



Increase product appreciation with Augmented Reality

Final Bachelor Project Report
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Trudie Bosse

Coached by
Client

Jun Hu
Waar

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DBP004 Connecting Realities

Trudie Bosse

0861838

s135930

g.o.h.m.bosse@student.tue.nl

Abstract

By using Augmented Reality, I tried to increase product appreciation by consumers. For my client Waar, I designed a system wherein users learn about the production of chocolate. In a store, they can download an app, and with this app, they can see the production process projected on a cabinet which displays chocolate. The concept was very positively received by the Client and by participants of user tests. Although the app does have some points of improvement, it works on a fundamental level.

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1. Introduction

Through the success of Pokémon Go in the summer of 2016 and the widespread uses of AR (augmented reality) in apps as Snapchat and Facebook since 2015, AR has become a technology that has grown commercially.

For my Final Bachelor Project, I explored how AR could be used for sustainability goals. More specifically I designed a system wherein retailers can show their customers with augmented reality how their product is made.

In this report, I describe my Final Bachelor Project. In chapter two, I describe the vision behind this project. The next section discusses the design process. In the fourth and fifth chapter, I describe the final concept and prototype, followed by the evaluation of these outcomes in chapter six and seven. In chapter 8 I discuss who this concept could be realized and this report ends in chapter 9 with my personal reflection.

2.Project Vision

Consumers have lost the appreciation of the products they buy. Without much effort, you can go to a store and buy anything you want. Through this ease, the whole production process is hidden. The makers, the place of origin, and the effort which has been put into a product remain invisible.

By making consumers/users aware of the origin of a product, I want to increase product appreciation. I want users to become aware of the communities which are centered around the production. Not only does this increase the appreciation of a product, it also gives one the opportunity to make better choices when choosing a product.

3.Design Process

In this chapter, my design process is described. In chronological order, essential elements and decisions are explained.

Early ideas

My early idea could be sorted into four categories: “Show the hidden story”, “Experience Music”, “Stimulating fantasies”, and “Physical and Mental health.” In the end, I chose “Show the hidden story”. I liked the philosophy behind it, it was close to my vision, and has more depth than the other categories.

Iteration 1

Seeking Context

In order to have a clear context for my idea, and on the advice of my coach, I started looking for a client. I contacted multiple companies that sell products with an interesting story. Among them was Tony’s Chocolonely. This company sells fair trade chocolate. The reply from Tony’s Chocolonely was very enthusiastic, so I started my first design

concepts for their product.

AR

As a technology, I chose augmented reality. I found it important that my design allows you to connect your actions as a consumer to the effects of the production process on another community and its environment. By seeing your own environment and a projected digital layer with the other environment, it would be easier to make this connection.

Fast prototype

With the help of the app “Layar”, I was able to make my first ideas more concrete (see image 3.1). With this prototype, I found out that using AR already excited people very quickly. The AR layer should be exciting. Therefore, attractive visuals for the AR layer are necessary. Furthermore, I learned that AR thrives when you can look around. The next steps would therefore be to search for another program that would be suited to make more complicated AR visuals, and also to ideate on other ways of using AR.



Image 3.1 Fast prototype



Image 3.2 Idea inspired on the paper

Iteration 2

Use of papers

To make it easier to ideate, I searched for papers that gave examples of AR. I was inspired by the paper Augmented reality: Designing immersive experiences that maximize consumer engagement (Smith,

2016). In this paper different ways of using AR for marketing are described. The article also explains, which parts of the AR services are essential to keep in mind. With this knowledge, I not only limited my ideas to the AR layer itself but also kept the environment of the AR (for example bystanders and the trigger) in mind.

Programming AR

By searching on the internet, I found out that the cheapest and easiest way to program AR was to use Unity in combination with Vuforia.

Iteration 3

No client

With the midterm approaching, I had not yet heard a response from Tony's Chocolonely, so I had to search for another client. Therefore I stepped out of the chocolate bar as a product and went further on designing for an apple. I could also use the idea to ask local shop owners as my client.

