From an obscure prototype to a market-ready product

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Thank you...

my advisors Peyman Pouryekta and Jamshid Alamuti and supervisors Tanel Kärp and Nesli Hazal Akbulut for giving directions by asking great questions, Anna Libahunt and Ottavio Gambieri for guiding the Tangible Design course and helping us make the first game in the first place, Laur Läänemets for helping to build the second version of the game and by always supporting the project with great insights, Villem Nilbe for being an great teammate during the creation of the game, Alfred Baskin and Kaarel Mikkin for expert opinions and guidelines, fellow interaction design students for giving feedback and for being supportive.

Abstract

This project will give an example of a journey that tries to get an obscure prototype into an early stage of being market-ready. Whether a prototype is born as a result of a school project or a hackathon, there is a chance it might be made into a product or service.

As a design student, my responsibilities often ended on a school project as soon as I did the final presentation to the mentors and to the companies we were working with. I had no idea what it means to take the next steps and apply the proposed solution to the real world. Having a prototype at hand from a Tangible Design course, I embarked on the journey of finding out what should happen in order to make a product market-ready and which framework is the most effective one for getting there.

The report will be showcasing the Double Diamond framework, the Build-Measure-Learn framework, and methods that were used to defining the core product of The Reach Game and finding its early adopters. The result of this project is an evaluation of the journey I had launching The Reach Game to the market and a new improved version of the product.

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1. Introduction

During my studies in the Interaction Design program at the Estonian Academy of Arts, my fellow students and I completed several projects with different backgrounds and assignments. Countless hours were spent researching and interviewing. A lot of work was put into ideating, building, and validating prototypes. All design projects resulted in a prototype or concept that could be applied in real life.

As a result of a Tangible Design course led by Anna Libahunt and Ottavio Gambieri in 2019, my course-mate Villem Nilbe and I developed a prototype for a game called Reach. The game is similar to Twister but has its own twist – it detects touches through human circuits, and the goal is to make ten connections between eight numbered plates as quickly as possible. Positive feedback was received from the mentors and visitors to the project's final exhibition. They said Reach has the potential to become an authentic product.

The only problem was that we lacked the knowledge of how to turn an obscure prototype into a product. In most of our master's program courses, the students' responsibilities on the projects ended as soon as they did the final presentation to their mentors and the companies they were working with. We were missing the experience of implementing our findings in the real world.

Inspired by the situation, this degree project is dedicated to all the fellow interaction design students, hackathon participants, and whoever has a low-fidelity prototype in their hands and is wondering what the next steps are to make it into a product.

2. Background

2.1 Designing in Cycles

Many startups and companies begin with an idea for a product they think people might desire. They spend months and sometimes years perfecting a product without ever showing it to the customer, even in a very rudimentary form. Without talking to the potential user, companies cannot determine if the product is desirable or not. One of the most cost-effective and fastest ways to develop a new product is to do it in cycles and continuously improve the product through customer validation and feedback. (Eric Ries, 2011)

This report will focus on the third cycle of development of the game Reach. Each cycle addressed methods and frameworks that were appropriate for the goal of that cycle. The purpose of the first cycle was to validate the concept of creating a collaboration game based on the human circuit and the gameplay itself. The goal of the second cycle was to reach the first customer. The purpose of the third cycle will be to get the game market-ready. Not only does a market-ready product need to have a clear core definition it has also to be able to attract early adopters (Innoway, n/d).

2.2 First Design Cycle

The first design cycle took place during the Tangible Design course at the Estonian Academy of Arts led by Anna Libahunt and Ottavio Gambieri. Mentors gave students the task of creating a piece for a Tangible Design exhibition.

With the help of the mentor Anna Libahunt, students mastered a beginners level of C++ programming and were introduced to an Arduino controller. Then they were able to start brainstorming possible use-cases for this technology. During the brainstorming session a game concept formulated from three ideas:

- In order for something to happen two people had to do something at the same time.
- The human circuit phenomena.
- Twister, a game of physical skill produced by Milton Bradley Company.

Different gameplays were tested through paper-prototyping (figure 1.) followed by the first hardware version of the game which was assembled on a breadboard. This version of the game was used to run tests with students and colleagues. After adjusting the hardware part of the game the housing of the game (figure 2.) was designed for the final exhibition (figure 3.).

Figure 1. Paperprototyping the gameplay

Figure 2. First housing for the game

Figure 3. Final exhibition of the Tangible Design Course

2.3 Second Design Cycle

Once the Tangible Design course ended, the game was tested among friends and family. Although, one does have to keep a critical mind of the feedback received from close ones as it might not be valid for the market (Rob Fitzpatrick, 2014). Once the players stopped playing, they were asked to give feedback for the following question – "What should happen in order for you to buy the game?".

These were the most critical requests:

- The game's setup took too long due to the wires, which were rigidly attached to the plates and the game controller.
- The numbers on display were too small.
- The edges of the aluminum plates should not defect the wall they are attached to.
- The game controller could look more aesthetically pleasing than the wooden one.

Taking into consideration these requests, a new version of the game was built, and the following upgrades were made (figure 4.):

- The housing with minimal aesthetics was designed for the game controller and laser cut from a black PVC sheet (figure 5.).
- Bigger numbers were installed (figure 5.).
- The edges of the aluminum plates were covered with a rubber guard to protect the wall. (figure 6.)
- Thanks to adding wire sockets to the controller, it was possible to attach each plate separately so the setup would be easier and faster.

The new version of the game was presented to the same group of people and the first sale was made indicating potential market interest (figure 7.).

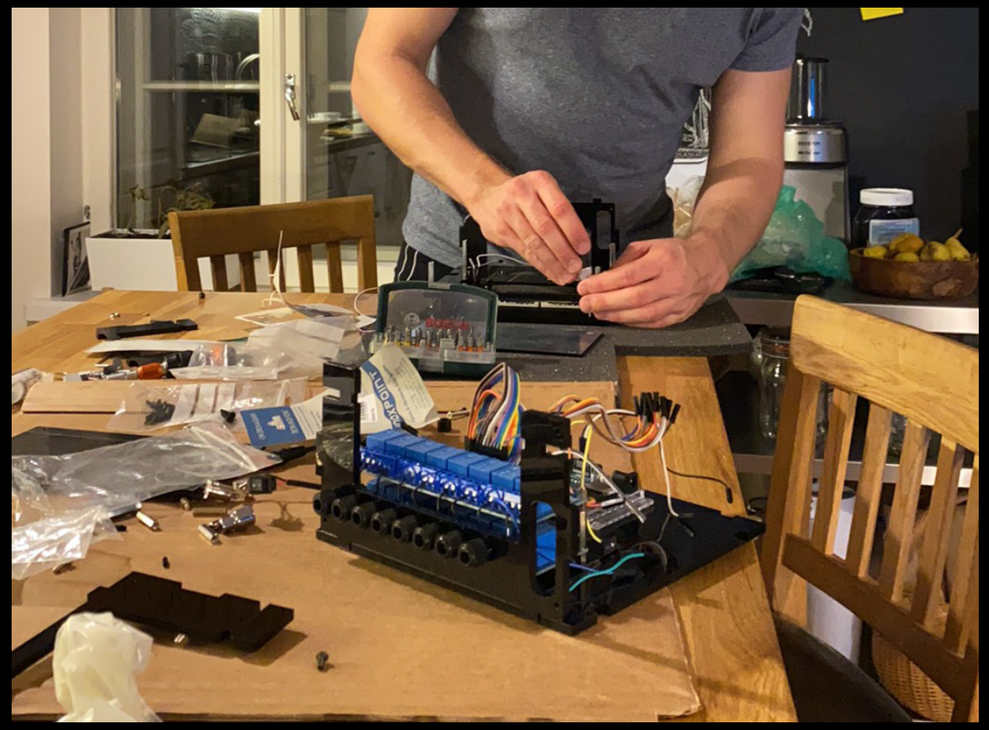

Figure 4. Engineer Laur Läämets helping to build the second model of Reach

Figure 5. New housing and bigger numbers

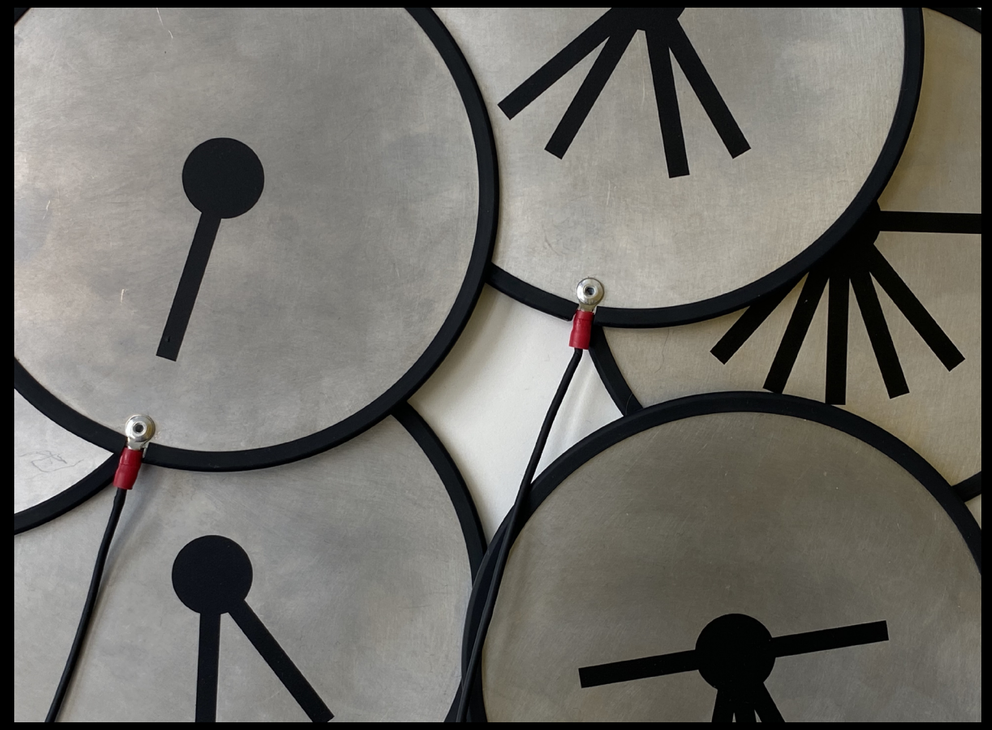

Figure 6. Engineer Laur Läämets helping to build the second model of Reach

Figure 7. New housing and bigger numbers

2.4 Tangible Design

Tangible Interaction Design gives digital information in a physical form. The essential task is to combine digital functionalities into physical forms in an appropriate and meaningful way (Ullmer, B., & Ishii, 2000).

