takes you to decide which product to buy, if you are unsure about which one you(r child) can and which ones you (/he or she) cannot eat?...

### **Persona's:**

*Aabharan Hemanth:*



**Parent:**

Mary is a 40 year old stay at home mother with a 13 year old daughter named Laura. Laura is intolerant to Lactose, and has always had trouble with most foods. Her reactions are not severe, but nevertheless are a major inconvenience to her.

Since Laura was very young, Mary has been very careful about her diet, and has gone out of her way to make sure her child gets a nutritious, lactose free diet. She has since built up a mental database of items in the supermarkets that are safe for Laura to consume. For anything new, Mary goes through the ingredients carefully, does a quick round of research online and then prepares a small quantity for Laura. If there's anything that is unclear (which is not that infrequent), she skips that item. This is a time consuming process, but Mary wants to make sure Laura is perfectly fine with what she eats.

Mary goes grocery shopping twice a week, and spends about 1.5 hours at the store if everything goes smooth. If she finds a new item, it takes her 15 to 30 minutes more to make sure that it's okay to be consumed by Laura. Many-a-times she has found that after spending 30 minutes analyzing an item, she has to put it back on the shelves because she was still unsure.

Mary isn't particularly worried about Laura, as Laura is perfectly aware of her condition, and is also very careful with what she eats. Whenever Laura is confused, she finds a way to contact Mary, who usually has an answer. Else, she skips that particular item, just to be safe.

*Jeanine de Leeuw:*



**Child:**

Emily is a 12-year-old girl who likes to do athletics, painting and playing with friends. She is an average student that likes to go to school more for friendships than for learning. Emily is distracted a lot because of all her friendships, this is no good for her grades but she still passes. When Emily is at a friend's home she has a problem. Emily cannot eat lactose and wheat, for her it is hard to explain what she cannot have and it is hard to make sure she eats the right food when she is at a

friend's home. When she eats wheat or lactose she gets a lot of pain in her stomach and this will hold on until about one hour after she ate it.

Emily's mother tries to inform the parents of her friends, but sometimes it is really hard to explain what emily can eat and what not. Emily mostly does understand what she can eat and what not but with some products she does not know it for sure. Then she does not eat it because she prefers to not have the pain more than eating what her friends eat. Emily tries to get to know more about her intolerance so she can explain it better and she wants to know better what she can eat.

## Appendix week 3

### Requirements

*Aabharan Hemanth:*

#### Functional requirement

- **Description:** Should inform a person whether a certain item is safe to consume for an individual with intolerances, based on certain inputs (BarCode)
- **Fit criterion:** Run a test on a sample set of barcodes and analyze the results
- **Customer value:**
  - Satisfaction: 5
  - Dissatisfaction: 5

#### Look-and-feel requirement

- **Description:** User interface should be simple and clear enough for children of ages 8 to 14 to use on their own, and attractive to encourage use.
- **Fit criterion:** Usage of the device should result in a 70% drop in the instances where an individual consumes unsafe food.
- **Customer value:**
  - Satisfaction: 3
  - Dissatisfaction: 3

#### Ease of use requirement

- **Description:** Usage of the device should be as simple as possible, with a minimum and understandable set of interactions that deliver a clear result.
- **Fit criterion:** Out of the total number of interactions, 80% should result in a valid conclusion.
- **Customer value:**
  - Satisfaction: 2
  - Dissatisfaction: 2

#### Ease of learning requirement

- **Description:** System/device must be extremely intuitive to use, requiring the minimum amount of effort in order to increase its use and speed up adoption.

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- **Fit criterion:** 80% of users should be able to successfully obtain a valid result and utilize the device as it was designed to be used, after 3 days.
- **Customer value:**
  - Satisfaction: 1
  - Dissatisfaction: 1

#### Performance requirement

- **Description:** System/device should have minimum errors that are the fault of the device. It should also be responsive, and should quickly give feedback for inputs
- **Fit criterion:** Out of all the times the device is used, It should provide wrong results (due to the fault of the machine) less than 2% of the time. It should also take less than 2 seconds to provide feedback for an input from the user.
- **Customer value:**
  - Satisfaction: 4
  - Dissatisfaction: 4

*Emma Driesse:*

#### Functional requirement:

With our product the user should have the ability to tell the product their specific kind of intolerance or allergy.

- **Description:** The product shall be able to let the child enter their intolerance or allergy.
- **Fit criterion:** There should be a complete list of choices for every intolerance or allergy and the child should be able to pick one or multiple.
- **Customer value:**
  - Customer satisfaction: 5
  - Customer dissatisfaction: 5

#### Look-and-feel requirement:

The menu of the product should be easy to understand with as less steps that the user has to take as possible.

- **Description:** The product shall have an easy accessible menu with just a few steps for children to use.
- **Fit criterion:** The child should be able to do his/her tasks in a small amount of time by using the product. With a maximum of three steps.
- **Customer value:**
  - Customer satisfaction: 4
  - Customer dissatisfaction: 5

#### Ease of use requirement:

It is important that children know how to use the product.

- **Description:** The product shall be easy to use for children from 7 years and older.

