HabitAR

Motivate physical activity by using personal interests

Alec, Kouwenberg
1551825
a.a.j.kouwenberg@student.tue.nl

Alexandra, van Dijk
1440608
a.n.v.dijk@student.tue.nl

Niels, Horrevoets
1564323
n.c.j.horrevoets@student.tue.nl

Nikki, Koonings
1573810
n.m.j.koonings@student.tue.nl

Project coaches: Jun Hu

ABSTRACT

HabitAR is a community-based platform in the form of a smartphone app. The focus is to motivate the user to walk an extra mile by letting them create routes that pass their interests; in this case animals, letting the user create routes depending on length and the number of possible animals on that route. By spotting, photographing and posting blogs the users gives to the community. They then get back a blog that gets updated by others about the animals they are interested in.

The goal of this study was to see if this community-based platform is motivating users to go for a (longer) walk, to validate that this concept works, and to see if this could be implemented in different areas. This is done by both questionnaires and a user test and interview on the prototype.

The results of the study show that our creates a bond with personal interest during your exercises can help motivate people to exercise more, but the degree of motivating effectiveness does depend on personal factors such as the value the individual attaches to the interest.

Keywords

Motivation; Physical activity; Community-based platform; Personal interests; Research through design

HabitAR: Motivates more physical activity by using a community-based platform

INTRODUCTION

'Approximately 80% of US adults and adolescents are insufficiently active.' [15] and Berkovsky, S (2010) states that 'contemporary lifestyle has become increasingly sedentary: little physical (sports, exercises) and much sedentary (TV, computers) activity.' [3] This is problem of inactivity is occurring in the whole society; all age groups and around the whole globe. So, what if you combine technology to motivate physical activity. This is nothing new take for example Pokémon GO. Research [8] shows that it is hard to retain active engagement with for example Pokémon GO once the initial novelty wears off. Ryan, R. M., & Deci, E. L. (2000) [17] is stating that having a motivation is the key to sticking to an exercise routine. So, what if people can create a valuable bond with something that lies within their interest during their exercise as a motivator?

To steer the research to this type of motivation, we use the following research question; "In other words, how can creating a valuable connection with personal interests, by using a community-based platform, motivate people who are relatively physically active to exercise even more often?"

In this paper we focused on using animals in nature as stimuli to motivate people to take that extra step, to go out or take a longer route. We describe the process of our research through design and present our findings on how to motivate people and if this concept is even motivating at all.

Figure 1: Interaction with the HabitAR app

RELATED WORK

Health benefits of physical activity

Today's lifestyle has become increasingly less active: little physical activity such as sports and exercise and many more activities involving sitting, such as watching TV and working in the office. The nature of sedentary activity is self-reinforcing, which makes it difficult to increase physical activity [3].

Previous research confirms that there is evidence for the effectiveness of regular physical activity in the primary and secondary prevention of several chronic diseases (e.g., cardiovascular disease, diabetes, and cancer) and premature mortality. A linear relationship appears to exist between physical activity and health condition, such that continued increases in physical activity will lead to further improvements in health condition [19]. Other research has shown that exposure to a natural environment promotes health-related factors. So, while simply being in nature can improve health, being physically active in nature could provide even more health benefits [4].

Motivation

Researchers suggest that the most critical factors influencing whether a person is physically active enough, have to do with whether the person is intrinsically motivated. Intrinsic motivation is the internalization of actions and self-assurance one gives themselves. Extrinsic motivation, in contrast to intrinsic, concerns behaviors done for reasons other than their inherent satisfaction [17]. The intrinsically motivated person is usually one who finds the activity worthwhile, because it is fun and values being able to do it [13]. The fact that although intrinsic motivation is required and more sustainable for longer periods of high achievements, extrinsic motivation is needed when the internalization cannot take place or as a promoter. To get people active, it is important to develop quality physical activity programs that get and keep people physically active, primarily on their own initiative [12].

Personal interest and intrinsic motivation seem to describe comparable outcomes. Personal interest refers to an ongoing and deepening connection of a person to a certain subject that does have qualities of complete commitment, ongoing involvement in a task for the sake of the task itself and the pursuit of challenge. For intrinsic motivation, these outcomes are more generally applicable to human behavior, over time (individual interest) and in the moment (situational interest). As such, individual interest can be considered a developing context for thinking about intrinsic motivation. It focuses on the relationships between each person and particular content over time and their impact on behavior. Thus, a combination of engaging in physical activity while building a deepening relationship with a particular interest might cause an individual to become more intrinsically motivated to exercise [1].

Research that was focused on designing technology that is engaging and motivating showed that the desired characteristics of a system or game like this are: social or competitive, outdoor, simple to learn and with large variations [2]. Many exergames currently use competitive aspects to motivate users. Research indicates that not all participants favor competition. This could be due to the different types of needs these users have. In addition, users may push the competitive aspect too far, causing negative feelings [18]. In such cases, collaborative elements can be included to reduce this tension. A collaborative feature would encourage cooperation between users and decrease the emphasis on competition between players [9]. A potentially important basic factor, in motivating increased physical activity behavior, is choice. Setting up the environment in a way that provides opportunities to make choices allows the individual to experience autonomy, which increases the intrinsic motivation to engage in a behavior (physical activity) [16].

Existing services

Gamification is generally understood as involving game elements in a non-game context. The overall goal of gamification is to increase a person's motivation for and engagement in certain activities. Gamification seems to have a potential impact on motivation to exercise, although there are individual differences [10]. One app that has ultimately been shown to influence people's physical activity and motivate them to go outside is Pokémon Go. Pokémon Go is a popular mobile augmented reality game that requires players to travel to various locations to catch virtual characters. Playing Pokémon Go was associated with a statistically significant but clinically modest increase in daily steps among players of the game, but this was short lasting. A challenge for future physical activity interventions using an application such as Pokémon Go, is to maintain active engagement once the initial novelty has worn off. Additional studies are needed to assess the extent to which augmented reality games can be used to promote physical activity over a longer period [8]. An app that has already existed for a long time now and helps people to navigate anywhere in the world is Google maps. Why does Google map the world? "Map making is an ancient human endeavor, and one that those of us working on Google Maps are honored to continue to pursue." [5]

This app helps you to discover new experiences across the world or even around the corner. The app lets you connect to places you are interested in so that you will never miss a thing. Navigate the world around with real time traffic and public transportation updates, with which it will determine the quickest and shortest route to anywhere you want to go. [5]

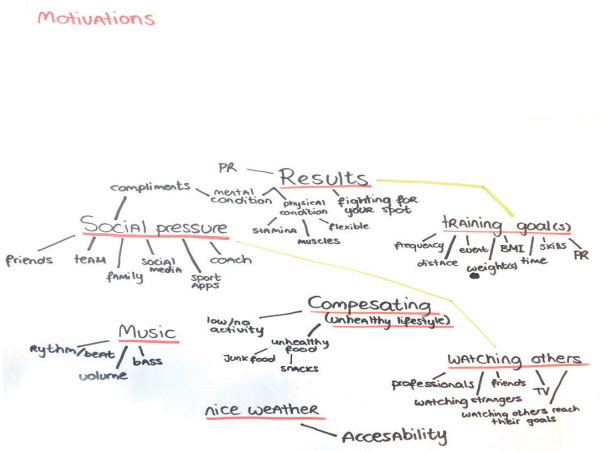

Figure 2: A mind mapping brainstorm about motivators for physical activity

Figure 3: Clustering of the results of the sketching challenge

DESIGN PROCESS

Scoping the project

The process started with the question 'How do we motivate people to exercise more in public spaces?'. Starting off from this question a brainstorm was done with the design method 'mind mapping' (Figure 2). Here it was concluded that there are a lot of different directions to choose from. Then a design method called 'sketching challenge' was done where each group member sketched 33 different concepts (Figure 3). After the challenge all the concepts were combined and each group member gave 7 votes to, in their eyes, "the best concepts". Reflecting back on this, writing down the best elements of the concepts to get more valuable information out of this brainstorming session could have been helpful. Then the voted concepts were laid together and were compared. This led to the conclusion that there were a lot of running concepts designed by every group member. Since this was a common interest, the running concepts were filtered and new concepts were separately made, based on the chosen running concepts. After presenting these within the group, all the good elements of each concept were integrated into the following first iteration (Figure 4).

First iteration

"LightTrack" is a concept which should motivate runners to challenge themselves to achieve their goals. These goals should be filled in by the user at the beginning of a set running track (in for example a park) and then during the run visualized beside them. Different ways of visualization (like light, waves, etc.) were then discussed, finally light was chosen. The user group for this idea would be runners between 18 and 60 years old who want to improve themselves. To dive more into the user and society, and get insights from the user group, the design tool story board and prototype video were made. These were used during the design method 'semi structured interview' which was conducted, to give the users a better understanding of the concept and therefore get better insight (Figure 5, Appendix 1). Conclusions from these interviews were that all the participants would be motivated by this concept. What they didn't like were for example that they couldn't use the concept together and that it would become boring to run the same round every time (Appendix 2,3). After more benchmarking, an already existing concept which was really similar was found and therefore a new direction was chosen.