To be successful at Tangible Interaction Design, it requires the following ability to integrate any physical medium as an interface. From an environment perspective, This method focuses on full-body interactions, which uses computing in the everyday environment and supports intuitive user experience (Wang, Moriarty, Wu, 2015). For the Interaction Design students attending the course, it meant having the restriction of creating a physical object which did not require a smart device.

A Tangible Design example is the SandScape project developed by Yao Wang, Assaf Biderman, Ben Piper, Carlo Ratti, and Professor Hiroshi Ishii at the MIT Media Lab. It has a tangible interface for designing and understanding landscapes through various computational simulations using sand (figure 8.). The users can form a landscape model from sand and see visual effects projected on the sand in real-time. (MIT Media Lab, 2002)

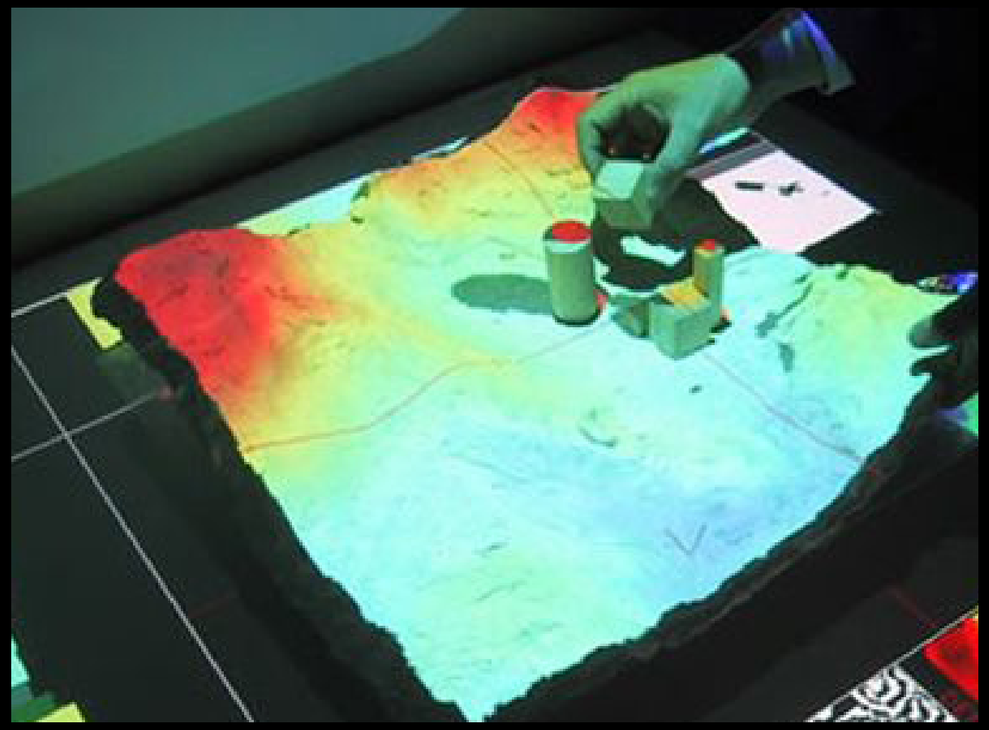

Figure 8. A tangible design example – SandScape project. From the MIT Media Lab page.

3. Research

3.1 Scope

The scope of this report is to follow the third design cycle of the game Reach. The goal of the third cycle is to understand what are the necessary steps in order to get to the first early adopters. Two different product frameworks were utilized during this design cycle – the Double Diamond and the Build Measure Learn model.

3.2 Framework

Companies like Amazon, Google, Apple, and Spotify have a reputation for consistently delivering great products. It is not a coincidence these companies are excelling in what they are doing. Successful companies often have a sufficient framework for how they manage and develop products. These product frameworks provide teams with a repeatable way to improve and consistently evolve their products. (Monty Mitra, 2019)

In this report, two different frameworks were used to get Reach market-ready. The Double Diamond model was used at the start of the project. Towards the end of the project, a more agile approach was needed, and the framework was shifted to the Build-Measure-Learn model. The reasoning behind changing frameworks is justified in the 4.2 chapter of this report.

3.3 Double Diamond

Created by The British Design Council in 2004, the Double Diamond framework (figure 9.) charts the divergent and convergent phases of an innovation project. In the first part of the diamond, divergent thinking is used to explore an issue more profoundly, in the second half of a diamond, convergent thinking is used to take focused action. This framework is described by significant up-front design before developing a final solution. (Jonny Schneider, 2015)

Although it seemingly looks like a linear process, then the Design Council has brought attention to cases where if companies learn something about an underlying problem it will send them back to the beginning of the process. (The British Design Council, n.d)

The Double Diamond consists of the following steps (The British Design Council, n.d):

First Diamond

- Discover. The goal is to understand, rather than assume, who the target group for Reach is. It involves talking to stakeholders and mapping their experiences.
- Define. The insights gathered from the previous step help to concentrate on the final problem Reach will solve as a product.

Second Diamond

- Develop. This step encourages finding different answers to the previously defined problem. It involves brainstorming potential solutions for getting Reach market-ready.
- Deliver. Delivery involves testing out the different solutions on a small scale. The project will end with the solution which performs the best.

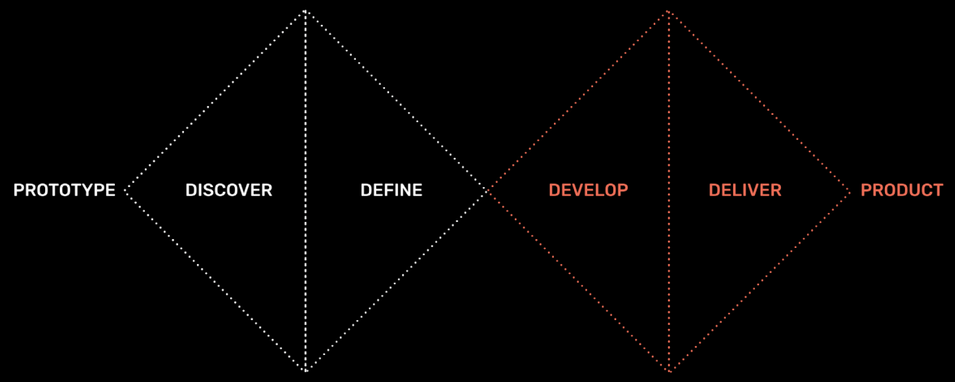

Figure 9. The Double Diamond framework by the British Design Council

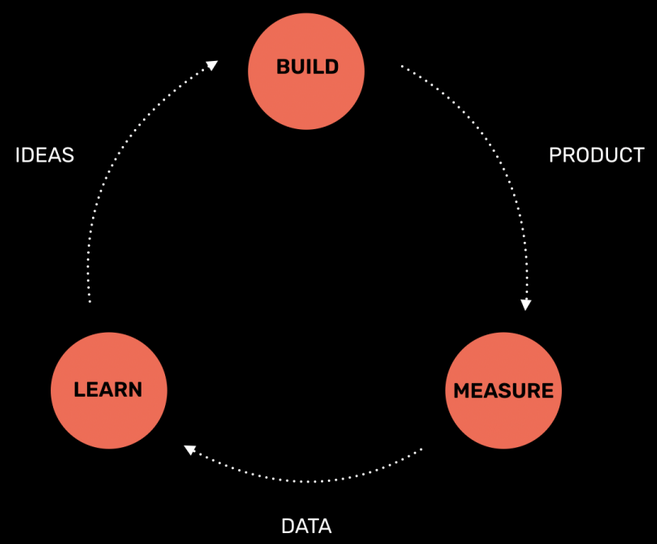

Figure 10. The Build-Measure-Learn framework by Eric Ries

3.4 Build-Measure-Learn

The Build-Measure-Learn model is one of the principles of a general Lean Startup methodology developed by Eric Ries (figure 10.). This methodology seeks to reduce wasteful methods and improve value-producing practices in the earliest phases of a company. A lean startup has a better chance of success without requiring large amounts of outside funding, elaborate business plans, or a perfect product. (Eric Ries, 2011)

The leading practice which the Build-Measure-Learn model presents is acquiring customer feedback in the development process. The strength of this technique is that it improves companies' ability to detect flaws in the product before it is too late to turn initial failure into future success. One of the biggest companies known to use the Lean Startup methodology is Dropbox. (Mindmodels, n.d)

The feedback loop consists of the following steps (Mindmodels, n.d):

- **Ideas**. The first task is to define the idea that needs to be tested. This is done by developing a hypothesis – a prediction of what will happen during the test.
- **Build**. The goal is to create a Minimum Viable Product (MVP) – the most modest possible product that allows testing the hypothesis. When the MVP is established, the next step is to launch it and collect data for the hypothesis developed in Step 1.
- **Measure**. In this step the company will measure the results which were obtained in Step 2. The data will show if the company will be able to build a sustainable business around your product or service.
- **Learn**. At this stage, the company can make an evidence-based business decision about what to do next. Based on the data collected, there are two options:
- **Persevere**. If the hypothesis was correct, the company may continue with the same goals. They will repeat the feedback loop to improve and refine their idea continuously.

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- **Pivot**. If the experiment has refuted the hypothesis, the company has still managed to gain valuable knowledge about what does not work. They can reset or correct their course and repeat the loop, using what they have learned to test new hypotheses and carry out different experiments.

How this framework was utilized according to the progress of the project is specified in the 4.2 chapter of this report.

3.3 Methods

These methods were chosen to gain an understanding of who the target group for Reach is and which improvements should be made to enhance the experience. In addition, to be prepared for making further sales, it was necessary to understand the manufacturing of hardware products.

3.4.1 Secondary Research

Secondary research serves the purpose of getting a more thorough understanding of an unknown context. The materials which can be used for secondary research are books, reviews, articles in newspapers or other publications, or articles found in scholarly journals based on existing research. (Ithaca College Library, 2021)

For this project, secondary research was used to acquire knowledge about manufacturing hardware products and the scope of mass production. This method was also used to study different product building frameworks and methods themselves. Materials used in this research originated from Google Scholar, blog articles from industry experts, online articles from companies, agencies, and organizations with the experience of building products such as The British Design Council, Mindmodels, IDEO, and from the book ‘’Lean Startup’’ by Eric Ries.