- **Fit criterion:** The product should contain images instead of just text, because there is a possibility that the user can't read very well. Besides that, the interface should not contain too much possibilities.
- **Customer value:**
  - Customer satisfaction: 3
  - Customer dissatisfaction: 3

Ease of learning requirement:

It is no problem if the product needs a bit of training/explaining before the child can use it on their own. It is okay if the parent needs to help the child the first few weeks.

- **Description:** The product shall be able to be used independently by children of 7 years and older within 3 weeks.
- **Fit criterion:** A clear interface with easy to understand images. The product should explain its use along the way. With a few directions of the parents, the child should understand how it's used and where it's used for.
- **Customer value:**
  - Customer satisfaction: 4
  - Customer dissatisfaction: 3

A user experience requirement:

The child should experience a sense of freedom and independency while using the product. Because the child doesn't need an adult to cope with their intolerance or allergy.

- **Description:** The product shall give the child a sense of freedom and independency.
- **Fit criterion:** The product should be able to be used by children on their own and provide enough information for the child to cope with their intolerance or allergy without an adult present.
- **Customer value:**
  - Customer satisfaction: 3
  - Customer dissatisfaction: 2

A performance requirement:

The product should be very accurate and reliable because otherwise it isn't safe to use the product because of their intolerance or allergy.

- **Description:** The product shall provide the child with accurate and reliable data.
- **Fit criterion:** The product needs to have enough and well based knowledge about the different intolerances and allergies.
- **Customer value:**
  - Customer satisfaction: 5
  - Customer dissatisfaction: 5

*Jeanine de Leeuw:*

Functional requirement:

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- **Description:** The product should help children to see what they can eat and what not so it should be able to be used by children.
- **Fit criterion (or test case):** The product should be tested by 100 children if 95 can use it the product is good.
- **Customer satisfaction:** 4

Look and feel requirement:

- **Description:** The product should be attractive for children to use but also not like a toy because the parent will use it too.
- **Fit criterion (or test case):** Put 100 children in a room with toys that look a lot like the product and toys that look very different and see what sort of toy they will use. Ask the parents if they would feel uncomfortable using the product without their child nearby
- **Customer satisfaction:** 3

Look and feel requirement 2

- **Description** The product should be strong and not break when it falls on the ground. Because children are not always careful.
- **Fit criterion (or test case)** Test from what height the product will break. If this is lower than 1.50m it is not good enough.
- **Customer satisfaction** 3

Ease of use requirement:

- **Description** The product should be really easy and the user should be able to use it without a manual.
- **Fit criterion (or test case)** Test if 100 children and 100 parents can use the product without a manual.
- **Customer satisfaction** 2

Ease of learning requirement:

- **Description** The child should be able to learn what their intolerance means so the product should explain why they cannot eat something.
- **Fit criterion (or test case)** Ask the children before and after 1 month of use if they can explain their intolerance, if the explanation is improved it works.
- **Customer satisfaction** 2

Performance requirement:

- **Description** The product should find the product someone wants to eat within 5 seconds.
- **Fit criterion (or test case)** Test it.
- **Customer satisfaction** 3

Performance requirement 2:

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- **Description**The product should give reliable information because if someone with an allergy or intolerance eats something the product said was safe they would get a lot of pain.
- **Fit criterion (or test case)** Update the information daily.
- **Customer satisfaction** 5

#### Performance requirement 3 :

- **Description**The product should last 5 years and the information should be updated every day.
- **Fit criterion (or test case)**After 2 years and after 5 years aks buyers if the product still works.
- **Customer satisfaction** 4

#### *Thijs Baselmans:*

#### Functional requirement

- **Description:** A lot of people have multiple allergies and/or intolerances. It is important that users can dial in all of their dietary preferences.
- **Fit Criterion:**Out of a test panel of 100 people with allergies/intolerances, at least 90% shall be able to dial in all their dietary preferences.
- **Customer value:**
  - Customer satisfaction: 3
  - Customer dissatisfaction: 3

#### Look-and-feel requirement:

- **Description:** The product needs to look attractive to use to children, yet reliable and safe, and not toy-like.
- **Fit Criterion:** From a test panel of 30 parents, at least 70% shall say they feel comfortable to have their child use the product.
- **Customer value:**
  - Customer satisfaction: 2
  - Customer dissatisfaction: 2

#### Ease of use requirement:

- **Description:** The product should be simple. It should not take more than 3 actions to find out whether a food product is safe to eat.
- **Fit Criterion:** After having set dietary preferences, it should take a maximum of 3 actions to find out whether a food product is safe to eat.
- **Customer value:**
  - Customer satisfaction: 4
  - Customer dissatisfaction: 3

#### Ease of learning requirement:

- **Description:** The user should be able to learn how to use the product relatively fast. User here means child as well as parent.
- **Fit Criterion:** A test panel of 30 children aged 8-12 shall take no longer than 10 minutes to get acquainted with the product. A test panel of 30 parents shall take no longer than 10 minutes to get acquainted with the product.
- **Customer value:**
  - Customer satisfaction: 2
  - Customer dissatisfaction: 2

#### Performance requirement:

- **Description:** Because some allergies and intolerances are very uncomfortable or even deadly when triggered, it is important that the product is absolutely reliable and safe to use.
- **Fit Criterion:** In a test of 200 random food products, 0% should result in false positives (allergens in a food product should be recognized in 100% of cases). A maximum of 3% should result in false negatives. Additional controlled lab tests should be done with individual allergens, using the same thresholds.
- **Customer value:**
  - Customer satisfaction: 1
  - Customer dissatisfaction: 5