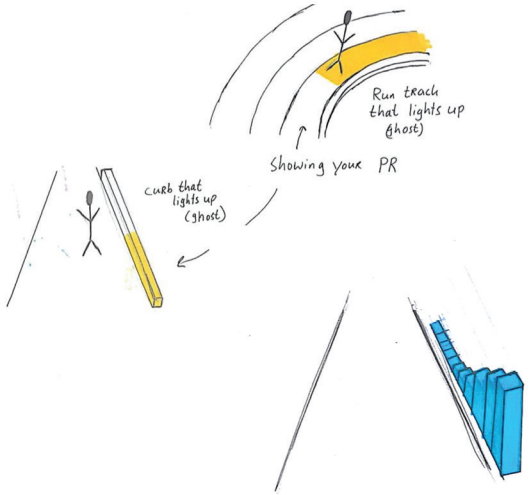

Figure 4: The presented running concepts

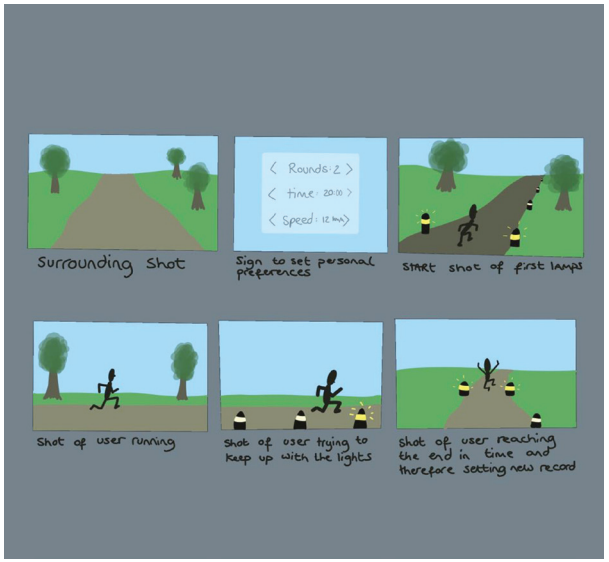

Figure 5: Storyboard explaining the concept of LightTrack

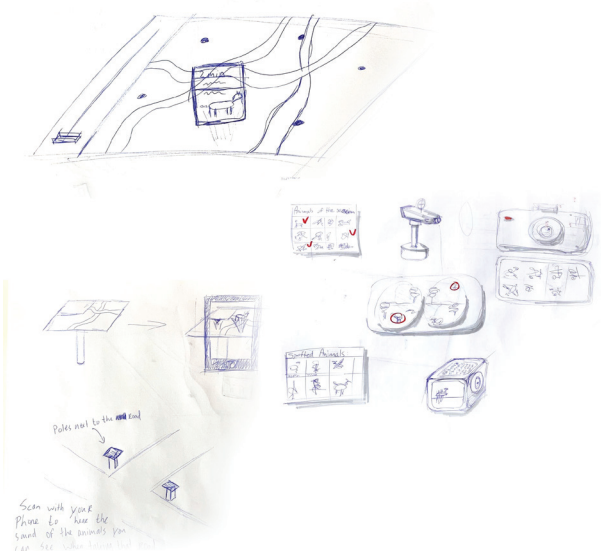

Figure 6: Sketches of the new concepts

Figure 7: The AR layer from paper prototype to reality

This led to doing a new design method which should really add new value to the design. Therefore, a first person-perspective approach was taken. Each member went for a walk themselves during which motivational elements, to keep walking, were written down. After analyzing, a common element was spotting animals. The group also attended a lecture about material choices and the influence of materials on design and interactions, which led to a broader look at the project. Based on this, it was chosen to use animals as a motivation in the next iteration of the concept. The research was then focused more on how we could motivate people to have more physical activity by discovering animal habitats. To be able to recognize animals research was done on digital layers and a workshop about AI was followed to maximize the technology and realization of the future prototype. There was knowledge gathered about for example "Halo AR". Then new concepts got induvial made based on the adjusted research question and adding new knowledge about digital layers (Figure 6). All the good aspects of these concepts were combined and merged into the second iteration: "HabitAR".

Second iteration

HabitAR consists of an abstract map which displays the paths of the forest in which the map is placed. This map can be scanned with the app (Figure 8) and a digital layer of the forest, based on satellite images, would appear. Then another digital layer will appear with recently spotted animals. A live location can lead the user to an animal of his or her choice. When arrived the user can upload a photo of the animal (in this way the location of the animal stays up to date and other users can use that photo to spot the animal themselves) and receive information about the animal. After uploading the photo, the user will unlock the habitat of the animal he spotted and earn 100 points for finding an animal. To earn more points on the same animal the user must come back on another day. Of this a video can be found in Appendix 4.

A low fidelity prototype was made to further brainstorm about this concept. Then, to get new insights about the iteration, a questionnaire was made and sent to an expert. This was Erik Schram who is a Forester of the area 'De Kempen'. After talking to the expert and sending out a questionnaire to the user group, new insights were gathered to improve the concept. For example, to keep the animals safe, a pop-up message was added which warned them about the safety of the animals and asked them to stay on the paths. Focusing more on technology & realization and user & society, a prototype video, a poster and a high-fidelity prototype (consisting of a physical map and AR layers (Figure 7)) were made to get useful new insights. Feedback received was for example about creating a social aspect by bonding the user with the animals to increase the motivation of coming back to the forest. Other feedback was about the point system which could maybe be adapted to a more community-based point system where the users must work together to earn points. Additionally, some feedback was about other layers which could be implemented like plants or even good restaurants in the neighborhood. Also, the note was given that the group could think about different animals in different places. Lastly a feedback point was about how people know that the sign has a digital layer and how this is clear to users who have not yet discovered the app.

All these feedback points adjusted the concept a bit more. After thinking about different layers and personal interest the decision was made to design a concept which could be adjusted to personal interests instead of only animals, since this would increase motivation of users who don't like animals. To represent this concept HabitAR was chosen (with personal interest animals) to use as an example of a possible "personal interest" which could be chosen for the app. This led the focus of the project more to how we could motivate people to go out for an extra walk using personal interests. Also the user group was more specified to people who are already physically active but need just that push to go outside even more. To stimulate the personal interest of animals even more, there would be a focus on adjusting the design so that the bond between the user and the animal becomes important.

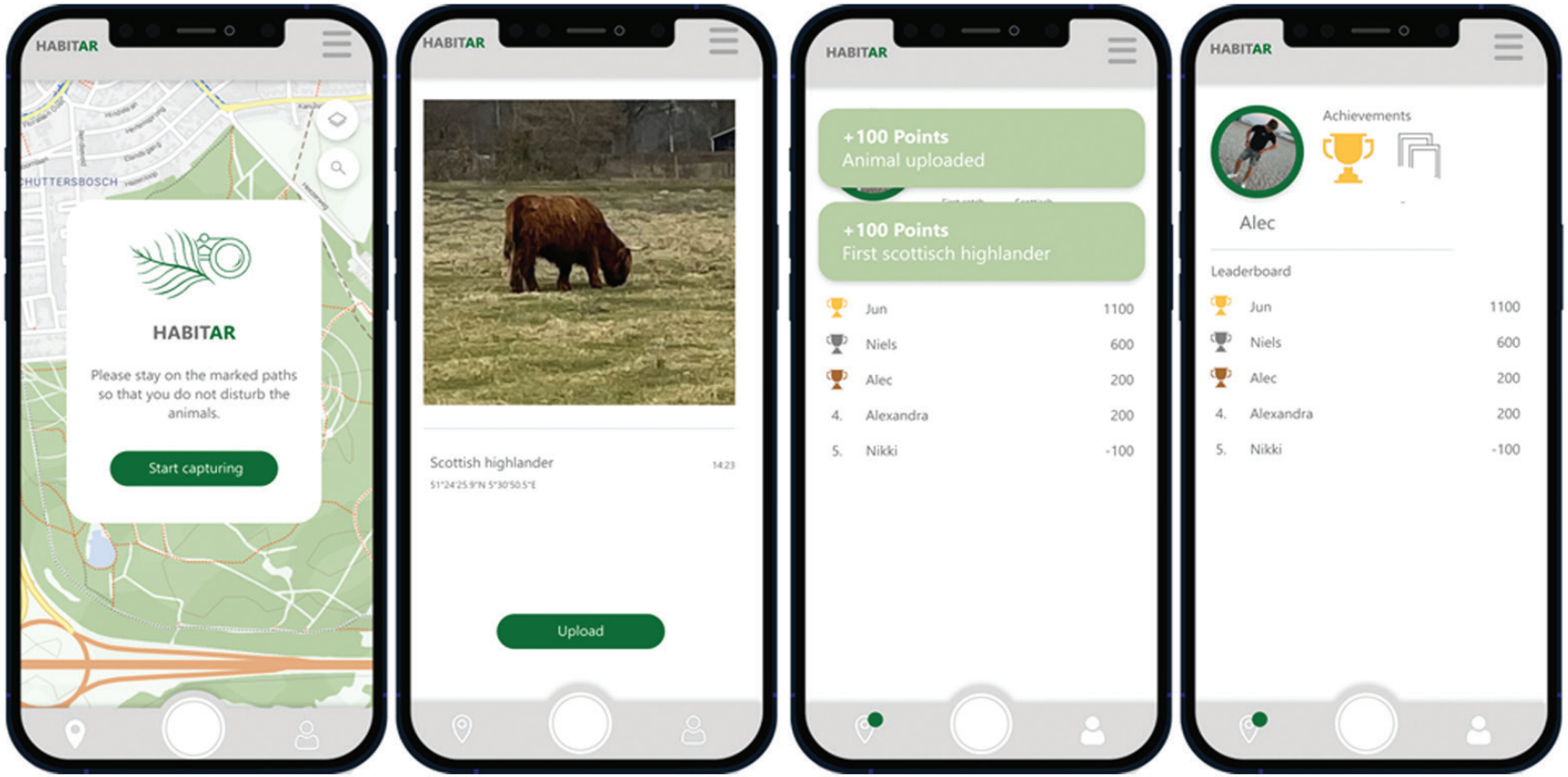

Figure 8: Example pages of the mockup app

Third iteration

For the third iteration the focus is more on creating a valuable bond between the animal and the user. This would be done by uploading a photo of a new animal, which is found by the user, and being able to name this first found animal. After planning a walking route, the user could for example find a rabbit, upload a picture and name him Mark. Also a text can be added to give information about Mark, for example; "Mark is swimming today, I've never seen Mark swim. Very cool!". After uploading, the user unlocks all the messages of Mark, because he/she uploaded a picture. When coming home the user can still read five posts about Mark, which are uploaded by other users. After this time, the user should become curious about how Mark is doing. This curiosity should be triggered by the bond he built, by naming his animal and reading all the stories about it. After the five recent uploaded posts get blocked and a message appears which would state "To unlock more stories go back, find Mark, upload a photo and see how he is doing.". This should be the motivation for the user to plan another route during which Mark can be spotted again (and maybe also other animals which the user wants to visit again).

To get more insights and improve this concept an application was made. After doing research into app building platforms and artificial intelligence (like "Lobe.ai" and "Flutter"), FlutterFlow was chosen to create a prototype with. The real-app builder was chosen over a mockup-app builder, because a high-fidelity prototype gives better insight in the concept and therefore leads to more valuable feedback. After the app (Figure 9) was built a user test was done in which the user group was approached to test the concept. After testing the concept, a semi-structured interview was conducted which led to qualitative information to be able to improve the third iteration.

