



DESIGN FOR IMMERSION: A CASE STUDY ON CREATING AN OUTDOOR ESCAPE EXPERIENCE

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Sherlocked

FOREWORD

Before you is my thesis which is the product of 20 weeks of work that started in May 2021, and was finished in October. This will finalize my studies, as I am now becoming a Master of Science.

First of all, I would like to thank the supervisory team that consisted of Maarten Wijntjes, Niko Vegt and Valentijn Visch. They guided me throughout this project, with their feedback and support. Our weekly Friday meetings always gave me a push to improve, and continue the project. Thank you very much for spending all those extra hours on making sure that I could continue.

I'd like to thank Victor van Doorn and Francine Boon from Sherlocked, the client. They made it possible for me to experience what it is like to work in the escape room industry, which was (and is) a long term dream of mine. Thank you for your wisdom, insights and feedback on my work. The daily stand-ups were a good motivator for me to start on time, and by being invited to the Friday weekly wrap-ups, you made me feel a real part of the company. Also thanks to the other employees and interns working at Sherlocked, as they often helped me test my designs.

Furthermore, I would like to thank my roommates for the lunch breaks we held together, and for giving me a way to talk about the graduation stress at the end of each day. Also a shout-out to Takkebeesten and the BoomBoomCrew, for the motivation, support, game sessions, and willingness to help out when needed.

With all of your help, this thesis has become what it is today, of which I am proud.

Note that if Sherlocked decides to produce the experience written in this thesis in the future, reading this report might lead to spoilers, for which you now have been warned. Enjoy reading.

Steffan Roskam

ABSTRACT

The main goal of this thesis is answering the question: “How can immersion be achieved in an outdoor experience, using synergy between narrative, puzzles and location?”

From literature research the following definition of immersion is formed: Immersion is a state where the interactor feels as if they were located in a different reality or world with an overarching specific theme. A narrative, interactions and location each contributes to this.

To find out what the players experience during an escape room, two indoor games and two outdoor games are played and evaluated to see what does and does not work for their immersion. The main takeaway is that the narrative, and the interaction play a major part in immersion.

After finding out what is considered immersive, an outdoor escape experience is built to function as a case study. Here, designs are tested and iterated upon to find out what improves players immersion even more.

Two final tests are held to find out if the entire experience is as immersive as can be. From these tests conclusions will be drawn to see how each individual aspect of the experience influences the total experience.

The conclusion of this thesis is that there is a synergy between narrative, puzzles and location. As having a location that fits the story, or the other way around, works great for storytelling and immersion levels. Also if the puzzles have a matching theme, Players experience more immersion, fun and excitement.

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GLOSSARY

ESCAPE ROOM	An indoor space where people have to solve puzzles in order to complete a story
MARY SIDNEY	The main character in a new escape room
NDSM WHARF	The place where a case study will be held
OUTDOOR EXPERIENCE	A treasure hunt where players will need to complete a set of puzzles, complete a narrative
PUZZLE ALIBI	A reason for the puzzle to be where they are, as part of the narrative or experience
SHERLOCKED	A company that builds escape rooms in Amsterdam
SOCIETY OF CROSSED KEYS	Fictive group of good people. Everyone completing a Sherlocked escape room will become member
THE ARCHITECT	An escape room in Amsterdam
THE VAULT	An escape room in Amsterdam

INTRODUCTION

This thesis is written for the TU Delft graduation course of the master Design for Interaction at the faculty of Industrial Design. The client of this project is Sherlocked which is a company that has multiple escape rooms in Amsterdam. Due to COVID-19 their rooms needed to be closed, and an alternative outdoor experience needed to be found. There the assignment comes from; How to design an immersive outdoor experience. By forming the following research question the project started: *"How can immersion be achieved in an outdoor experience, using synergy between story, puzzles and location?"*.

This main question is divided into the following sub questions:

- What is considered immersive?
- Of what factors consist immersion?
- What role play stories, puzzles and locations in escape rooms?

The theoretical framework given in chapter one gives a good base for the rest of the project. As here the definition of immersion, and the role of the different aspects is described based on papers of McMahon & Ojeda (2008) and Roth and Koenitz (2016).

By using the papers in the evaluations of the initial designs, multiple iterations are made and tested to make the best immersion interactions. These individual interactions formed a coherent outdoor experience that was tested on two occasions. The results that were gotten from them gave an answer to the research question. However, more testing is needed, to see if these conclusions hold in any outdoor experience.

Chapter one will form the theoretical framework of this thesis, with definitions given for terms regarding immersion. In chapter two the client will be mentioned, along with an evaluation of their escape rooms. The third chapter will introduce the case study that is designed, by visiting the location and doing brainstorming. In the fourth chapter the different prototypes and iterations steps that are made are listed, along with why they are iterated. Chapter five will describe the entire experience that was created with an in depth view on how each puzzle works. Next is chapter six in which the experience was tested, and the results are listed. On these results, conclusions are drawn. The last chapter, number seven, will bundle all the findings that were gathered during this project, and will have general conclusions on how to design an immersive outdoor experience. Also the research questions will be answered there.

CHAPTER

THEORETICAL FRAMEWORK OF IMMERSION AND ESCAPE ROOMS

ONE

To start off this graduation project, it is needed to form a theoretical framework. By researching key factors and scientific definitions such as immersion, escape rooms, outdoor experiences, story, puzzles, and location, the boundaries for the thesis are formed. This will help with strengthening the design choices of the case study performed later on.

CHAPTER ONE, THEORETICAL FRAMEWORK OF IMMERSION AND ESCAPE ROOMS

1.1 WHAT IS AN ESCAPE ROOM?

“A game where people are locked into a room and have to find a way to escape by finding clues in it, and solving puzzles, or a special room where this is done”.

That is what the Cambridge Dictionary (2021) defines an escape room as. Note that the Cambridge Dictionary defines the term escape room as both the game and the room itself. For this thesis, the term “escape room” will focus on the game, the actual room or location will be phrased differently and accordingly. The room provides players with a live experience through the game it offers: escaping within the time limit by finding the clues scattered throughout the room and solving the puzzles.

However, nowadays these live experiences can consist of much more than just escaping a room, if that even is the end goal at all. For example, the overall theme can also be a vault heist, an Alice in Wonderland adventure, or a crime investigation. Some escape rooms also have live actors playing in them. Doing an escape room is a supposedly entertaining activity which can work great for team building, as it allows participants to feel important and be part of a team (Masters of Entertainments, LLC, n.d.). The differences in enjoyment of these experiences seem to be insignificant throughout demographic groups of different age or gender. However, the majority of group compositions appears to be mostly consisting of friends. According to Nicholson, S. (2016), these experiences are played by groups of friends (56 %), used as a team building exercise (19 %) or played by families (14 %).

HISTORY

The first escape room was developed in Kyoto, Japan in 2007 by the amateur puzzle enthusiast Takao Kato (Japan Times, 2009). He made a room for players where they needed to solve puzzles and find clues. Takao's reason to build such an experience came from the realization that, in his adulthood, there is a severe lack of interesting things happening like in the books he read as a child. Therefore, he wanted to create an adventure for himself and others to experience childhood wonders once again. This however did not start the escape room hype. In 2011 the first escape room in Europe was a fact, with the opening of Attila Gyurkovics' escape room in Budapest. According to Sugar (2019), this was only the beginning, as the rising hype for escape rooms made it that there are now between 50.000 and 60.000 escape rooms in the world (The Logic Escapes Me, 2019), of which more than 500 are located in The Netherlands.

1.2 WHAT IS IMMERSION?

Immersion is a difficult term to fully envelop, many different definitions can be found in literature throughout, all varying greatly in the context and meaning. According to Agrawal et al (2020), this is due to the vague and intrinsically ungrounded nature of immersion itself. In their paper, they phrase a definition for immersion:

“Immersion is a phenomenon experienced by an individual when they are in a state of deep mental involvement in which their cognitive processes (with or without sensory stimulation) cause a shift in their attentional state such that one may experience disassociation from the awareness of the physical world.”

This thesis highly focuses on immersiveness. Therefore it is necessary to form a scientific understanding of what immersion means for this project specifically and how that can be reached. Therefore, this thesis will work towards its own definition of immersion, which is presented in section 1.5.

Terms like plot, narrative, rules, flow, and aesthetics all affect immersion (McMahon & Ojeda, 2008). Optimizing each of these aspects within an experience therefore builds towards higher levels of immersion. Roth and Koenitz (2016) state that the aspects from figure 1.2.1 form a hierarchical scheme which ultimately forms an immersive experience.

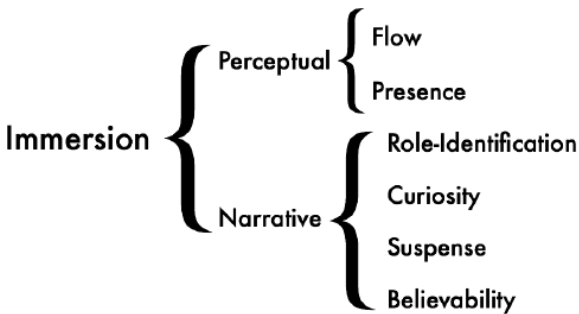


Figure 1.2.1, Underlying aspects of immersion (Roth & Koenitz, 2016).

1.3 EXPERIENCING PRESENCE, NARRATIVE, AND INTERACTION

PRESENCE

Presence, or the physical appearance and elements, is an important aspect to heighten a player's immersion. According to Lee (2004), it influences what someone will experience when being pulled into a mediated, designed world. This can either be a virtual or physical one. A way of transporting someone to a fictive world can be done with interaction with elements from that world. In the scope of an escape room, presence translates to all the physical elements in the room, such as the room itself, the props, the decor, and the scenery that is placed inside it. The location where an escape experience will be held should ideally have a link to the narrative, as Clare (2015) states this can be of major influence on the total immersion levels of the experience. An example would be an old bank building, which now houses an experience of a heist. When a world is designed well and in holistic fashion, it will feel natural instead of forced, even though it is fictional.

NARRATIVE

In escape rooms, the narrative consists of the story that people will follow. It can also be an alibi for puzzles to be present in the room. A way to implement narrative into a well-designed immersive experience is to link the puzzles and story together on a progressive basis. The progression through the story happens by completing puzzles, and thus the puzzles can be seen as short episodes within the narrative. The puzzles should have a wide variety of puzzle elements among them, all the while adhering to the same theme of the story, as otherwise the narrative gets boring, or will play a less important role in the whole experience. Players need to understand, and preferably enjoy, the narrative, as it has a big impact on their immersion (Roth, 2015). Qin et al. (2009) state that when people recognize familiarity within the narrative, it influences their immersion in a positive way. It can be argued that, when people empathize with elements from the

story, it causes an emotional connection, making them more immersed and involved. A way to make the narrative understandable, is by having a basic plot that people will know from other media, such as books or movies. According to Burroway et al. (2019), plot is a series of deliberately arranged events, making them reveal an emotional, dramatic and thematic significance. According to Sundberg (2013), there are more than 20 different ways a story plot could play out. Most of them involve a non-linear timeline, with flashbacks and flashforwards happening. In the context of an escape room however, complicated plots are unsuitable. The total experience of an escape room often plays out within one hour, in which the narrative, puzzles and all other interactions will play out. As the puzzles and interactions already require much attention from the player it is preferred to keep the narrative interesting, but not too complicated. Thus, the plot does not play an important role in escape rooms and is therefore often a simple linear one.

INTERACTIONS

In an escape room people will get to interact with the story, the puzzles and the physical space itself. Ideally, as Wiemker et al. (2015) state, the narrative, physical presence, and the interactions should have a close connection. This will enable the players to be transported further into the story, making both the narrative and world come to life, as the total experience will be more believable and immersive. Having the interaction also fit this theme, a coherent experience will take place. Most of the interactions happening in an escape room are looking for clues, gathering pieces of a puzzle, solving said puzzles, and exploring the room itself.

However, different perspectives define more factors of what influences immersion levels. In another paper (2015), Roth writes that immersion can be viewed with a top down approach (figure 1.2.2). There is some overlap with figure 1.2.1, but in the top down approach the interaction and narrative play a bigger role, and consist of multiple sub-touchpoints. Note that some terms such as autonomy and character believability are regarding digital experiences.

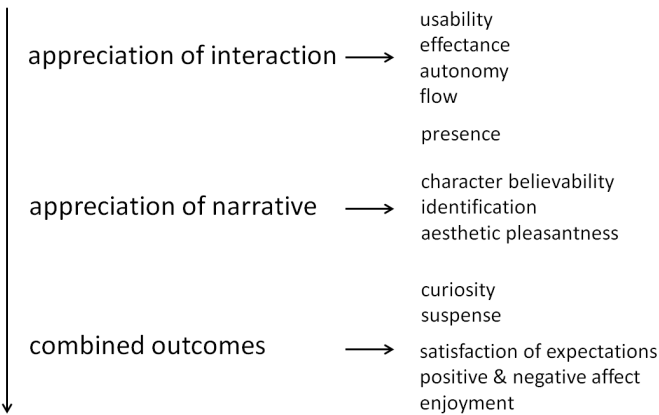


Figure 1.2.2, Top down approach of immersion (Roth, 2015)

Because focusing on all these aspects would not be feasible timewise in the research phase of the project, a selection was made. As the research question only focuses on outdoor experiences, as will the case study later in this project, the physical attributes are of much more value than the digital aspects of immersion. To efficiently focus on information per spend time, the three most applicable aspects are to be further analysed: Wiemker et al. (2015) state that the immersive success of an escape room depends on the match between puzzles, the narrative, and the decor of the room itself. These translate to interaction, narrative and presence respectively. These aspects form the key elements to improve immersion and so improve the total user experience.

1.4 EXPERIENCING ESCAPE ROOMS BOTH INDOORS AND OUTDOORS:

ESCAPE ROOMS

The room decor, puzzles and narrative should all work together to form a believable experience. In almost all escape rooms, there is an overarching theme, such as a heist, escaping a prison, or dealing with a curse. The puzzles, tasks people need to do, and props an escape room might have should all be connected to the narrative (Roth & Koenitz, 2016). When the puzzles lack the context of the narrative, players will not interact with them in a meaningful way (Wiemker et al., 2015).

INDOOR VS OUTDOOR

There are major differences in designing an indoor or an outdoor experience. For indoors, the designer can customize everything in the room, such as lighting, decor, sound, and even smell. When done right, all these aspects are complementary to the narrative, making for a complete and believable world (Wiemker et al., 2015). This complete picture will be immersive, and people will be drawn into that world.

Designing an outdoor experience is another deal entirely, as there are many factors that cannot be controlled by the designer. To name a few: the weather, interaction with other strangers, daylight. These all form distractions and ways for people to lose immersion. These are touchpoints of the real world, which make it harder to be submerged into a fictive one. However, it is also possible to use these distractions and implement them in the experience. This will make it easier for people to get transported into the narrative and stay immersed outdoors.

1.5 REDEFINING IMMERSION

This framework made it clear that immersion has not one definition, as multiple scientific papers gave more than one interpretation as it is influenced by many factors. By focusing on aspects which immersion builds upon, it is possible to form a custom definition that ties in together with the topic of escape rooms. For the rest of the report, the following definition is final when speaking of immersion and immersive experiences:

“A state where the player feels as if they were located in a different reality or world with an overarching specific theme. The narrative, interactions and location each connect with each other and form a synergetic relationship.”

If the interactions are recognized, are understood, or fit and feel logical inside this new world, immersion is improved. This is also the case when the fictive narrative and the interactions that are experienced, fit the theme of the location.

CHAPTER THE CLIENT & EXISTING EXPERIENCES ANALYSIS.

TWO

Now that the theoretical framework has been formed, and a scientific view on immersion is clear it is time to introduce Sherlocked, which is the client for which this thesis is performed and is located in this chapter. Furthermore it also describes both escape rooms that were tested and a detailed evaluation of one. Next to that, two outdoor experiences were done from a competitor of Sherlocked. Both of them are evaluated resulting in feedback from the players on what works, and what does not contribute to the total experience.

2.1 THE CLIENT: SHERLOCKED

Apart from the TU Delft, the client Sherlocked plays a big role in the research, as they are the ones that helped form the assignment. Founded in 2014, Sherlocked is an escape room company based in Amsterdam and has two different rooms; The Vault and The Architect. They position themselves as the top quality mystery experience brand. Their mission is "to re-enchant the world by making the impossible possible", and they focus on extreme levels of detail, along with creativity to make the best experience possible for their players.

As both their experiences are indoors, the COVID-19 pandemic caused them to close both rooms. Therefore an outdoor experience would be good to add to their portfolio, as it potentially gives people the same feeling as an indoor escape room, but now being safe outdoors. Here the assignment came from, to develop an outdoor immersive experience that would fit their style of games. Ideally, this would fit in the bigger story that Sherlocked is now working on. To get started the two escape rooms they have were played and evaluated.

2.2 THE VAULT & THE ARCHITECT

For research purposes both of the escape rooms of Sherlocked were played; First The Vault and thereafter The Architect. It was useful to experience them as a player because that gave insights into the entire customer journey, what puzzles work, what causes the most immersiveness and what breaks immersion. To analyze these escape rooms, a Miro board was created where the entire experience was broken down into all the separate interactions. These interactions were then clustered into the emotions, or feelings that were stirred. After asking three fellow players of both escape rooms to cluster them, they could be brought back to the following: excitement, thrill, confusion, humorous, neutral, boring.