#### Mapping, Affordance, Constraints

*Aabharan Hemanth:*

##### Mapping:

- **Good:** The volume keys on a mobile phone is a good example of good mapping. Each button is clearly linked to its function, and you almost never get confused about which button to press to increase/decrease the volume
- **Bad:** The keys on a laptop keyboard that have multiple functions (like ; and :) Often confusing to understand which one is directly accessible through the key, and which one requires the key and "SHIFT"

##### Affordance:

The display brightness slider is very intuitive to use, and it is very clear what needs to be done to change the value of brightness. It uses a combination of icons and color to indicate which way the pointer should move to control the brightness. The only way one can interact with the pointer is to slide it to the left or right

##### Constraints:

- **Physical:** The capacitive buttons on the bottom bezel of the phone do not often light up. This leads to confusion regarding which side of the home button maps to which task, and it is sometimes confusing to use.

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- **Logical:** Scrolling on a phone is a good example of a logical constraint. Through feedback from the screen, it is very logical to understand which way your finger has to move to scroll whatever is shown on the display. You can't scroll the wrong way.
- **Cultural:** Swiping on a phone can be thought of as a cultural constraint. If a person who had no prior experience was handed a phone, they would probably not know how to interact with a UI that requires an innate understanding about swiping elements (swiping away notifications from the notification drawer in Android)

*Emma Driesse:*

Mapping:

- **Good mapping:** On a mobile phone in a lot of apps you can see a < symbol to go back to the previous screen. This is very clear because the < looks like an arrow and points to the left that suggests that you go back to the screen you were before.
- **Bad mapping:** The button at the bottom of an iPhone (home button) goes back to the screen with all apps. But if you see the phone for the first time, there is nothing around it or on the screen that will tell you that this button is for turning back to the home screen.

Affordance:

An iPhone has very clear turn on and off switches that look like physical switches. You can swipe over the switches to turn them on or off as if you are doing it with a real switch. The switch even turns green after you turn it on. Green means in general on, good, ready, etc. so this immediately shows the user that his/her action has the intended result. This is an example of Material Design.



Constraints:

- **Physical constraint:** There is a case around fire buttons that prevents that prevent the user from accidentally turning on the fire alarm or makes sure that you think about what the button does before just pressing it.



- **Logical constraint:** The switch to roll down or roll up the window shutter has a little arrow for upwards and a little arrow for downwards. This prevents you from accidentally rolling up the shutter instead of rolling it down.



- **Cultural constraint:** An orange flashing light means attention. This is used in several ways in several products to let the user know he/she should stop their current activity and pay attention to something else. So it is used to move the user's attention to specific action.

*Jeanine De Leeuw:*

Mapping

- **Good:** The tap with a red button for hot water and a blue one for cold. It is really clear what button you need to use to get the water the temperature you want.
- **Bad:** Multiple doorbells for houses with one entry. It is not clear what bell to ring for the right level.

Affordance:

The camera button to make photos. Because you see an old school camera on the button you know that it is used to make pictures with.

Constraints:

- **Physical:** The battery loader does not fit in the earbuds hole of an iphone. This constraint makes sure that you use the right hole because it will not fit in the other.
- **Logical:** You can call with the phone app but not with the text app. You can conclude it without really thinking about it.
- **Cultural:** The text message is blue when the other person has an iphone and yours is connected to the internet. It is green when you send a sms. You have to know this via the people around you, if they would not tell you this you would not know it.

*Thijs Baselmans:*

Mapping:

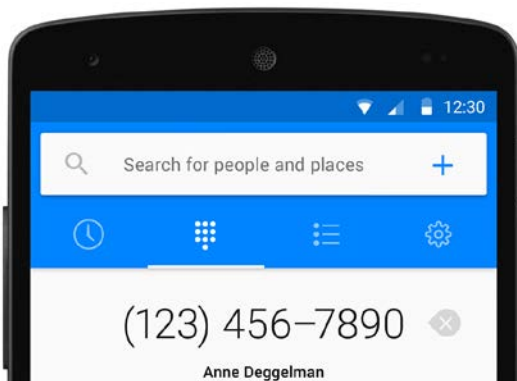
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- **Example of good mapping:** On my particular laptop, a hp zbook. The letters “fn” on the “fn”-key have a small, square border around it. All keys that have a function when paired with the “fn”-key have an icon clearly describing the function and a similar, small border, making them easy to recognize among all other keys and their functions.  
For example: “fn + f8” turns volume up while “fn + f7” turns it down. The “f8”-key shows a speaker icon with three sound waves emanating from it within a square border. The “f7”-key shows a speaker with one soundwave in the same “fn”-border.
- **Example of bad mapping:** The touchpad on my laptop doesn’t have any markings on it. It serves three basic functions though. Moving the mouse, left clicking and right clicking. Anyone who has used a touchpad before will be able to figure this out quite easily. For someone who has never used a touchpad before, or is used to a different interface, this might be difficult though. It is not entirely clear where both buttons are. They’re fairly hidden. Maybe the main problem is that interfaces differ so much on different types and brands of laptops.