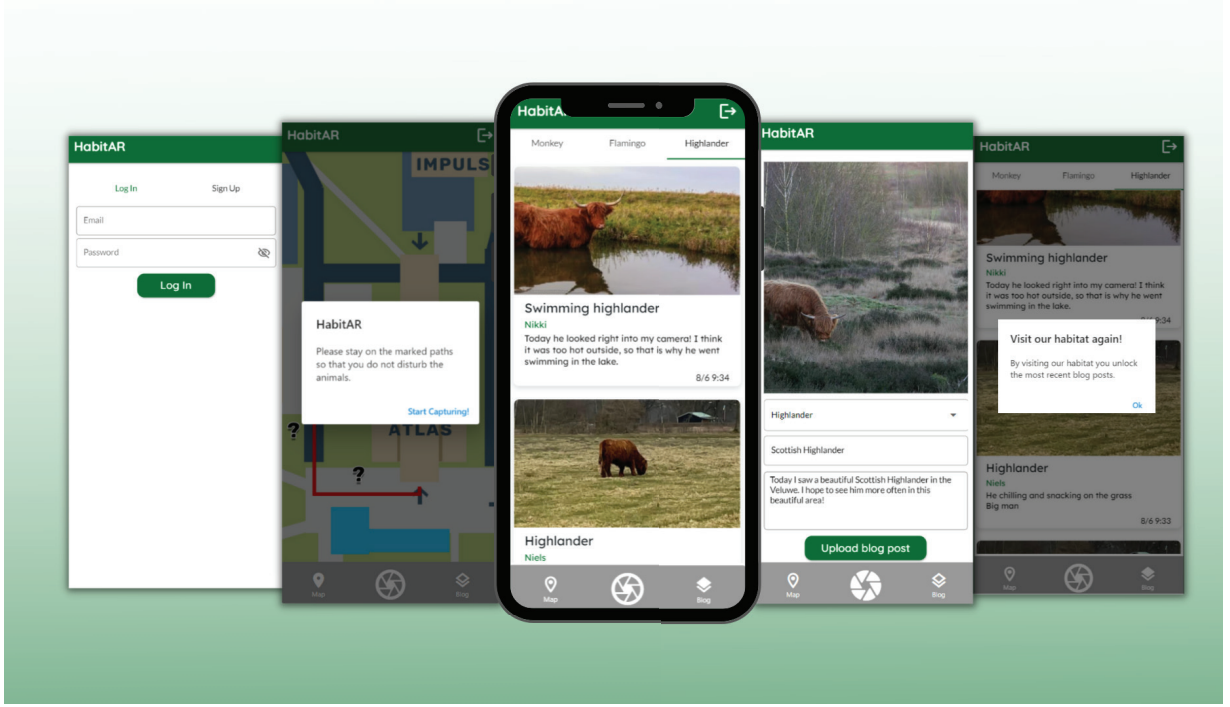

Figure 9: The final app made in FlutterFlow

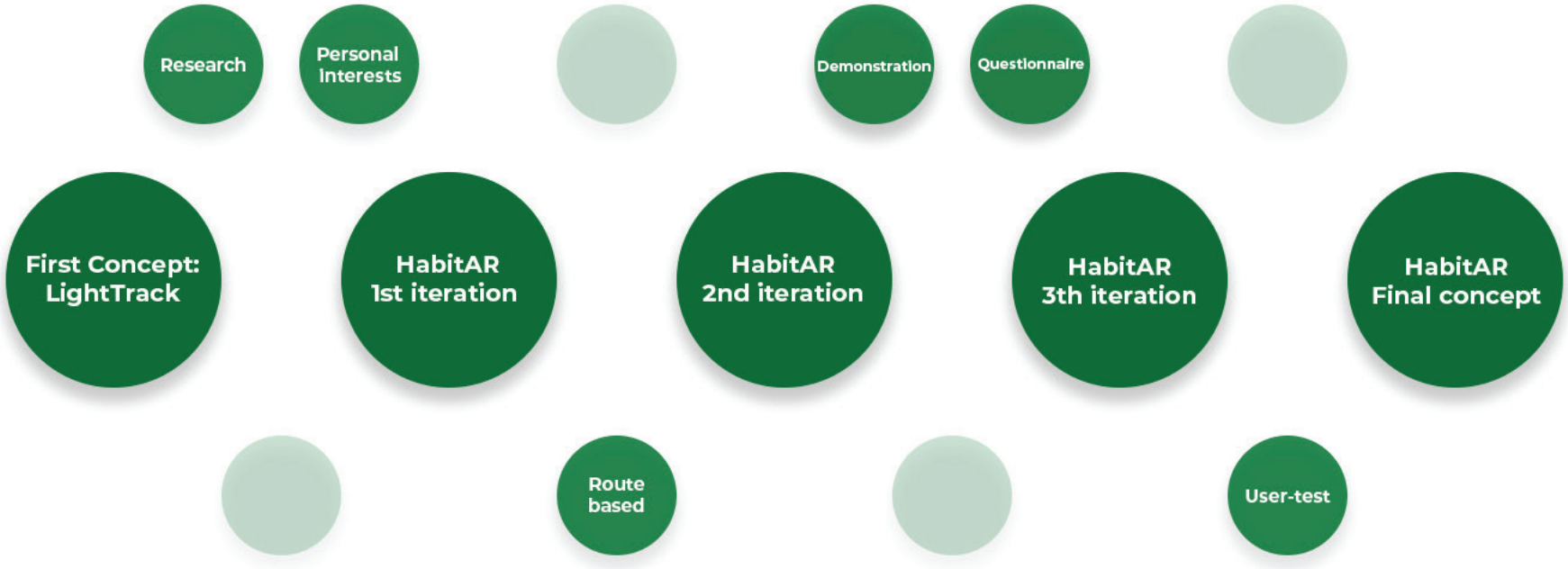

Figure 10: Visual representation of the design process

FINAL DESIGN: HABITAR

The final version of HabitAR motivates the users to be physically more active using a community-based platform in the form of a smartphone app (Figure 9, 13). In this version we used animals as a motivator, since that is a shared interest in our team. The app works as follows; the users can make their route in the app. These routes have two variables, the length and the expected number of animals. In generally it holds that the longer the route, the more likely it is to spot animals. When a user creates a route themselves, they see question marks on the maps, that show the expected area of a certain animal (these are generated by the blog posts the community provides). After creation of a route the app just works as a typical navigation servicev. However, if you arrive at a recent location of an animal the adventure begins. Then the user must activate all their senses and search for the animal. When the user spots the animal, he or she takes out their phone and tries to take a picture. The animal in the picture gets recognized using machine learning. (This is not integrated into the demonstrator app; however, it is part of the final concept and using Lobe.ai it was tested to distinguish two stuffed animals that had similar features. One pink flamingo and a red monkey. This worked out surprisingly well, so would be a nice addition in the future (Figure 11)). Besides the picture they add a blog post, consisting of a title and a piece of text describing the photo. After uploading that blog post of a specific animal, the user unlocks the complete blog of that specific animal. Once the user is back home, they can read all the blog posts on that animal and stay up to date about that animal. This means that all the users, who upload pictures, maintain this blog and therefore create a bond with nature and their favorite animals. However, after some time the blog gets locked, and they cannot read the new blog posts anymore, and must go back outside and upload a new picture to contribute to the community. In this way the user maintains the connection with the animals, has a higher chance of unlocking new blogs and at the same time has more physical activity.

This concept is focused on motivation through personal interest, where animals are just one example of a possible personal interest. This could be implemented way broader. For example, car spotting (showing car hotspots) or historic (showing old (important) buildings). These different layers should fulfill the purpose of making a valuable emotional connection between the user and their interests. This should give the motivation, and therefore a final push, to go outside for a walk or take a slightly longer walk if that means the user will pass his or her interest. To emphasize walking, and taking a longer route, we discarded most gamifications. So, users cannot gather points anymore and the friend ranking has also been removed. This puts the focus more on social bonding with the personal interest than on physical activity.

A real working app (Appendix 5) of HabitAR was developed using FlutterFlow and attached to a Firebase database which stores the users' information, photos and blogs. Next to that, in Google cloud platform, API's were created to realize a safe connection between the app and the databases (for Android, IOS and Web). Lobe.ai was used to test to make a functioning animal detection system with machine learning. As described above, this worked. Implementation of this can be beneficial for a future launch. If correctly implemented, an animal detection system could take over all manual checks. This then can also detect non animal photos, protecting the users from unwanted and explicit content.

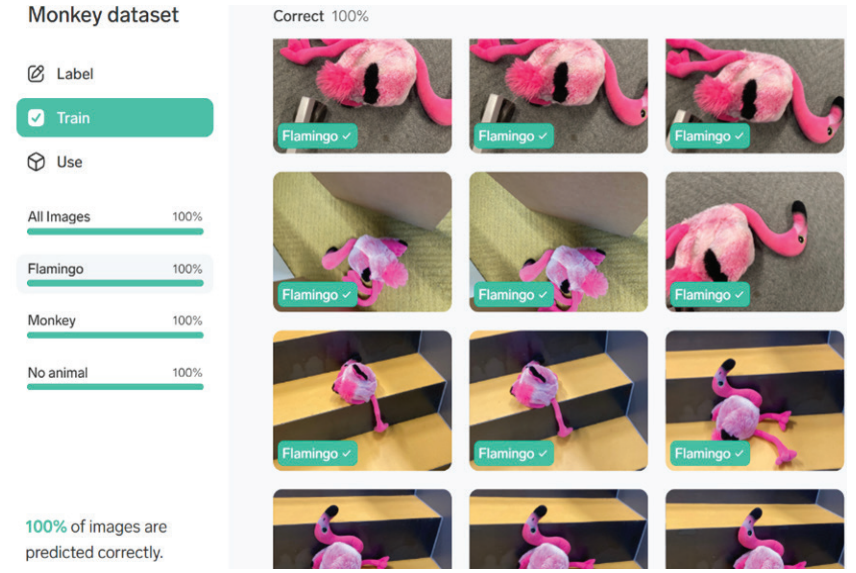

Figure 11: Testing out Lobe.ai

Figure 12: Final concept of HabitAR

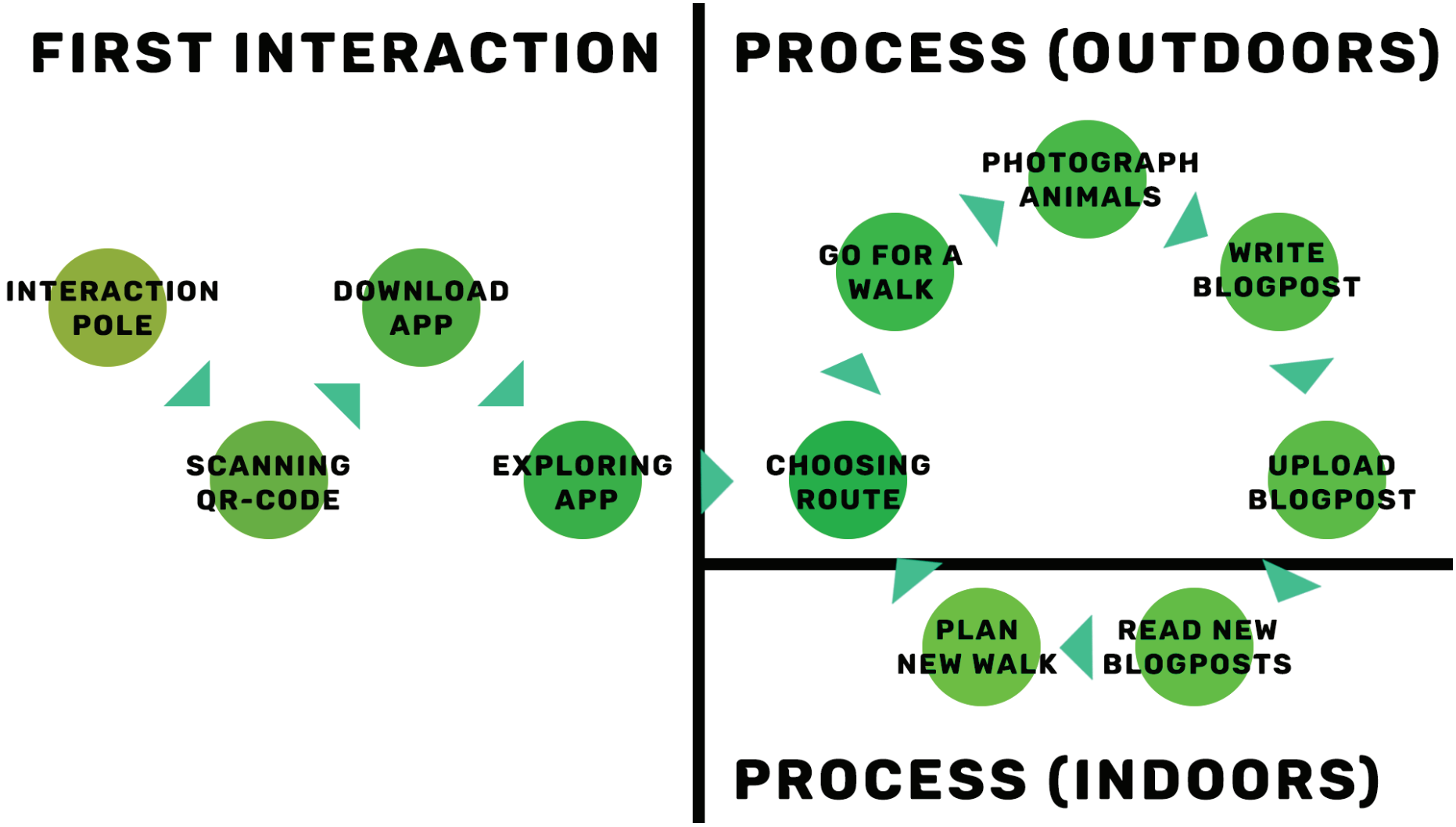

Figure 13: App interaction cycle

VALUE PROPOSITION

HabitAR is created to motivate people that are already going for a walk on a regular basis, to get them to walk that extra mile. It is focused on creating a community in which people can connect with each other but also with the natural environment and the animals. HabitAR wants people that are already going for a walk a couple of times a week to walk even more and become more physically active. It does this by connecting this routine with their personal interests, which in this case are animals. The goal is to motivate people who are relatively physically active to exercise even more often by adding personal interest to their exercise.