Midterm prototype

As a prototype, I wanted to make a video that showed the concept. I

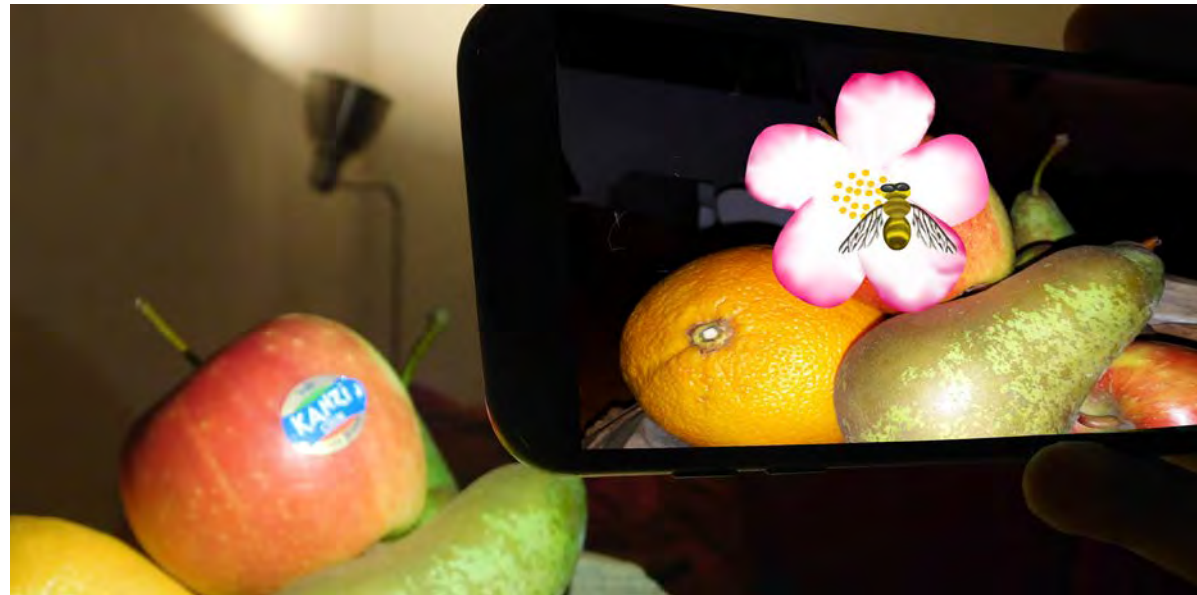


Image 3.3 the working of the midterm demo day prototype

started by learning Adobe After Effects. Unfortunately, I made a mistake and therefore I couldn't finish the video in time. Thus, I used the Layar app to present my concept during the midterm. In the Layar app a farmer and a apple tree are shown, while in the fruitbasket on the table the fruit is visible, with also a marker on it (see image 3.3 and 3.4).

Feedback

From the midterm, I learned that I should focus more on how the users get to know the people behind the



Image 3.4 the set-up of the midterm demo day prototype

production process, and to keep in mind that the AR technology should be different than just showing a video.

Iteration 4

Waar

A few days before midterm demo day, I finally had a client: Waar. Waar is a warehouse chain that sells all kinds of sustainable products. Together with Waar, we agreed to use a special cabinet for the concept. In this special cabinet, Tony's Choclonely chocolate bars are displayed (see image 3.5).

Target audience

During a meeting, and with the help of communication documents from the Waar, I learned what the target audience of Waar is. This group consists of women between 25 and 65 years old, who are interested in culture and traveling, and who are concerned about the world. Appendix A contains a detailed overview of Waar, their mission and their target audience.

First AR design on cabinet

Armed with this information, I started making a layer of augmented reality on



Image 3.5 the cabinet with chocolate bars

the cabinet. As a first design, I started putting images of different parts of the production process on the various boxes



Image 3.5 the cabinet with the first version of the AR layer

on the cabinet (see image 3.6). I was not sure what kind of information the target audience was interested in.

Interview

To retrieve this information, I interviewed a 56-year-old woman. Furthermore, I wanted to see if she owns a smartphone and if so, how she uses it.