#### Affordance:

- **Example of good affordance:** In material design I really like the way tabs work. It is intuitively clear which tab you are currently on because it is underlined and bright white. The rest don’t have a line under them and are less light. Tapping a different tab moves the line to the one of your choice. Underneath: an example of material design tabs in the Google Phone app.



- **Example of bad affordance:** Some phones have a fingerprint scanner that is indistinguishable from a button. For people that have never used or seen a fingerprint scanner before, this can be confusing. “Is this button for touching or for pressing?”



- **Physical constraint:** My phone has two holes. One is for the usb-cable which is used for data transfer and charging, and one is for the audio jack. The usb cable would never fit in the audio port and the audio jack would never fit in the usb port. Because of this you will never be mistaken.
- **Logical constraint:** There are three buttons on my phone. A home button annex fingerprint scanner (see “Example of bad affordance”) under the screen, a button to lock the phone on the right side of my phone and also on the right side, a volume button. Which looks similar to the lock-button but twice as wide. This makes it clear that this button controls the volume, and not the other one. That’s because volume can go up and down, and a lock can only lock if the phone’s unlocked and unlock if it’s locked. That’s because of how we logically think about the functions of locking and controlling phone volume. It would have been even clearer if the volume button had a split down the middle, making it clearer that it was actually two buttons. Below: the two buttons on the side of my phone.



- **Cultural constraint:** The notification light on my phone indicates how full my phone battery is. If it goes yellow I know it’s starting to get low. If my phones is almost empty, the light goes red. When I plug in the charger it changes from red, back to yellow, and eventually to green when it’s full. This is because of red being a colour of danger, as it is in a lot of nature. The same colours are mapped in a similar way onto a lot of other things in everyday life, for example: traffic lights and some fuel gauges.

# Appendix week 4

## Scenario of use:

### *Aabharan Hemanth:*

Mary (40) is out buying groceries in the store. She comes across a new brand of biscuits she would like to purchase for her lactose intolerant daughter, Laura (11). Usually, she would read the ingredients, and then do a quick google search to verify whether the product is safe. But today, she has a new product she is going to try out. She's wearing a bracelet armed with a barcode scanner and a small screen. She holds up her hand to the pack of biscuits, such that the scanner is able to comprehend the code. After a few seconds, she hears a beep and the screen lights up green with a big check mark. Having configured the device to approve a product if it is safe for lactose intolerant individuals, she is now certain that this pack of biscuits are safe for Laura.

### *Emma Driesse:*

Anna (38) has a daughter Rory (12). When Rory was a baby Anna found out that Rory didn't respond well to certain food. Rory has an intolerance for lactose he gets stomach aches. Anna knows a lot about Rory's intolerance and knows exactly what she can and cannot eat, but she would like Rory to become more independent considering her intolerance. That's why Anna now has a small device in her hand and shows it to Rory whilst they are in the supermarket. At home they made a profile for Rory, so the device knows which intolerance(s) Rory has. The device asks Rory to scan a product in the supermarket. She grabs a package which contains yogurt. She scans the barcode on the package and the product tells her that it's not safe to eat this product because it contains lactose. Now Rory can check whether she can eat a product without asking her mom.

### *Jeanine de Leeuw:*

The de Jong family has four members: Rick who is 12 years old, Sterre (10), and their parents Anja (38) and Henk (40). Rick has just found out that he has a food intolerance. The family wants to use the scan device that is just on the market. When they turn the device on it shows a menu. In this menu they can click on the intolerance that Rick has. Then the device goes to another menu that shows a barcode. Rick scans a product and the device shows the name of the product and a picture of it and asks if this is the right product. When Rick clicks on the "yes" button a list with ingredients that belong to this product. The device now lights up the ingredients that Rick cannot have in red. On the bottom it says try something else. Now the family knows Rick cannot eat this.

### *Thijs Baselmans:*

Harry (38) is having a busy day, and has hurriedly gone to the supermarket to buy groceries. Because his son has a lot of allergies, he has to watch the ingredients the products he buys. Harry takes a lot of time reading the tiny ingredient lists on the packages. Therefore, shopping is often a stressful experience.

Recently, his supermarket introduced a new service on their self-scanners. At home, he created an online profile with his sons allergies some time ago. Now, every time he goes shopping he takes the scanner at the entrance, scans a product and watches the display.

If it turns green, the product is safe for his son to eat. Otherwise, it shows the ingredients of the products on a red screen, and the options: “buy anyway” and “remove from shopping cart”.

Harry always chooses the second option, so that he only has ‘safe’ products at home.

#### Task description:

##### *Aabharan Hemanth:*

1. The bracelet is connected to an online portal via the 4G network
2. Accessing the online portal, a user configures the bracelet based on his/her requirements
3. Individual enters a store wearing the bracelet, and finds a new product s(he) would like to purchase
4. Individual scans the barcode of the product using the bracelet
5. The screen on the bracelet lights up with a picture/few details of the product. If the details are correct, individual taps on screen. If details are wrong, individual shakes wrist.
  - a. CORRECT:
    - i. After a few seconds, the screen lights up with green if the product is safe, or red if the product is unsafe.
  - b. WRONG:
    - i. The bracelet tries searching other databases for the barcode, step 5 repeats.