The next step in the process was to rank the interactions based on their level of immersiveness, as can be seen in figure 2.2.1. They were given a color that reflected the amount of immersion. As immersion can be a vague term for people, they were given the definition stated earlier in the report.

After giving the interaction post-its a color they were put back in a new cluster of positive and negative emotions / feelings. Then it can be seen in figure 2.2.2 that the interactions that people were excited about or found thrilling score highest on immersion. Vice versa, the negative cluster also scored the lowest on immersion, as is visible in figure 2.2.3.

Thus it can be said that immersion lies close together with interactions that users find thrilling or are excited about. Whenever something gives off a negative vibe, the level of immersion will drastically decrease. For the entire Miro board, see Appendix A.

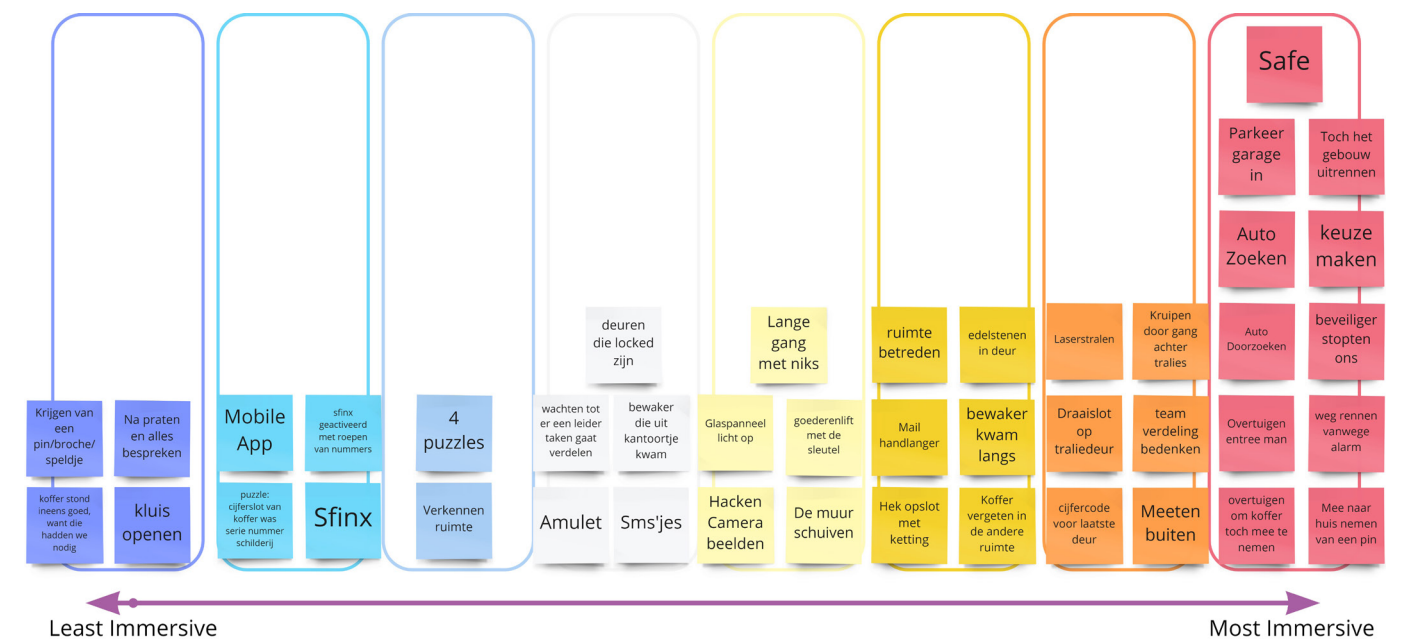


Figure 2.2.1, interactions ranked on immersion

Excitement or Thrilling



Dull, Boring, or Confusion



Figure 2.2.3, Immersion in negative emotion categories

Figure 2.2.2, Immersion in positive emotion categories

2.3 MYSTERY CITY

As the experience that will be built as part of this graduation will take place outdoors, it is important to understand what people will go through. Hence the fact that two outdoor experiences from Mystery City Amsterdam were done in a team of four (see figure 2.3.1). The findings about the ups and downs were put in a Miro template. Here, also the level of excitement could be put in, as there is a distinctive link between emotions and immersion which was proven with the The Vault & The Architect analysis in chapter 2.2. The detailed sheets can be found in Appendix B.

The biggest insights were the following:

- After walking for too long between puzzles (mentioned throughout walks from over about 7 minutes) people got tired both physically and mentally. Someone said: "The walking felt like commercial breaks in the experience".
- The puzzles should make sense within the context of the narrative and thus be part of the experience. E.g. a bomb defusal puzzle in the narrative of Operation '45 when you are part of the resistance.
- The puzzles should have a puzzle element in them which requires some thinking. E.g. instructing people to look up a house number on the corner of the street is not a puzzle, it is just a task given to people which requires no thinking, making it not a good puzzle. Ideally, the puzzle's difficulty should be adjusted to the target group.
- The experience should take up no more than 60 to 90 minutes; a longer experience is not a better one as people's energy gets low, the excitement drops and people want to stop.
- People stay in the flow if the puzzles have an alibi for being there.
- People stay immersed if the walking (in between puzzles or other points of interest) fits within the narrative.

2.4 CONCLUSION OF FIELD RESEARCH

Having a location that fits the story, or the other way around, works great for storytelling. Having the Sherlocked location in De Beurs Van Berlage adds to the mystery of The Architect. Here, the player is tasked with finding a secret room, and this old building adds to the belief of it really being there. This improves the immersion because people really believe the story, which makes them more invested through empathy (Qin et al., 2009; Burroway et al., 2019). This also goes for the puzzles that have a matching theme. Those were, according to the participants, the most fun, exciting, and thrilling ones. When interviewing the players and asking about their level of immersion, it proved that those puzzles corresponded with higher immersion levels.



Figure 2.3.1, Mystery City Experience.

CHAPTER

DESIGNING A CASE STUDY

THREE

With everything learned from the papers, the evaluations and experiences discussed earlier, it is time to start designing a case study. In this study an outdoor experience is created to eventually test what underlying principles cause immersion, and what design choices one must make to create the best outdoor experience possible. In this chapter the location which was appointed by Sherlocked was visited and evaluated. After seeing the style and experiencing the vibe of the location, brainstormers were held to come up with a narrative direction, design style and preferred interactions.

3.1 THE NDSM

The case study's location will be in Amsterdam at the NDSM wharf, which stands for Dutch Dock and Shipbuilding Company (Nederlandsche Dok en Scheepsbouw Maatschappij). This company was operational from 1894 to 1979, after which the company was not profitable anymore and closed down. During the 85 years of operation multiple international freighters were built, such as the Madura, which can be seen in figure 3.1.1. Sherlock chose this location as it is easily accessible by public transportation, lies in the center of Amsterdam and feels a bit mysterious.

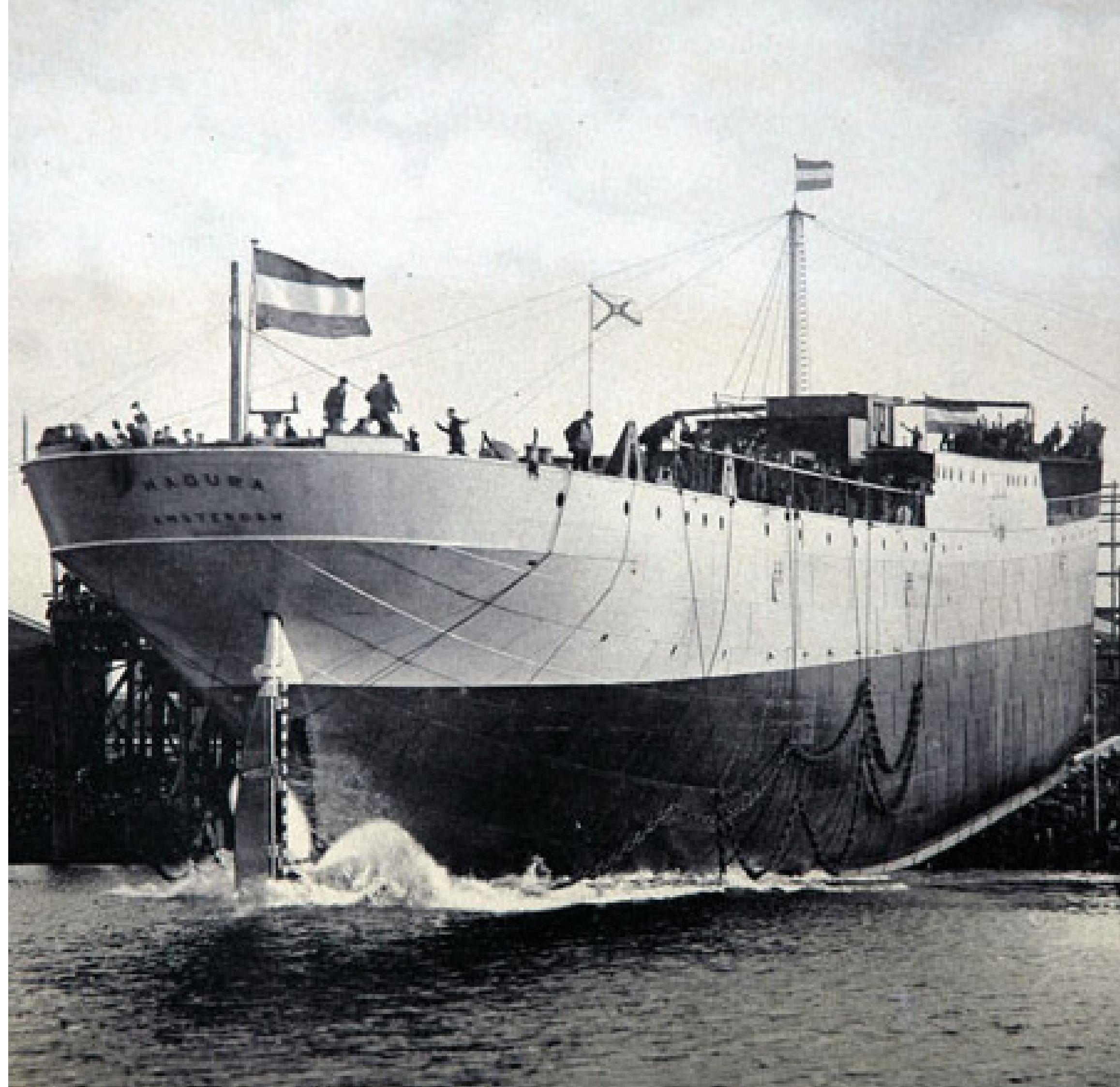


Figure 3.1.1, Launch of the Madura from NDSM



VISITS

To scout the location and come up with initial ideas there were two visits to the wharf, of which one was guided by a representative from Stichting NDSM. By taking lots of photos, one can be seen in figure 3.1.1, the vibe of the place could be felt. There were immediately some interesting objects and places, as can be seen in figure 3.1.2.

It is clearly visible that this place was partly abandoned for a couple of decades and left alone as there are broken down industrial machines still laying there. The wharf is a magnet for creative people and youngsters which can be seen by just walking around. Stickers and other art is located all around the wharf and artists are spraying graffiti at dedicated and non dedicated places.



Figure 3.1.3, interesting places at NDSM

Figure 3.1.2, NDSM Wharf



3.2 BRAINSTORM

By facilitating multiple brainstorms at Sherlocked the first ideas came to be regarding different puzzle elements, story events and interactions. Because one of Sherlocked's key design principles is the blurring between reality and fiction, the first mindmap that was made was about "magical interactions". The second and third mindmap were about objects that people take with them, and what could be in the story. The biggest takeaway from these first sessions was that for all the magical interactions, there should be a connection to the story, to form an alibi. The mindmaps can be found in Appendix C.

After the mindmaps individual puzzle elements were thought of, written down, passed around and discussed by the group. After this session around 25 unique elements were the result of this brainstorm. See Appendix D for a detailed overview of them all, but to name a few:

- Looking at something in perspective
- Have hidden compartments in the small boat that lays at NDSM.
- Block a water fountain, so something gets unstuck in another.

Next, the narrative was discussed and the following critical questions were thought of, to make sure that the narrative had all aspects of the experience covered.

- Who are you as the player?
- Why are there puzzles?
- What is happening?
- Why is this happening to NDSM?
- What are you doing?

3.3 NARRATIVE DIRECTION

"ARE YOU WORTHY?" NARRATIVE

The first narrative that was thought of, and could answer all these questions was the following:

"Amsterdam is the first place for non magical people to experience magic. After a mysterious burst of energy, a part of Amsterdam is suddenly enchanted. However, only the ones looking for it will be able to find it. To see if you are worthy of interacting with the magic, the member of the Society of the Crossed Keys that caused the energy burst has hidden puzzles infused with strange energy throughout a location in Amsterdam. If a group is able to complete them all they'll be accepted into the society and asked to enchant the world even more"

The burst of energy that is blasted through the city comes from another escape room that Sherlocked is currently making. Their goal is to create a universe where all their experiences are connected. However, the experiences should also be playable as a stand alone, for people who are not familiar with their other escape rooms.

After discussing this angle of coming up with an answer to the narrative questions posed in the paragraph above it turned out that this was not the optimal way to go. In the universe of Sherlocked it wouldn't fit that someone purposefully hid puzzles in the city. Therefore iterations were made on the story to have it fit the bigger picture.

“GLITCHED” NARRATIVE

The elements that were kept were the burst of energy and interacting with strange-energy infused puzzles. The energy burst now however manifests in a different way, namely in the form of a glitch. The narrative that was chosen is:

“Mary Sidney’s (main character in the new escape room) experiment went wrong and produced a large amount of chaotic energy that blasted away over the city. One of the hotspots where the chaotic energy is the highest is the NDSM wharf. These large concentrations of energy have resulted in something bad; tears in the space-time continuum. Through these tears objects were teleported to and from the NDSM. To restore the balance, it is important that these glitches are found and dealt with. The players are sent out from the secret Correction Division as a first aid team. Their task is to restore order once again. The team will travel to the NDSM where they’ll pick up their gear, and start investigating the scale of the distortion.”

This story was altered several times to fit best with the Sherlocked universe and have a great match with the vibe of the NDSM. As there are a lot of random objects already laying around there, it will be easier to design an outdoor experience as the alibis will feel logical.

GLITCH CRITERIA

After exploring how far one could go with glitched objects, some criteria were thought of, on how the glitches would work. The entire list can be seen in Appendix E and an impression is given in figure 3.3.1. The most important ones however are:

- There is no such thing as a clean glitch, they appear in a messy and chaotic way.
- The glitched objects have a distinctive glitch pattern.
- A glitched object can also only be partly glitched.
- The glitched objects didn’t travel through time.
- The glitched objects are not enlarged or shrunk.



Figure 3.3.1, Impression of a glitched object.

3.4 INTERACTIONS

GLITCH

Different ways to interact with a glitch were explored. One interaction was that different places of the glitched object need to be scanned with the scanner that is in their supply kit. This then sucks up all the glitch energy, causing the object to be stable again.

Another way of interacting with a glitch is to solve their respective puzzles. This would get rid of the energy that is contained within. There should however be a valid alibi for puzzles to be there, as otherwise this would cause a disconnect with the story.

A third option was to use Augmented Reality, and making the participants use their smartphones. They would then have to install an app which they would use during the experience.

A last interaction that was explored was to interact with the parts of an object that were not transported to the NDSM. They would then have to find ways to imagine what the objects would look like as a whole. They would get hints on what the object looked like before the glitch.

In the end it was chosen to use interaction one and four, and combine them. This was favourable as no app needs to be installed. Also, the objects at the NDSM didn’t have to be altered significantly by Sherlocked to make puzzles out of them. This would be difficult to do, as most of the objects at NDSM are seen as monuments and proven to be tough to get permission to make even only small alterations.

OTHER INTERACTIONS

As this experience is outdoors, there is walking involved between the start, the glitched objects, and the finish. The field research proved that long walks, particularly walks 7 minutes or over, had a big negative impact on the level of excitement, as people get tired both physically and mentally. Luckily, the NDSM wharf is not more than 400 meter wide, which practically guarantees that the walks are not going to be too long.

There are different ways of telling players where to go. One interaction could be that they receive a radar-like device that scans the area for glitches, and pinpoints them on a map. However, this would give people the freedom to choose where to go first. This cannot happen as there will be multiple people on the track simultaneously, in which it is important teams do not cross other teams during their experience.

From the Mystery City it proved to be better to get the walking route presented with one stop at a time, rather than the whole route in advance. Therefore it was chosen to make different route puzzles. After each time they fix a glitch, they get a new route puzzle that tells them where to go next.

At the NDSM Wharf there are usually people just walking around, minding their own business. From The Vault evaluation it turned out that the small part that was played outside, where actual people could interact with the player, was considered one of the most immersive parts. Therefore if there is a way to involve bystanders in a way, it would be favorable

3.5 INTERACTION VISION

For the design phase a interaction vision was thought of. This can be seen in figure 3.5.1, and consists of two images. The first one is Ghostbusters. Here the group of 4 save the world by getting rid of ghosts. The same feeling will be present at the NDSM experience, where the player will team up with friends/family and save Amsterdam with their weird gear in an heroic way.