3.3.2 Defining the Audience

In order to make right decisions in product development and to ask the right questions during the testing phase it is essential to know for who the product is designed for (IDEO, n.d).

For this project, this method was used to see if the game had other potential target groups besides the initial hunch which were team event participants. The audience was defined by mapping out values Reach offers and then brainstorming together with mentors Peyman Pouryekta and Jamshid Alamuti the different groups of people who might benefit from these values (figure 11.). The defined target audience is revealed in the chapter 3.4.4 of this report.

3.3.3 Expert Interview

Interviews with experts provide knowledge from existing experiences of the project area. Experts can share their best recommendations for what works and what in their field, based on their own expertise and practices. (IDEO, n.d)

For this project, expert interviews were conducted to understand the caps and best practices in the team-building game market. The interview was made with an Estonian adventure company 360° employee Alfred Baskin, who is responsible for organizing team building games for company events.

3.3.4 Testing

The goal of testing a prototype is to get feedback from the people the product is being designed for. The prototype is put in the hands of the target group, and one part of the feedback will be acquired through observing how they interact with it, and another part is by asking what they think of it. (IDEO, n.d)

For this project the existing game was put to the target group environment to observe the behavior of users and gather information if the game could be improved. Since there is

pandemic, the closest thing to testing the game was to take it to an office environment. The office chosen was the Estonian ride hailing startup Bolt Technologies since there where still some teams carefully working in the office during the pandemic. The game was set up at the Marketing department and once the interested players showed up they were introduced to the rules of the game and left to try it out.

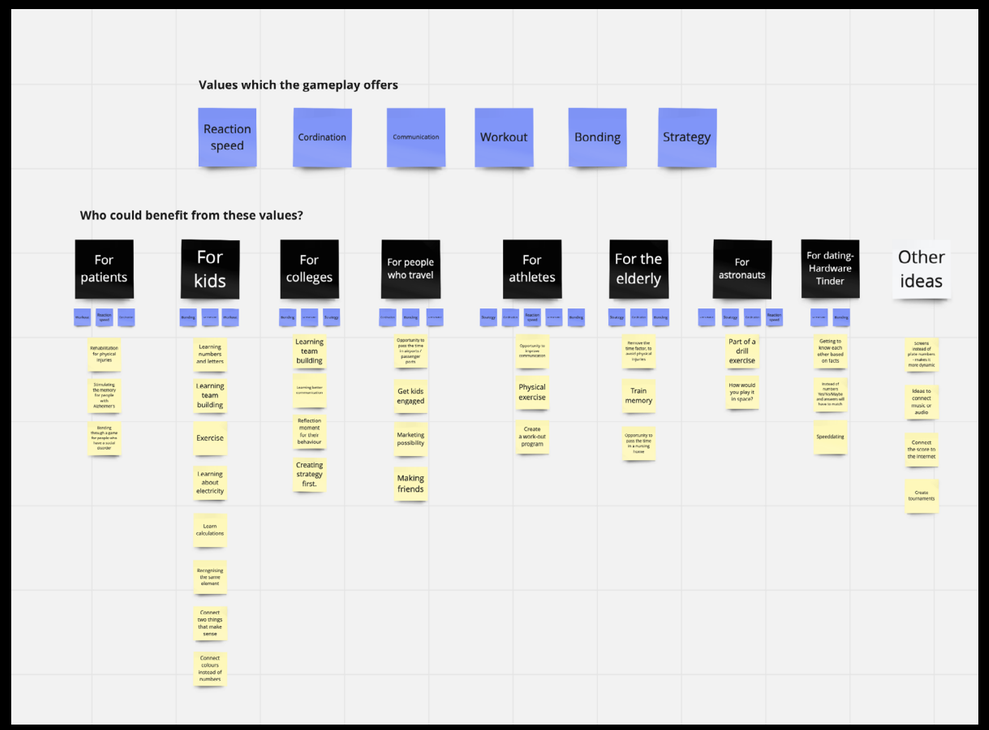

Figure 11. Brainstorming traget groups through values.

3.4 Results

All the research methods used provided important insights which helped to define the problem Reach as a product will be solving and how.

3.4.1 Manufacturing

Since the goal of the third design cycle is to get first customers it is necessary to understand how to produce more games of Reach as effectively as possible. With no previous knowledge of producing hardware products the secondary research provided crucial insights in this field. Based on the information gathered I divided the process of launching mass produced products into three stages, each of which consist of several steps.

In the first stage (marked in white color on figure 12.), the goal is to bring to life the initial idea by building a proof-of-concept prototype. The proof-of-concept prototype is used to determine the practicality of the concept (John Teel, n.d). If the concept proves to be working during the tests then the prototype is taken to the second stage, if not the journey goes back to the start. This stage is similar to what was done in the first design cycle of Reach.

In the second stage (marked in orange color on figure 12.), the proof-of-concept prototype is prepared for a final production prototype. Two main questions are being answered - how should the product look (looks-like-prototype) and how to make the hardware as effective as possible with minimum cost (works-like-prototype). (John Teel, n.d)

In the third stage (marked in dark gray color on figure 12.), based on the production-ready-prototype, final molds and assembly fixes are designed to cut the cost of production and to make the whole process as cost effective as possible. The production-ready-prototype

RESEARCH

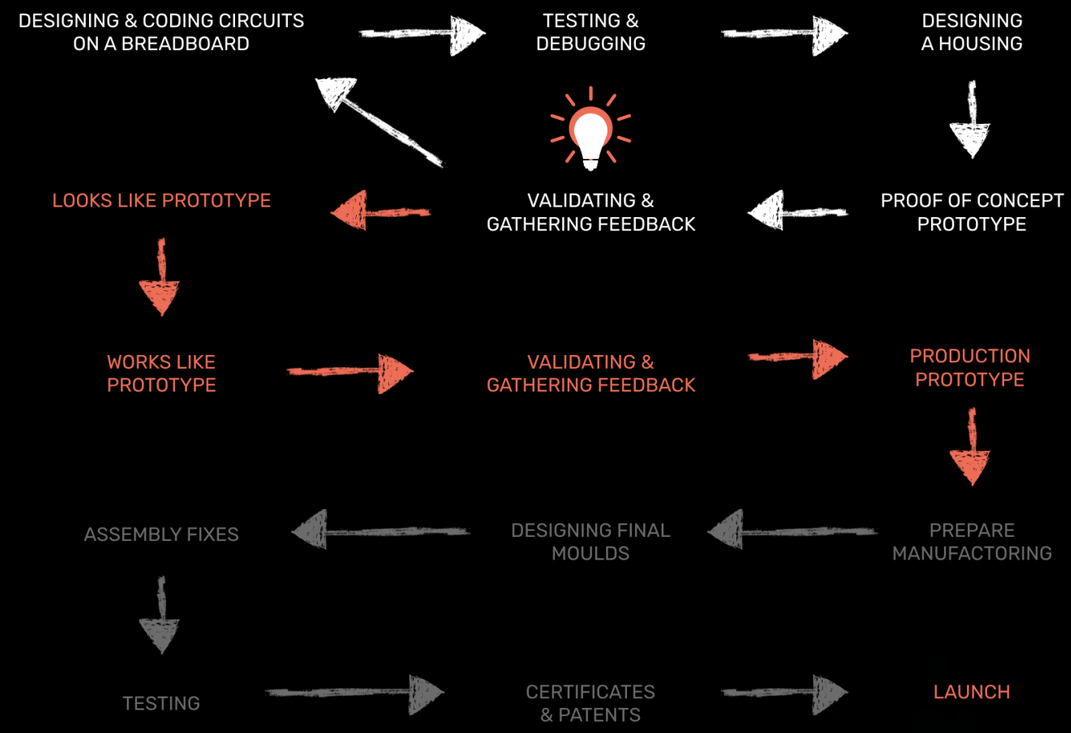

Figure 12. Hardware product mass production journey

is also used for acquiring patents and certificates needed to put a product to the market. The stage ends with mass manufacturing the product. (John Teel, n.d)

The whole process of mass producing a hardware product can take up to 18 months (John Teel, n.d). This meant multiplying the Reach game effectively was out of the scope during the ongoing design cycle and it was necessary to find a more approachable business model than selling whole units of the product.

The key value which emerged from this research is that in order to get to the market, faster one unit of the game needs to be usable by multiple customers.

3.4.2 Game Value and Target Group

Before building any new physical models of the game it was necessary to know if there are some functionalities which could be added. These functionalities should benefit the potential target group. Although, having previous feedback and a hunch that the target group could be office teams, it is good practice to consider all the other possibilities as well to see if there are any hidden opportunities. To understand who could benefit from the game the most qualities of the product were mapped out (figure 13.).

Physical qualities

- **Reaction speed**. As the gameplay is around the fastest time, then reaction speed is definitely something which is being put to the test.
- **Workout**.As it is a physical game and needs movement it can be used as a workout tool.
- **Hand-eye coordination**. The game requires precision for connecting two visual information pieces with a physical movement.

Emotional qualities

- **Strategy**. The gameplay has a lot of potential for creating personal strategies on how to get the best possible time. The gameplay can be also tweaked in a way so more firsthand strategy will be needed — for example covering half of the numbered plates so the participants need a system to finding out the numbers behind the plates first.
- **Communication**. As it is a game which can be played in teams, communication can be improved during the game to get the best possible time.
- **Bonding**. When going through such a rapid game which also requires physically touching your teammate then it can be used as a real ice-breaker.

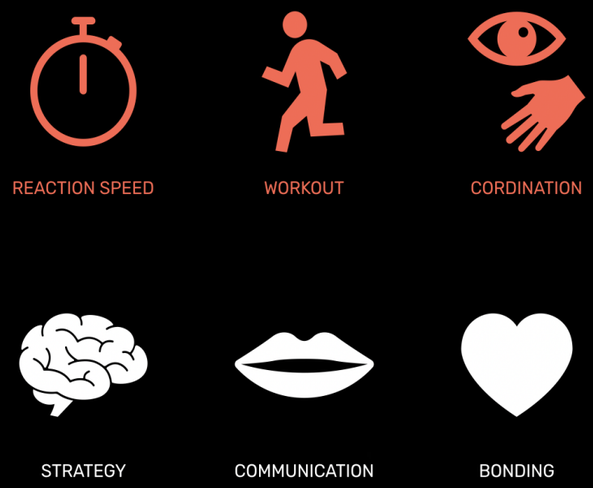

Figure 13. Values the game offers

Mapping out all these qualities helped to brainstorm more target groups who could benefit from these qualities (figure 14.).