The interview can be found in Appendix B. The most important takeaways from the interview were that the woman:

- Is not afraid of technologies
- Likes the playfulness of AR
- Uses a smartphone
- Has an interest in production processes
- Wants to know the technology behind the production process
- Wonders who the people behind the product are because she values their effort

Although I only interviewed one person and she couldn't represent a whole user group, this interview did provide me more context for the user group. For example, because playfulness is mentioned, I later added a game inside the design.

Following the interview, I showed the cabinet, with the imagines of the production process on it, to the interviewee. As feedback she mentioned that she would like to have the feeling that she was actually there. As an example, she mentioned a farmer who could take you by the hand and show the production process.

Meeting Tony's Chocolonely

On the November 17, I had a meeting with Femke Lotgerink from Tony's Chocolonely to tell me more about the production process. In this meeting, I learned very nice and interesting details

about the production of chocolate, which I was able to use in my design. What I also noticed during this interview, was that my appreciation for chocolate grew, because I learned more about the production process.

Iteration 5

Combining the information from Femke from Tony's Chocolonely and the interviewee. I changed the concept. In the new concept, you could turn your phone away from the cabinet and see the farmers in the store. Also I added a little game to make the app more playful. I presented this new concept on November 20, at Waar.

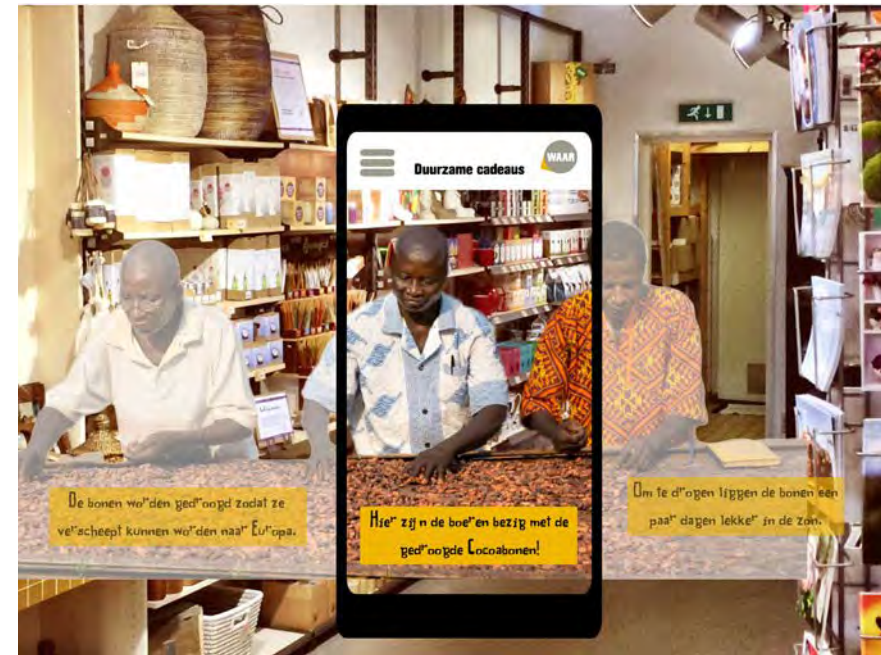


Image 3.6 Farmers in the store

Feedback

The feedback that I received on the concept was that it was “very cool”. I had to pay attention to the text with the images, to make it more fun and exciting. Also, the text had to connect more with the people who were buying the items in the shop.

I noticed that I knew what had to change, yet I was unable to think of ways to improve it. Therefore asked some students and friends of mine to think with me about my concept. From these informal co-design sessions, I got the following insights:

- Many people find different aspect interesting.
- By using a button, I could place more text by an image, without losing the interest of the people that don't want to see that much detail.
- I should look more carefully at the interaction, how are people instructed to use the app.
- Turning around in a shop isn't that obvious
- Which way to follow to get a logical flow in looking at the boxes.
- Recipes for chocolate would be sweet rewards for the games.

Iteration 6

With these new insights, I made the first version of the app in Unity and presented this to Waar on December 5. They were very excited about my project and they even asked me to find out what it would cost to make the app. One big point of improvement were the images. They thought that it would still be hard for customers to identify themselves with people who looked different and lived so far away. After a brief discussion, we found out a way to make it

easier for customers to identify with the producers.