##### *Emma Driesse:*

1. The user creates an online profile at home in which he/she tells the system what intolerance(s)/allergies he/she has.
2. This profile is send to the device.
3. The user goes to the supermarket and chooses a product from which he/she wants to know whether he/she can eat it.
4. The user scans the barcode on the package of the desired product.
5. If the product is safe to eat by the user the display on the device turns green. If the product is not safe to eat by the user the display turns red.
6. The user knows whether he/she can eat the product and can decide whether he/she wants to buy it.

##### *Jeanine de Leeuw:*

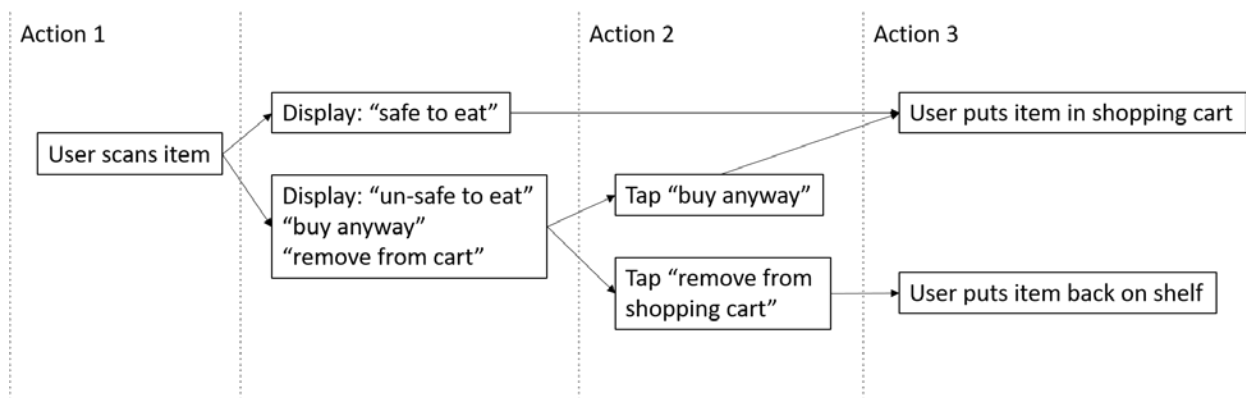
##### Use case Rick, 1

1. The user scans the product  
The system checks the product  
The user knows if he can eat it or not.

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2. The system shows a list of intolerances and allergies.  
 The user clicks on the ones he has and clicks on the “next” button  
 The system shows a barcode  
 The user scans the barcode of the product  
 The system shows the name and a picture of the product  
 The user clicks “yes” if it is the right product  
 The system shows another screen where the ingredients are shown and the ingredients the user cannot have are marked red. If no ingredient is marked red the system shows a big green ✓  
 The user now knows if he can eat the product or not.

*Thijs Baselmans:*



## Appendix week 5

Task description for evaluation:

*Aabharan Hemanth:*

Scanning a device to determine whether it is safe

1. Picks up desired product at the supermarket
2. barcode scanner attached under wrist to the bracelet. Place wrist a few cm for barcode, such that the code is lit up from the scanner
3. listen for the first audible beep signifying that the scanner is reading the barcode
4. keep hands in the same position until secondary beep confirms the barcode has been read
5. watch the screen for the picture/info about the product
6. confirm if the details are correct/incorrect by tapping screen/shaking wrist
7. wait for the display to light up green (safe) or red (unsafe)
- 8.

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*Emma Driesse:*

Our prototype has a box at the wrist which indicates as a scanner.

When you are at the supermarket and want to know whether you can eat a certain product or not you can use our prototype.

- First pick up the desired product.
- Look for the barcode on the package of the desired product.
- Hold the desired product in the other hand then where you are wearing the device.
- Make sure that the inside of your wrist is facing downwards.
- Move your wrist towards the barcode on the package.
- Hold your wrist at a distance of approximately 10 centimeters above the barcode.

*Jeanine de Leeuw:*

The user selects his account on the desktop computer.

The user presses the button on the watch.

The watch scans the barcode from the computer.

The user goes to the store and picks a product.

The user presses the button on the watch

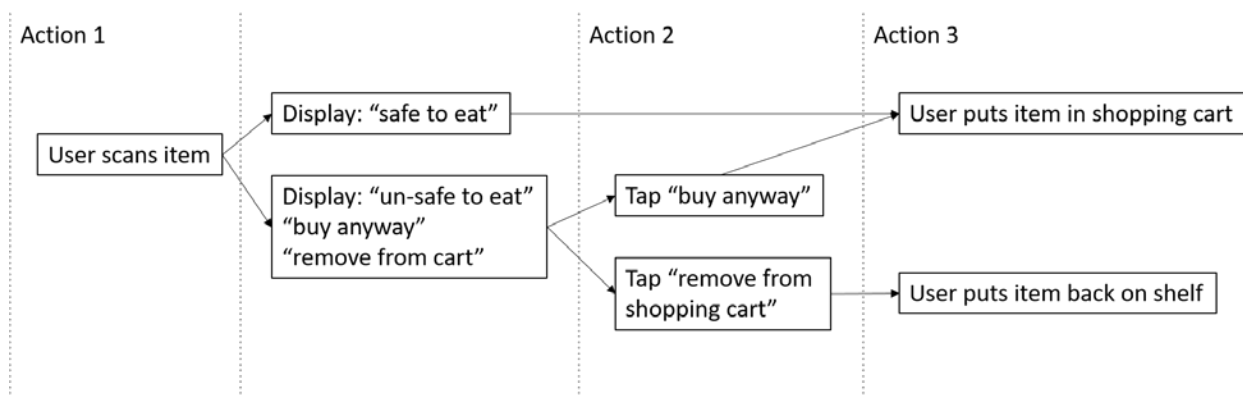
The watch scans the product.