The main three groups who could benefit the most from the game values are office teams, soldiers and team sports athletes. This method provided more potential target groups with who the game can be tested with.

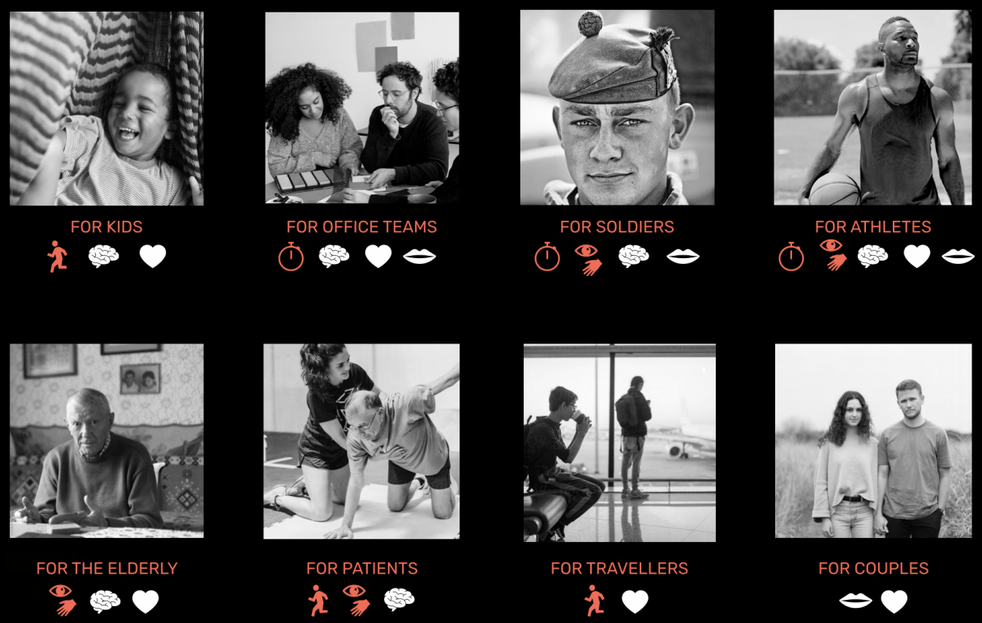

Figure 14. The potential target groups

3.4.3 Expert's Knowledge

In previous design cycles and research methods the main feedback Reach got was that it has potential to become a team-building game. In the expert interview with Alfred Baskin from 360° the goal was to understand what are the main practices in hosting company events and what has he learned about team building games from his experience (figure 15.).

Here are the key highlights from the interview:

- There are a lack of good physically active team games which can be played indoors.
- Best games in team building events have a common goal.
- The 360° team is looking for games and activities which reinforce communication and team building.
- A good team size for team building games is usually around 5–7 people.
- Their clients love games where they don't have to use their smart device, such as phones or smart tablets. This gives them a break from everyday life.

All these aspects validate the potential of Reach becoming a team-building game. A key problem that Alfred pointed out is that there is a lack of physically active team building games which can be played indoors. When living in a country where half of the year, the weather conditions do not support many activities outdoors, having an active indoors game is a significant benefit. Another major takeaway which affects developing the game is the last aspect. Not incorporating smart devices into the game can have an unexpected positive appeal to the game.

At the end of the interview, the Reach game was also introduced to Alfred. He asked whether the wires could be removed or at least changed to more aesthetic ones. Alfred also showed interest in trying the game out once the wiring could be changed.

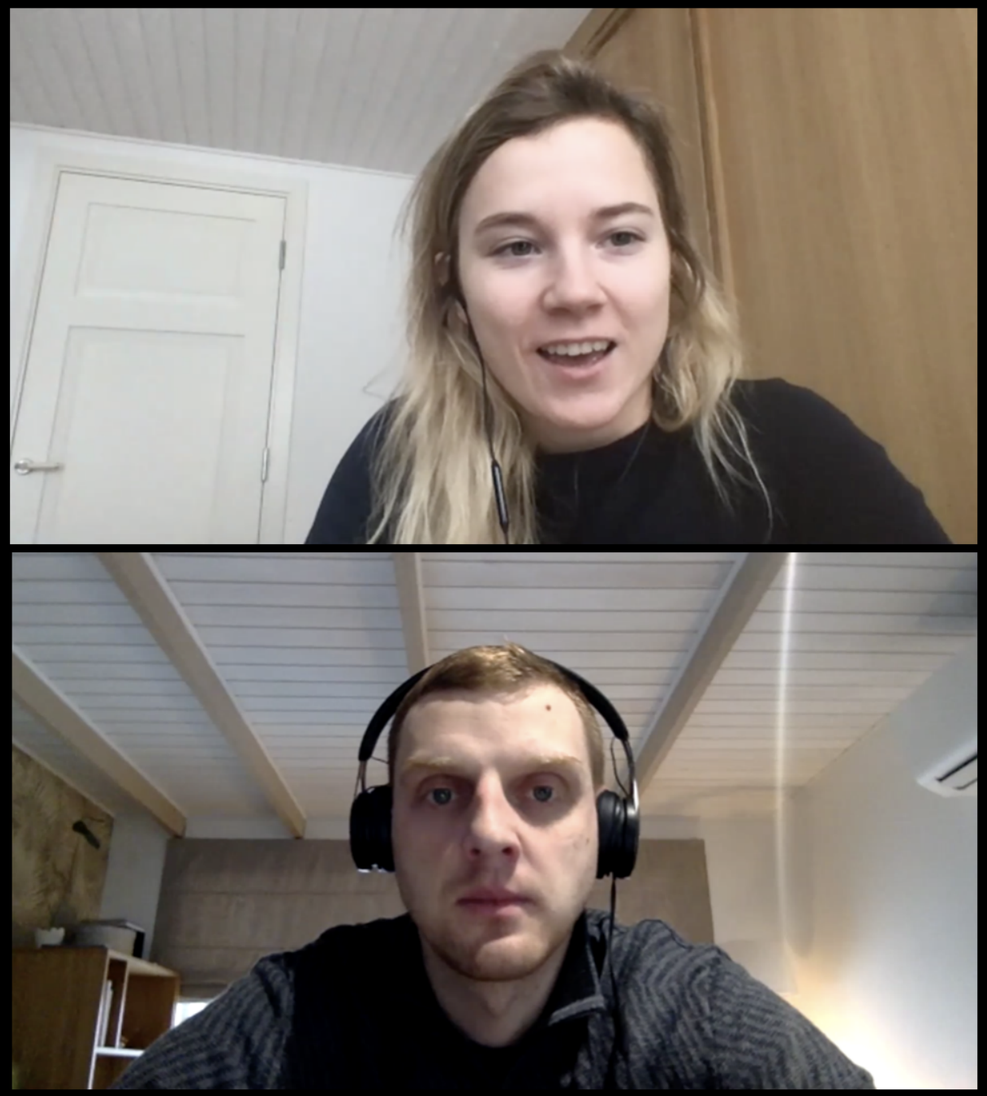

Figure 15. Expert interview with Alfred Baskin

3.4.4 New Improvements

Testing the game in an office environment and in the hands of the potential users provided several insights on how to improve the game (figure 16.). Here are the key highlights from feedback gathered by observing five playing teams:

- The first players played only two rounds just to improve their own time.
- Once there was a scoreboard with the first score new players would play until they got the best time.
- The shorter the best time on the scoreboard got the more rounds teams played to achieve the first place.
- Players did not stay to spectate other teams.
- Nobody tried to play the game with more than two people.

Once the players stopped playing they were asked to give feedback for the following questions:

- Would they see themselves playing the game again?
- If yes, in what environment? If no, why not?
- What improvements could they see could be made to the game?

Answered quotes for the first question:

- “This could be like a really good icebreaker game, we could use it when someone joins the team.”
- “It would be a fun thing to do during the company summer days!”
- “We have these company events where there are a lot of different activities, it could be one of the activity stations there.”
- “We could try playing against other offices, like making a competition between different startups.”
- “It could be somewhere where you have to wait, for example in the office kitchen and there is a queue for the coffee machine or something.”
- Answered quotes for the second question:

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- “Can you make it without the wires?”
- “Maybe there could be some sounds for feedback?”
- “I’d consider adding sounds to the game, like if a connection was successfully made then a bing-bing-bing effect.”

The main takeaways which were considered in this design cycle are the scoreboard and possible sound design. From observing the players, the scoreboard has a big effect on the motivation of the players (figure 17.). From the player’s own feedback, adding sounds to the game is something that should be further looked into.

Figure 16. Testing the game at the Bolt HQ office

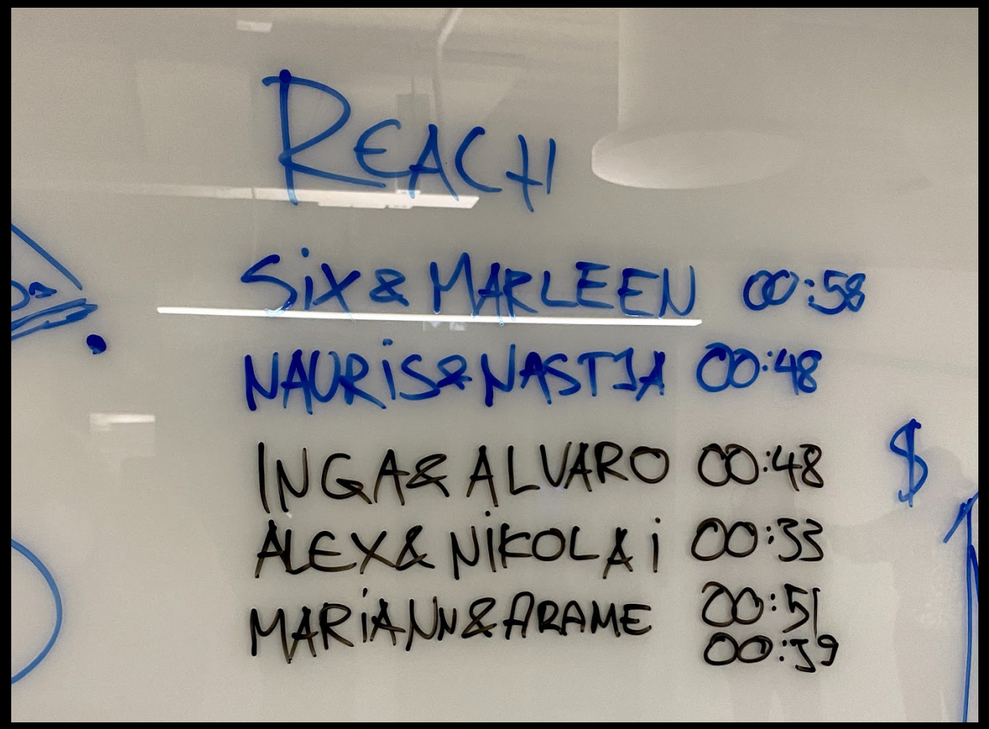

Figure 17. Reach scoreboard at the Bolt HQ office

4. Development

4.1 Defining the Focus

From the research made the following problems, values and improvements were taken into account in the development phase of the project:

Problem

- There are a lack of good physically active team building games to play indoors.