Iteration 7

I decided to make graphics of a few images to make it easier for customers to identify themselves with the images on the cabinet and to make it look less realistic more fun. Furthermore, I also had a meeting with Rosie Zopfi, who is specialized in communication, photography, and film. With her, I discussed how I could make the cabinet look more appealing. I made some parts of the AR layer on the cabinet move, I looked more specifically at the images and their colors, and I added arrows to make the order of the images of the process visible.

As a finalization, I also made the games in the app. Based on four user tests, I also decided that the rewards of the games would be chocolate recipes. These were the most appealing to the users and they were also the most fitting to the identity of the Waar.

4. Final Concept

As the final concept, I designed a system in which consumers can see the production process of a product with Augmented Reality in a store. To develop this concept, I worked together with Waar. Waar is a warehouse chain that sells various kinds of sustainable products.

System

The designed system is explained by two use case diagrams. In the first use case diagram, a retailer sells his products from a supplier to a customer. As an extra service, he can offer an AR service to the customer (see figure 4.1).

The AR services are further explained in the second use case diagram (see figure 4.2). This diagram shows that AR services are designed by an external designer, based upon the information about the product provided by the retailer and the supplier. The customer can use this AR experience in multiple ways: he can get more information about the product, he can play little games, and he can share his experience with others.

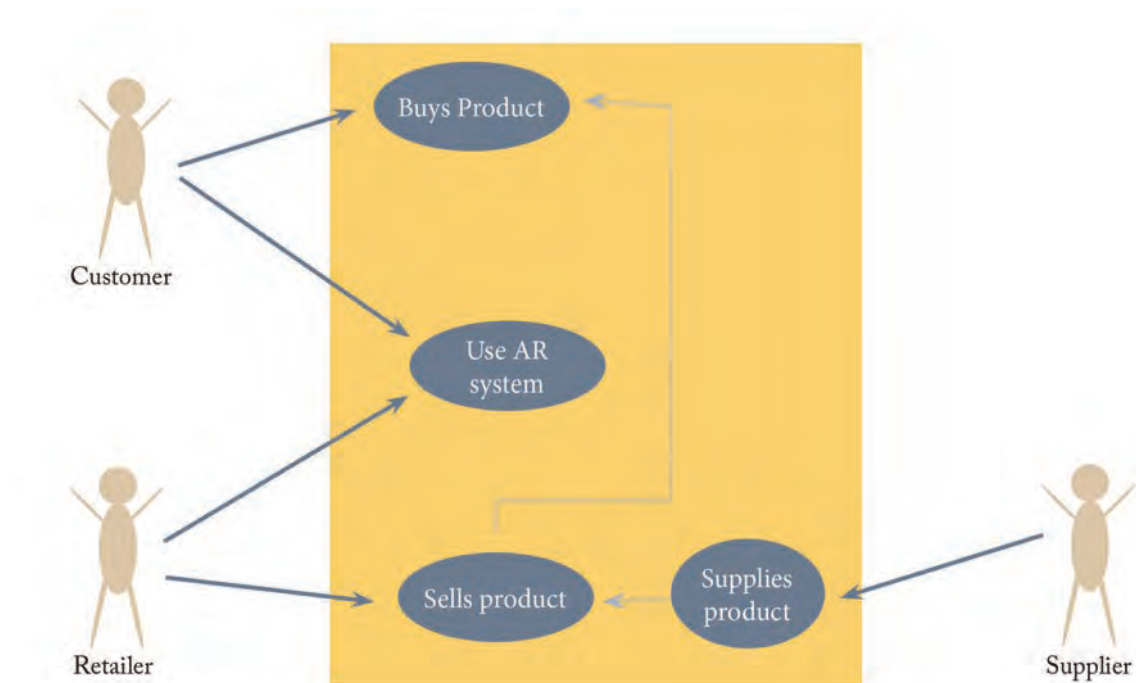


figure 4.1 use case diagram selling products

The retailer instructs the customer to start using the app. The retailer also promotes the app, for example by placing posters in the shop or with face-to-face communication.