The second image is from the movie Spider Man: Into the spider-verse. In this film the hero needs to save the world before everything gets glitched. This glitch can be seen in figure 3.5.1 as well, where the brooklyn bridge is partly glitched. Here, the fact that an entire bridge is glitched adds to the scale of the problem in the film. It will be favorable if an object of such large proportions could play an integral role in the experience as well.



Figure 3.5.1, Interaction vision, Ghostbusters & Spider Man: Into the Spider-verse

3.6 DESIGN STYLE

The gear and touchpoints where the people will interact should have a distinctive style. Figure 3.6.1 gives a good representation of the preferred style. It can be categorized as Steampunk, but with modern touch points. This fits the design language of Sherlocked and the story.

3.7 DEMANDS FROM THE CLIENT

Sherlocked has certain demands for the design, based on what fits their portfolio, what fits their resources, or would qualify for government funding:

- The group size is two to five
- The target age group is 14 years and over
- The total experience should last between 60 to 90 minutes
- The experience should not have to be reset manually after each use
- The experience should run free of manual staff interactions

The puzzles, narrative and interactions should also complement each other, and cause for a complete and compelling experience. As stated before, this leads to optimised immersiveness.



Figure 3.6.1, Preferred Style Collage

CHAPTER PROTOTYPING

FOUR

This chapter describes the first designs and the iterations that were made. These changes were made based on feedback from tests, and by applying the insights of the theoretical framework. The iterations kept going until the interactions proved useful for an outdoor escape experience.

CHAPTER FOUR, PROTOTYPING

4.1 SCANNER PROTOTYPES

PAPER PROTOTYPE

One of the glitch interactions was to scan the glitch, suck up all the energy, and therefore make the object stable again. Thus a paper prototype has been built; the glitch fix scanner is a device that people will get at the start, and carry with them the entire time (figure 4.1.1).



Figure 4.1.1, Cardboard glitch fix prototype.

Because a boat that lies on land at the NDSM can be used as one of the glitched objects, a cardboard representation was made. In both the boat and anchor a NFC chip is located. In the glitch fix scanner an RFID scanner is put so it can read out the chips. Once an NFC chip is being scanned, a LED will turn purple on the scanner over time. After 5 seconds the LED turns green for 2 seconds, meaning the glitch energy is sucked up. After both glitches are scanned the LED stays green, indicating this object is done. See figure 4.1.2 for the insides of this prototype.

This prototype had been tested by three employees of Sherlocked to see how they would respond to this interaction. During the test valuable feedback was acquired. The most important points are:

- Fun to see something actually happening (LED changes color)
- The interaction is not that intense, feels minimal and that is something is missing.
- I didn't need to think, it feels like trial and error..
- I want to feel like I'm solving it, and not that the machine is fixing it.



Figure 4.1.2 inside scanner

ITERATION: SUITCASE

From these results of the paper prototype, an iteration was made and the idea of giving the participants a suitcase came to be, which, according to the findings of chapter 1.3, would increase immersion due to presence. The design style defined in chapter 3.6 is also applied here, using a rustic suitcase styling (figure 4.1.3) to suit the steampunk styling. This should theoretically heighten immersion even more, due to the combined efforts of both narrative and presence (Clare, 2015). Players will need to place it at the right location at the wharf to interact with the glitches. With this suitcase, it was tested if the immersion would be higher and the experience would be better when players had to carry and interact with it. The positive feedback like seeing actual changes was increased and different attributes were put in the suitcase to make that happen.

In the iteration an Arduino is placed to increase the immersive experience, as lights and a physical moving pointer will adjust after a glitch point is fixed, and thus energy is stored in the suitcase. Furthermore a vibration motor is installed that can be activated when the energy in the suitcase is getting too high. This can be seen in figure 4.1.4. as well as an impression on the style the suitcase will be.

The meter and colored dashboard indicates how much energy the suitcase already has absorbed. After each glitch, the level increases which results in the meter advancing to the right. Also, there are four LEDs inside the suitcase that turn on after each puzzle. The suitcase can be 'overcharged', where too much energy is absorbed. This can be played around with during the story, as it leads to opportunities with how the suitcase can work through problems occurring due to the overload.



Figure 4.1.3, Suitcase aesthetics



Figure 4.1.4, Suitcase for players

This new suitcase / scanner prototype was tested on multiple occasions, of which most important insights were:

- The player is hesitant to charge the suitcase to make the reader reach the red area.
- Carrying around and interacting with the suitcase is found to be nice.
- The physically perceivable consequences following interactions with the suitcase are amazing.

ITERATION: SUITCASE 2.0

One new iteration was made to the suitcase based on the feedback that was gotten. The dashboard now would not be color coded, but will have a scale as can be seen in figure 4.1.5. Therefore people will not stop playing the game because they need to put the meter in red. This new prototype also tells people how far they are in the game, as the percentages correspond to their progress. Furthermore, during the test, the cables were not visible, nor were the LEDs in the beginning. They only got powered on after completing the first puzzle, and got increased in brightness after each stop.

In this suitcase, a display would be placed where the players could see their next objective, the route, and the narrative that guides them through the experience. This was the final iteration of the scanner suitcase, as now it would be operational to perform at the first field test at the NDSM.



Figure 4.1.5, new suitcase iteration.

4.2 PATHFINDING

From the Mystery City experience it proved that just giving the route was bad for immersion, as it does not contribute anything to the story. Therefore multiple ways of giving players the route were explored and iterated upon.

PAPER PROTOTYPE MAP

The first paper prototype of a map puzzle that was made can be seen in figure 4.2.1. After it is put on the ground the map would start scanning the environment, 3D buildings will appear, and LEDs will indicate points of interest. The tiny 3D buildings represent real buildings at the wharf, and players need to find out where the LEDs point to. There they will find the glitches they are looking for.

This prototype was tested and the following points were the most useful ones:

- The 3D aspect adds to the experience.
- It is a nice puzzle to find out where to go, instead of a map pointing you the way.
- I want to know if I'm heading in the right direction.
- I don't want to carry it around all the time.



Figure 4.2.1, 3D radar map prototype.

ITERATION ON MAP

Although the physical 3D aspect added to a positive experience, there was not an easy way to implement it in the whole experience, as people will need to carry it, or it needs to be somewhere located on the NDSM. This was not feasible and iterations needed to be made on the way people find their next objective. So different puzzles were tested to make this pathfinding part of the puzzle experience. One of those puzzles was a radar which pointed the players in the right direction and a path that needed to be laid on the map (see figure 4.2.2).

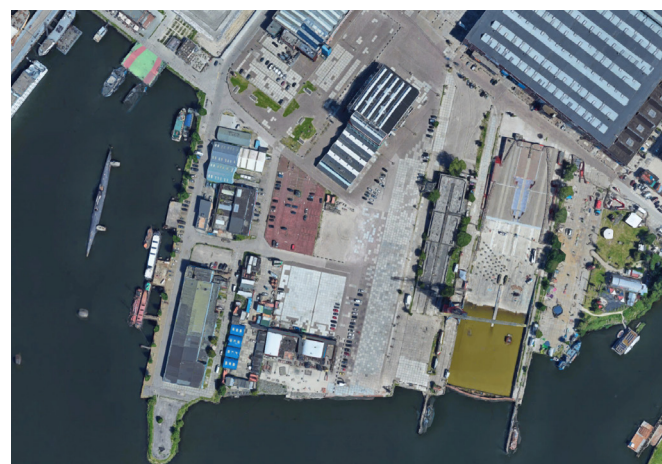
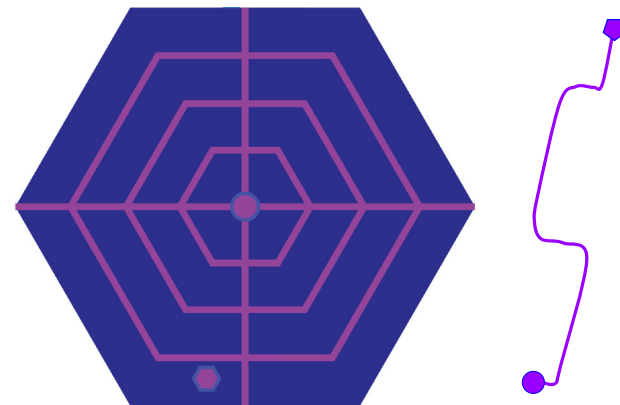


Figure 4.2.2, Radar puzzle

This radar would give an indication where the players would stand, and the endpoint was given as well. Also the route to the next stop would be given, but the puzzle would be to put it on the right place on the map with the points of the radar corresponding. The feedback gotten from this puzzle was:

- Due to the line fitting in only one spot on the map, the radar was unnecessary for one participant, who therefore also claimed the puzzle was a tad easy.
- The interactive aspects of the map and the route were nicely perceived.
- Some participants were unable to solve the puzzle, as they did not grasp the direction of the route and 'dots'.
- Doing this one time is fun, but after 4 times it gets boring.

NEXT ITERATION

To implement these comments in a final design an iteration was made. As people would find the interaction fun yet repetitive, it was chosen to make small iterations on this satellite map. In this new iteration, to reach each location a different kind of puzzle needs to be solved, while they remain similar as some elements stay the same. This will keep part of these elements familiar for the players, which pulls them more into the story (Qin et al., 2009). Three of these pathfinding puzzles are depicted in figure 4.2.3.

After giving participants these puzzles, they gave positive feedback, which made them suitable for the field test at the NDSM, to see how they would fit in the bigger picture.



Figure 4.2.3, three pathfinding puzzles with the same elements.

4.3 PUZZLES

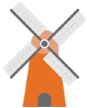
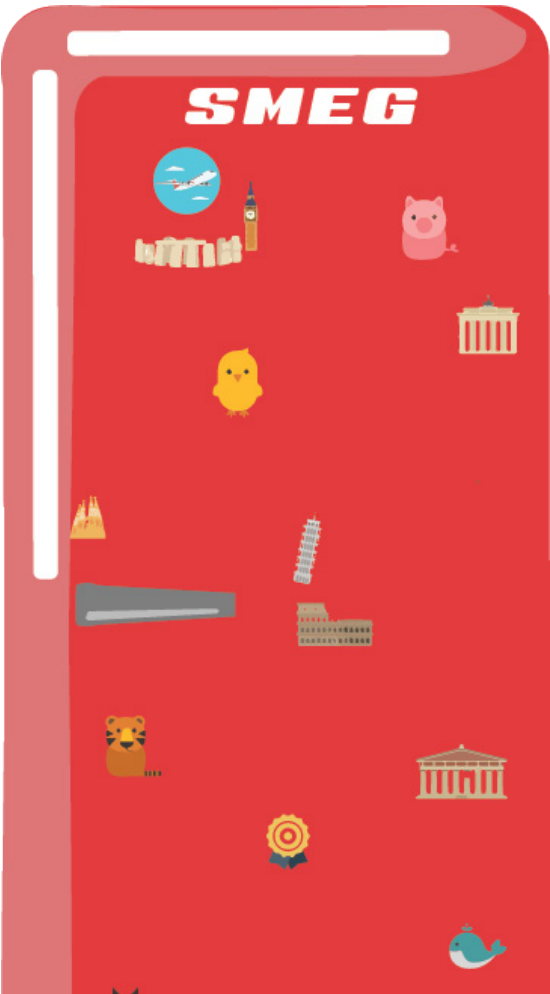
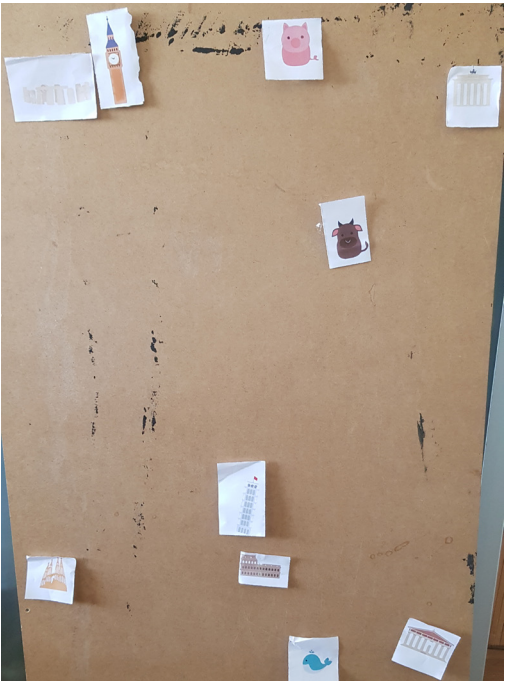
INTERACTION

Almost all the puzzles players need to compete are based on interactions with the objects at the NDSM. Therefore testing and prototyping them at the faculty or home proved difficult. However, one idea was to have a fridge glitched to the NDSM, where it would be stuck out of a wall. More on the esthetics of this in chapter 5. The fridge door could be prototyped making the interaction testable. This interaction is to fix the object to their original state. This is tested in the puzzle that can be seen in figure 4.3.1. With the fridge being glitched to the NDSM, it has a disbalance in its energy level. The way to solve this in this case is to place a magnet on the door at the right place. Storywise, this would result in restoring the disbalance, and returning the fridge to its natural state.

Several iterations of this puzzle were tested by fellow students to get feedback on the interaction. Most noticeable what they said:

- Fun to interact and physically make a change to the environment.
- The red herrings made it too difficult.
- It's not too hard to recognize the landmarks, making the puzzle suitable for many.

It was decided to use this fridge puzzle as a start, as it is not too hard to solve. Therefore it forms a good tutorial on how a glitched puzzle should be solved, and what kind of interaction players need to do.



>>
Figure 4.3.1, fridge puzzle

STUCK ON A PUZZLE

As there are no actors or staff present during the experience, there needs to be a contingency plan ready for when players get stuck. Different options were looked at and explored. First, a chatbot that players could send messages to was tested. However, it proved that players would test the intelligence of this bot, by making deliberate spelling mistakes, or typing in complicated sentences. Also photos were sent of locations where people would get stuck. Some players thought that the WhatsApp bot also needed to be regularly updated, which they found a chore to do. As this all would make it too complicated to design for, an alternative was looked at.

By having a question mark icon on every screen in the suitcase, players who get stuck have the option to tap the icon. This leads them to a help page, where clues can be found, based on where they are in the game. Each puzzle holds multiple hints that first poses a question which should help players in the right direction. After clicking again part of the solution is given. When players are still stuck, a third time will list the tasks they need to do to finish the puzzle.

CHAPTER

THE GLITCH EXPERIENCE

FIVE

With all the testing, feedback and research done it is time to build the most immersive experience possible. This chapter will point out the different steps in building the experience, explaining the puzzles players need to solve and why it should add to the immersiveness.

CHAPTER FIVE, THE GLITCH EXPERIENCE

5.1 SUMMARIZED OVERVIEW

The entire journey players will undergo can be broken down into four segments:

PHASE ONE: BOOKING THE EXPERIENCE

This phase can happen two weeks, but possibly also two hours in advance (depending if there is an available time slot). People would book the experience and get a confirmation mail with practical information where and when in Amsterdam they need to be. They'll also be shortly briefed on the role they take and what they are going to do. One day in advance they'll receive another email with more details about the story, and where their experience will start; Amsterdam Central Station ferry F4 to NDSM. If the experience is booked and played within 24 hours, they receive a different, all including mail.

PHASE TWO: START OF THE EXPERIENCE

Phase two will take place on the day itself. As the team already received instructions on where to start (Amsterdam Central Station and go with ferry F4 to the NDSM). On the ferry they will receive an email with the first map they will have to follow pointing to where on the NDSM they can pick up their gear. Also included in the mail are the instructions to divide some team roles.

PHASE THREE: PUZZLES AT THE NDSM

Getting their gear will initiate stage three; Here the real experience will start. There will be a cabinet that will have a glitched suitcase for the team to use. After that, the team will have to find out where to go by solving the route puzzles which lead them to glitched objects. At these places they need to use the suitcase to suck up all the extra energy these objects hold in them to stabilize them.

PHASE FOUR: ENDING

The last puzzle will set off the final phase. The suitcase can't contain all the energy that is collected and a countdown timer will start. The team is instructed to get the suitcase back to the cabinet they got it from, so it can be glitched away from the NDSM and be discharged at a safe location.

In figure 5.1.1 (below) a holistic overview is given where each puzzle will play out.



5.2 GETTING DETAILED

STORY & TEAM ROLES

There has been an energy blast registered in Amsterdam. (The origin of this is an experiment that went wrong in one of Sherlocked's escape rooms.) This energy spike has resulted in objects that are glitched to the NDSM Wharf. These objects are random, and often torn in half. One half is moved to the NDSM, while the other still stands in its original spot (figure 5.2.1). As these glitch events are happening often, there is a special organisation dedicated to restoring order, and making sure people are safe. This organisation is called "The Correction Division", operates from the shadows and will send the team out to the location of the glitches to fix them. If these glitches are not found and dealt with in time, they have a chance to glitch away again. This cannot happen as it could lead to dangerous situations (figure 5.2.2).



Figure 5.2.1, Left behind fridge part

The players each take on the role of one of the agents that works for this organisation and because of the research of Roth and Koenitz (2016), it is proven that this will get people invested in the story and cause immersion to increase. Players could choose between these different identities:

- Team Captain & Pathfinder
- Crowd Control
- Hardware Specialist

These roles were chosen because some groups don't have someone who takes on the leader role. As a team that is in the field on an assignment, it fits the story that that team has a leader. As only one player could hold the map, this is also a specific role given to the team captain. In the case of four players, the team captain and pathfinder are split up. The crowd control was chosen to see if people would interact with bystanders, or give them the feeling as if they have to. Lastly because there is only one suitcase to carry, it would be preferred if one of the players is responsible for taking it with them from one location to the next.