Values

- Team event participants like smart-device free activities.
- The product focus is to contribute to team building.
- One game unit should serve as many customers as possible.

Improvements

- A scoreboard motivates the users to improve their score.
- Users are looking for a sound design added to the game.
- Potential customers are looking for a wireless option.

An occurring feedback was about the necessity of the wires. Unfortunately, the human circuit technology would not work without them and exploring new technologies on this subject will be out of the scope of this project. A speculative version of the game without wires is demonstrated in the 5.3.1 chapter of this report. At this stage of the project an aesthetic upgrade which can be made is using fiber coated wires.

Furthermore, having a scoreboard installed to the game controller is a nice-to-have feature considering the technical difficulty. At this stage of the project a quick and easy way to provide it to the users is adding an analog white market board to the game set.

The following plan for the Develop phase of the Double Diamond was to get a better understanding of team building activities and existing solutions, test sound design and try out the game in different team environments.

4.1.1 Team Building

Since one of the focuses of the product was team building, then another round of secondary reserch was made to understand why is team building important and what are the key elements of a good team building activity.

Research shows that teams in organizations face many challenges. Not only do they have to solve problems that benefit the organization, but they also have to establish healthy relationships between each other to have effective communication in the team. Often the structures of teams change, and working with an unfamiliar colleague might cause employee resistance. Problems arise from lack of communication, personal conflict, or overemphasizing that solving tasks is transactional. This issue might decrease the effectiveness of the team and their ability to make decisions. (Tinuke Fapohunda, 2013)

In a study made in New Zealand in 2017, it is shown that team members' general responses to conflict in the workplace are irritation or disappointment (83%), stress (57%), anxiety (47%), loss of self-confidence (25%) and trouble sleeping (25%). Almost half of all workers stated that due to conflicts they felt distracted in their work, suffered a lack of motivation and self-esteem, and even missed their project deadlines. In the long run, these problems compromise the success of the business. The study's conclusion shows that a cohesive team is beneficial both for the mental health of the employees and the success of the company. (Fairway Solutions, 2017)

One way of defeating or avoiding an uneasy environment is through team building. Team building ventures to increase group performance by decreasing disputes, enhancing communication, and forming a more cohesive and engaged team. (Field & Swift, 1996)

Team building activities create opportunities for people to interact outside of the typical workplace scenarios. These activities help see team members in a nonwork-related light and create a more meaningful and empathic connection. Especially doing something outside the people's comfort zones can encourage bonding through new ways. Spending

time together and striving towards a common purpose enables bonding to happen more naturally than practical leadership or corporate lessons. (Brian Scudamore, 2016)

Unfortunately, many team building activities are not engaging enough to create a connection between the members. Developing that connection is the primary goal of team building, so exercises that do not help that cause are a waste of the organization's resources. Here are some significant elements a good team building activity should have brought out by respected leaders and executives (Forbes Coaches Council, 2020):

- "Exercises need to allow everyone to start from a common baseline where no one is smarter, funnier or better informed." – Karyn Gallant, Gallant Consulting Group.
- "Team-building exercises that build trust are worth every minute because there can be no truth-telling without that trust." – Laura Camacho, Mixonian Institute.
- "Fun is powerful because setting the stage for fun unlocks creativity. Creative thinking leads to innovation. Innovation is the cornerstone for success." – Robin Blakely, Creative Center of America.
- "If tasks are done just for fun and without putting them in the right context, they're not truly team-building. Best questions to ask: "How do you feel your solution relates to real-world situations and problems?" and "How does it relate to your work?"." – Inga Bielińska, Inga Arianna Bielinska Coaching Consulting Mentoring.
- "True team building starts with identifying challenges faced by the teams and solving them through group activity." – Sameer Khan, Inspiring Insights LLC.

Previous Reach game records show it displayes a few of these elements. Firstly, an equal start for the players – usually the first game results are quite similar among all players (45-60 seconds). From observing the players, one could say that the game is fun since the players usually end the game by smiling at each other. In addition the goal of the game can be solved through team work. When it comes to other elements, further testing should be done in the future to improve the team building aspect of the game.

4.1.2 Competitive Research

After finding out why team building is necessary, it was time to investigate some existing solutions. Competitive research is used to identify these solutions.

Competitive research helps to identify competitors on the market and evaluate their strengths and weaknesses (Jamie Johnson, 2019). By investigating the competitors, it is possible to see which market gap does Reach potentially fill and what could be improved. Competitive research can be executed at any point and several times throughout the product development (Goodman, Kuniavsky, Moed, 2012). In this cycle, the main goal is to map out if there are similar solutions to Reach. In the future competitive research can be used to build a marketing plan, build a corporate identity, and to investigate market trends (Jamie Johnson, 2019).

For mapping out Reach competitors, the following keywords were used to research existing solutions:

- physical team building games/activities
- human circuit games/activities
- tangible games/activities

Analyzing the results, it was clear that there are no identical solutions to Reach out in the world. Although, there are still some solutions that benefit team building and could be mapped out as competition. One team building exercise involves the human circuit, some solutions are tangible multiplayer games, and many of them are physical activities. The following two solutions were investigated to see if there are any learning opportunities for the Reach game.

Mash Machine

An example of a tangible activity is the Mash Machine project created by the Mo'Joes company in 2011 (figure 18.). The Mash machine is a social game that allows people to create music without having any prior knowledge or skills in music production. It features

an interactive interface powered by sensors that detect when users move specially designed blocks on it, each of which represents a musical component such as a beat, vocal, melody, and bass. (Mach Machine, n.d)

Based on an initial assessment, the Mash Maschine does have a lot of the elements a suitable team building activity needs – it is fun, the users have an equal starting point, and it is a group activity. An additional perk is that the sides of the table can be branded according to the environment in which the game is installed. Another great perk is that the music genres can be modified - there are different playlists from jazz to techno (MashMachine).

Possible learning and growth opportunities for Reach can come from finding brandable aspects of the game and creating more than one game mode. One potential improved solution for Reach is displayed in the chapter 5.3.2 of this report. Since MashMachine can also be played just by one person, a positive value that Reach offers is a defined goal that can not be accomplished without another team member.

Human Circuit Puzzle

An American company, Frightprops, has developed an example of a team building activity that uses the human circuit. The company creates products for an escape room game. In this game, a team of players will perform a variety of tasks in one or more rooms in order to accomplish a goal in a limited amount of time (Scott Nicholson, 2015).

The following example is one of their products that can be bought and installed in an escape room. The Human Circuit Puzzle is a product in which team members must use their bodies to create an electrical circuit between two metal objects which are placed in different parts of the room (figure 19.). It includes the circuit control board and 12V 2A power supply (figure 20.). The puzzle can be customized by using metal objects which match the room theme. (Frightprops, n.d)

This is an example where the product is part of a bigger team building activity. One learning opportunity is to sell the Reach game to other companies which offer entertainment equipment, so it could be a part of a set of activities. Since after solving the Human Circuit Puzzle, the players will move on to other tasks, a positive value that Reach offers is the possibility to learn as a team and find ways to improve their results in the game.

Other physical team building activities

Many team building activities are often games that require a lot of space and time and are by their nature very different from Reach. Here are a few examples: scavenger hunt, lasertag, company Olympic games, GPS orienteering game. Most of them do not offer an equal starting point to all team members since people who are physically in a stronger shape might have a more significant competitive edge. Also, these games are not necessarily unique products or services and hence are not investigated at this stage of the product development thoroughly.

Figure 18. A tangible design example – Mach Machine. From The Mach Machine Youtube page.

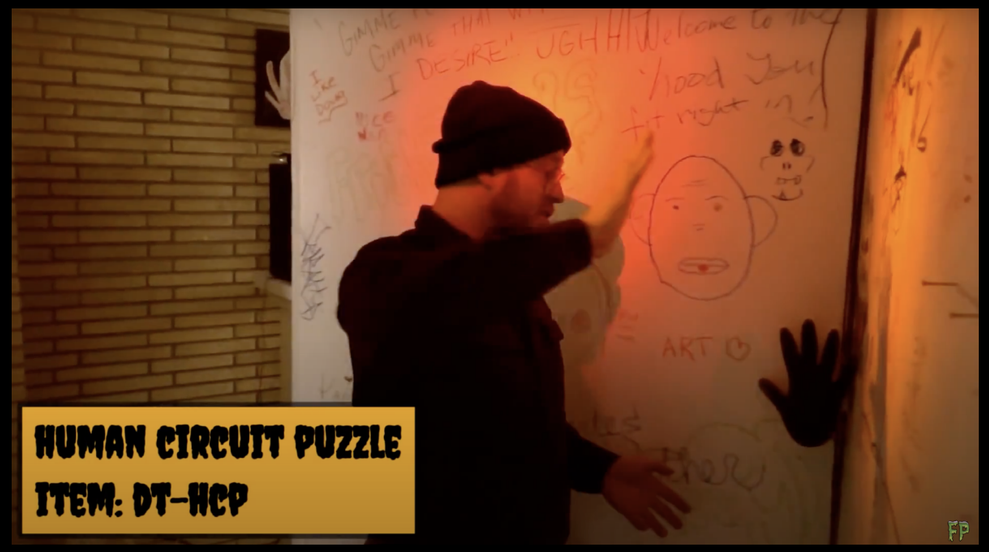

Figure 19. The Human Circuit Puzzle installed to an escape room. From the Frightprops Youtube video.