The app within the system
To be able to make the Augmented Reality accessible and cheap, the customers can use their phone and download the Waar-app to view the Augmented Reality layer. In this app,

there is also space for further explanation about Waar.

Using the app

To see the AR layer, the customers have to open the app and scan a product. When the app recognizes the product, the augmented reality layer appears on the mobile phone. In the AR layer, different parts of the production process are shown on the product. For each step, the app can display more information and a closer look. Furthermore, little games, record and share options are available inside the app.

The app can only be used inside the store, but the experience of the user can be recorded and shared with others. The reason why the app only can be used inside the store is that the app should entice the customer to come to the store.



figure 4.2 use case diagram Use AR system



Image 4.1 The cabinet



Image 4.2 The cabinet with Ar layer



Image 4.2 The whole Ar layer

Worked out AR layer

To make the concept more concrete, I worked out the AR layer for one product in the Waar store. This product is the chocolate bar “Tony’s Chocolonely,”

which is sold in a special cabinet. The cabinet is used as a marker to trigger the AR layer.

When the cabinet is scanned, the layer shows different parts of the production process on the cabinet (see images 4.1,

4.2 and 4.3). Each section of the cabinet represents a part of the production process. By pressing a box, a part of the process is emphasized. The instruction to turn the phone around in the store appears, and the scene in the box becomes

visible in the store (see image 4.4). The scene shows the production process and more information is given by text. If the customer wants to learn more about the scene that is visible, the customer has can press the “+” on the bottom of the scene. More information in the form of text then appears in the app.

Some parts of the production process can also be experienced by playing little games in the app. These games make the app more playful and the story more fun. These little games also mimic the movements a producer has to make, and therefore let the user experience in another way what the producers have to do to produce the product. In the AR layer that I made, there are two games. One of them is to cut all the weeds away for the cacao trees to grow, and the other is to chop all the cacao pods into pieces to get to the cacao beans. As a reward for winning the game, the user gets chocolate recipes.



Image 4.4 The AR layer in the store

5. Final prototype

As a final prototype, I built an app with Unity and Vuforia. This app I presented with a video to explain the concept and with two images to represent the environment: one of the store and one of the cabinet (see image 5.1).

Working of the prototype

When opening the app, the logo of Waar appears. When pressing this logo, the app accesses the camera of the mobile phone. The text “scan an object” appears on screen. When the cabinet is scanned, the text disappears, and the AR layer appears on the cabinet. Over the cabinet, the text “Press on a box” appears (see images 5.2, 5.3 and 5.4) When the user presses on a box, this text changes into “Look around or press on another box,” below the text, an arrow illustrates the movement. When the user turns the phone towards the store image, he can see an AR layer projected on the shop. This AR layer consists of an image without a background and some text (see images 5.5 - 5.12). Some AR layers have 3d elements in it: for example, the two games and the scene with the plants.



Image 5.1 Set-up final prototype during demoday



Image 5.2 opening Waar app



Image 5.3 Scan an object



Image 5.4 AR layer

To change the image that is projected on the shop, the user has to turn around towards the cabinet image and choose another box.

The two games that are implemented in the final prototype work on a fundamental level. For both games, the user gets to see a machete on the screen. When the user moves a finger across the screen, the machete moves with the user. If they touch a game object, this object disappears. In one scene, with this mechanism, the weeds in the scene dissolve. In the other scene, a cacao pod breaks down into cacao beans. Technical working of the app