Figure 5.2.2, Dangerous situation

FIRST STOP: CABINET

The first stop the players will reach is the cabinet in figure 5.2.3. This is the place where they will have to pick up their gear. At first sight this locker will be empty, but after entering the right code players have gotten via mail, the cabinet will start shaking. Purple light will then be emitted out of the cabinet. This indicates that something is being teleported to them. The suitcase will be sent from the headquarters to them via glitch technology. This new technology is just in development and not yet stable. However, it is the only way for the team to get their gear from the HQ. Therefore players will have to take for granted that the suitcase is partially glitched. This adds another alibi for puzzles to be present and also fits the story and thus adds to the immersion. As this cabinet already stands at the NDSM, it has a good rusty exterior with lots of stickers and graffiti on it and therefore matches with the location style and thus adds to the immersion for players.



Figure 5.2.3, Cabinet at NDSM-wharf

SUITCASE

The suitcase players will receive from the cabinet is their gear and is named the "GLITCH-case". This stands for "Geographic Locator and Irregular Time-space Correction Hardware". This forms the base of their experience, as almost all the interactions happen with, or in this case. It will hold different puzzle elements, such as a magnet and photos. There is also a screen inside of it, which forms the way people will progress through the story. On this display the tasks the players are currently doing is displayed. A Raspberry Pi will provide the screens, and different sensors such as GPS, or Bluetooth beacons readers will provide the Raspberry with the necessary information at which point in the game the players are.

For the players, there are multiple physical elements they will interact with. Firstly there is an LED strip around the lid of the case, which will start flickering at a faster pace at each stop (figure 5.2.4). Also the meter and dashboard is clearly present for the players. After each solved puzzle the meter will increase to a higher level. This also primes them that there is a chance to reach overload. Without ever stating that that can happen, players will start thinking about whether that will happen or not. Furthermore there are vibration motors present in the handle that give extra feedback buzzes once the players solve the final puzzle.



Figure 5.2.4, LEDs light up inside suitcase

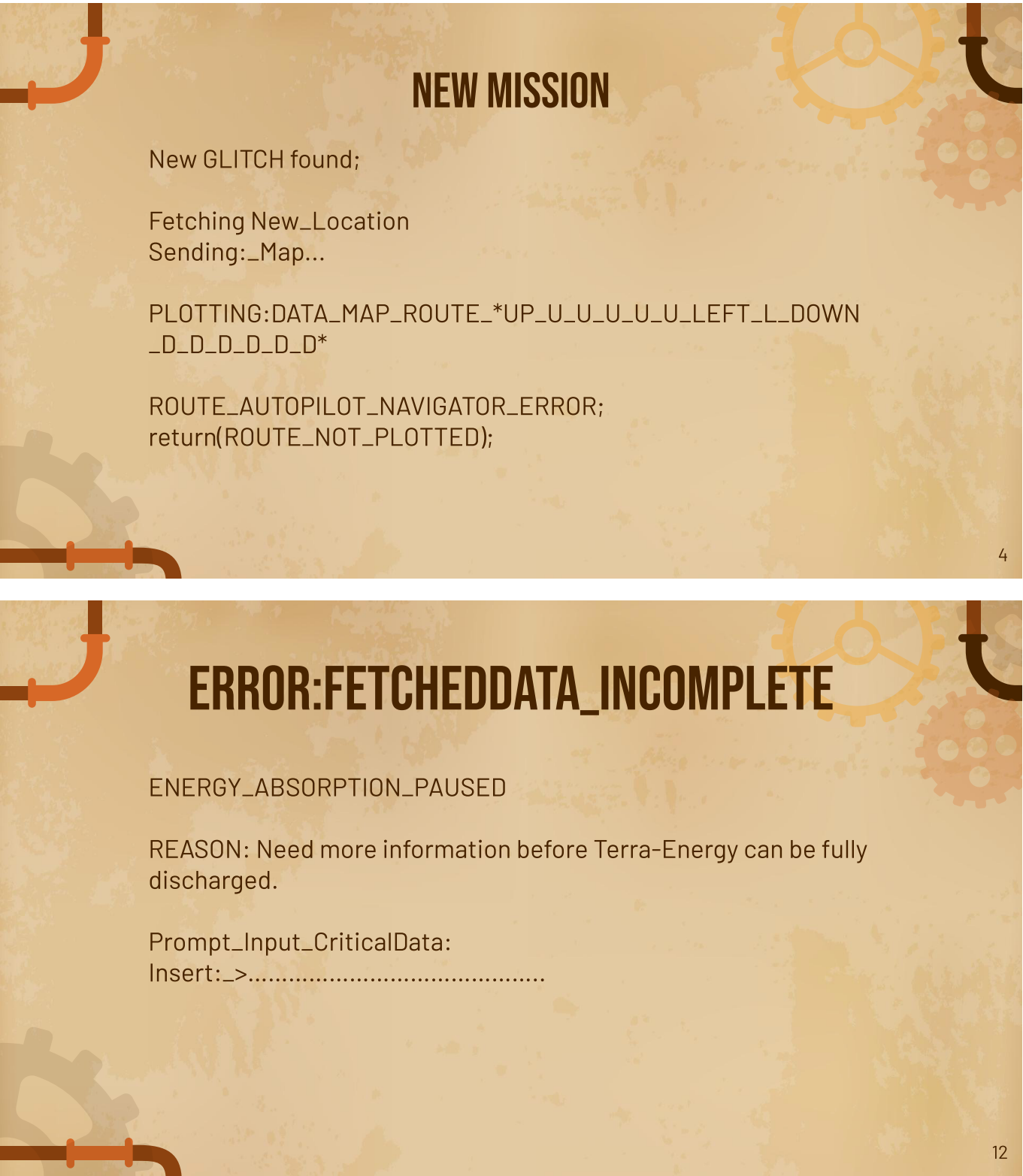


Figure 5.2.5, Screens

Some of the screens that will be displayed can be seen in figure 5.2.5, the whole set of screens is noted in Appendix E.

PUZZLE: REFRIGERATOR

The GLITCH-Case gives the first route puzzle that people need to complete in order to get to a glitched refrigerator. This fridge is vertically sawed in half and placed against a wall, as can be seen in figure 5.2.6. Players will see for the first time what the glitches are capable of, and will have to interact with the fridge and the suitcase in order to get rid of the excess energy radiating from the fridge.

The suitcase will notice via a bluetooth beacon that players are near the fridge. The display will tell them to place the suitcase against the door, so it can get scanned for the excess energy to be absorbed. However, the scan cannot be completed because the energy is not balanced. Players need to restore the fridge door to its original state. By placing the suitcase, it unlocks a magnet with a windmill from the case they need to use. Figure 4.3.1 shows what the puzzle would look like.



Figure 5.2.6, Half fridge glitched in the wall

There are famous european themed landmark magnets on the door. The way they are placed on the door represents a European map with each landmark in the city it comes from. The mill magnet players get represents The Netherlands, which needs to be placed at the right place on this imaginary map.

By solving the magnet puzzle the fridge opens and the suitcase can be placed inside. The case then starts buzzing and flashlight lights, indicating the excess energy gets sucked up. After a few seconds this stops and the meter inside turns higher. See figure 5.2.7. This is the first time the suitcase will experience physical changes, which will increase immersion as the players feel like they made this happen.



Figure 5.2.7, Meter to a higher level

PUZZLE: BOAT ON PIER

After the fridge the players get another route puzzle through the suitcase. Solving it leads them to a pier with only the bow of a boat on it, and the other 90% of the ship missing. Again with the use of a bluetooth beacon, the suitcase will know players are at the right location. The display will state that the suitcase wants to absorb the glitch energy, but to do so, it needs to be calibrated the right way. Players are asked to find and report critical information regarding the ship. Looking at the bow, the name of the ship can be found and should be entered in the suitcase. After that the suitcase will give twelve possible matches, and a satellite image with the scale of the place they currently are.

The players need to find out which of the 12 boats is glitched. By searching the pier (figure 5.2.9) they can find three clues; which are three bollards pictured in figure 5.2.10. The locations, with the help of the scale, will point to one possible ship. After entering the right boat, the players are instructed to place the case on the stern (back part of the boat). If the suitcase is in the right position it starts reacting with the glitch, by flashing the lights again.

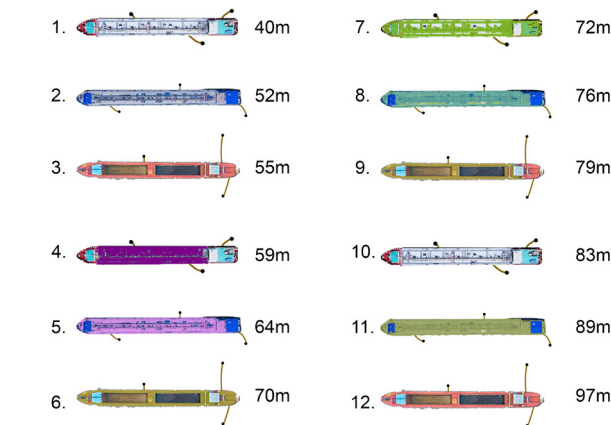


Figure 5.2.8, Boat puzzle



Figure 5.2.9, Pier



Figure 5.2.10, Bollard

PUZZLE: PLANTER & GREENHOUSE

The next stop is a part of the NDSM where 75 big square planters are located (figure 5.2.11). Also a greenhouse is located next to it in the water, surrounded by metal plates. Once the location is reached players are instructed to find the greenhouse, and at the numbers on the sides. Due to all the numbers not being visible from one location, players need to strategically place themselves and cooperate to find out which number is missing. There are in total 74 numbers present so it can take a while to find out which one it is.

The most logical way to solve this is to start counting from 1 upwards. Everytime there is a silence players will have to deal with the anticipation that that could be the missing number, adding to the excitement to continue. After they find the missing number (which is 36) they need to find the flowerpot with this number on it. Placing the suitcase there will trigger the LEDs, and the meter to reach 80%.



Figure 5.2.11, Planters



Figure 5.2.12, Greenhouse

PUZZLE: HALF CRANE

After finishing the planter puzzle, players get notified of an incoming message from the headquarters. It will be displayed on the screen of the suitcase and reads:

“Team, We received news of half a crane laying in the streets of Amsterdam which caused a lot of damage. Only the bottom part is missing, which is probably still somewhere at the NDSM. Find it and neutralize this object, before it is too late and also glitches!”

Attached is also a picture of a crane laying in the middle of the street, to make players aware of the situation (figure 5.2.2). As instructed, the players need to find the bottom part of the crane, which stands in the middle of the NDSM. During their walk from puzzle two to three they have walked past it. If they did not see it however, the suitcase will tell them after 3 minutes where they should go.

After finding the crane and placing the suitcase underneath, it will start scanning the environment. Again however, the energy cannot just be sucked up, because a second point needs to be found. This is the place directly underneath the hook of the crane. However, since the top half of the crane is missing it will be a puzzle to find the correct location. Luckily, the suitcase can access old archives of how the crane was positioned and had two photos ready for the players. Figure 5.2.13 need to be used to find the exact location. By standing at the place the pictures were taken, a third player will be instructed to move left and right and stand in the right place from both perspectives.

This is the final puzzle, as when the suitcase is located correctly it starts buzzing, and flashing the LED more intensely than what happened at the previous moments. The meter will turn to “OVERLOAD” and a red screen reads: “Suitcase Energy Container 155%. Breach in 2 minutes and 30 seconds.” see figure 5.2.14.

This means the final stage of the game has been reached. The suitcase will not stop flashing the LED, and stop shaking. A countdown timer is set off, and a voice counts down. The players are instructed to bring back the GLITCH-case to the cabinet they first got it from. That way it can be sent back to a location where it can safely discharge all its energy.

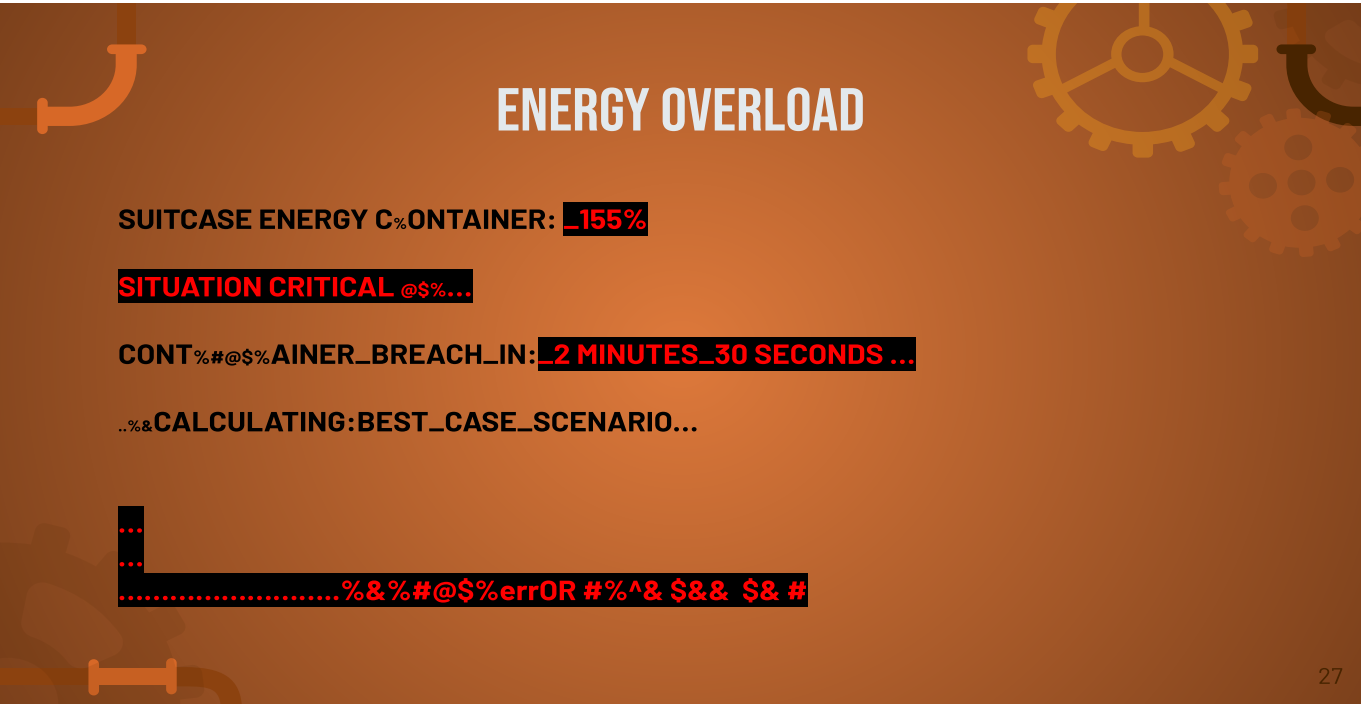
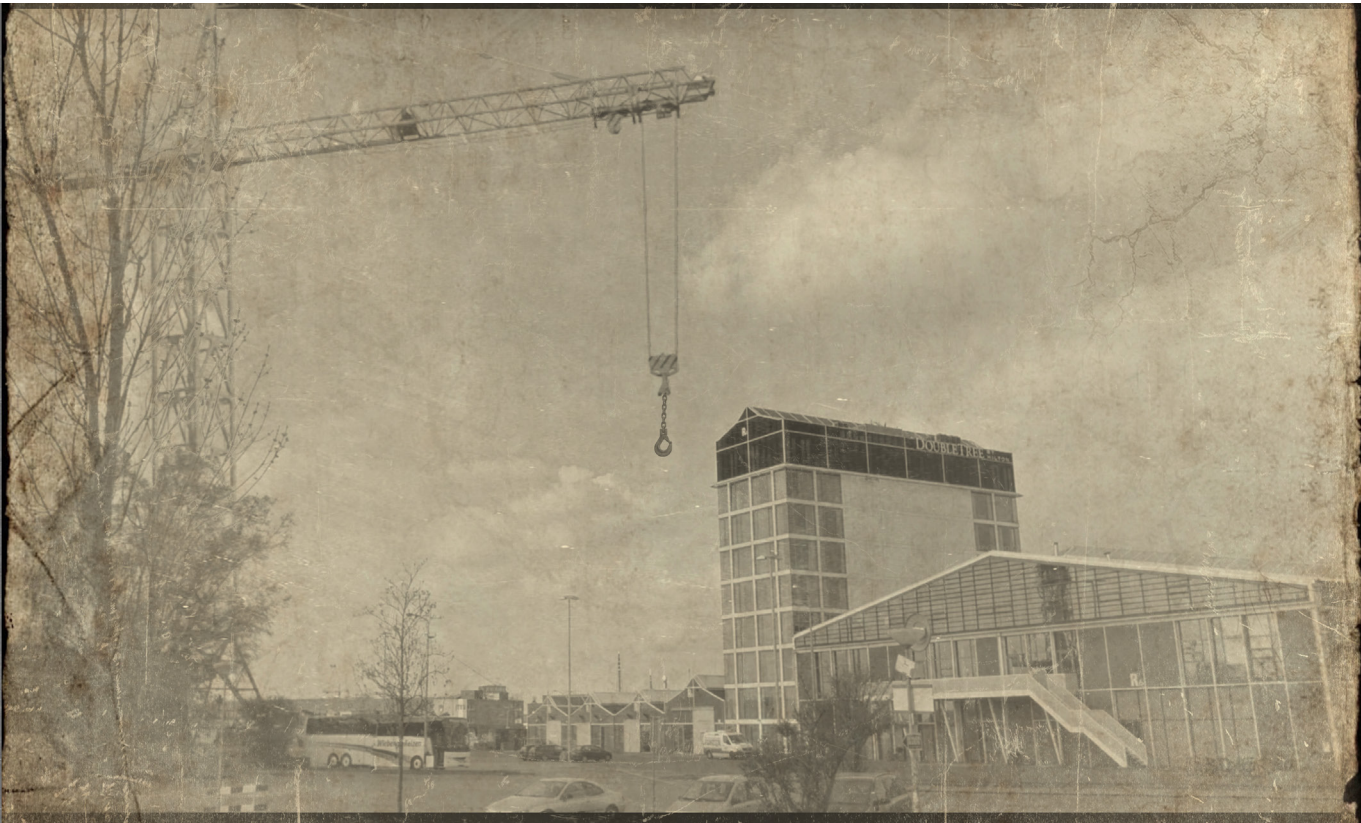
This means players are urged to run or walk quickly to the start of the game with the added stress of a suitcase that is full of energy. Also this is an excellent way to have them return the suitcase for the next group of players, without giving them the feeling as if this is a chore.

top >>

Figure 5.2.13, Old photo crane

bottom >>

Figure 5.2.14, Overload screen



PUZZLE ROUTES

Players will need to find the way around the NDSM by themselves. This will be possible by giving them puzzles to solve. Each route puzzle works with the same principle; a satellite view map of the NDSM wharf. However, how they figure out the location is different each time. As these puzzles are less narrative involved, they are a fun and quick way to send them to the next direction.