The watch shows a happy or a sad face.

The user can press a second button

The watch shows the ingredients and highlights the ones the user cannot have.

*Thijs Baselmans:*



## Appendix week 6

### Heuristic evaluation and cognitive walkthrough

#### The task description:

The user selects his account on the desktop computer.

The user presses the button on the watch.

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The watch scans the barcode from the computer.  
 The user goes to the store and picks a product.  
 The user presses the button on the watch  
 The watch scans the product.  
 The watch shows a happy or a sad face.  
 The user can press a second button  
 The watch shows the ingredients and highlights the ones the user cannot have.

*Aabharan Hemanth:*

|  |
|--|
| Heuristic violated: # 1 visibility of system status  |
| Description: No clear visual depiction of whether the scanner is performing a task (3)       |
| Possible causes: Only limited auditory cues given to the user                                |
| Expected consequences: User might get confused with the current action/status of the scanner |

Solution: Have a visual depiction (graphic) to imply the scanner is (A) searching for a barcode, and (B) reading a barcode.

|   |
|---|
| Heuristic violated: # 3 User control and freedom  |
| Description: No way to cancel the scanners current task without waiting for the entire cycle to finish            |
| Possible causes: Scanner does not look for feedback from the user when it is active (working on a task)           |
| Expected consequences: the user has to wait for the entire cycle to finish before cancelling/stopping the scanner |

Solution: Let the scanner listen for some feedback from the user at any given point of time. This will allow for a way for the user to cancel/force stop the scanner

|   |
|---|
| Heuristic violated: # 10 Help and documentation |
|---|

|   |
|---|
| Description: No real way to access help information on device   |
| Possible causes: Device not advanced enough to support a way for user to get help and documentation. Also, screen size.       |
| Expected consequences: If user forgets how to use device/gets confused with device statuses, becomes unable to utilize device |

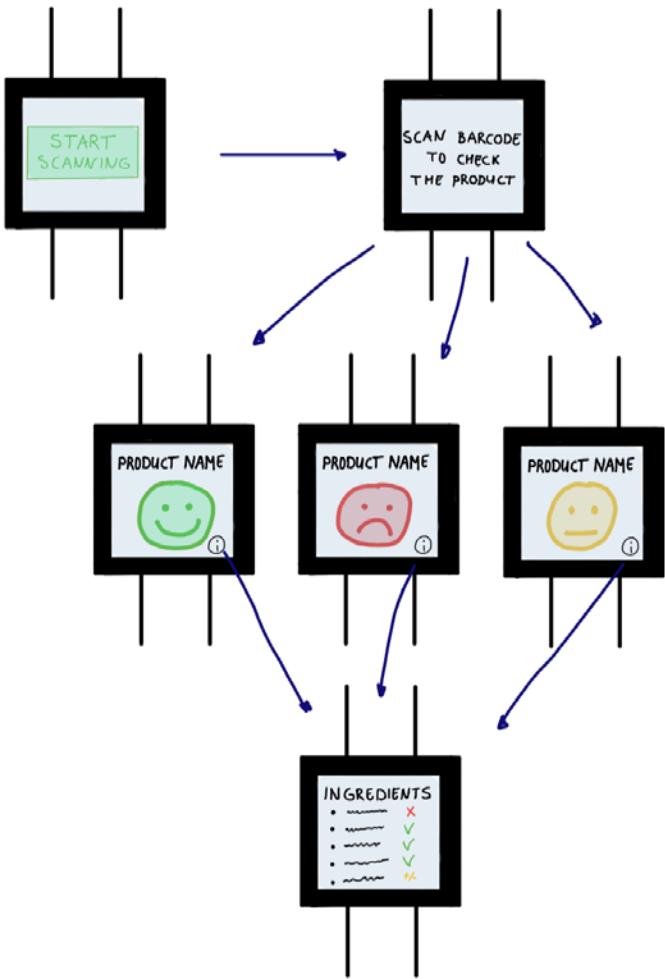
Solution: Provide help and documentation information on the web portal, which is accessible from any device equipped with a web browser (Phone, Computer, Tesla)

Emma Driesse

Cognitive walkthrough

**Preparation:**

1. The users of the product are children with an intolerance and/or allergy and their parents.
2. The product is a bracelet with a small screen.
3. The product tells the user whether the user can eat a certain product or not.
4. To complete this task, the user has to scan a product. The scanner tells the user with the symbol of a sad, happy, or yellow face if the user should eat the product or not.



The real walkthrough:

1. Conceptual model: Does the user know how to check a product? Does the user know where he needs to hold the scanner to scan the barcode?

At the beginning there is a big button with start scanning, so the user should know that he/she should click that button if he wants to check products. From experience most people know that they need to put the barcode from a certain distance from the scanner, also a red laser indicates where the scanner is actually scanning.