HabitAR brings value to society, because it creates a community in which people share the same interests and in which they can post about their interests on the shared blogs. With the help of this blog, HabitAR can create a personal connection between the users and the animals. The blog also keeps the users curious, after they have read three recent blog posts at home, the posts after that are hidden and can only be unlocked by visiting the area again. These blogs do not only cause a connection between the user and the animals but can also cause a connection between users. Blogs have the objective of creating alternative information exchange or debating forums [6]. The value of the blog is to connect people with each other and share the same interest, all in one place.

HabitAR also brings value in vitality. It is created to get people to walk even more often and longer. If people walk 30-60 minutes every day, the benefits would be extensive. Although it is currently difficult to quantify all the effects, one predicts lower rates of chronic diseases (such as obesity and CVD) and a dramatic reduction in medical expenditures, with only a modest increase in number of activity-related injuries [11]. The experience was tried to make more enjoyable by connecting the personal interest of the user with their walk. The users can choose their own route and can therefore also choose where they want to go and how far. By adding their interest to this route, we hope to get them to go an extra mile to see even more animals. When the user is back home again the user can still access the blog which will stimulate and trigger the user to go for another walk again. The added value of people exercising more often means lower chances of getting diseases as well as getting healthier in general.

Another value HabitAR strives for is getting people to go outside more often. Because the blogs get locked after five new posts, it creates curiosity. With this curiosity HabitAR tries to get people outside again. Exposure to forest environments is relaxing and has stress-reducing properties as observed by reductions in the physiological parameters of blood pressure, heart rate (accompanied by an increase in HRV) and endocrine markers [4].

ETHICAL CONSIDERATIONS

The concept is created to motivate people to exercise even more often. HabitAR focuses on exercising outside as being outside is good for your health. For example, being out in the forest is relaxing and stress-relieving. [4] Our concept therefore helps people to get more physical activity as well as a connection by creating a community. These are also the norms of the concept, getting people to exercise even more often as well as getting people to connect and bond with each other with the help of their personal interest.

Another issue is the navigation system. It is now created in such a way that you must look at your phone to know where you need to go. In this way you cannot fully focus on the surroundings, and it can also be dangerous to constantly look at your phone. People can trip or people do not watch other traffic anymore.

When people get addicted to the concept it can become harmful as exercising too much is not good for your body. To prevent this there could be a maximum number of kilometer or minutes a user is allowed to walk.

As our concept uses a blog in which the community can post pictures together with some text people can of course abuse this function by posting inappropriate pictures or texts. This also applies if people hack the blog and can post whatever they want. To prevent this there must be some sort of filter, that denies people posting things that should not be in the blogs, before the concept could ever be released. To set the border on what is allowed in the blogs and what not, can also be difficult. Blogs are there for people to discuss a bit, but it must be a friendly discussion. When a lot of people are using the concept there maybe must be some sort of admin which will rule the blog. Another hazard is that the app needs input from the community to work properly. If after a longer period people stop posting in the blog the app would get boring.

The app works with a navigation system when uploading the blog and selecting a route. When you upload a blogpost people can see where you are and at what time you were there, which can violate users their privacy. This is therefore something that must be stated clearly before people start to use the app.

Lastly there is the consequence of people leaving the route and getting too close to the animals. This can disturb the habitat of the animals and even scare them off. It can also be dangerous for the user itself, if some animals feel threatened, they could attack the user for example, when they come too close or when they enter their habitat.

METHODOLOGY

A mixed methods approach was used where quantitative data was collected through a questionnaire and more in-depth qualitative data through a user experience test and a semi-structured interview afterwards. This was used to see if the expectation of participants corresponded to participants who tested the system. In addition, this qualitative data is used to support quantitative data. The purpose of this study is to find out if an application with features like HabitAR could motivate people by creating a valuable bond with personal interest to have more physical activity.

Questionnaire

First a questionnaire was used to get more insights on our first concept, so changes to the application could still be made before the user-test. An online questionnaire was used, because with this tool it is easy to reach people in a short period of time. The questionnaire consisted of 11 questions focused on the themes of motivation and physical activity (Appendix 6). The type of questions was a mix of multiple choices questions, Likert scales, open-ended questions, and sentence completion. A storyboard was used to explain the concept. Questions about the concept were asked to evaluate the design concept and to collect data on design opportunities.

Participants

Participants were recruited online by publishing the questionnaire online through social media. Completion of the questionnaire was anonymous, voluntary, and no demographic questions were asked. Since the concept is not meant for a specific age or group with certain demographic characteristics, it did not matter who filled it out. The only requirement for completing the questionnaire was to you needed to be relatively physically active. The questionnaire was not intended for people who never exercise, since this is not our target group. The sample size consisted of 25 participants.

Material

Materials needed are an online questionnaire (Appendix 6) and a storyboard that clearly explains the concept (Figure 14).

Procedure

Before completing the questionnaire, participants had to give permission for their answers to be used in the study. Then they were allowed to proceed to completing the questions. Participants were required to complete each question so that we could substantiate their answers to questions with answers from previous questions. The average time to complete the questionnaire was 8 minutes and 5 seconds. Since the questionnaire was online, the data was automatically saved in an excel file.

Data analysis

The questionnaire was online; therefore, the quantitative responses were automatically displayed in percentages and graphs that we could use for our analysis. In addition, the sentence completion questions were analyzed through thematic analysis to find similarities in answers of the participants.

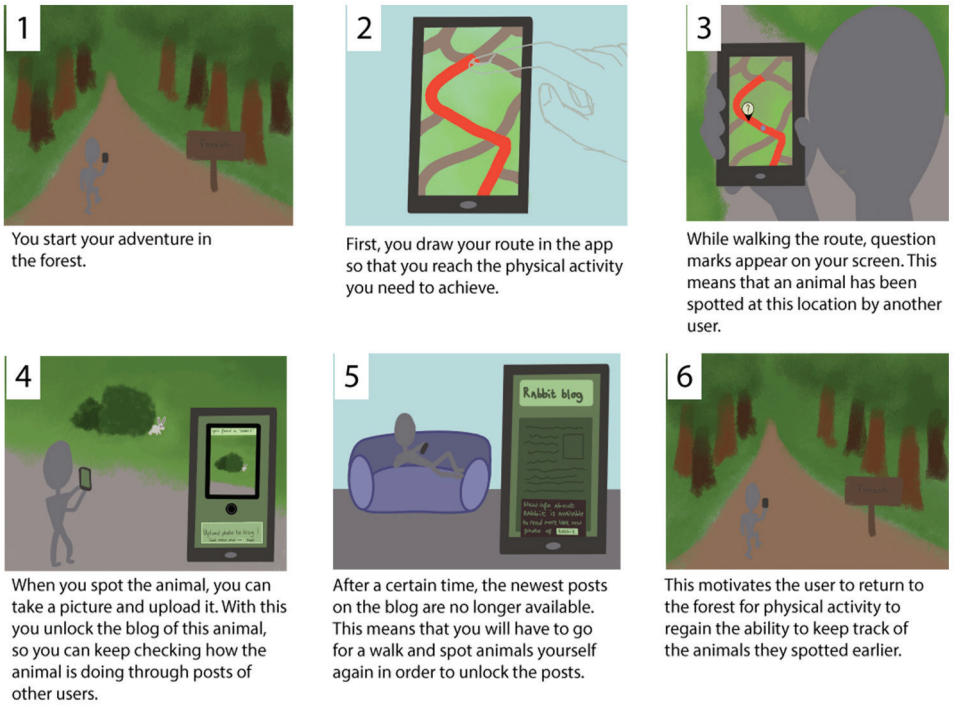

Figure 14: Storyboard explaining the concept for the questionnaire

METHODOLOGY

User-test

To get more in-depth data and feedback on the experience with the application and its usability, a user test was conducted in which the participants had to test the application. After the user test, a semi-structured interview was conducted to obtain this more in-depth data.

Participants

Five participants were recruited for the user test to experience our system. The participants were selected based on their interest in animals, since HabitAR is focused on the personal interest of animals. The participants are between 19 and 23 years old and study at TU/E in Eindhoven.

Material

All participants need a mobile phone. The best is to let them use their own phone, since they are familiar with it, and this is also the device on which they would use the application in real life. Then you need the application (Appendix 5), in this case HabitAR, to let the users interact with the prototype. Since it is not possible to do the user test with real animals, because they move and therefore the setting of the user test would be different each time and could not be compared because of the influence of other factors, you need stuffed animals (or something else that represents the animals). To get more in-depth information of the user experience, good formulated semi-structured interview questions are necessary (Appendix 7)

Procedure

At the beginning the participants got an explanation about the concept and the app, but they were not told what the goal of the app is, which is to motivate people to walk more often by creating a valuable bond with their personal interests. The duration of the total user test was about 45-50 minutes. 20-25 Minutes for the explanation and the experience and 20-25 minutes for the interview afterwards.

The user test was held on the TU/e campus. Stuffed animals, that were supposed to represent real animals, were placed on the terrain. The participants were asked to scan a QR-code with their phone in order to be guided to the app. On the app they could determine the route they wanted to walk (by choosing 1 of the 3 preset routes we made, representing making your own route in the real concept). After they selected a route, the participant got the assignment to start walking and trying to spot the animals (Figure 15). On their route, they could see question marks on the places where other users spotted animals, so they know where to look for the animals. When they found an animal, they got the task to take a picture of the animal and upload a blog post of it on the shared blog (Figure 16). After they walked their route, found the animals, and uploaded pictures of them on the blog, they were able to read the posts of other users of the animals they spotted. In the final app, new posts of other users would no longer be visible after a certain amount of time, meaning that the user would have to go back outside to exercise and spot animals themselves to unlock new posts again. Since this feature was not yet incorporated into the app and it was not possible to apply in the user test because then we would have to follow the participants for a longer period of time, we explained this part of the concept and asked the participants to imagine themselves how they would experience this feature.