The first route challenge is a simple “X marks the spot” puzzle, as can be seen in figure 5.2.15. Players will recognize the ferry dock, and get to see the wharf from above.

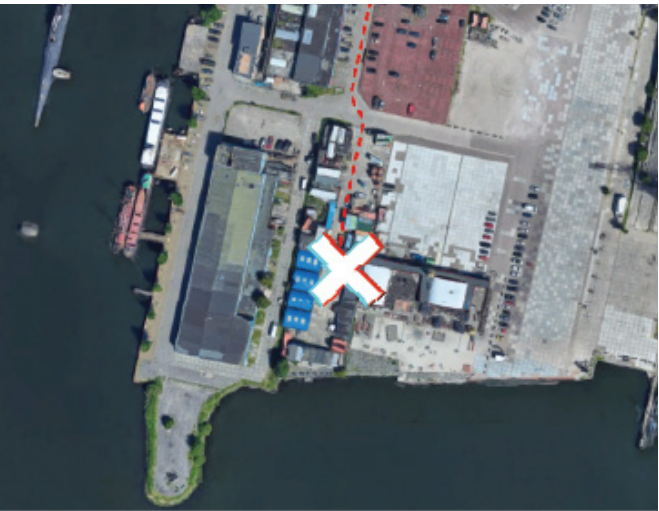


Figure 5.2.15, X marks the spot

The second route from the cabinet to the fridge will have the same satellite map, but this time there is a dotted overlay placed over it. The GLITCH-case will give the following code: “DATA MAP ROUTE *UP_U_U_U_U_U LEFT_L DOWN_D_D_D_D_D_D*”. The number of U, L and D tells how many dots they need to move to find the next location. This can be seen in figure 5.2.16. The third navigational puzzle will include the same dotted map, but this time a path is given by the suitcase. This path should be placed on the map, without having to walk over buildings. There is only one way this path fits on the chart that involves walking on the sidewalk. It can be seen in figure 4.2.2.



Figure 5.2.16, Dotted map puzzle

The last route puzzle will again use a satellite view, but this time a Venn diagram is placed over it (figure 5.2.18). With the table above it can be solved.

Green	True
Green Dash	False
Purple	True
Purple Dash	False
Pink	True
Pink Dash	False
Red	False
Red Dash	True

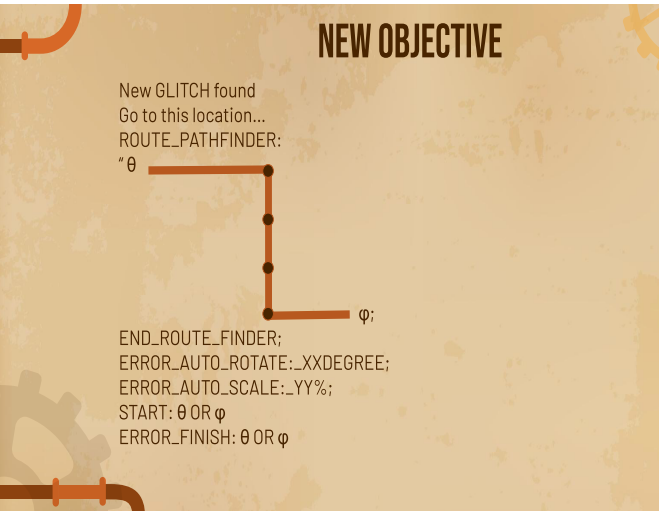
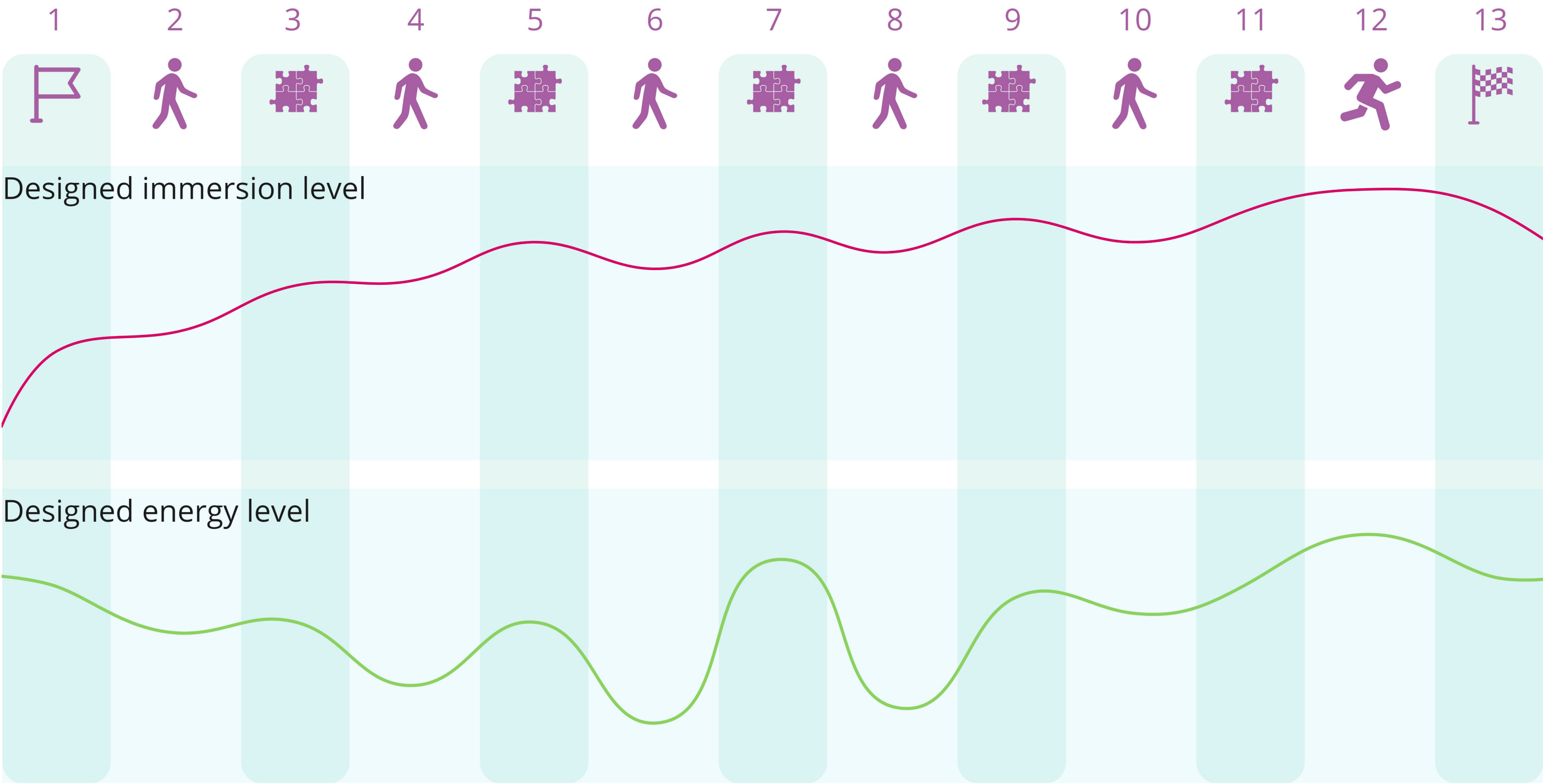


Figure 5.2.17, Pathfinder puzzle



Figure 5.2.18, Venn Diagram puzzle



DESIGNED EXPERIENCE

With the whole experience described in detail, it is time to look at the prediction of what the immersion level of players looks like, along with their energy levels. Figure 5.2.19 displays what is intended.

The red line represents the immersion, while the green line represents the player's energy level.

Legend

- | | |
|--------------------|---------------------|
| 1: pre game, ferry | 8: walking |
| 2: walking | 9: planters |
| 3: cabinet | 10: walking |
| 4: walking | 11: crane |
| 5: fridge | 12: running |
| 6: walking | 13: finish, cabinet |
| 7: pier | |

Figure 5.2.19, Intended levels of energy and immersion

CHAPTER CASE STUDY TEST, RESULTS & CONCLUSIONS

SIX

With the entire experience being designed and built, it is time to test it with the players. Two tests were performed and this chapter will discuss the test plan and the test itself. Also the results and conclusions drawn from them.

CHAPTER SIX, THE CASE STUDY TEST, RESULTS & CONCLUSIONS

6.1 TEST SETUP & TEST PLAN

For the test to be successful multiple participants were needed. Three people at Sherlocked were willing to help by testing the entire experience in the first test. In the second test three highschool students participated. Between the two tests small iterations were made, to see if the immersion level could already be elevated.

In order to focus on the things that are crucial for answering the research question, a test plan was made. It can be summarized by the following points, but can be read in full in Appendix G.

- When do they appear to be the most immersed?
- How do they divide the tasks?
- When is there engagement with the story?
- Are they enjoying it?
- What does their body language say?

A phone for photos, an action camera for video, and taking notes during the test were used to document everything. This made it possible to evaluate it at a later time.

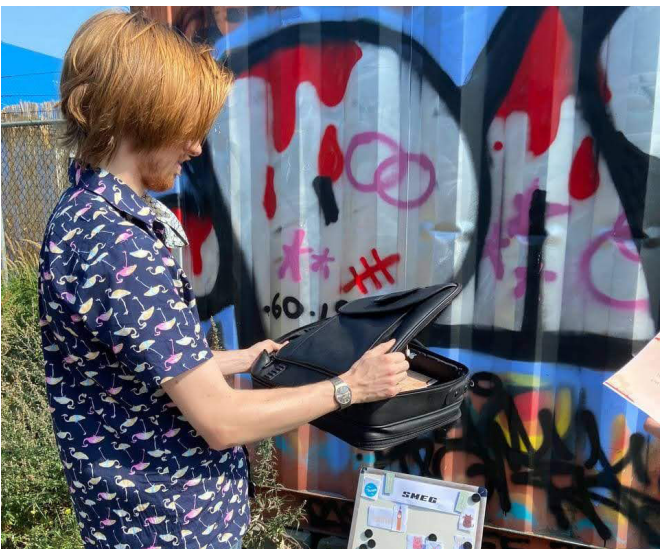
6.2 TEST DAYS

The two tests were both successful, as there were no major points where the players got stuck, or the game would break. There was some confusion with the first test during one of the route puzzles. As it turned out there were two ways to solve it, resulting in two different places to go. By dropping hints about the walking distance the correct path was chosen. This was altered in the second test to avoid the same confusion. Another time the first test group needed a push in the right direction was at the boat puzzle. Here the visuals proved not to be accurate enough, making them doubt what the right choice was. This also was altered for the second test. The pictures to the side show the first participants solving the different puzzles, and walking at the NDSM.

The way the narrative got told also differed from both tests. In the first test there was no screen present to show the narrative on. Therefore when players progressed in the story, a new sheet of paper with the next screen was put in the suitcase. Also after solving a puzzle, a button needed to be pressed inside the suitcase in order to let the suitcase know the puzzle was solved.

In the second test there was a digital screen present which told players when they could advance to the next screen. Also, an internet enabled Arduino was used to tell the GLITCH-case wirelessly when a puzzle was completed, and the programmed LED and meter reaction was needed (code in appendix H).

After the test everybody spoke enthusiastically about the experience they just had, and were extremely positive about the way it was set up for an initial test. Interviews and Miro templates were filled in by all test candidates which gave detailed feedback regarding positive and negative elements of immersion.



6.3 RESULTS; INTERVIEWS & TEMPLATES

To find out in depth what the participants thought of the experience, interviews with three of the participants were held. Furthermore all 5 of the 6 players filled in a template as well. Both the transcripts and these templates can be seen in Appendix I. The key points of the feedback regarding an immersive experience are divided into immersion enriching and decreasing factors.

POSITIVE FEEDBACK RESULTS

Suitcase

Receiving the suitcase was a fun and immersive experience, as it got players involved in the story. They really had the feeling that it got sent to them. This feeling also came to be after solving the first puzzle as that set off the meter and turned on the LEDs. This immersion enriching experience did not only occur at solving the first puzzle. Each time the suitcase responded to their actions, participants felt more immersed. Having a meter which told them how far they were in the story worked as an energy booster. As naturally towards the end the energy got lower, the fact that they knew it was over soon helped them. Lastly, the feeling that the case could overload also kept them busy, which started speculation over what could happen. Talking about the narrative helped keep them immersed.

Team roles

Having each member assigned a different role was perceived as a positive aspect of the experience. Talking about who will be responsible for what works great when players have to walk some distance. This way they keep talking about the experience itself. The three roles they could pick were also chosen right. To quote a player: Having a crowd controller was brilliant, that is why I picked it. Even the thought of having to do that was amazing, as it made me feel like a real player who was on a real mission.

Puzzles

Most of the puzzles had an overarching theme, this made players understand them quickly, and gave them more mindspace on how to solve them. Furthermore the puzzles required walking around, and using the surroundings. This was received as something that was fun to do, and surprised people in a positive way. These interactions with the real world made the story more fascinating and gave them an urge to really solve the glitch problem. Solving some puzzles together, and needing to work together strengthens their relationship.

The finale

After solving the last puzzle immersion rose to the highest level, as a chain reaction of events happened. The suitcase once again responded to their actions, the long thought of overload level was reached, and a voice counting down started. All this led them to be as immersed as possible, and gave a push to solve the game quickly. Both teams reached the cabinet with just seconds left, and that feeling of being just in time was considered amazing.

Other

The immediate start players get to experience is considered positive. From the first moment they get their gear, which indicates a clear start, they feel like they entered another narrative driven world. Furthermore, the use of objects that are already at the NDSM worked great for immersion, as these fit the theme and vibe of the wharf. Also walking across the wharf and looking around at all the artwork and urban style was something people enjoyed. Just as having a clear start, the clear finale was something that was appreciated, as everybody knew they reached the end and they finished the game successfully.

NEGATIVE FEEDBACK RESULTS

Also, a lot of critical feedback and points of improvement have been gotten regarding immersion, and the experience itself.

Pregame

The way the information got sent to the players beforehand was considered inadequate. Some players found the emails unclear, others found that there was too much information, or felt like they did not have enough information to start.

During game

During the game players found bits of the story unclear, and said that sometimes they did not know what they were doing. Also why they were doing it was not clear. The planter puzzle had no connection to the story, and felt therefore narrative wise out of place.

End game

After returning the suitcase to the cabinet, they received the message: "you saved the city". That felt anticlimactic and detracted from the final experience. One participant only figured out at the end what they were doing, and thus did not understand everything during the game.

Other

The middle part was harder energywise. This was also the place where players needed to walk the furthest, (350 meter). During this walk players complained that there were no touchpoints to the story. Lastly, as there were not that many people present at the wharf, the crowd controller did not have to use their role that much, which was considered unfavourable.

TEMPLATES

In the template, players were asked to fill in their level of immersion, which can be seen in figure 6.3.1. They were given the same definition of immersion that is stated in this thesis. The x-axis are divided into different parts, with the left being the start of the experience, and the right being the ending. The y-axis is the level of immersion. The lighter sections are the parts where players had to do the route puzzles and walk to the next location, and the darker parts were the glitch puzzles. Appendix I holds the entire templates. The figures are split up per test, as different kinds of participants played the game. The employees from Sherlocked are all into puzzles and look at such an experience with a different view. The highschoolers are part of the actual target group, and it is interesting to isolate their results for a closer look. The black line is the designed and anticipated level of immersion and energy.

It can be seen that the designed immersion and energy lines do not match with the participants' experiences. This is because there is a lot of immersion breaking feedback on elements that still can be improved. For an initial test the results are good enough to see that there is potential in reaching a total immersive experience.