Figure 20. The Human Circuit Puzzle control board.

4.1.3 Sound Design

Adding sounds to the game meant new electrical components and going back to designing, testing and debugging circuits on the breadboard. In order to be certain which sounds benefit the gameplay the most a new rapid prototype testing was organized (figure 21.). The low fidelity prototype was created by using the existing game together with an external speaker which was connected to a computer. The following tests were made:

1. Players play without the sound.
2. Players play with a success sound when they make the connection.
3. Players play with the new numbers being called out.

After the tests players said that neither the success sounds or called out numbers aren't that helpful in the game. The reason being that it takes less time to check the display than waiting for the new numbers being called out.

Although, from an unexpected angle, a key feedback which emerged was that the game was much more interesting to watch for other players if the new numbers were called out loud. This was an important insight, because considering the experience of the audience into product development hadn't occurred in the project before.

The test, which was done at the Bolt office, showed that players would not stay to watch other players. The reason for this was assumed to be that the employees had to get back to work. If there would've been sound design involved the results might have been different.

Coming back to the sound design test after running the planned tests, one of the players suggested trying out a popular game show music where the musical clock's rhythm is getting faster and faster. Testing this sound turned out to be a success. It provided intensity for the players and a more general feedback on how they were doing. If the rhythm got fast they knew they had to speed up.

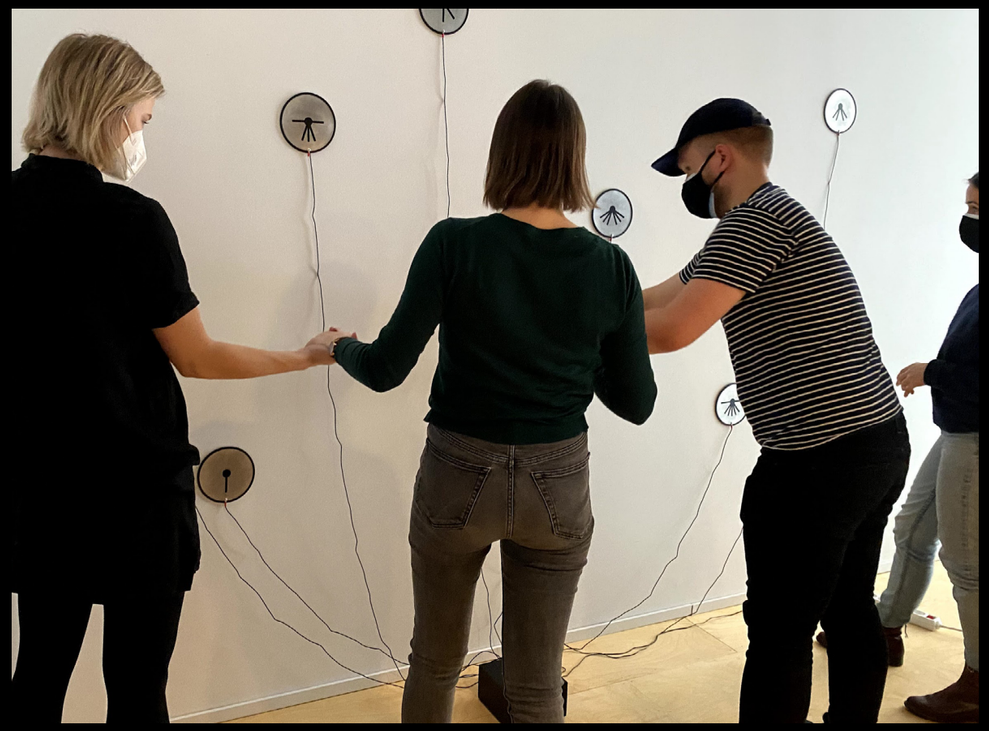

Figure 21. Testing sound design

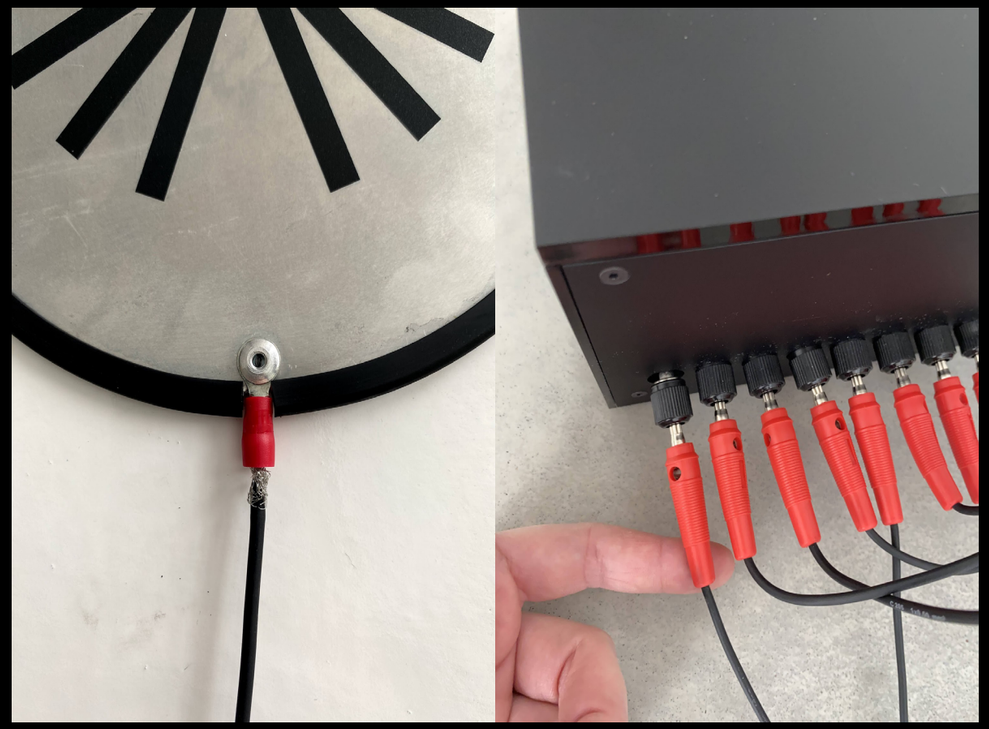

Figure 22. Durability flaws

4.1.4 Durability

A small but crucial unplanned test went on while testing the game in different environments - the physical durability of the game. The first flaws started to emerge from setting the game up in different environments. Although the hardware system was running fine, some of the smaller physical parts started to break down.

Two of the eight wire connections with the plates had come off, and the wire sockets connected to the central controller got loose (figure 22.). These flaws gave immediate feedback on what to improve on the engineering-wise when the following games are being built.

4.2 Changing Frameworks

By the Double Diamond framework, up to this point of the report, the project was in the transition to the Deliver stage. Until, a problem occurred. Carrying out further rapid prototyping and testing out different target groups got too difficult due to the COVID-19 pandemic lockdown in Estonia. Being stuck for weeks and getting calls that testing the game can't be carried out, meant it was time to change the strategy.

One way of making any progress with the project was to continue with the Build-Measure-Learn framework which by its methodology is a more agile and quicker approach to continue with. Here is the adapted plan with the Build-Measure-Learn model:

- **Ideas**. The hypothesis – Reach has potential in the team building games market.
- **Build**. A website for the product.
- **Measure**. Even though there are pandemic restrictions which prohibit organizing events, it is possible to measure collaborations made for future projects.
- **Learn**. Depending if there are deals made for future collaboration the following two options for continuing the project are:
- **Persevere**. If the hypothesis was correct, then the potential improvements which were uncovered by the Double Diamond framework can be carried out and the next design cycle can follow.
- **Pivot**. If the experiment has refuted the hypothesis, it is necessary to determine why it did and whether it is necessary to determine another target group or to go back to question the initial idea entirely.

A critical realization occurred when creating a new plan according to the new framework. If there was no interest in the existing version of the game, then the truth is that the building improvements would not help to get the game to the market and that there was an initial flaw in either the target group selection or the game itself.

4.3 Measuring Potential

During the period of this report all team and company events were restricted due to the pandemic. One way of measuring if the product is market-ready was to see if there was an interest for future collaborations. The goal was not necessarily getting paying customers, but to see if there is enough interest for the product in the upcoming events.

4.3.1 Build

To reach more people faster a simple web-page was created (figure 23.). A short promotional video was made to introduce the game and in case of interest it was possible to register it through a short form. Link to the website: www.thereachgame.com

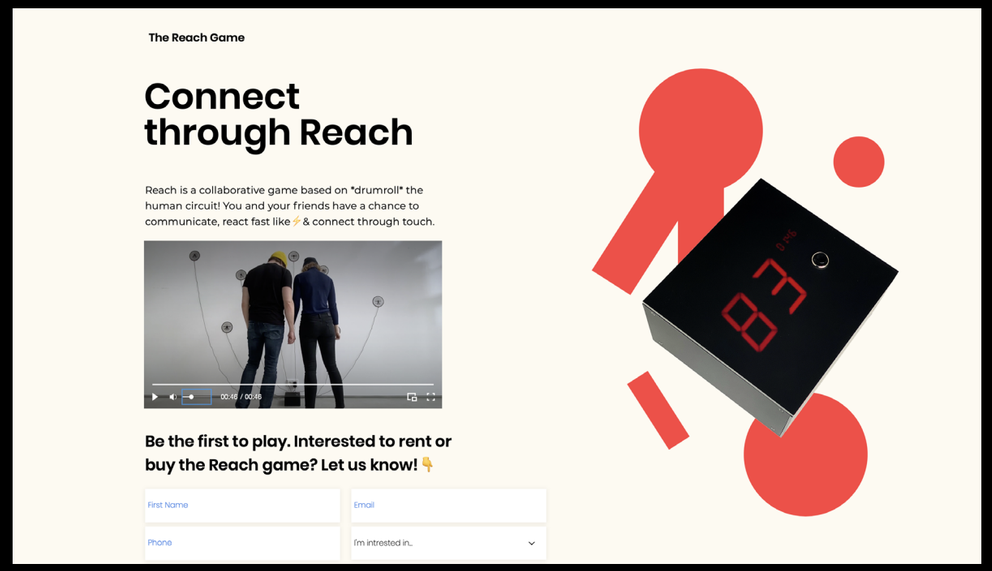

Figure 23. The Reach Game website

4.3.2 Measure

The website link was used for sharing on social media and for reaching out to potential companies who might be interested in renting the game. To measure the different effect between the social media post and contacting the target group directly a two week gap was left between the two actions.