The qualitative data is collected throughout observation during the experience and a semi-structured interview afterwards. During the user-test, the participant's reaction to using the app, spotting animals, and reading the storyline will be observed. Afterwards, a semi-structured interview was conducted to get more in-depth insights on how the participant experienced HabitAR and if it had a motivating effect

Figure 15: Looking at the walking route on the app

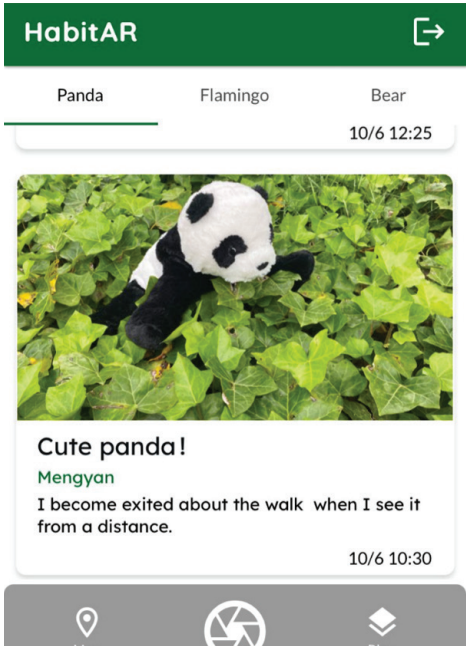

Figure 16: Example of a blog post made by a user

Figure 17: Question 4 of the questionnaire

Figure 18*:* Question 5 of the questionnaire

RESULTS

Questionnaire

The first results are from a questionnaire that was administered to get initial feedback on the concept and use the results as the basis of our user-test.

Participant profile

The first question was about how often the participants go out for a walk per week, to see if they are familiar with this type of physical activity. 18 of the 25 participants (72%) reported that they go out for a walk at least once a week. This means that this is not new for most of them, which probably made it easier to empathize with how our concept would work, since they can think of how they would use it during their walk.

Questions were then asked about how participants react when they see an animal during their walk. Since HabitAR focuses on personal interest in animals, it is likely that people who share this interest will express themselves more positively about the concept and see more potential in it than participants without this interest. However, a conscious decision was made not to specifically seek out participants with an interest in animals, as this might cause us to miss valuable insights from participants with a different perspective. 24 participants (96%) answered with agree or strongly agree to the question: 'When I see an animal while walking, it attracts my attention' (Figure 17). This shows that almost every participant has some interest in the presence of animals during a walk. However, this interest is not the same for every participant, namely seven participants indicated that after spotting an animal they were not motivated to spot another animal, ten participants were motivated by this to spot another animal and eight responded with neutral (Figure 18). This shows that the level of interest in animals is distributed among the participants in this questionnaire.

Thus, the participants who filled in this questionnaire are people who generally do go out for walks, but there is still room to motivate them to walk more often and for longer periods of time. In addition, interest in animals is different among participants, which may also influence how effective and meaningful the participants consider this concept to be. These factors may have an influence on the results of this questionnaire.

Concept evaluating

After explaining the concept through a storyboard, participants were asked to choose five words, from a list of 18 words with a distribution of about 60% positive terms and 40% negative, that they felt best described the concept (Figure 19). This was done to see if the user's thought matched the purpose and idea of HabitAR and the vision of the designers. The most frequently chosen words are stimulating (16), creative (14), motivating (13), exciting (13), entertaining (10). The ratio chosen positive and negative terms is 17:5, which means that the majority chose positive terms to describe the concept. 14 participants (56%) have a positive feeling about our concept and nine participants (36%) are neutral. Two participants (P12 and P21) have a negative feeling about our concept. These two participants are also the ones who chose only negatives words (boring, frustrating, ineffective, irrelevant, annoying) in the previous question. This outcome combined with the ratio of positive and negative terms shows that people are overall positive about a concept such as HabitAR and see its potential and motivating effect.

The features of the concept that are seen to have the most potential and motivating effect are: being able to draw your own route, being able to see where other people have spotted something on your route and the disappearance of other users' posts that become visible again when you yourself perform physical activity.

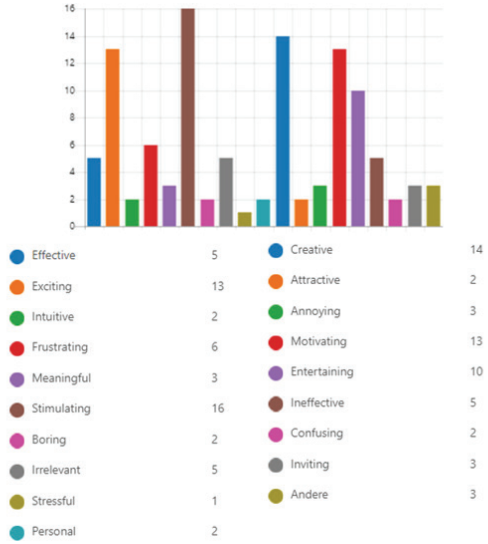

Figure 19: Question 6 of the questionnaire

Four participants indicated that they did not find it motivating to use their phones while walking. This is an outcome that was not considered beforehand, because using a phone these days is so commonplace. In addition, three participants indicated that they would like to have an option that allows you to spot other things instead of animals (P6, P16 and P21). This is because their interest lies in a different area. P6 stated "When people love animals, they will probably like it".

Motivation

10 participants (40%) indicated that HabitAR would motivate them to go out for a walk more often (Figure 20). Eight participants (32%) indicated that it is unlikely/very unlikely that HabitAR would motivate them. The other seven participants are neutral. This shows that the thoughts on whether HabitAR would motivate them are divided. Four out of eight participants who indicated that HabitAR would not motivate them are also the ones who indicated that they would like to see this concept with the focus on something else than animals (P6 and P21) or that they do not like to be on their phones while walking (P7 and P12). Six out of the eight participants do, however, indicate that they think that the basis of the concept of spotting things, making pictures, uploading and the disappearing of posts is motivating and stimulating. This shows that if the concept was more focused on something within their interest, that it could have a motivating effect on them.

User test

Experience

All five participants experienced using HabitAR as fun. Two participants (P4 and P5) said they found it difficult to imagine how this concept would work in practice and whether spotting moving things, such as animals, would not be too difficult. P3 also had some uncomfortable and confusing experiences concerning the app. Participant 1 stated that the pop-up message was too frequent which, after a while, became very annoying.

Usability

The application was described as easy to use and intuitive by most participants. One participant (P3) (who was able to use the app smoothly) indicated that it could be confusing to understand the symbols and what would happen when clicking on them. "The blog symbol is not really clear what it contains. I first thought they were the different kind of routes you could choose from." (P3). It was also not clear, to this participant, what happened when clicking the "take photo" symbol. The participant expected to take a photo, but instead got an empty template of a blog post which could be filled in, after clicking the button. This was very confusing for the participant, since he expected his camera to open and later add a title and text to the picture. The other four participants did understand immediately which symbol was for which function. Participant 3 also stated that he didn't want to share his post about an animal with everyone on the platform. Participant 1 had concerns about being on the phone the whole time when searching for an animal. She said that traffic-wise, in a big group of people (in a park or in the city) she wasn't sure how nice this would work.

Features

The features of the app that the participants considered the most useful correspond to the answers from the questionnaire, namely being able to create your own route and being able to see where other people have spotted something. In addition, the ability to create, upload and read posts from other users was also mentioned.

Features that the participants would possibly add in the future are being able to add comments under the posts of other users (P2, P4 and P5). Furthermore, being able to filter what you want to find on your route (for example a certain kind of animal) so that you can adjust your route accordingly (P1 and P3). Other things which could be added to the concepts, according to the participants, were fun facts or more information about the animal which was found. Another feature which could be added, according to participant 3, was being able to exclude animals he didn't like. P3 his interests for example lay in mammals which he liked to spot, and not in birds which he didn't like to spot. This made a big difference in his motivation when using HabitAR, this shows that personal differences have a big influence on the effectiveness of the concept.

Motivation

Four participants (P1, P3, P4 and P5) indicated that an application like this would motivate them to walk more. All participants indicated that they would choose a longer route if they saw on the app that another user had spotted something a little further on. P1 and P4 indicated that they perceived the feature that you can read posts from others and thus get updates about the animals as the most potential feature. For these participants, building the connection with the animals through a shared blog, which is what the concept is mainly about, is a motivating aspect. "What I like the most about using this app is reading the blog posts of others, and what they write about the other animals." (P4) and "With the shared blog you have engagement with the animals and learn about them." (P1). Based

Figure 20: Question 12 of the questionnaire

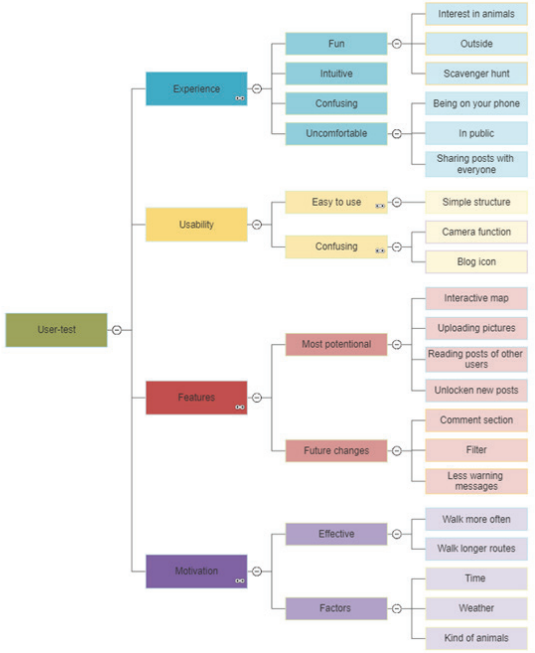

Figure 21: Coding tree of interview data

on quotes like "What is the challenge?" (P5) and "I liked the scavenger hunt element" (P3), it seems like the other participants experience it more as a game and therefore see it as motivating, rather than wanting to maintain their connection with a personal interest. This shows that the focus on creating a valuable connection with a personal interest is not highlighted enough and needs to be given more emphasis through, for example adjustments of features in the app.

DISCUSSION

The research question on which the focus laid in this paper was: "How can we use personal interest, with the help of a community-based platform, to motivate people who are already physically active to go out for a walk even more often?".

Based on the answers given by the participants who tested HabitAR, it can be observed that a concept such as HabitAR has a motivating effect. Overall, they indicated that the experience with the application was fun. The usability of HabitAR app was generally perceived to be easy and efficient. Some difficulties were mentioned with understanding the icons in the app, so this could be improved user-experience wise. New features were mentioned by the participants, like a comment section or fun facts about an animal, that they would like to see in a future design. Or being able to exclude animals which a user didn't like.

Overall, the participants indicated that a concept like HabitAR would probably motivate them to walk. Some participants did not understand the purpose of the app, which is to motivate them to exercise more by creating a bond with their interests. Some still perceived it more as a game to find all the animals, rather than realizing what the actual goal was.