- Legend
- 1: pre game, ferry

2: walking

3: cabinet

4: walking

5: fridge

6: walking

7: pier

8: walking

9: planters

10: walking

11: crane

12: running

13: finish, cabinet

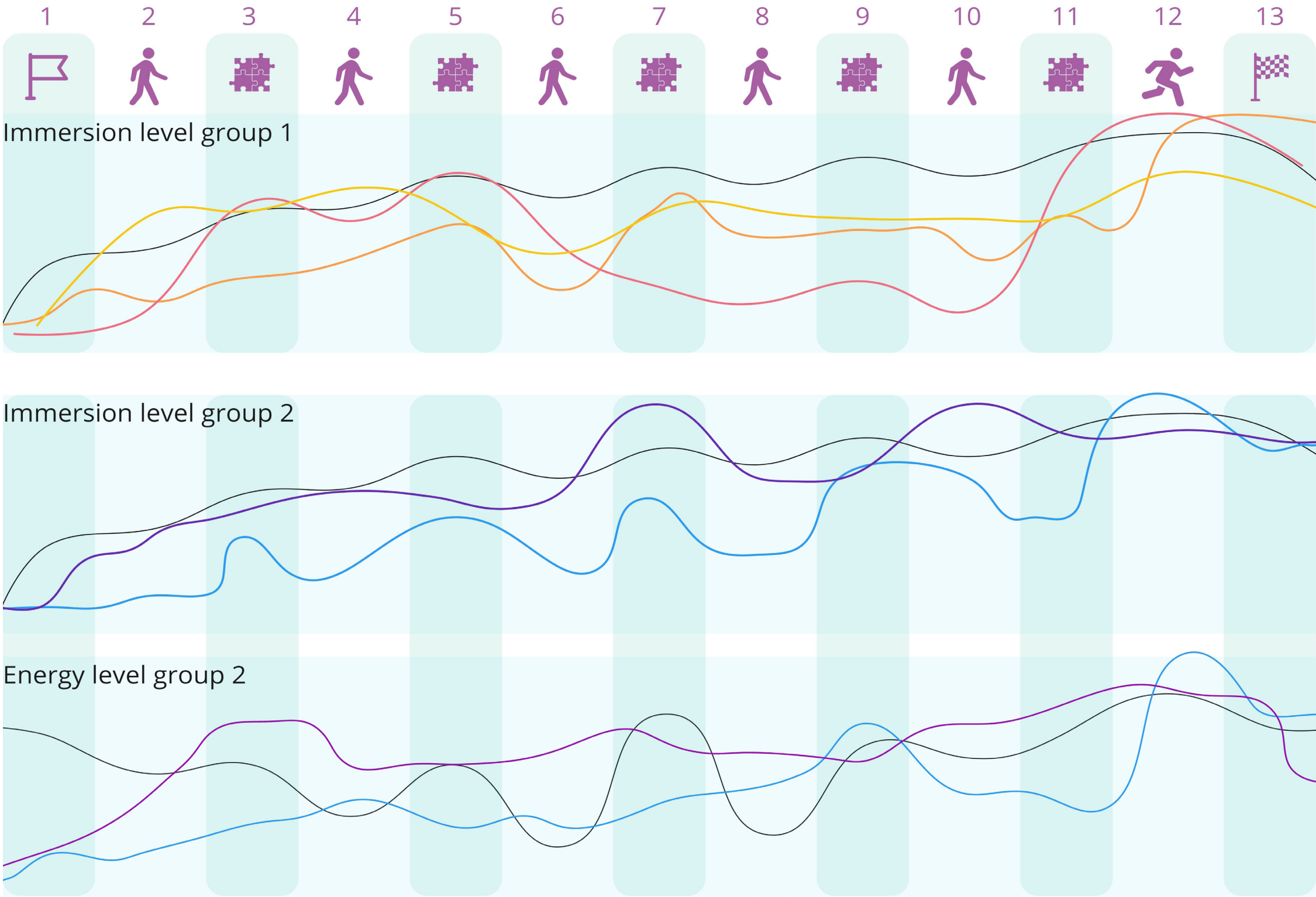


Figure 6.3.1, immersion and energy levels of test participants.

6.4 DISCUSSION OF THE RESULTS

The results from the case study proved useful as it gave an insight into what players would think of the entire experience. By having two different groups of participants, more feedback has been gotten on which the entire experience can be improved on. By already having small iterations between the two tests, the second test group did not need to get help during one of the puzzles. Also the fact that a screen was used for the narrative, along with no interruption to the suitcase by the testleader made for a more realistic experience.

It is not possible to compare the immersion level of both test groups to each other, as the participants were too different. Therefore it is impossible to say if the changes between the two tests had any positive or negative influence. The adult Sherlocked crew is daily working on puzzles and invested in immersive experiences, they cannot play the game unbiased. It will be wrong to compare their immersiveness with those of the 17 year olds, who form part of the actual target group. Their feedback on the different puzzles however can, and was combined.

6.5 CONCLUDING THE CASE STUDY

After the tests and evaluations, conclusions can be drawn on what does increase immersion, and what does not. Here, they are grouped in immersive enriching and degrading conclusions

IMMERSIVE ENRICHING

Running back with the suitcase counting down was ranked by four of the six participants as the most immersive part of the experience. The quote: "It feels like something bad will happen if we don't make it in time, so we have to hurry" indicates a good connection to the story. The time pressure makes the participants feel like they are the heroes of the story, and thus immersed in another reality.

Another big experience is the GLITCH suitcase they get. Just receiving it already builds towards a better immersive feeling as it is a physical touchpoint to the narrative, which is also discussed in the framework. However, it is not just interacting with it for the first time that helps them get pulled into the story, but often when they needed to use the suitcase, the immersion levels were raised (see figure 6.3.1). On top of that, the suitcase gave feedback on what they were doing; giving them the feeling they had a real influence on the story. Which resulted in a higher immersion. Furthermore, because the meter display had the word overload on it, participants were kept busy with what that would mean, and helped build excitement overtime with a big release when the overload stage was finally reached.

By being pulled into the story right in the beginning when they get the suitcase, players are immediately immersed, proved from the filled in templates. This abrupt change from the real world to the story was considered favourable. Same goes for the NDSM themed items that were used (in particular the cabinet). These fit the scenery and people were amazed that it was part of their experience as well.

Walking around on the wharf and seeing and being in control of a part of Amsterdam was considered cool and amazing, thus keeping people in the narrative.

IMMERSIVE DEGRADING

During the pregame, the communication was unclear which resulted in mixed and contradictory feelings among the participants. One would say that it was too much information, while others found they needed more context and felt they were missing information at the start. This is a crucial step to get right, as it is the first interaction they have with Sherlocked and the experience. More tests are needed to find out what the right amount of information is, and how to phrase it, making it not too long and complicated, but at the same time sufficient for the gross of players to start the experience with confidence.

During the game, the feedback regarding the story was that it was sometimes unclear. Questions that were asked were: what are we doing and why? For the narrative and plot it is okay to have questions, as not all the information is to be revealed in the beginning, in an effort to create suspense. However, during the test it got people out of their immersion. Therefore it needs to be clear what they are doing, and why they are doing it.

Furthermore, one of the puzzles didn't connect to the story, but was considered fun and exciting (see figure 6.3.1) because of the teamwork and clever use of surroundings. This was interesting as people were questioning how it tied in with the rest, but still stayed immersed and enjoyed solving the puzzle. This gave the insight that the story does not have to be strongly present all the time. As long as people are having fun and kept busy, they will stay connected to the experience.

At the end of the game players felt anti-climactic after getting the message:

“Congratulations, you saved Amsterdam”

This happened because players did not feel like Amsterdam was in danger. This also needs to change, as the ending of the experience is considered to be the most immersive part, getting a message that feels out of place will do the experience no good. One participant said: “ah so that’s what we were doing”. This was caused by insufficient storytelling during the pre-game and should thus be a focus point.

Furthermore, feedback was received regarding part of the route. Between the 2nd and 3rd puzzle players need to walk for 5 minutes, which is the longest they have to walk continuously. As during the walk no touchpoint with the story happened, energy levels dropped. This got people out of the experience and should be improved upon. By moving the fridge puzzle, and changing the order of the puzzles, it is possible to get rid of this large walking part.

Lastly, as players were enthusiastic about getting a role, it was a letdown that they did not really need to use it. Because they were hyped about choosing a role, it is a missed chance to not use this more, in turn making them even more immersed. Extra props could be introduced to their team role, to enhance the immersion. This can be useful during times players do not interact with the puzzles. The team roles can be a good way to give people a bit of a background. Also, dividing the team helps them to get involved in the story. One role in particular is important to mention: The crowd controller. The participant who had taken this role upon themselves felt like an important person, and only the thought of having to control a crowd was enough to make their experience better.

CHAPTER
CONCLUSION
SEVEN

With the literature study, escape room evaluations and the NDSM case study being done, it is time to conclude how to design for immersion and answer the research question which was:

“How can immersion be achieved in an outdoor experience, using synergy between story, puzzles and location?”

CONCLUSION

By comparing all the findings from the literature, evaluations and the case study, an answer can be formed on how to create an immersive outdoor experience. It proved that both location, narrative and puzzles/interactions influence the perceived immersion of players. The question is however, how does each role add to an increase in immersion, and how to design an immersive outdoor escape experience, with these terms as ingredients.

LOCATION

To start off with the location, the following design guidelines should be kept in mind for creating an outdoor experience. According to the results from the Mystery City evaluation and case study, the time players need to spend to reach the next location should not exceed 5 minutes. Walking for a couple of minutes will be noticeable in the player's energy and immersion level. This is branded the worst case of an experience as each walk, even a short one, lets the immersion drop. There are luckily ways to deal with this. By finding an outdoor place that is small enough to fit the entire experience this problem gets eliminated. Furthermore, participants should be given a task during their walks, as that keeps them immersed, and involved in the experience (proven from Mystery City and case study).

Using the surroundings of a location is considered immersive and preferred, based on the case study. Furthermore, when the physical game objects that are located at the location feel a bit out of place, it is immersion enriching, as proven by the case study. However, these objects must not be completely the opposite of the style and vibe of the location, as long as some connection can be made.

NARRATIVE

The narrative does not have to be a realistic one, however it should be compelling where players play the main part (case study). To start an experience, the following questions should be clear for players: what are we going to do, what happens if we do not succeed, what is the bigger picture (case study). People also want to be immersed in the story, as they enjoy getting a role, and want to use that role during the game. The entire game should not be longer than 90 minutes, as people will get tired, their energy level drops and stop caring about the narrative.

PUZZLES & INTERACTIONS

Puzzles are a way to progress through the story and should feel logical. If players do not understand what interaction they must do, their immersion will fall, bringing them back to the real world where they will start realising what they are doing is just a game (Mystery City). If the puzzles cause physical changes, their immersion level rises and players having the feeling they are the cause of these changes was favourable (case study). These changes could be happening to the puzzle itself, or an object they will carry with them. The puzzles should all have a matching theme, this makes them recognizable, and gives more mindspace to solve them (case study). Working together as a team to solve a puzzle was considered immersive as well (case study).

SYNERGETIC RELATONS

A link between story, puzzles and location is needed to stay immersed, as is proven by the literature and The Vault analysis, what does this synergy look like?

Puzzle, interaction vs location

There are multiple strong relations between puzzle and location, the puzzles should be included into the story, and hold a reference to it (The Vault). However, there is an order in designing the puzzles as they will need to be inspired and extracted from the location. Meaning, thinking of a puzzle and then scouting a location will work less immersive (case study).

As an outdoor experience involves walking from location to location, there should be made use of this. A pathfinding puzzle works for players, giving them the feeling they have solved something important. Compared to just giving the entire route, it makes the time spent walking feel less of a chore (Mystery City).

Puzzle vs narrative

The relation between puzzle and narrative is ambiguous, as the puzzles should make sense within the narrative. If not, people will start getting distracted by the real world, what they are doing, and thus get less immersed (literature research). However, from the case study, it proved that the puzzle with a weak connection to the narrative was never considered the least immersive one. The fact that players needed to work together to solve it was enough to keep them invested in the game. Thus the alibi of a puzzle is less important than the interaction itself. If players enjoy the puzzle, they unconsciously are forgiving and stay immersed.

Location vs narrative

It adds to the experience if the location has something unusual to it, as then the story can be interesting. Designing a story for an average street is possible however, but harder to sell to people. Furthermore, when players are walking, it would be ideal if they start talking about the story, as that makes them more immersed