Image 5.5 The plants



Image 5.6 cutting weeds game

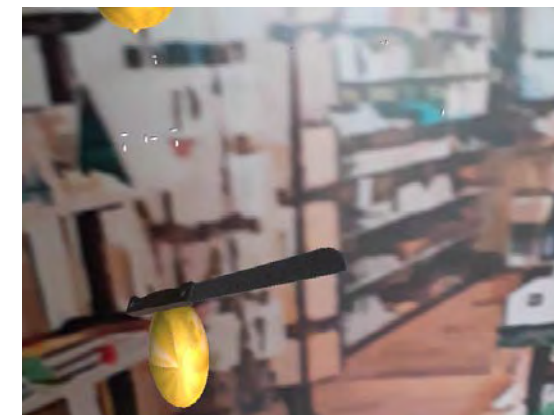


Image 5.7 chopping cacao pods game



Image 5.8 Cacao trees



Image 5.11 Cooperation

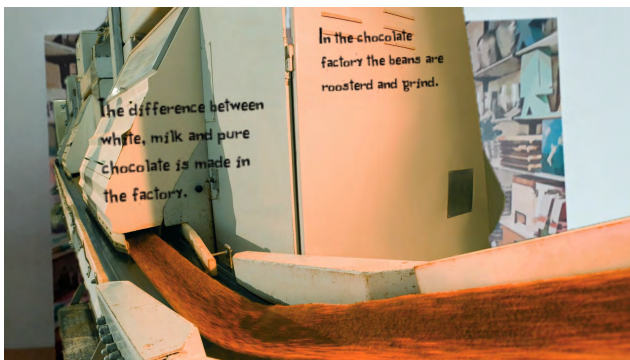


Image 5.9 Fabric

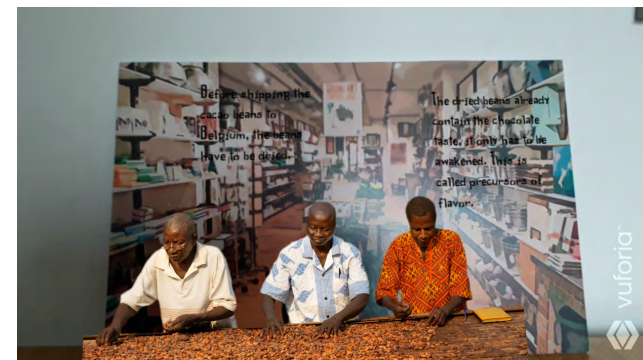


Image 5.12 Dried cacao beans



Image 5.10 Collecting cacao beans

As already mentioned, this app is made with Unity and Vuforia. Unity is a game development platform, and Vuforia is a platform for AR.

To trigger the AR layer in the app, I used markers. By uploading images to the site of Vuforia, Vuforia creates markers, which can then be downloaded from their site as a package for Unity. As markers, I used the images of the cabinet and the shop.

In Unity, I designed the game. In this game development platform, game objects can be placed inside a scene. For each different AR layer, a different scene has been created. All the scenes include the game objects that create the projection upon the cabinet, except for the start scene where the Waar logo appears. For the objects projected on the store images, each scene has different game objects, and most of these scenes also have text.

The images which are projected on the cabinet are all game objects that function as buttons. When one taps on an image of the box. Unity changes into the scene which belongs to that box.

To add behavior to some of the game objects, I used scripts. Examples of behaviors which are scripted are the breaking down of the cacao pods when they are touched in the game, the appearing of the text “scan an object” when no object is scanned, and the change of scenes when an image projected on the cabinet is tapped. The scripts I made are based on scripts from tutorials and can be found in Appendix C.

Video

Apart from the app, I also made the video. I wanted to add a video to give a better impression of what the cabinet should actually look like with the added AR layer, to explain the concept, and to make my presentation more attractive. In the video, some parts of the AR layer move. The farmer in the upper right corner is cutting away weed, in the middle a ship moves from Ghana to Belgium, and in the lower left corner kids are waving. The movements are added to the AR layer, to make this layer more attractive.

The video also explains more about the

concept. It explains that when a user is winning a game, the user gets chocolate recipes as a reward. Furthermore, the video shows the share- and record options in the app.

Another function which is visible in the video, but not in the app, is the option to see more text. In the video, a small bottom is visible next to the text in a scene if users want additional information.

9. Evaluation of concept

To validate my concept, I did four user tests, and I surveyed with open questions using google form to gather the information. The overall reaction to the concept was very positive.

Method

For the user tests, I asked four participants, three women and one man between 55 and 64 years old. These participants are people which I knew and fit inside the target group of Waar.

I gathered my participants for the survey over the application what's app by asking people, who are interested in culture and travel. As a check, I also questioned the participants in the study, what their highest level of education was. In this way, I tried to reach the target audience of Waar.

I divide the results of the survey into the questions in categories, to have an overview of the reactions. By writing down essential quotes from the participants of the user tests, I made an overview of the conversations with the tested users.