Through posting the website to social media following information was received:

Statistics

- 139 people opened the website during 10 days after posting it.
- One person showed interest in renting the game.
- One person showed interest in buying the game.

Public feedback

- Comment 1. “It could work in some public place - a dining room, a training room, a meeting room, but I wouldn’t put it in my home because after a few times of playing and then it would probably hang unnecessarily on the wall because the first enthusiasm has passed and why should I do it again and again? This requires new people experiencing it for the first time, hence the recommendation to put it in a passage where new people end up.”
- Comment 2. “The people at Pipedrive would be thrilled with Reach, I think it would fit into the Tallinn or Tartu office very well!” – Pipedrive is an Estonian startup.
- Comment 3. “The primary idea for such a thing arose in the use of some kind of psychological distress therapy. Maybe an expert evaluates validity (for example, the main people) but I thought adhd, impaired concentration, dealing with social anxiety, some mild spectra of autism. Also a good warmer in terms of team building.”
- Comment 4. “It would also be nice to use it for a birthday party game, you could get a change for the game Alias.”

For choosing the companies to whom to reach out, Kaarel Mikkin was contacted for some feedback. Kaarel is a business strategist who has a long experience helping companies excel through service design. The discussion with him provided the insight not only to contact start-up companies who like team building activities and rent entertainment equipment but also to reach out to agencies who help organize events and interior design agencies who design office spaces.

20 Estonian companies who matched the criteria were contacted, and the following critical feedback was received (the names of the companies are not written for the sake of privacy:

Statistics:

- 7/20 organizations didn’t respond
- 2/20 organizations declined the cooperation – 1 startup office, 1 interior design agency
- 2/20 organizations were interested in the game, but needed improvements
- 4/20 organizations were interested in using the idea in the future – 1 design agency, 1 event planning agency and 2 event rental companies
- 4/20 organizations were interested in becoming early adopters of the game – 2 event planning companies and 2 startup offices

Feedback from declined companies

- “For a permanent solution in an office there should be more than one game mode. It would suit bigger companies, not who have around 15-20 people in their office.” – feedback from an interior designer who has experience in office design.
- “At the moment, people tend to avoid direct contact, but that is the content of your game. Also, in some cultures, holding hands or even hugging is not appropriate.” – startup office.

Feedback from interested companies

- “This is a great solution for a break activity during a conference! It would be awesome if the plates could be branded and if there would be a screen which shows the tutorial of the game.” – event planning agency.
- “We would love to hear more!” – a startup office.
- “This seems really exciting! A scoreboard should definitely be there as well. It would be interesting to see if the human chain could be even longer. We would love to add this solution to a procurement of organizing a youth event.” – event planning agency.
- “Thank you for reaching out. We would happily like to try it out.” - startup office.
- “This is a great new product. Companies are constantly looking for new entertainment for their events. Right now it feels like we are offering the same old solutions to companies who are hoping to see something new. Although, people are avoiding direct contact right now. Then again this product isn’t like a mass hugging event and the situation with the pandemic is getting better. We would like to use this in a procurement we are working on for an event. Would you happen to have any more games?” – event planning agency.
- “This is a great idea. We will keep this idea in mind in our future projects.” – design agency.
- “Thank you for introducing us to your game. It is possible that this may be necessary in the future.” – event equipment company.

4.3.3 Learn

Through building a website for the game and measuring potential interest the following things were learned:

- Reaching out to potential customers through an email or call is more successful than sharing information on social media.

- Although, there are potential hardware adjustments which could be made, like improving the wiring and adding a screen, early adopters for the existing version were successfully found.
- There is no interest in buying a permanent solution at the moment, rather renting the game for a day or two for a one-time event
- There is a lack of new games in the corporate entertainment market. This is a problem which came out previously from the expert’s interview as well and got confirmed by two of the early adopters.

4.4 Business Model

The end business model has not been determined as the product is still at the early stage of finding a market fit. Although when talking to the first early adopters, the discussion inevitably led to the price. A rental business model was chosen due to the key-value which was the following – one game unit should serve as many customers as possible.

One of the first price estimates was given by one of the early adopters themselves. Based on their experience of organizing events for their customers, they would pay between 200-600 euros a day for a product like this and take a 20% commission.

The business model will be formulated in the following stages of the product as in the current design cycle the main goal was to get to early adopters and defining the core product. If there is a hypothesis for a business model, then the Build-Measure-Learn framework can be successfully used for validating it.

If the business model will stay as a rental model, then a service design cycle should be also done. Feedback for this can be already gathered in the upcoming deals made during this design cycle.

4.5 Core definition

The progress made in this design cycle provided enough information for characterizing the initial core description of the product. The One Sentence Pitch formula, which is often used for pitching products in the start-up world, is utilized for this. The model is following (Founders Institution, n.d):

My company, *The Reach* (name of company),
is developing *a rentable game* (a defined offering)
to help *corporate teams* (a defined audience)
get a physically active team building experience (solve a problem) with *incorporating the human circuit into the gameplay* (secret sauce).

The definition is still agile as the product is at an early stage of being market-ready and future iterations can bring new directions all together.

5. Results

5.1 Evaluation of the Process

After 5 months of product development and testing two different frameworks (figure 24.) the Reach game managed to get 4 early adopters and 6 potential future collaborations. Enough feedback was gathered and tested to build a market-ready model of the product (report chapter 5.2) and to speculate on future models of the game (report chapter 5.3).

When analyzing the two utilized frameworks then the Build-Measure-Learn method proved to be more useful at getting the game market-ready quicker. In one month this agile approach, which led straight to collaborating with the target group, provided more relevant information about the market potential and needs. Still, many useful product improvements were discovered following the Double Diamond framework of 4 months.

A takeaway of the process is to stay agile and curious. If an obstacle occurs there is a way of overcoming it, sometimes it even means letting go of initial plans and coming up with new paths to make progress towards the goal. In case there is lack of knowledge of some sorts, for example building hardware or creating a business model, it is always possible to find qualified experts who are able to help. No matter which method or framework is used, progress will not happen without reaching out to other people.

In conclusion, the process all together has given the following learnings:

1. The Double Diamond framework works great if there is a lack of knowledge on the general topic and a lot of research should be done. Although, with an existing prototype the Build-Measure-Learn approach is a quicker and agile approach.
2. Design in cycles. Don’t try to hit all goals in one cycle, rather take it step by step. The Build-Measure-Learn is a great framework since each cycle starts with a hypothesis which helps to focus.
3. The product does not have to be finished in order to be tested with the potential customers. Sometimes presenting a concept, in this case in a form of a website, can be enough for making progress.

List continues on the next page >

4. Whether it is an app, a physical product or a service, it is useful to know what is the standard timeline and procedure of launching these kinds of products. This can help make choices to get to the customer quicker.
5. The best way of improving a product is together with industry experts and with the potential users. They will help you validate all new product features.
6. Although, product development is important and adding features for users is great, the most important thing is actually designing the core product right. If there is no potential in the main idea, then the smaller improvements will not help to get it market-ready.

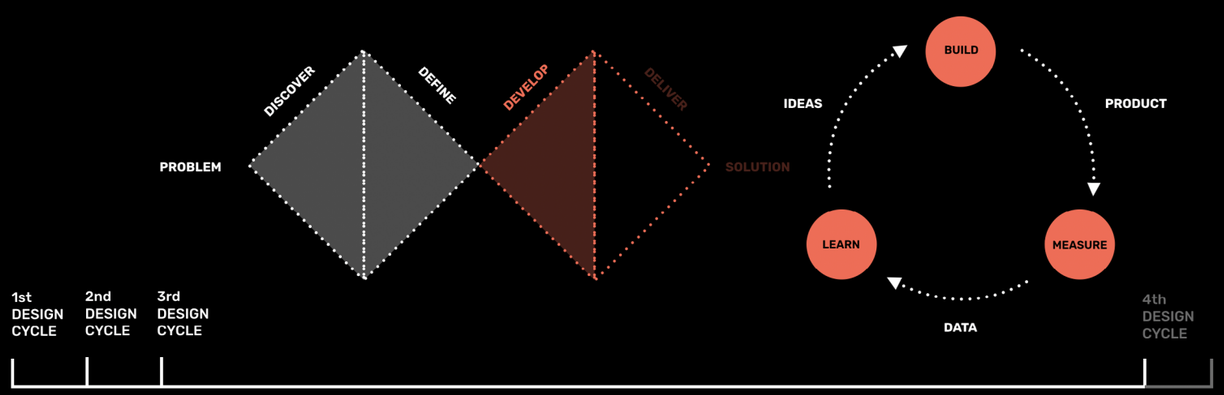

Figure 27. Visualization of the journey

5.2 Final Design

The final design of this cycle is a team-building game which can be rented for corporate events. The game provides a physically active experience and a chance to improve the players collaboration skills through a playful goal. The product fills a gap in the corporate entertainment market with a new technology. The product can be introduced through a website which was also created during this cycle.

Link to the website: www.thereachgame.com

In order to enhance the experience of the players and spectators the following upgrades to the game were tested, validated and applied in building the new physical model (figure 25.):

- For a more aesthetic appeal the wires of the plates will be substituted with fabric covered cables.
- An analog scoreboard will be included to the game set.
- The game will now play music which gets faster and faster while making the ten connections and call out the numbers which need to be connected.
- Previous durability flaws will be avoided by heat proofing the wire connections to the plates and gluing the wire sockets to the controller.

Design mock-up on the next spread >

Durability flaws were fixed, one of them being the wire connections which are from now insulated by heatshrinking.

A marker board will be provided for the game-set as an analog scoreboard which motivates the players to get the best time.

The wire cables are replaced with more aesthetic fabric covered cables.