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APPENDIX

APPENDIX A, MIRO BOARDS

APPENDIX A, MIRO BOARDS

Excitement



Thrilling



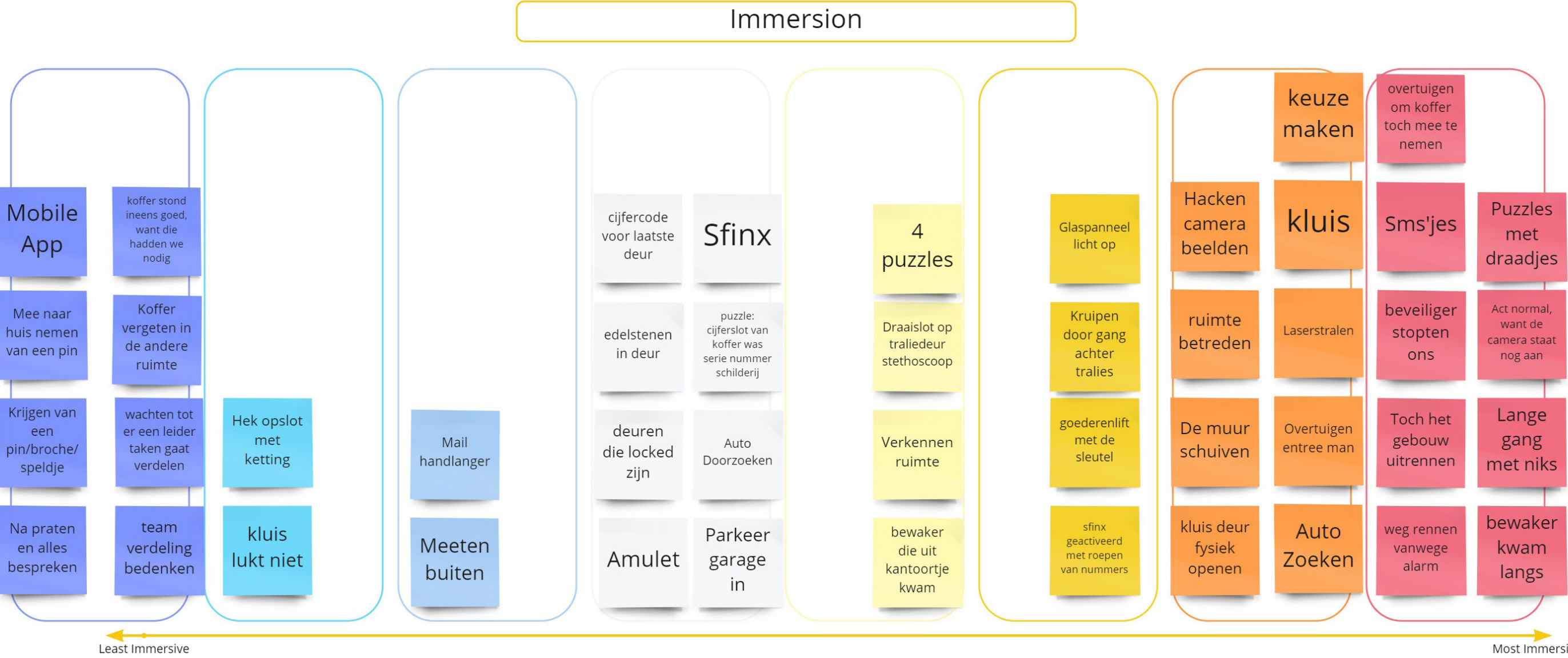
Dull, Boring



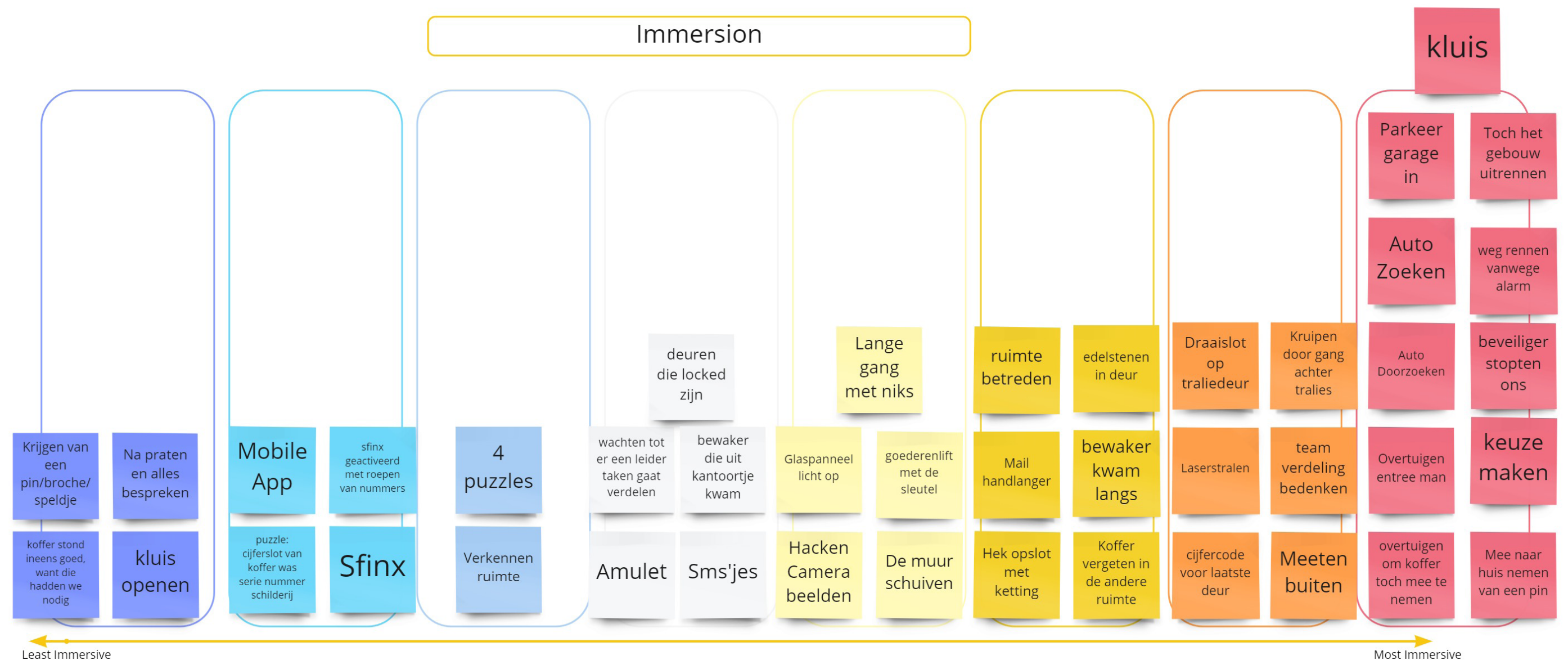
Confusion



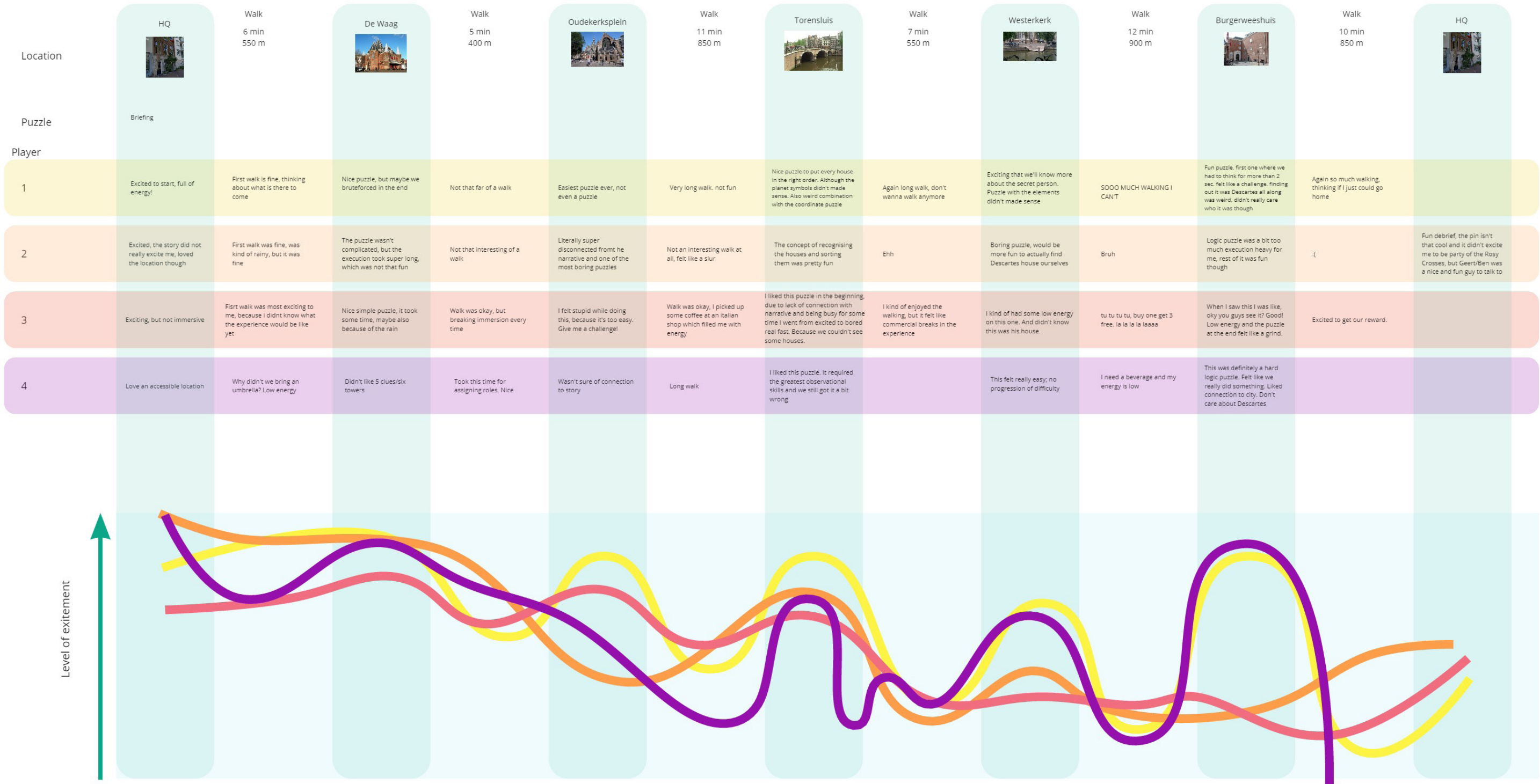


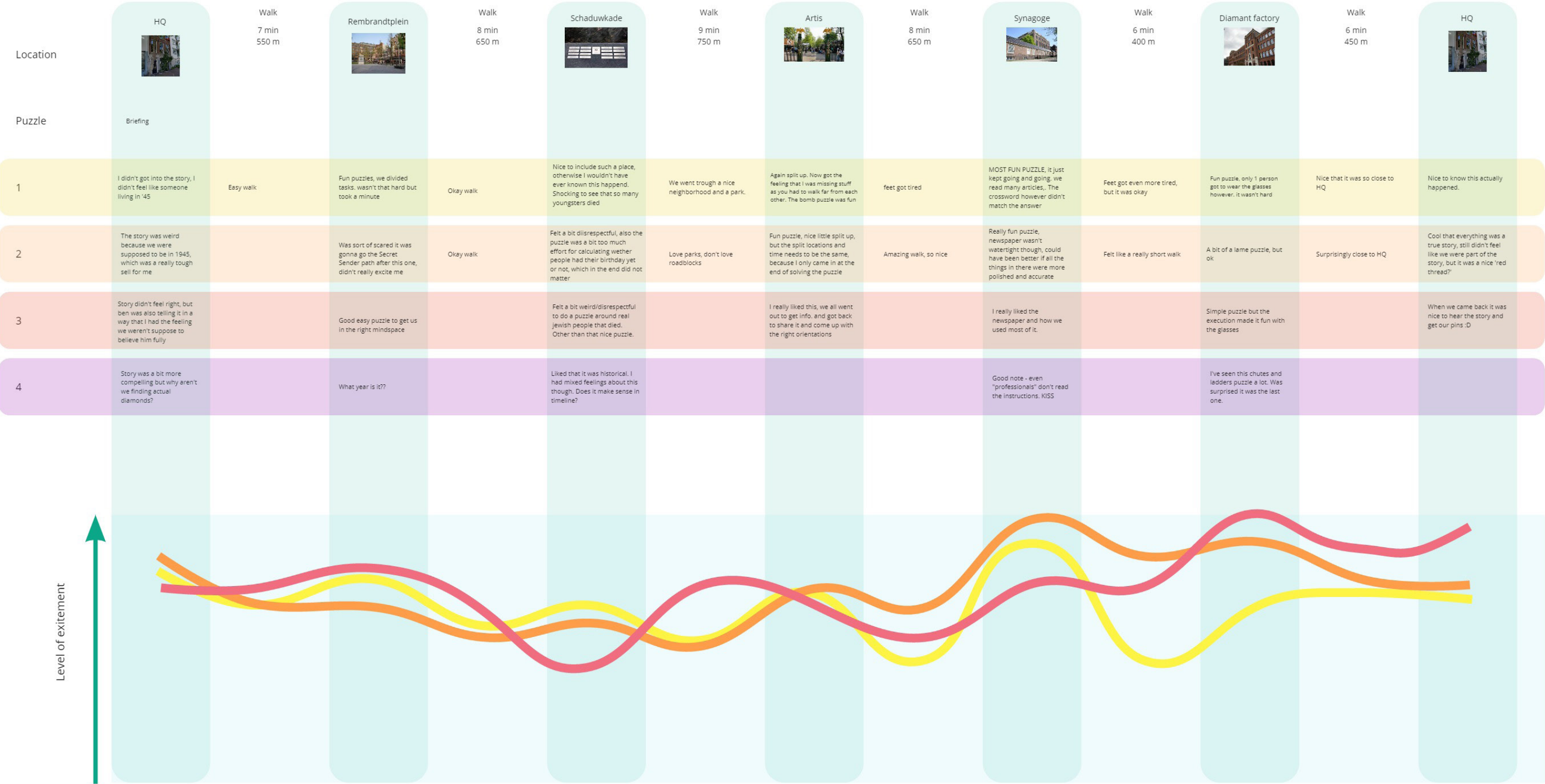






APPENDIX B, MYSTERY CITY EVALUATION





APPENDIX C, MINDMAPS



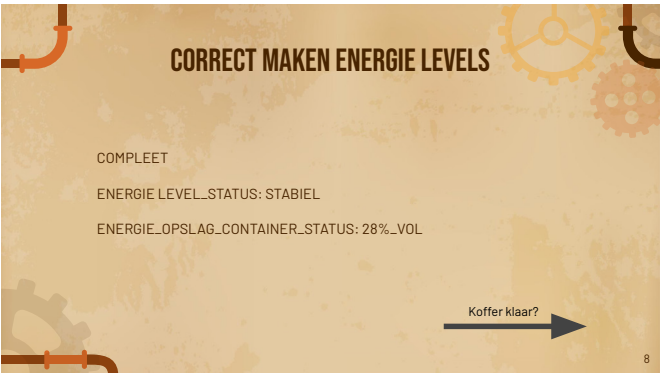
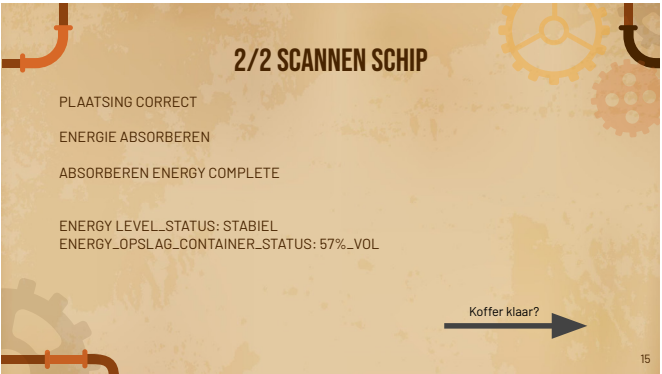
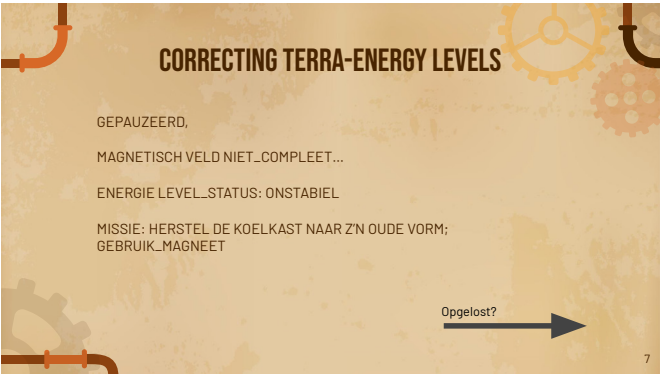
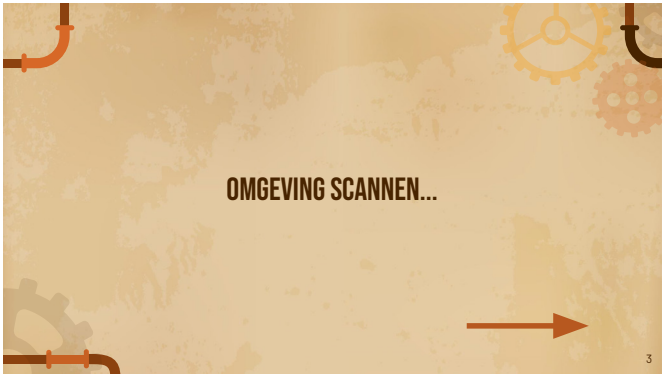
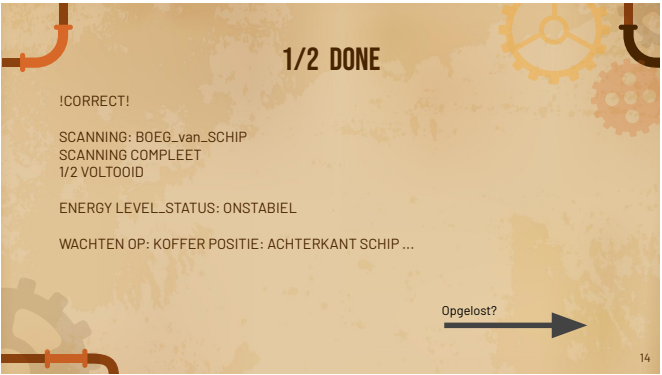
APPENDIX D, BRAINSTORM

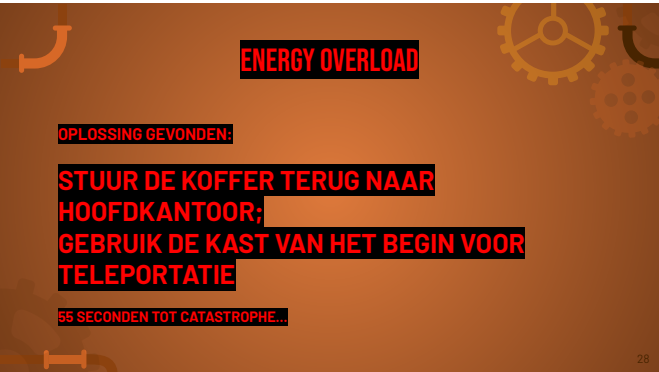
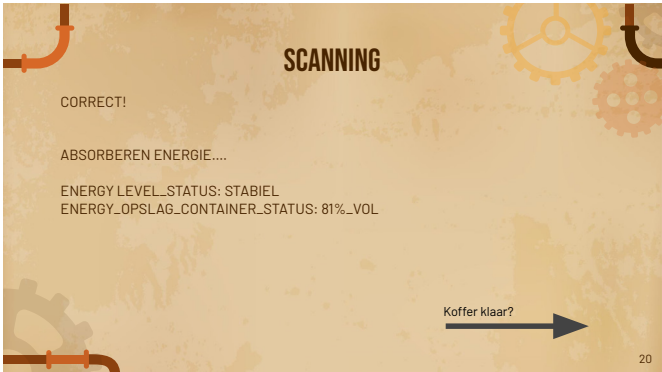
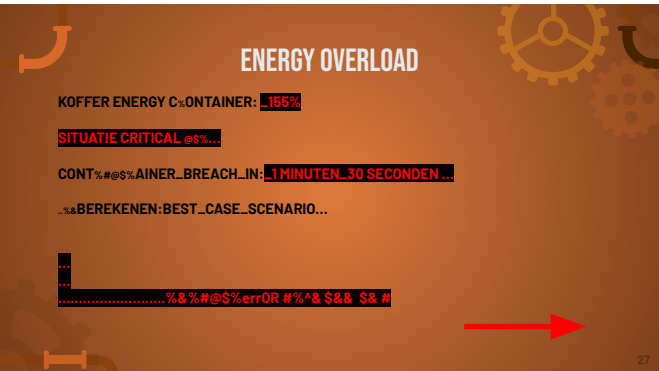


APPENDIX E, LIST OF GLITCH RULES

- There is no such thing as a clean glitch, they appear in a messy and chaotic way.
- Each time an object glitches it produces a distinctive visual identity/has a distinctive pattern. So that people will know that it is glitched. Such as:
 - Purple Goo
 - Holographic foil
 - Geometric shapes all around it
 - Polyurethane foam (Purschuim)
 - Maybe artist can help us, give them the object and they glitchify it
- The glitched objects didn't travel through time
- The glitched objects are not enlarged or shrunken.
 - However, when there is a fun interaction or a good alibi I can convince Vic
- A glitched object can also only be partly glitched. Like the crane
- The glitched objects don't have to be in perfect conditions
 - There can be graffiti on them
 - Be already be broken down
- A glitched object that contains electronics can work,
 - The power is coming from the glitch itself
 - It doesn't function as normal, but flickers
- The glitched objects shouldn't just be touched
 - Don't blame us if you do touch it, and your hair will turn blue in a month
 - Don't touch it, as we don't know what happens
 - If you eat a TicTac, you're protected against the side effects of touching it
- The glitches need to be fixed because
 - It will exponentially build up
 - Back to normal, who wants that
 - Dangerous energy
 - If this energy is left unchecked all goes to shit
 - If it is not fixed, it will be bad.
- The glitched objects can be fixed by:
 - An amulet that will get rid of the bad glitch energy
 - A digital scanner that will absorb the energy. (must have a progress bar)
 - The object is changed, so by unchanging it / fixing it, it will become harmless
 - Use the object as normal again, for it to remember what object it was (should not be boring though)
 - Different objects have different needs. It depends on the object how to fix it. People would need to figure it out themselves.
 - In their starting kit they have all the necessary tools to fix every glitch, question though, is it a spoiler or is it anticipation.
 - Backpack (like in ZiGZAG tv show)
 - Keychain
 - briefcase

APPENDIX F, SCREENS





APPENDIX G, TEST PLAN

Basic test plan

Wat wil ik testen

- Snappen ze de puzzels
- Hoe is de teamverdeling
- Zitten ze er “in”
- Wanneer zijn de participanten het meest immerst

Waar ga ik op letten?