2. Visibility: Is the action visible?

There is no other button then the start scanning button at the beginning, so it's clear to the user which button to push.

3. Labelling

The start-button is a green button, which indicates that you start with something, which makes it more intuitive.

3. Feedback

If the start button is pressed, the screen changes to 'scan barcode to check product', this makes it clear to the user that they can now start scanning.

*Jeanine de Leeuw:*

|   |
|---|
| Heuristic violated: # 9 Help users recognize, diagnose, recover from errors         |
| Description: when an error occurs because the system does not recognize the product |
| Possible causes: there is no button yet to go back to the main menu.                |
| Expected consequences: the user has to start the system again every time            |

A solution would be to put in a button to go back to the home menu, also when the user has scanned the product this button could be used to go to the home menu and it would not go automatically what provides the user with more time to read the ingredients.

|   |
|---|
| Heuristic violated: # 7 Flexibility and efficiency of use   |
| Description: the user cannot switch to another user when he is in the store   |
| Possible causes: the user has to scan the code from the computer when he wants to change the user   |
| Expected consequences: in a family who has multiple members with intolerances or allergies everyone has to have their own watch because switching profile in the store is not possible. |

A solution would be to be able to select multiple main users that can be selected at the main menu, the computer would now only be used to change one's profile.

|  |
|--|
| Heuristic violated: # 10 help and documentation  |
| Description: when an error occurs the user cannot ask anywhere                                   |
| Possible causes: there should be a way that the user can ask for help when the user has an error |
| Expected consequences: the user has to go home to get help via the computer                      |

A solution would be to add a button for help, the user would have to have access to the internet because otherwise the button would have no use.

|  |
|--|
| Heuristic violated: # 2 match between system and real world  |
| Description: when the yellow screen pops up the child cannot decide for himself if he can eat a certain food |
| Possible causes: children are not as responsible as adults   |
| Expected consequences: the user eats the food that he might not be able to eat.                              |

A solution would be a screen between the yellow screen and the ingredients that asks the parent if the child can eat it.

*Thijs Baselmans:*

The user touches the button that is on the display and hovers the bracelet over the barcode of the product to be scanned.

1. Conceptual model: Do they know what they need to do? Can the customer be expected to try to do this action?

As this is the biggest button, and it is displayed on the screen, they can be expected to know that they should press this one.

2. Visibility: Is the control for the action visible? Can they see what they need to do?

Yes. It is on the screen, facing the user.

3. Labelling: Is there a strong link between the control and the action?

No. The button is on top of the bracelet and the scanner under the bracelet. Maybe the button should have a clear icon of the underside of the bracelet scanning... Maybe the button should be moved from the screen to be a physical button on the underside of the bracelet (where the scanner is).

4. Feedback: Will the user understand the feedback?

Probably. When the scanner is on, it will shine a red light. This is clear to see, and familiar to the user as a scanner.

The scanner presents (a) a green screen, with a smile. The user puts the item in their bag and continues shopping.

(b) a red screen, with a frown. The user puts the product back on the shelf and continues shopping.

Additionally, there is a button that, if pressed, leads to a screen showing the ingredients that the user cannot eat that are in the scanned product.

1. Conceptual model: Do they know what they need to do? Can the customer be expected to try to do this action?
  - (a) Yes, there is not really any further actions needed from the user.
  - (b) Yes, it is the only button. The user might accidentally press it, trying to get back to the 'neutral' screen, that is shown before scanning.
2. Visibility: Is the control for the action visible? Can they see what they need to do?
  - (a.) Not applicable. No action needed.
  - (b.) Yes. It is on the screen, facing the user.
- (3) Labelling: Is there a strong link between the control and the action?
  - (a) Not applicable. No action needed.
  - (b) Only if the button has a proper icon.
- (4) Feedback: Will the user understand the feedback?

Yes. Green means go and red means no. We expect this to be universally clear.

# Appendix week 7

## The consent form:

Participant # \_\_\_\_\_



### **Permission**

I hereby indicate that I voluntarily participate in this research on interaction techniques, which is executed by Aabharan Hemanth, Emma Driesse, Jeanine De Leeuw and Thijs Baselmans, January of 2018. The research consists out of executing a finite amount of interactions according to instructions given by the researcher. I understand that I am not responsible for any damage or defects that might occur. I understand that the risks I take during this research are no additions to risks I take every day.

I understand that for research purposes movement data is recorded during the study. I hereby give permission to use this data to evaluate the study. I also give permission to be recorded on a photograph or video. I understand that this media is use by the researchers to revisit the study at hand. I give permission that media in which I am unrecognisable could be used in publications and presentations to be visible for a limited audience.

I understand that the data will be anonymized, after which it will not be possible to trace back to my participation. I understand that my name will never be named in reports of this research.

### **Participation**

I understand that participation is voluntarily. With any question I do not want to answer I have the right not to answer. I can refrain from participation at any moment. Abstinance from my participation in this study has no effect on the relationship with the researchers, Eindhoven University of. I have been given the opportunity to ask any questions I have regarding the study before participation.

### **Contact**

If you have any questions during or after the study feel free to contact the researchers at any time given.