The participants thought that HabitAR overall would probably motivate them to walk. The reason that they were not sure that the emotional bond with the animals would motivate them could have multiple reasons (which could also limit the validness of the findings of the paper). For example, participants could see HabitAR more as a game, which was not entirely unexpected, because most apps in the field of motivation are based on gaining points and creating competitive tension between users. It is therefore understandable that participants interpreted this application in the same way.

Another reason could be that, in the user test, stuffed animals (instead of real animals) were used and that this did lead to weaker emotional bond and therefore less motivation. Besides it was not yet possible to name a newfound animal which should contribute to a stronger emotional bond. Another element which didn't stimulate the bond with the animals as much as planned, was the fact that the users only tested HabitAR for approximately 20 minutes. To get a stronger bond with a certain animal, more posts over a longer period of time should be read to build this bond. Locked stories should also be integrated into the user test to better see if a participant is motivated to plan another/longer route. This is because after building the emotional bond by reading so many posts of a certain animal, the curiosity (and therefore motivation to go for another walk) should be bigger.

It was however not expected that the app could be confusing, but after processing the feedback this seemed like a valid point which could be changed for future design to improve user experience, and therefore motivation, to use the app.

Other research using a new application to motivate people while exercising also showed that not every participant immediately understood how the app worked and what its purpose was [7]. This was also the case with some participants who had tested HabitAR for the first time. Not every person is motivated by the same trigger and within the same amount of time, so this may explain why it didn't work for some participants the way it should have. Furthermore, not much research has been done in this area, making it difficult to find sources that fit and are comparable to this study.

This research shows that people (who are already physically active) are willing to go for a longer walk if they come across animals. A big part of the participants was interested in animals, so it makes sense that such a concept would work for them. Next to that the number of participants could be increased, also including different ages, backgrounds and ethnicities to make the research more complete. Since a wider study provides a conclusion based on a wider target area, create a stronger statement.

The setup also has room for improvement. A longer test would have resulted in a better understanding of the use of the application by the participants. In addition, a longer study could show if the concept has a motivating effect for a longer period of time.

Next time real animals or a better representation than stuffed animals should be used, so the participant experiences the user-test as more real and takes it more seriously.

The findings from this study can be used to improve the concept and application of HabitAR and the user study so that new and useful insights can be obtained. Finding new ways to motivate people to exercise is important, since exercise is good for your health and not everyone is motivated by the same factors. In addition, by focusing on personal interest, this concept offers new insights, besides the already existing applications that mainly focus on motivating through rewards and competition. For future research, a longer user study should be used to gain insights into how high the motivation and enjoyment level is after using HabitAR for a longer period of time. In addition, the concept should be expanded to include other interests, to see if it also works with interests other than animals.

FUTURE WORK

There are multiple things that can be changed about the concept to make it better and more convenient. One of these things is the subject itself. Research showed that not everybody likes animals, which is obvious. The concept should not only be about animals in the future, but it should be about personal interests. Think about car spotters there could be a variant of that with its own blog. This makes the concept way stronger, and this will broaden the target group. Another thing that should be different is the navigation system. It is now created in such a way that you must look at your phone to know where you need to go. An adaptation to this concept would be navigation with voice or by vibrations. For example, one vibration is to the right and two is to the left. In this way the user can enjoy the walk and their personal interest way more instead of looking at their phone most of the time. Something else for the future which has to do with navigation is the capability of filtering which animals the user wants to spot. In this way the route would be even more focused on personal interest as you can then decide which animals you want to visit and photograph.

A different aspect that should be added in the future is the ability of commenting underneath someone's blog post. In this way two or more users can have a direct conversation without having to post a photo.

The stand that is situated at the entrance of the forest must be rethought as well. It is now designed with a screen inside, but this is easy to vandalize and is not fully weatherproof. A better solution would be three routes engraved for example together with a QR code. This is not as easy to break and still does the job. (Figure 21)

A limitation of the user test that has been done was that there were not any real animals used. This is something that can influence the user test as real animals could motivate people more than stuffed animals. So, for further research the stand needs to be installed with a fully working app in which you can choose your own route together with the photographing of real animals instead of stuffed ones. With this there can be done more research if the concept works and can motivate people to walk more often.

Figure 22: The stand with engraved routes

Figure 23: The stand with engraved routes

CONCLUSION

In this research an application was created to see if creating a valuable connection with personal interest would motivate relatively physically active people to exercise even more. This was done because many people remain stuck in their regular exercise routine and do not explore what else they can achieve on a physical level. Previous research on motivating people using digital systems had been done before, but these apps were usually focused on creating a competitive environment and earning rewards. In such apps, mainly the extrinsic motivation is triggered while in this study the focus was more on the intrinsic motivation to keep people motivated for a longer period of time.

To investigate this, HabitAR was designed. This is an application based on personal interest in animals. The concept consists of drawing your own route, spotting animals during your walk, uploading photos and reading posts by others that will disappear after a while if you do not perform enough physical activity. HabitAR was tested with five participants, each with a different level of interest in animals.

This research showed that an application which creates a bond with personal interest during your exercises, in this case HabitAR which is based on the interest in animals, can help motivate people to exercise more, but the degree of motivating effectiveness does depend on personal factors such as the value the individual attaches to the interest. The features of the app that the participants considered the most useful were being able to create your own route and being able to see where other people have spotted something. In addition, the ability to create, upload and read posts from other users was also mentioned.

Since this concept focuses on intrinsic motivation, it is more likely to keep an individual motivated for a longer period than a concept based on extrinsic motivation where you can, for example, earn points, like most motivation apps at the moment. To find out if this is actually the case, participants in future research should use this concept for a longer period of time.

REFERENCES

1. Ann Renninger, K. (2000). Individual interest and its implications for understanding intrinsic motivation. Intrinsic and Extrinsic Motivation, 373–404. https://doi.org/10.1016/b978-012619070-0/50035-0
2. Arteaga, S. M., Kudeki, M., Woodworth, A., & Kurniawan, S. (2010). Mobile system to motivate teenagers' physical activity. Proceedings of the 9th International Conference on Interaction Design and Children - IDC '10. https://doi.org/10.1145/1810543.1810545
3. Berkovsky, S., Coombe, M., Freyne, J., Bhandari, D., & Baghaei, N. (2010). Physical activity motivating games. Proceedings of the 28th international conference on Human factors in computing systems - CHI '10. https://doi.org/10.1145/1753326.1753362
4. Gladwell, V. F., Brown, D. K., Wood, C., Sandercock, G. R., & Barton, J. L. (2013). The great outdoors: How a green exercise environment can benefit all. Extreme Physiology & Medicine, 2(1). https://doi.org/10.1186/2046-7648-2-3
5. Google. (n.d.). About Google Maps. Google. Retrieved June 16, 2022, from https://www.google.com/maps/about/
6. Gunter, B. (2009), "Blogging – private becomes public and public becomes personalised", Aslib Proceedings, Vol. 61 No. 2, pp. 120-126. https://doi.org/10.1108/00012530910946875
7. Kari, Tuomas; Piippo, Jenni; Frank, Lauri; Makkonen, Markus; and Moilanen, Panu, "To Gamify or Not to Gamify? Gamification in Exercise Applications and Its Role in Impacting Exercise Motivation" (2016). BLED 2016 Proceedings. 20. https://aisel.aisnet.org/bled2016/20
8. Khamzina, M., Parab, K. V., An, R., Bullard, T., & Grigsby-Toussaint, D. S. (2020). Impact of Pokémon Go on Physical Activity: A Systematic Review and Meta-Analysis. American Journal of Preventive Medicine, 58(2), 270–282. https://doi.org/10.1016/j.amepre.2019.09.005
9. Kurosu, M. (Red.). (2015). Human-Computer Interaction: Interaction Technologies. Lecture Notes in Computer Science. https://doi.org/10.1007/978-3-319-20916-6
10. Kyewski, E., & Krämer, N. C. (2018). To gamify or not to gamify? An experimental field study of the influence of badges on motivation, activity, and performance in an online learning course. Computers & Education, 118, 25–37. https://doi.org/10.1016/j.compedu.2017.11.006
11. LEE, I.-M. I. N., & BUCHNER, D. A. V. I. D. M. (2008). The importance of walking to public health. Medicine & Science in Sports & Exercise, 40(7). https://doi.org/10.1249/mss.0b013e31817c65d0
12. Mandigo, J. L., & Holt, N. L. (2000). Putting Theory into Practice: How Cognitive Evaluation Theory Can Help Us Motivate Children in Physical Activity Environments. Journal of Physical Education, Recreation & Dance, 71(1), 44–49. https://doi.org/10.1080/07303084.2000.10605984
13. Miller, K. A., Deci, E. L., & Ryan, R. M. (1988). Intrinsic Motivation and Self-Determination in Human Behavior. Contemporary Sociology, 17(2), 253. https://doi.org/10.2307/2070638
14. Nederlands Jeugdinstituut. (n.d.). Cijfers over beweging. Nederlands Jeugdinstituut. Retrieved June 16, 2022, from https://www.nji.nl/cijfers/beweging#:~:text=Bijna%2061%20procent%20van%20de,week%20spier-%20en%20botversterkende%20activiteiten
15. Piercy KL, Troiano RP, Ballard RM, et al. The Physical Activity Guidelines for Americans. JAMA. 2018;320(19):2020–2028. doi:10.1001/jama.2018.14854).
16. Roemmich, J. N., Lambiase MS, M. J., McCarthy, T. F., Feda, D. M., & Kozlowski, K. F. (2012). Autonomy supportive environments and mastery as basic factors to motivate physical activity in children: a controlled laboratory study. International Journal of Behavioral. Nutrition and Physical Activity, 9(1), 16. https://doi.org/10.1186/1479-5868-9-16
17. Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. American Psychologist, 55(1), 68–78. https://doi.org/10.1037/0003-066x.55.1.68
18. Toscos, T., Consolvo, S., McDonald, D.W.: Barriers to physical activity: a study of self-revelation in an online community. J. Med. Syst. 35, 1225–1242 (2011)
19. Warburton, D. E. (2006). Health benefits of physical activity: the evidence. Canadian Medical Association Journal, 174(6), 801–809. https://doi.org/10.1503/cmaj.051351)