Results survey

Appendix D contains the questions of the survey and the answers of the responses. There were 25 participants, 9 male, and 16 female. The average age is between 21 and 62 years old.

The reactions to the idea were overall positive. The mean of the grade that the concept received was a 7,88, with a minimum of 4 and a maximum of 10 and a mode of 8.

On the question what do you think of the concept, 22 reactions were positive although some with some doubts. For example, two people had concerns about downloading the application, and four

Quotes from the survey

“Very internering, It’s good to know and learn where our products come from. I am curious how that would be made possible for products that are questionable. Also the game part is a good way to maybe also make kids aware of where their food comes from.”

Female -34 years old

“Good concept! For this to work in practice, keep in mind that people have little time during shopping to use such an app – so keep it short and simple.”

Female – 25 years old

“I like the concept, but maybe it’s too much effort to download an app for just using it one time in a shop.”

Male – 27 years old

other people had doubts about using this app during shopping. Five people mentioned the sustainability aspect as a positive side of the app.

Form the 25 participants, 16 mentioned that they would want to download the app. Of these people, 8, wanted to download the app to read the information, 5 to try the app and 3 out of curiosity. For 3 people it would depend if they would download the app. A participant mentioned that there should be enough products in the app before he would download the app.

Although the overall reaction is positive, 8 people would like to change a part of the concept. Two participants mentioned that they would like to try the app at home, one other participant would like the app to be more straightforward.

There was one critical participant that didn't like the concept. This participant thought that it was unpractical to use the app inside the store.

Results user tests

All the four participants were very positive about my concept for various reasons.

One participant mentioned that she liked the combination of creating a commercial value and a value for society. Another participant liked the experience and felt happy and surprised when using the app. She liked the way of gathering information. The two other participants reacted very enthusiastically after having the experience. Both were very surprised about what they have learned from the app.

Although 3 of the 4 participants did not frequently download new apps, they would download this app. Two of the participants did emphasize that they should be attended on downloading the app

“No, I would not download the app because I try to minimize te number of ‘entertainment’ apps“

Female – 25 years old

“Yes, because I think it s interesting to know more about a product”

Female –47 years old

“To try out, sure”

Male – 34 years old

“I don’t hink that no one would want this. Furthermore you are reading and playing games in a shop, not practical.”

Female – 34 years old

by a sign.

At the end of the test one participant even mentioned that with the knowledge that he gained through this system, he started to appreciate the product more.

Conclusion

The concept was received very positively. Mainly, the participants of the user tests were enthusiastic and had a pleasant experience using the app. The participants of the survey were also positive, yet there were some critical notes. A few questioned why there was an app needed for this function, and they also wondered if the games are necessary and if people would use it inside the shop.

Quotes from the user tests

“I get more appreciation for the product”

Participant 4

“I wouldn’t spend the time in the supermarket to look at every item, but for specific products I would use it.”

Participant 1

“I become more involved with this product, more binding by this app.”

Participant 2

“I think that it is a very nice idea, the combination of creating a commercial value and a social value.”

Participant 1

“I find it very interesting to see“

Participant 3

7. Evaluation Final Prototype

During the final demo day, I presented an app as a final prototype. Before demo day I did some user tests to validate the prototype. Although the app works at a fundamental level, there are still some things to improve.

During these user tests and final demo day, I noticed that my app needs more instruction than the text and images in the app give. Furthermore, the text in the app requires a plane as a background to make it more readable.

All the 4 participants during the user tests were confused by the text scan an object and didn't know what to do. To resolve this problem in the future, the app could have an instruction video, which plays the first time a user opens the app. After explaining the workings of the app to the participants though, all the users very soon could work flawlessly with the app.

One participant gave as feedback though that he would like to see if he already pressed a box. As an example, he said that



Imagine 7.1 Set-up usertest

he would want the color of the box to change when he already had touched it. One last remark about the prototype is that the machete of the game does not work intuitively. The reason for this is that the weeds or cacao pods

are removed when the handling of the machete touches the object, instead of the knife part of the machete.