I have read and understood the above:

Signature

Date

\_\_\_\_\_

\_\_\_\_/\_\_\_\_/\_\_\_\_

Name

\_\_\_\_\_

### **Agreement by researcher**

Signature

Date

\_\_\_\_\_

\_\_\_\_/\_\_\_\_/\_\_\_\_

Name

\_\_\_\_\_

### Results of the user tests:

#### *Aabharan Hemanth:*

Performed user tests with one parent and two children.

- Parent: was able to understand the device fairly smoothly. S(he) had a few initial questions, but when handed the device, s(he) was able to successfully navigate through it. S(he) was comfortable with the fact that it was a prototype, and s(he) also went to a point where s(he) started stress testing it and finding faults with the UX. S(he) also stated that the s(he) found the faces on the screen a bit jarring. Overall, it took about a 75 seconds to get a confident grasp of the device. S(he) also mentioned how the device did not give any feedback (ie: everything was happening instantaneously) - But this is a problem with the mock ups, it won't be an issue with an actual prototype (which actually has to process data).
- Child 1: The child was more fascinated with the scanning aspect of the device. With regard to the UX, s(he) had some initial trouble understanding what the screens really meant. After a rough first attempt and after a little explaining, s(he) immediately understood and navigated through the device intuitively. S(he) was particularly happy when s(he) came across the green face. s(he) took about 3 minutes to get a good grasp of the device.
- Child 2: intuitively understood and was able to smoothly navigate the device very quickly. Only thing that particularly confusing was the exclamation mark - s(he) indicated that s(he) wasn't able to understand what its function was initially, but s(he) clicked on it anyway and figured out what it was for. Took <1 minute to understand the device.

#### *Emma Driesse:*

I performed user tests with two children with the age of 7 and 9 and one user test with a parent.

- Child 1, 9 years old: I was quite surprised how soon he understood the meaning of the device and how he should use it. From the screen on our prototype he figured that he needed to scan products and also the control of the screen was very easy for him. It was clear to him what the smiley's meant and how the ability to eat the product was connected to the color of the smiley.
- Child 2, 7 years old: I thought it would be a lot harder for her, because she just started reading and is a lot younger than the first child. It did take a bit longer for her to fully understand the device and to be able to fully control the device on her own. What I did think was quite interesting is that when she understood the device was used as a scanner, she still did not know what to scan. In other words, she did not know what a barcode was. When I explained to her what it was and showed her a package with a barcode, it was clear to her. But did make me think about the fact that inside our little walkthrough through the device when the user opens it for the first time, we need to add an explanation about what the user needs to scan, what a barcode is and where the user can find it.
- Parent: The parent also found out quite fast how the device works and how to use it. He did find it harder to understand what the use of the device was. He did not see his children going to the grocery store to buy food for themselves. That's why I think we

should emphasize the fact that children can also use the product when they go to a friends house and the mother wants to give a cookie to the child, she can check herself whether she can eat the product or not.

*Jeanine de Leeuw:*

I tested two parents and one child.

- The child understood the device in 2.5 minutes without many explanation. She started pressing buttons and got to the end very fast. The child had some trouble with the orange screen, it was not clear enough that this was a smiley. This was the first screen she had to try out and that made that it took a little longer. The other screens were very easy to understand and took less time to understand. The child suggested that the orange face was not clear enough and had to get a stripe as a mouth to make it more clear. The child also liked it and said that it would be a good device to get to know what the intolerance or allergy mean, also for a sibling.
- The first parent understood the device in 3 minutes but asked a few questions during the test. The parent was afraid to touch any buttons because she thought it could erase stuff. After explaining it could not she understood it pretty fast.
- The other parent took 4 minutes and did not understand the device really well and had to have a little explanation at the end before he understood what the device was meant to do. The parents really liked the system and thought that they would use it but they would like a help menu that guides through the system the first time that they would use it.

*Thijs Baselmans:*

I performed a user tests with one child and two parents.

- Child: The child was very eager to try the device. Therefore he was quick to try all options and he seemed to navigate through the interface very fluently. He indicated that he understood the feedback.  
Time it took to understand the device: instantly.  
He noted that he would probably use it for a bit, but not all the time. He was not comfortable putting all his trust in the device because of the severity of some of his allergies. He thought he was safer off reading the ingredient lists himself.
- Parent 1: The first parent was more uncertain in the way she navigated through the interface. She performed a few wrong clicks, but was in every instance back where she wanted to be quite quickly.  
Time it took to understand the device: approx. 3 min.  
She thought she would use the device, and found it handy that she wouldn't have to read all the ingredient lists anymore. She furthermore noted that for people following a diet or people with a mild intolerance, it would be useful if the device could track how many grams of a particular substance the user has bought/eaten.
- Parent 2: The second parent was also more hesitant in the way he used the device. Although he didn't perform any wrong clicks, he often asked for clarification on what a button was for.  
Time it took to understand the device: approx. 2 min.

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He thought he would be fairly comfortable using the device.

A button that was found particularly unclear was the “exclamation mark”-button for bringing up the list of ingredients that were not okay to eat. (Noting that the exclamation mark should perhaps be changed into an “i”, signifying: “more information”).

He also added that the device might be a very useful product for elderly people with intolerances/allergies, since the ingredient lists on packages are often too small for them to easily read.