CONTRIBUTION OF TEAM MEMBERS

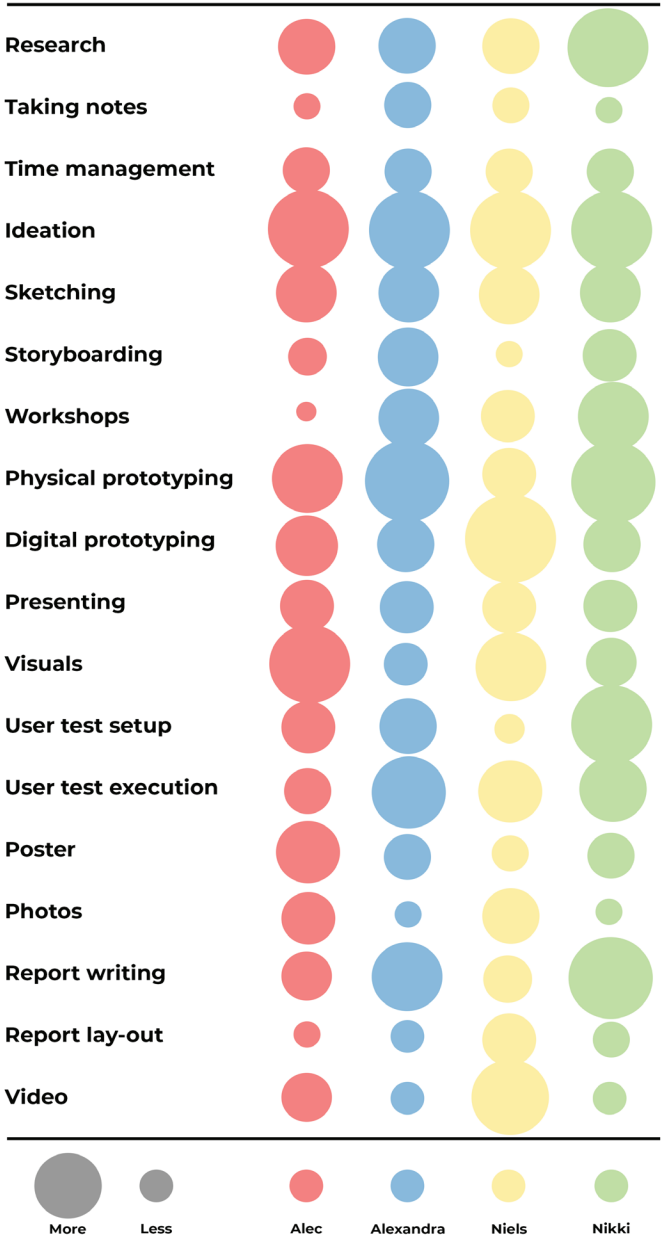

Figure 23: Contribution of team members

APPENDICES

Appendix 1

Link video first iteration prototype:

https://tuenl.sharepoint.com/:v:/r/sites/VitalitySquad21-22S32/Shared%20Documents/Project%20B22%20-%20Motivating%20environments%201/First%20Concept/LightTrack%20Final.mp4?csf=1&web=1&e=m8OkdO

Appendix 2

User test interview questions first iteration:

- Would this concept fit in your running style?

- What do you like most about this concept? And why?

- What don't you like about this concept? And why?

- Would this concept motivate you during running?

- What would you change about this concept? Which aspect(s) would you add?

- Which aspects of this concept do you think we should use in a further iteration?

- If you were a designer and you had to design a concept for runners, what would you design?

Appendix 3

User test result first iteration:

Participant 1

Age: 22

Level: novice runner

1. Yes, I usually run at an interval, a little faster one moment and slower the next. This system would give me more rhythm in running.
2. The lights, because they give you a goal and this also shows you if you are on track.
3. I wonder if the lights are also easily visible during the day in this way, and I also don't know if this is very easy to do with several people at once
4. Yes
5. A kind of display which shows the distance and speed on each pole or alternately
6. That you can set your own preferences
7. I would design an interactive running path on which you play a game at the same time (think of a kind of subway surfer but straight ahead)

Participant 2

Age: 19

Level: average runner

1. No, because I prefer running in places where it is very quiet / no one else is (like the woods). I think something like this would be placed especially in a place where several people come together (like in a park) and where it gets busier, so I would never run there myself.
2. That you see progression while you are running, because it motivates you to keep going and it probably makes you last longer. I don't care if it are lights or something else.
3. That you always have to run the same routes where these poles are and that there are probably more people using them at the same time, so I don't know if my lights are still visible if people run for example faster than me.
4. Yes
5. I do not necessarily have something I would change; I just wonder how it would be realized, is such a running route long enough, how many differ ent tracks you can run, ..., that would for me largely depend on whether I would like it or not.
6. good that people are motivated to achieve their goals
7. No idea.

Participant 3

Age: 20

Level: novice runner

1. Yes, I think so
2. The lights give you an idea of how far you have gone/how long you have left to run and give you motivation to keep going
3. I don't know if it is very realistic to carry out. Are you going to put mul tiple lamps in every park every so many meters? And do you see the light/ lamp in daylight?
4. Yes, because I set my goal in advance and I want to reach it. By the lights you can see how far you are.
5. Make the light/lamp clearer so you can see it well during the day or use something else instead of light to show your goal
6. Perhaps add something where you can meet other runners and use this concept together
7. I really have no idea

Participant 4

Age: 20

Level: novice runner

1. yes, if I were running I think it would help me
2. What I like best about the concept is that it motivates you to keep run ning, like you have some kind of buddy/trainer encouraging you.
3. Not necessarily something I don't like, but more something I wonder about. I wonder if these blocks are in a fixed place in a park and then everyone can use them or am I misunderstanding
4. This would definitely motivate me
5. Maybe a different form instead of those big objects that they are now. So that you can take it yourself to different places.
6. The aspect of setting a goal for yourself and trying to achieve it through this concept.
7. Tricky, maybe something like special shoes? Maybe a little bit of this con cept but with vibrations in your shoes or something.

Participant 5

Age: 19

Level: Average runner

1. yes because I often run just to stay fit / lose weight and here I often want to improve myself and with this concept you can always take a step further
2. That you can challenge yourself and improve
3. I find it still unclear what further advantages of the concept are. So not something I do not like but for people who run and just have motivation to just run instead of trying to better themselves may be demotivated by this
4. To a certain extent if I know exactly when I am how far etc and whether I can run faster or slower yes to ultimately improve my performance
5. I don't know
6. I think the concept that you at a certain time always reminded how you run (on schedule or not) is a nice concept
7. No inspiration

Participant 6

Age: 21

Level: no runner

1. No
2. That the lights move along with you
3. If you can't keep up with the lights it feels desperate
4. Yes, because you want to try to keep up with the lights
5. That you can adjust the pace and see how fast you ran in the end
6. That you can see were you have to be if you want to run a certain speed
7. I don't know

Participant 7

Age: 21

Level: no runner

1. Yes
2. That you don't have to use your phone to see the time and pace. And it is in nature. It is also more easy to see your speed in nature than on a run ning track
3. If multiple people run it is hard to use
4. Yes
5. Maybe work with colors and keep up with your own color
6. That lights are shining on the poles
7. Placing lockers to put your stuff in to set the bar as low as possible to go run

Participant 8

Age: 21

Level: no runner

1. I never run, but I would try it
2. That it got lights and it is tangible
3. Sound reminds me of piepjestest
4. Ja
5. I would add music or motivational quotes while running
6. Light
7. Motivational quotes and music connecting with spotify

Participant 9

Age: 21

Level: no runner

1. I never run, but I would try this
2. That if you don't have a good stamina you still can use this concept
3. I would prefer doing this with the bike
4. Yes
5. I would add music
6. Light
7. Motivational quotes and music connecting with spotify

Analysis of user-test data

- All the participants showed that a concept like this would motivate them
- What do they like:
    - o That the concept shows if you are on track
    - o You can easily see your goal
    - o Gives you motivation
    - o That you can challenge/improve yourself
    - o That you can set your own preferences/goals
- Dislike/concerns:
    - o Are the lights visible in daylight?
    - o Are MY lights still visible if other people are using them and run, for example, faster than me? Would it not be confusing seeing multiple lights from different people to recognize which one is yours?
    - o Is it possible to carry it out? Placing so many poles in a park
    - o I think it will become boring if you have to run the same round every time
- Feedback/improvements:
    - o Use something else than light, to be sure that it is always visible
    - o Make something that you can carry with you/replace, so you don't have to run the same round every time

Appendix 4

Midterm Demo day video:

https://tuenl.sharepoint.com/:v:/r/sites/VitalitySquad21-22S32/Shared%20Documents/Project%20B22%20-%20Motivating%20environments%201/0%20Midterm%20DEMO%20Day%20Deliverables/HabitAR%20%5Bsubtitles%5D.mp4?csf=1&web=1&e=PeZM2C

Appendix 5

Final prototype:

https://app.flutterflow.io/run/DyQZB39kzGRGMm0VBI0D

Appendix 6

Questions questionnaire

1. How often do you go out for a walk?
2. When you go for a walk, in what surroundings do you prefer to go for a walk?
3. When I see an animal while walking, it attracts my attention
4. When I spot an animal while walking, it encourages me to spot even more ani mals
5. Please pick 5 words that best suit this concept according to your own impression. It does not matter whether these are positive or negative words. You can als pick the option 'Other' to add your own words if these are not in the list.
6. My overall feeling about this concept is...
7. The fact that new posts on the blog about the animal I spotted are no longer visible after a certain time until I spot them again myself, motivates me to go for a walk again in order to maintain the connection with the animal
8. The aspects of this concept that have the most potential in my opinion are...
9. The aspects of this concept that I would change in a future concept are....
10. What would motivate you more to go for a walk and spot animals:

    Showing question marks when using the app for the first time at the locations where animals can be spotted, so you don't know what animals are where (Story board image 3) Or Showing immediately what animals are where instead of ques tion marks
11. How likely would HabitAR motivate you to go for a walk more often?

Appendix 7

Question interview final user-test:

1. What was your first impression of the concept?
2. How would you describe your overall experience with the product?
3. Would you add something to this concept to make it better? What?
4. What did you like the most about using this product/app? And why?
5. What did you like the least about the concept? And why?
6. What aspects of the concept do you think have the most potential? and why?
7. How easy was the app to use? Were there some functions or some thing else unclear?
8. Do you think this service will motivate you to go out for a walk more often? And why or why not?
9. Did finding one animal motivate you to go on with your walk and find more animals? Why or why not?
10. Are you motivated by choosing a longer path the next time to poten tially find more animals?
11. Where you motivated the whole time when using the habitAR to keep walking? Or what were some aspects/events that motivated you more? (User experience curve)
12. Do you have any additional comments?