8. Concept realisation

In this chapter, I describe the steps which are needed, to realize this concept. My client Waar asked me to write a proposal for accomplishing the product. They were very excited when they saw the first unity prototype. Although this proposal should become more extensive than this chapter, it would partly be based on this.

AR interaction and look

The first improvement, which I would make, is the instruction for the prototype. During the user test, I found that the app was still not intuitive enough. Therefore I think that it is essential to make an instruction video, that a user can see when he/she opens the app.

Furthermore, the displaying of the text should become better, by placing a plane behind the text. The text should be placed in a visible area on the screen. A working button should be placed next to the text so that users can read more information if they want to.

The games should be developed further, and the share and recorded option need to be made.

As for visuals, the quality of the pictures

should be improved. To do this better pictures should be made, or 3D scenes need to be created.

AR on a technical level

On a technical level, the app should recognize the form of the cabinet as a target, instead of the image of the cabinet. A 3D object should be used instead of a marker. Vuforia has the option to do this, it is called a 3D object Target.

The location where the images in the store have to be projected can be based upon the ground plane.

The other possibilities of the app

At last, the whole app needs to be developed. In good communication with Waar, there needs to be explored for what other goals the app could be used. An example could be that people, can find information about discounts through the app.

To make these improvements, the help of a software developer is needed. The

software developer could also provide the license to use Vuforia and Unity for commercial ends.

9. Reflection

My Final Bachelor Project was a very good learning experience for me. I learned how to do a design process on my own, what kind of designer I want to become, how to address and work with different stakeholders, how to work with papers during a design project and to work in various programs.

Individual project

At the start, I found it very difficult to work alone. It was hard for me to keep myself to the deadlines I had set, without any social pressure. During the project, I learned to use meetings as deadlines. In this way, I had still the social pressure to keep myself to these deadlines.

Design approach

I think that what distinguishes my design approach is that I have many iterations. In these iterations, I gather or validate ideas quickly and informally by others. Although I find my design approach very nice to work with at the start of a project when ending a project I should be more aware of making decisions based on wrong information. I think that at the

end of a project I should be more critical and work more precisely with the results of user tests and surveys.

Overestimating

I have the characteristic of being too optimistically. Therefore I overestimate the difficulties of some tasks. During the project, I also made this mistake. For the midterm demo day, I planned to make a video with after effects. Although I picked up working with this programme very quickly, I did end up with making a mistake and could not finish the video in time.

I learned from this experience and started early with Unity and Vuforia, to make sure that I understand the basic working of the programme before I start to work on the prototype.

Sustainable designer

This project taught me that I want to become a sustainable designer. At the start of the project, I did have two different kinds of directions I wanted to go for. But working on this project with this vision, I found out what I

found important. I think it is essential that people become more aware of the results of their actions and that we as a society should change some of our behaviors. Mainly because the world around us is organized in such a way, that it is hard for an individual to change their unsustainable actions. I think that designers we can design a world where it is not hard to change this and that designers should take more initiative to do this.

Business

At the start of the semester, I was still not sure what I wanted to get out of the competency Business and Entrepreneurship. By searching and working with a client (and another company which supplied products for my client), I learned how I see the competency business and entrepreneurship. When designing, a concept should add value to all the stakeholders. For me, it means looking from the perspective of different stakeholders and not only from the

perspective of the user.

Papers

As a PDP goal, I wanted to use at least four papers during my project. In the report, I only refer to one paper, because at the end just one paper made a contribution to my project. I think that, although I did spend a significant amount of time looking and reading papers, I might have searched too strict for a specific subject. Further, another reason why I used soo little papers is how my design process turned out to be. Until the midterm, I didn't have a client. The time which was left, I wanted to spend primary on making and testing and not on searching for papers which could add value to parts of the design process. What I will take from this, is that I should be careful with the goals I set for myself. The paper that I did use, really helped me during the design process to inspire and validate my concept. So for the next design process, I should use papers, but be careful about searching for too specific subjects.

Skills

At last, I do want to mention that I became skillful in working with four programs without previous experience. These skills are: making animations in Adobe After Effects, making a video in Adobe Premiere Pro, making games in Unity and Augmented Reality in Vuforia.

10. References

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