Figure 25. Final design of the game of this design cycle

Sound design was added to improve the game experience both for the players and the spectators. Tap to listen background music >

5.3 Reflection

All the methods used in this report are familiar to the students participating in the Estonian Academy of Arts Interaction Design Masters course. Hopefully this example will inspire the students to go on their own journey and experience developing ideas and prototypes into products as they already have the methods to do it. Even if there is only minimal experience in business, hardware, or marketing, it is still possible to create a market-ready product with feedback from stakeholders and the target audience. At the end of the day their opinion and interest in the product is what really matters.

When it comes to Reach, this is just the beginning. Further Build-Measure-Learn cycles will be made to find the perfect market fit and develop the concept further. Besides testing the game in the corporate entertainment market, it will be interesting to see if there can be a market-fit in the sports and education sector. Hopefully, once the pandemic situation gets more under control, it is possible to test the game with other audiences such as children and athletes. Besides testing different market-fits and improving the technology of the game, the following cycles will include finding a business model and branding an identity for the game.

Thinking about the future work to be done and inspired by the feedback, drafts were made of four speculative future versions of Reach.

5.3.1 Wireless

Although a wireless solution is something several people gave feedback on then unfortunately there is not enough information to be found if the human circuit is still achievable without the wires. One of the Reach engineers had a speculation that radio waves might be used to make the game wireless, but this concept will need thorough research (figure 26.).

RESULTS

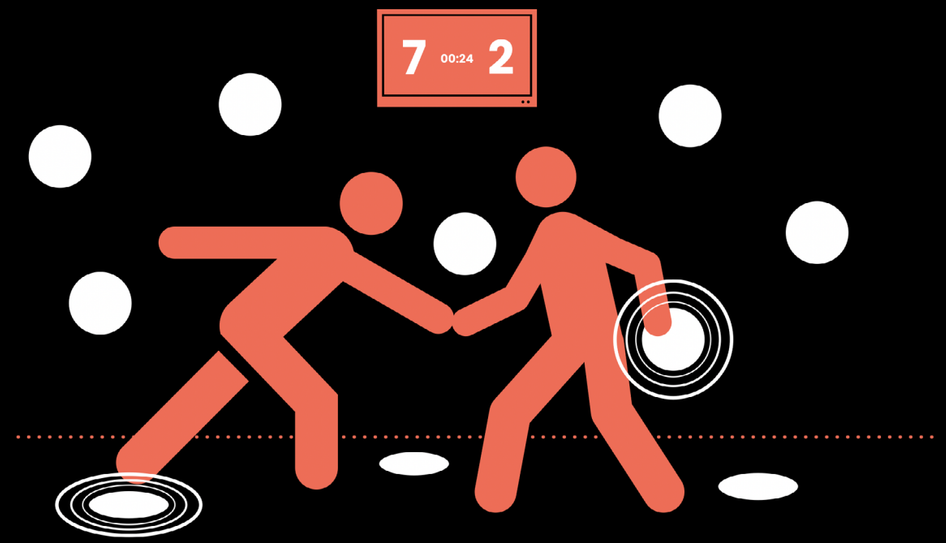

Figure 26. Radio waves could be potentially used for closing the human circuit.

5.3.2 Different game modes with screens

Thinking about the education sector an idea which came up is to have different modes to the game. If in the center of the plates there would be small screens and if the game controller would have a screen it would make different game modes easily possible. Younger children could play the game by identifying animals (figure 27.), older children would be able to connect answers for math answers.

Changeable modes would also make it possible to brand the connections according to the company's nature who wants to rent it.

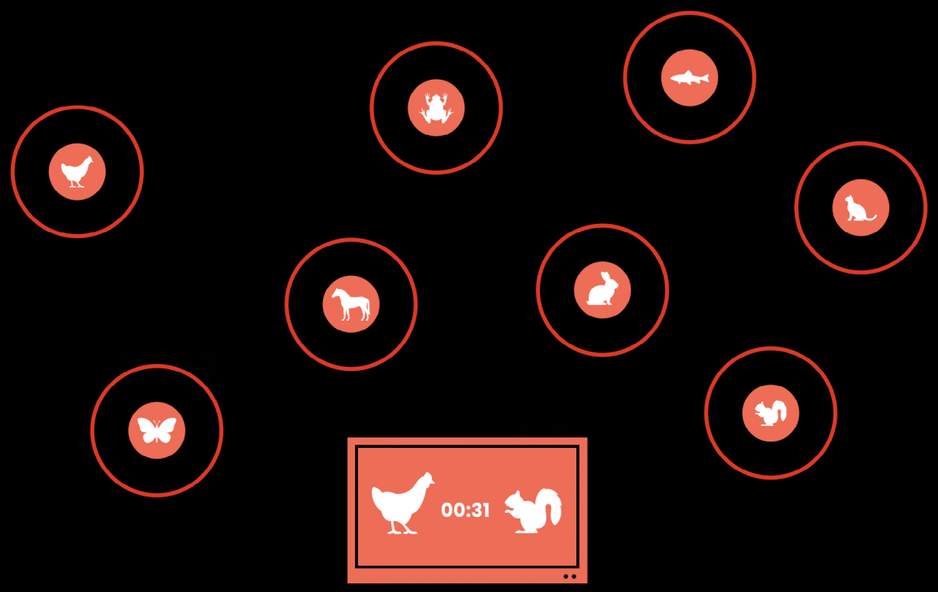

Figure 27. Installing screens to the game would make different game modes possible.

5.3.3 Hardware "Tinder"

An idea which popped up from mentor Peyman Pouryekta was a game for a speed dating event. The people on the date could answer personal questions about themselves by touching either the yes-answer plate or no-answer plate (figure 28.). The more the people have in common the higher their date score was.

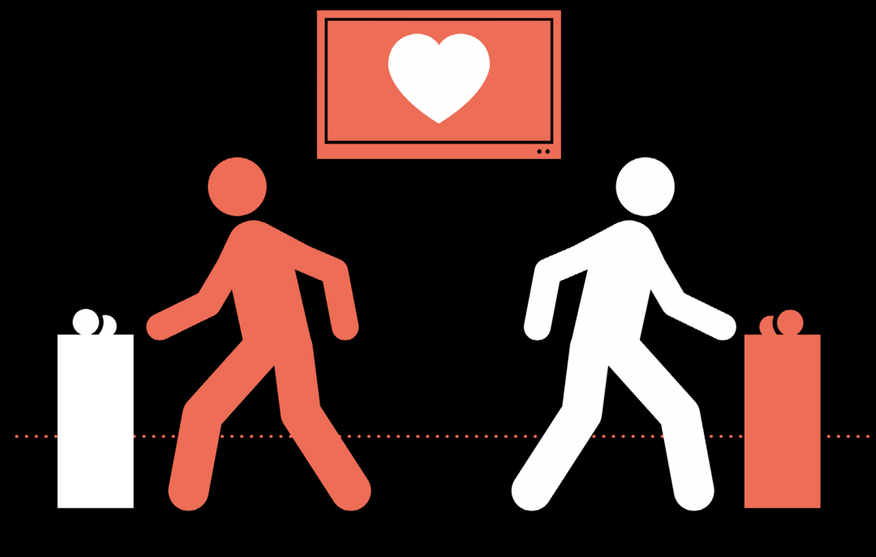

Figure 28. A dating game could be made where people would instead of numbers need to connect answers to personal questions.

5.3.4 Playing against another team in real time

One of the ideas that came from seeing how competitive players got when playing to beat other team's scores was to make teams compete against each other in real time (figure 29.). This version of the game could be used to unite employees of a multinational company. If the game could be installed to all the different offices of the company the employees could play with colleagues around the world.

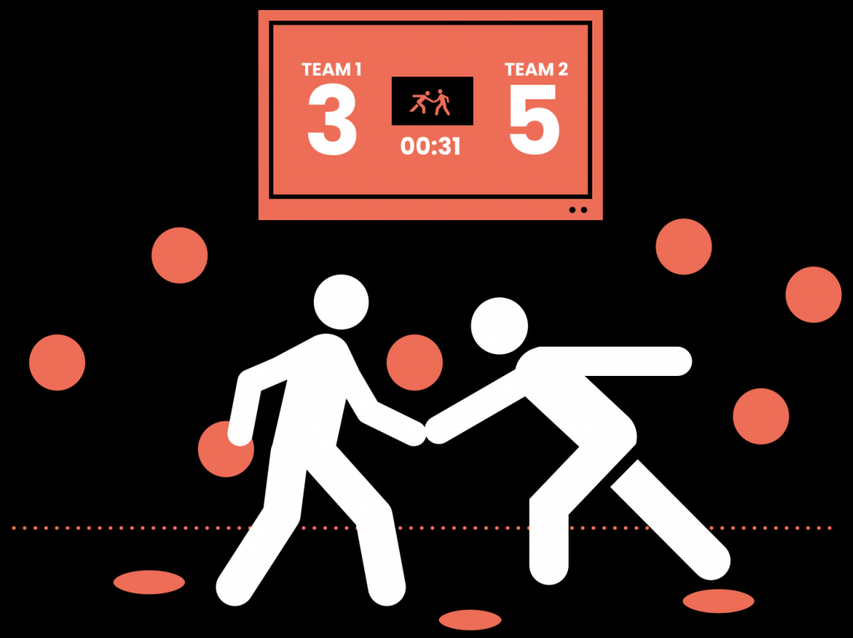

Figure 29. Two teams playing against each other in real time

Abstract in Estonian

See projekt toob näite teekonnast, mille käigus püütakse ebaselge prototüüp viia turuvalmisoleku varajasse etappi. Sõltumata sellest, kas prototüüp on sündinud kooliprojekti või häkatoni tulemusena, on tõenäoline, et sellest võib saada toode või teenus.

Disainitudengina lõppesid minu kohustused kooliprojektiga sageli niipea, kui tegin lõppettekande mentoritele ja ettevõtetele, kellega koostööd tegime. Mul polnud aimugi, millised on järgmised sammud, et pakutud lahendust võiks rakendada reaalses maailmas. Olles *Tangible Design* kursuse lõpetanud prototüübiga, asusin teele, et teada saada, mis peaks juhtuma, et sellest saaks turuvalmis toode ja milline raamistik on selleks kõige tõhusam.

Aruandes tutvustatakse *Double Diamond* raamistikku, *Build-Measure-Learn* raamistikku ja meetodeid, mida kasutati mängu The Reach põhitoote defineerimiseks ja selle varajaste kasutuselevõtjate leidmiseks. Selle projekti tulemuseks on hinnang The Reach Game turule toomise teekonnale ja toote uus täiustatud versioon.

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