Appendix 8

Data questionnaire:

ID	How often do you go ou	When you go for a walk	Column	Below a concept is expl	2	The aspects of this conc	3	The aspects of this conc	What would motivate yo	4 more to go for a walk a	5nd spot animals:
1	Once every day	Countryside;	Disagree	Exciting;Stimulating;Crea	Agree	That you can draw your	Positive	The fact that the animal	Option 1	Neutral	Unlikely
2	1-2 times a week	Forest;	Disagree	Exciting;	Strongly agree	Knowing places where a	Positive	Nothing	Option 2	Neutral	Likely
3	Never	Forest;City;	Disagree	Exciting;Stimulating;Irrel	Strongly agree	A motivation to go for a	Neutral	The aspect that you can	Option 1	Neutral	Neutral
4	Once every day	Countryside;City;Forest;	Disagree	Boring;Irrelevant;Creativ	Agree	That you need to go for	Neutral	Difficult	Option 2	Agree	Neutral
5	1-2 times a week	Forest;City;Countryside;	Disagree	Creative;Motivating;Ann	Agree	The need to go for a wal	Positive	-	Option 1	Agree	Unlikely
6	1-2 times a week	Countryside;City;	Disagree	Frustrating;Motivating;C	Neutral	When people love anima	Neutral	Animals in the Netherlar	Option 2	Disagree	Unlikely
7	Once every day	City;Forest;	Neutral	Stimulating;	Agree	Keep track of the scale o	Neutral	Having to use a smart ph	Option 2	Agree	Unlikely
8	Less than 2 times per mo	Forest;City;Park;	Neutral	Creative;Confusing;Ente	Agree	Finding animals	Neutral	In don't know if I would	Option 1	Neutral	Neutral
9	Once every day	Forest;Countryside;	Agree	Entertaining;Interesting	Agree	The questionmarks on th	Positive	Draw own route	Option 1	Neutral	Neutral
10	Once every day	City;Campus;	Agree	Stimulating;Creative;Attı	Agree	paths	Positive	AR	Option 2	Neutral	Likely
11	3-4 times a week	City;Countryside;	Neutral	Creative;Stimulating;Inel	Agree	the drawing of your rout	Neutral	that it is necessary to wa	Option 2	Disagree	Unlikely
12	2 times per month	Forest;Countryside;City;	Neutral	Boring;Irrelevant;Ineffec	Agree	That you know where to	Negative	Being on your phone in ı	Option 2	Disagree	Very unlikely
13	Less than 2 times per mo	Forest;	Agree	Meaningful;Effective;Fru	Agree	dat er iets gebeurt als je	Positive	dat het informatie is mis	Option 1	Neutral	Neutral
14	1-2 times a week	Campus;Forest;City;	Agree	Irrelevant;Inviting;Intuiti	Agree	Connection with others	Neutral	Needs to be more stimul	Option 1	Neutral	Unlikely
15	1-2 times a week	Forest;Countryside;	Strongly agree	Exciting;Stimulating;Frus	Strongly agree	That are animals involve	Positive	I would leave the drawin	Option 2	Agree	Likely
16	3-4 times a week	Campus;	Neutral	Exciting;Meaningful;Pers	Agree	It is a very original idea,	Positive	I like the idea of spotting	Option 1	Neutral	Neutral
17	3-4 times a week	Forest;	Agree	Exciting;Stimulating;Crea	Strongly agree	The question mark make	Positive	Idk	Option 1	Agree	Likely
18	1-2 times a week	Forest;	Agree	Intuitive;Effective;Persor	Agree	Question marks	Neutral	/	Option 1	Agree	Neutral
19	Once every day	Countryside;	Neutral	Exciting;Stimulating;Crea	Strongly agree	Motivates people to wal	Positive	You cant really change it	Option 1	Agree	Likely
20	2 times per month	Forest;	Disagree	Stimulating;Exciting;Attr	Agree	The motivation to go out	Positive	I think it's very hard to s	Option 1	Neutral	Likely
21	Once every day	Countryside;Forest;	Agree	Ineffective;Frustrating;Sl	Agree	The challenges for the pe	Very negative	As mentioned above, I w	Option 2	Strongly disagree	Unlikely
22	3-4 times a week	Countryside;	Neutral	Motivating;Stimulating;F	Agree	The Animals	Neutral	-	Option 1	Neutral	Likely
23	Less than 2 times per mo	Forest;	Agree	Effective;Frustrating;Mo	Agree	Motivation to spot anim	Positive	It mighr be difficult to fir	Option 1	Agree	Likely
24	1-2 times a week	Forest;Countryside;	Neutral	Exciting;Meaningful;Crea	Agree	-	Positive	-	Option 2	Agree	Likely
25	Less than 2 times per mo	Forest;Countryside;	Agree	Stimulating;Entertaining	Strongly agree	The fact that you can see	Positive	The time it takes for the	Option 1	Neutral	Likely

Appendix 9

Notes interview final user-test:

Participant 1

1. What was your first impression of the concept?

   Fun, pretty fun

2. How would you describe your overall experience with the product?

   I found it kind of funny, making pictures, typing words post it.

3. Would you add something to this concept to make it better? What?

   Maybe some sort of indication of what kind of animal it is. Instead of a question mark that you know what kind of animal you are searching for. So you can possibly make your own route to see certain animals

4. What did you like the most about using this product/app? And why?

   I like that the structure of uploading is very simple and that you can see other posts of the animal. I like animals so spotting animals is kind of fun like a scavender hunt.

5. What did you like the least about the concept? And why?

   Walking, I am lazy. If you are walking you are a lot on your phone. This could be concerning with paying attention to traffic.

6. What aspects of the concept do you think have the most potential? And why?

   Animal spotting and the keeping up to date of an animal. You can spot animals in the wild but you don't know where to look and with the question marks you know where to look and with the blog you have engagement with them and learn about them.

7. How easy was the app to use? Were there some functions or something else unclear?

   Overall it was very easy to use. But maybe for jakiness, it gives the same starting message the whole time which is kind of annoying.

8. Do you think this service will motivate you to go out for a walk more often? And why or why not?

   I think so. I am not a walking person but if I use the concept I think I would go for a walk more easily

9. Did finding one animal motivate you to go on with your walk and find more animals? Why or why not?

   Yes, collecting behaviour. I wanted to collect as much animals as possible.

10. Are you motivated by choosing a longer path the next time to potentially find more animals?

    Probably yes, not every time. But I think I would more often say I would go a round longer.

11. Where you motivated the whole time when using the habitAR to keep walking? Or what were some aspects/events that motivated you more? (User experience curve)

    When you where coming close to the questions marks I became more motivated to spot the animal

12. Do you have any additional comments? Nahh.

Participant 2

1. What was your first impression of the concept?

   Funny

2. How would you describe your overall experience with the product?

   Easy to use, intuative, fun

3. Would you add something to this concept to make it better? What?

   For which target, families with kids, I wouldn't use it myself, more for kids addition info about the animal, maybe add a comment function

4. Do you think this service will motivate you to go out for a walk more often? And why or why not?

   Not sure, probably not perse, so now and then try it out

5. What did you like the least about the concept? And why?

   The motivation of going outside

6. What aspects of the concept do you think have the most potential? And why?

   The blog function since it will give inform you about the animals you like

7. How easy was the app to use? Were there some functions or something else unclear?

   It was easy in use

8. Do you think this service will motivate you to go out for a walk more often? And why or why not?

   Not sure, I think I will use it in the beginning but then forget about it

9. Did finding one animal motivate you to go on with your walk and find more animals? Why or why not?

   Made me more motivated to search for more

10. Are you motivated by choosing a longer path the next time to potentially find more animals?

    Depends on the time, but if I have all the time I would go for the long / more animals

11. Where you motivated the whole time when using the habitAR to keep walking? Or what were some aspects/events that motivated you more? (User experience curve)

    Yes I was, it would motivate me to walk a further distance if I can spot more animals

12. Do you have any additional comments?

    No

Participant 3

1. What was your first impression of the concept?

   Nice idea. (I like animal spotting, it depends on the animal kind tho (I don't like fish, birds, amfibien; I only like mammals and reptiles))

2. How would you describe your overall experience with the product?

   I found the camera button confusing. I expected the camerea and got an fill out list.

3. Would you add something to this concept to make it better? What?

   A monkey. Funfacts about the animal when you spot an animal.

4. What did you like the most about using this product/app? And why?

   I liked the scavenger hunt element, because I like scavenger hunts. The app was pretty intuitive on the camera button. The map was clear and it was clear what to do when looking at the app.

5. What did you like the least about the concept? And why?

   I found it uncomfortable to search in a large group of people.That what you post is available for everyone and maybe I want to keep some thing for myself or my com munity.

6. What aspects of the concept do you think have the most potential? And why?

   The map because there is not a lot done with it (very simple) so there lies the most potential.

7. How easy was the app to use? Were there some functions or something else unclear?

   It was pretty easy. The blog symbol is not really clear what it contains. I first thought they were the different kind of routes you could choose from.

8. Do you think this service will motivate you to go out for a walk more often? And why or why not?

   Yes, I like scavenger hunts

9. Did finding one animal motivate you to go on with your walk and find more animals? Why or why not?

   Yes, because I want to spot animals. If I spotted an animal which I didn't like (like a worm) I would not be motivated to search further. Flamingo also didn't motivate me to search on because it is a bird,

10. Are you motivated by choosing a longer path the next time to potentially find more animals?

    No, because I really don't like walking.if it was in a car I would have chosen the longer route

11. Where you motivated the whole time when using the habitAR to keep walking? Or what were some aspects/events that motivated you more? (User experience curve)

    Yes untill it became hard to spot the flamingo then I lost motivation and because it was also a bird. Finding the bear because it was a mammel and I like bears so I was more motivated to spot the bear than other animals

12. Do you have any additional comments?

    Monkey was gone. I would like to chose the kind of animals to search on my route so I can exclude animals like birds or amphibians.

Participant 4

1. What was your first impression of the concept?

   Fun, difficult how it would really work in a forest. Real animals move. Searching for the animals is nice. Hard to pinpoint a spot for the animal.

2. How would you describe your overall experience with the product?

   Nice, it works and is inuative, simple easy in use

3. Would you add something to this concept to make it better? What?

   Nope, maybe comment or like on blogs

4. What did you like the most about using this product/app? And why?

   The blog posts of others, and what they write about the other animals

5. What did you like the least about the concept? And why?

   The map is an image

6. What aspects of the concept do you think have the most potential? And why?

   The blogs see previous

7. How easy was the app to use? Were there some functions or something else unclear?

   Easy

8. Do you think this service will motivate you to go out for a walk more often? And why or why not?

   I think so, if there is an area around me. If stuff gets added.

9. Did finding one animal motivate you to go on with your walk and find more animals? Why or why not?

   Ya, hunter

10. Are you motivated by choosing a longer path the next time to potentially find more animals?

    Depends on the time, but the animals don't make me walk longer Or it has to be an amazing animal

11. Where you motivated the whole time when using the habitAR to keep walking? Or what were some aspects/events that motivated you more? (User experience curve)

    I wanted to catch them all

12. Do you have any additional comments?

    Funny

Participant 5

1. What was your first impression of the concept?

   Fun, but how does it work in practice

2. How would you describe your overall experience with the product?

   Motivating, there is a goal for your walk. Searching for the animals, inspiring, more information about nature

3. Would you add something to this concept to make it better? What?

   Nope, its good. Like/reacting on blogs could be nice, exchange information

4. What did you like the most about using this product/app? And why?

   The maps that show the animals, triggering the user, more searching.

5. What did you like the least about the concept? And why?

   Not really, could be nice if the map is interactive (google maps) / AR

6. What aspects of the concept do you think have the most potential? And why?

   x

7. How easy was the app to use? Were there some functions or something else unclear?

   Very easy, intuitive, what is the challenge?

8. Do you think this service will motivate you to go out for a walk more often? And why or why not?

   Yes I think so, if I know I would find animals, since I like nature

9. Did finding one animal motivate you to go on with your walk and find more animals? Why or why not?

   Yes, motivating that something works, inspired to find more

10. Are you motivated by choosing a longer path the next time to potentially find more animals?

    Yes more animals would make me choose a longer path.

11. Where you motivated the whole time when using the habitAR to keep walking? Or what were some aspects/events that motivated you more? (User experience curve)

    x

12. Do you have any additional comments?

    Questioning what the influence on the animals is. Does it harm the animals. Conse quences for leaving the path.