- Hoe snel zijn ze afgeleid?
- Wanneer is er engagement met het verhaal
- Hoe vaak hebben ze het naar hun zin

Tools die ik ga gebruiken

- GoPro
- Foto’s
- Interview achteraf
- Template laten invullen

APPENDIX H, ARDUINO CODE

```
#define WIFI_SSID "****"
#define WIFI_PASSWORD "****"

#include <FastLED.h>
#define DATA_PIN D1
#define LED_TYPE WS2812
#define COLOR_ORDER GRB
#define NUM_LEDS 51
#define BRIGHTNESS 80
CRGB leds[NUM_LEDS];

#include <Servo.h>
Servo myservo;
#include "FirebaseESP8266.h"
#include <ESP8266WiFi.h>
#define FIREBASE_HOST "****.firebaseio.com"
#define FIREBASE_AUTH "****"
FirebaseData firebaseData;
FirebaseJson json;

int servoStartPos;
const long interval = 250;
unsigned long previousMillis = 0;
int currentPosition = 180;
int counter = 0;
int servoPos2 = 180;
int servoTarget;
unsigned long currentMillis;

int random1;
int random2;
int random3;
int puzzleNumber = 0 ;
int puzzleNumberNew;
byte nieuweFirebaseWaarde = 0;
byte ledsGo = 0;
int trilMotorPin = D3;

void printResult(FirebaseData &data);

void setup()
{
  Serial.begin(115200);
  WiFi.begin(WIFI_SSID, WIFI_PASSWORD);
  Serial.print("Connecting to Wi-Fi");
  while (WiFi.status() != WL_CONNECTED)
  {
    Serial.print(".");
    delay(300);
  }
  Serial.println();
  Serial.print("Connected with IP: ");
  Serial.println(WiFi.localIP());
  Serial.println();
  Firebase.begin(FIREBASE_HOST, FIREBASE_AUTH);
  Firebase.reconnectWiFi(true);
  firebaseData.setBSSLBufferSize(1024, 1024);
  firebaseData.setResponseSize(1024);
  Firebase.setTimeout(firebaseData, 1000 * 60); //Set database read timeout to 1 minute (max 15 minutes)
  Firebase.setWriteSizeLimit(firebaseData, "tiny");

  myservo.attach(D2);
  myservo.write(180);

  delay(2000);
  FastLED.addLeds<LED_TYPE, DATA_PIN, COLOR_ORDER>(leds, NUM_LEDS).setCorrection(TypicalLEDStrip);
  FastLED.setBrightness(BRIGHTNESS);
  pinMode(trilMotorPin, OUTPUT);
}

//-----LOOP-----//
void loop()
{
  currentMillis = millis();
  readingFB();
  ledStrip();
  meterCode2();
  delay(500);
}

//-----FUNCTIONS FIREBASE-----//
void readingFB() {
  Serial.println("begin readingFB");
  if (Firebase.getInt(firebaseData, "/Sherlocked/puzzle/")) {
    puzzleNumberNew = firebaseData.intValue();
    if (puzzleNumberNew != puzzleNumber) {
      puzzleNumber = puzzleNumberNew;
      nieuweFirebaseWaarde = 1;
      ledsGo = 1;
    }
  }
}

//-----FUNCTIONS SERVO-----//
void meterCode2() {
  switch (puzzleNumber) {
    case 0:
      servoTarget = 180;
      myservo.write(180);
      break;

    case 1:
      servoTarget = 150;
      for (servoPos2 = servoTarget; servoPos2-- > 0) {
        myservo.write(servoPos2);
        delay(20);
      }
      servoPos2 = servoTarget;
      break;

    case 2:
      servoTarget = 120;
      for (servoPos2 = servoTarget; servoPos2-- > 0) {
        myservo.write(servoPos2);
        delay(20);
      }
      servoPos2 = servoTarget;
      break;

    case 3:
      servoTarget = 90;
      for (servoPos2 = servoTarget; servoPos2-- > 0) {
        myservo.write(servoPos2);
        delay(20);
      }
      servoPos2 = servoTarget;
      break;

    case 4:
      servoTarget = 60;
      for (servoPos2 = servoTarget; servoPos2-- > 0) {
        myservo.write(servoPos2);
        delay(20);
      }
      servoPos2 = servoTarget;
      break;

    default:
      myservo.write(180);
      servoPos2 = 180;
      break;
  }
  myservo.write( random (servoTarget - 2 * puzzleNumber, servoTarget + 2 * puzzleNumber));
  nieuweFirebaseWaarde = 0;
}

//-----FUNCTIONS LED'S-----//
void ledStrip() {
  int ledDelay = 630;

  if (puzzleNumber == 4) {
    for (int j = 0; j <= 10; j++) {
      for (int i = 0; i <= NUM_LEDS; i++) {
        digitalWrite(trilMotorPin, HIGH);
        // Serial.println(ledDelay);
        leds[i] = CRGB(165, 0, 255);
        FastLED.show();
        FastLED.delay(20);
        ledDelay--;
      }
      for (int i = 0; i <= NUM_LEDS; i++) {
        random1 = random(30, 255);
        random2 = random(0, 40);
        random3 = random(30, 255);

        leds[i] = CRGB(random1, random2, random3);
        FastLED.show();
        digitalWrite(trilMotorPin, LOW);
      }
      ledsGo = 0;
    }
  }

  if (ledsGo == 1) { //If de waarde is veranderd
    for (int j = 0; j <= 10; j++) {
      for (int i = 0; i <= NUM_LEDS; i++) {
        digitalWrite(trilMotorPin, HIGH);

        // Serial.println(ledDelay);
        leds[i] = CRGB(165, 0, 255);
        FastLED.show();
        FastLED.delay(ledDelay / 30);
        ledDelay--;
      }
      if (j < 10) {
        for (int i = 0; i <= NUM_LEDS; i++) {
          leds[i] = CRGB(0, 0, 0);
          FastLED.show();
          digitalWrite(trilMotorPin, LOW);
        }
        digitalWrite(trilMotorPin, LOW);
      }
      ledsGo = 0;
    }
  }
  else {
    if (puzzleNumber != 0) {
      for (int i = 0; i <= NUM_LEDS; i++) {
        random1 = random(50, 50);
        leds[i] = CRGB(100 + random1, 0, 155 + random1);
        FastLED.show();
      }
    }
  }
  if (puzzleNumber == 0) {
    for (int i = 0; i <= NUM_LEDS; i++) {
      leds[i] = CRGB(0, 0, 0);
      FastLED.show();
    }
  }
}
```

APPENDIX I, INTERVIEWS & MIRO TEMPLATES

Interview Participant 1

Wat vond je van de ervaring?
Waar moet ik beginnen, ik vond het heel leuk. Mijn rol is als participant. Het uur en kwartier vloog voorbij, na een uur dacht ik ik ben er semi klaar mee. Qua puzzles vond ik het goed dat het veel verschillende mechanics had. Zoals de kaart die steeds terug kwam, maar in verschillende vormen. De flow kwam er toen goed in, want dat gedeelte was steeds hetzelfde, maar wel met een andere opzet. Dat werkte heel leuker en kwam ik er goed in.

Buiten ben ik snel afgeleid, dus een structuur is heel fijn. Ik vond het lekker om afgeleid te zijn, er was niet veel haast, dus op je gemak rondkijken.

Wat was de leukste ervaring?
De puzzel die het meest bijleef was de koelkast, omdat die zo out of place was. Qua interactie was het toen de koffer in overload ging.

Waarom was dit het leukst?
De anticipatie van de wijzer die op overload kon gaan. Ik was de hele tijd bezig met wat er zou gebeuren als het in overload gaat. Het is leuk en spannend als het dan gebeurt. Ik heb niet nagedacht wat er zou gebeuren als de teller op 0 komt. Ik wilde gewoon op tijd zijn

Welke stap kon er beter
Het overarching verhaal kan beter, wie zijn wij, wat doen wij precies, de begin textjes waren vrij lang. Ik lette niet op tijdens de begin textjes. Op de locatie kwam ik aan met weinig info. De lading van de dingen die ik aan het het doen was, was niet heel duidelijk. Ik vroeg me af waarom we dit aan het doen waren.

De informatie: jullie hebben amsterdam gered had geen lading voor mij, ohhh dat was ik dus aan het doen. Hoe breng ik het verhaal over. Het verhaal is verder prima, niet onnodig complex. Maar het mag meer benadrukt, met visuals.

Het plaatje van de hijskraan was een grote sprong. Aan het begin plaatjes laten zien van wat er mis gaat. Toen ik de foto zag dacht ik oohhh, dit is heftig. Bij meerdere stops/objecten foto's laten zien. Ook ludiek, dat je ergens de andere helft van de koelkast bij iemand thuis zit.

Ik heb niet geweten waarom je nu eigenlijk dit doet, en ik weet niet wat de energie is. Terra energy was heel vaag. Wat is terra energy, leg dat uit. Aan het begin wil ik uitleg wat de terra energy is. Als je er een rampjaar kiest, verder terug in de tijd. Naar 1900 ofzo. Amsterdam is in 1700 afgebrand, misschien kan je dat gebruiken.

Wanneer zat je er helemaal "in"?
Dat begon toen we rollen moesten verdelen. crowd control is echt briljant. Toen ik een rol had, voelde ik me alsof ik iemand was, en wat te doen had. Een ander moment was moment dat je je koffer hebt, en het kastje gaat trillen.

Toen de koffer ging afhellen, wow er gebeurt iets. Elke keer dat de koffer iets deed, dat die reageerde op ons handelen. Elke keer dacht ik velt hij reageert en het heeft effect wat we doen. Ik voelde me gewoon excited, en happy. We waren gewoon lekker buiten, het verhaal is niet super zwaar, maar gewoon leuk, ook beetje onnozel. Dat zorgde voor een goede sfeer.

Welke rol had je op je genomen en hoe heb je die gebruikt?
Nou, want er was niemand, maar ik heb er wel goed om kunnen lachen. Wat ik gister ook zei, als er meer mensen zijn, kunnen er 2 mensen crowd control zijn. (checken of mensen het leuk vinden om mensen te managen). Ik zou het leuk vinden om probs te hebben.

Hoe vond je het gebruik met de bot?
Het switchen tussen appen, en input in de koffer leveren vond ik lastig. Ik zou het liever allemaal in de koffer hebben. Alles op een plek houden is beter. Dan heb je ook controle of mensen foto's sturen of niet. Je moet hem ook een naam geven. Wat ook kan is dat je mensen dwingt 1 telefoon te gebruiken, en daar een rol voor geven. Of een vakje in de koffer waar ze moeten kiezen welke telefoon daar in gaat. En dat gebruiken ze hun eigen telefoon, maar zit die in de koffer.

Wat had je graag anders gezien?
De pre-game communicatie en introductie van het verhaal was niet duidelijk. Ook hebben de puzzels finetuning nodig, maar dat kan je zien hoe wij dat gedaan hebben. Als de flow er echt goed in zit, zou er misschien ruimte zijn voor een extra puzzel, maar voor jou scope is dit genoeg.

Welke puzzel werkte het beste?
De magneet puzzel werkte het beste. Ik ben heel slecht in topo, maar wel visueel ingesteld. Ik zie snel het hele plaatje. De variatie met de kaart was heel leuk, ook het grid. Het niveau van de puzzles was goed.

Voor de doelgroep voor gezinnen was dit perfecte moeilijkheidsgraad. Nu was die een uur en een kwartier, als die langer was, had ik pauze genomen. Daar heeft de meter echt goed bij geholpen, omdat die steeds aangaf hoe ver we waren.

Welke puzzel werkte minder?
Het minst leuke vond ik met de z-vorm de route vinden. Ik snapte niet hoe we hadden kunnen weten hoe die precies moest.

Remarks
Denk na over, wat als het regent, heeft dat effect op puzzles, plezier. In de regen kan het ook best leuk zijn. In een algemene introductie kan staan: check het weer als je hier komt en trek goede schoenen aan. Chapeau voor hoe je het hebt opgezet, als eerste test.

Laat ook Ewa laten testen, in een team van vier. Dan kan ze meteen aangeven als iets echt niet kan, of andere goede feedback.

Interview Participant 2

Wat vond je van de ervaring?
Nice, ik was nog nooit daar geweest, was leuk om dat gebied te zien. Leuk om gericht rond te lopen. Het weer was nice, dat hiep zeker mee. De coole effecten waren er nog niet, dus moesten we ons inleven. De dingen die er wel waren, de puzzles, de koffer, rollen verdelen, dat zat allemaal goed in elkaar. Er zat humor in, dat was leuk, we hebben gelachen. De interacties waren hier en der... tja, er zaten haken en ogen aan. Je haalde ons soms uit de ervaring. We moesten originele dingen doen, en heb veel puzzles nog niet eerder gezien. Dat maakte dat ik er lekker in zat. Begin was ik excited, in het midden zakte m'n energy. Dit kwam omdat we ver moesten lopen, wat niet heel erg was. Er waren geen touchpoints met het verhaal tijdens de langere afstand. Ik was toen aan het afdwalen. De puzzle daarna kreeg ik niet veel energie van. Toen we de kapotte kraan moesten fixen ging m'n energy weer omhoog.

Wat was de leukste ervaring
Er zijn twee momenten die ik heel leuk vond. Die hele laatste puzzel met die kraan uitvogelen en een stuk rennen daarna. En iemand verantwoordelijk maken voor crowd control was echt leuk.

Waarom was dit het leukst?
Bij de kraan: leuke puzzle, goed van de omgeving gebruik gemaakt, het geeft een gevoel dat je in de echte wereld iets doet. En het rennen is ook leuk. Goede stress die je daar van krijgt. Crowd control: het is grappig dat er iets gaat gebeuren dat helemaal niet gaat gebeuren. Vaker moet je rollen verdelen, maar crowd control is er helemaal niet dan.

Welke stap kon er beter
Dat lange stuk wandelen haalde mij eruit, of met een tussenstop of op iets letten onderweg zodat je bezig bent met het spel zou al helpen. Nu is het was basically een kwartiertje pauze. De prototypes zouden nog beter kunnen. De boot puzzle was niet duidelijk wat voorkant en achterkant was. En het anker wat er ligt zit niet in de graphic. De touwtjes leken op akers, maar dat was niet. De koelkast puzzle was leuk.

We hadden twee interfaces, waarom was er een bot die niet heel behulpzaam was. Bot liever er helemaal uithalen, of grotere rol geven. Hoe werkt het als je geen losse blaadjes meer hebt? Nu gingen we overal op tekenen. Het tellen van de nummers vond ik ver gaan, we moesten echt tot 36 tellen. We hoefden achteraf niets te doen met de plantenbak, storywise is dat vreemd. Het einde, als je de koffer erin deed, zei de bot: gelukt! De stad is gered, dat was antiklimax. Wat kan is mogelijk een filmpje van glitch objecten die verdwijnen, of een nu.nl artikel waarin staat dat het is opgelost.

Wanneer zat je er helemaal "in"?
Toen we de koffer hadden, en rollen verdeelde toen zat ik er redelijk in. Ook toen we naar de koelkast gingen. De s-vorm route vinden ging ik eruit. Ook de boot puzzel die niet soepel vertielp hielp ook niet mee. Bij de kraan zat ik er weer in. Wat beter zou kunnen is als we aan

het begin wisten wat we nou eigenlijk aan het doen waren. Via telegram zou je de halve gebroken kraan foto met ravage kunnen sturen.

Welke rol had je op je genomen en hoe heb je die ervaren?
Ik was de hardware specialist, gekozen omdat ik het leuk vind om aan alle knopjes te zitten. Niet echt ervaren, tot ik erop gewezen werd door de andere. Ik had het grappig gevonden als je iets meer met je rollen moest doen. Dat je rol een differentiërende mechanic had gehad. Maar dat is meer een leuke puzzel mechanic, dan dat het me in het verhaal trekt.

Hoe vond je het gebruik met de chat bot
Ik denk dat die of alleen maar emergency contact moet zijn, of meer het verhaal intrekken. Het voelde als een chore om hem ook nog te laten weten waar je bent. Als je echt vast zit is het fijn als iemand contact op kan nemen.

Wat had je graag anders gezien?
Die wandeling ergens in het midden, en de boot puzzle.

Lengte van the total experience:
De lengte was goed. Ik was na de planten door m'n energie heen. Van de kraan kreeg ik wel weer energy, maar ik was blij dat het daarna klaar was.

Lengte van het lopen
De loopafstand was helemaal okay, zeker niet te lang, had evt nog wel langer gekunt. We hebben heel weinig dubbele routes gelopen, dat was fijn.

Welke puzzel werkte het beste?
De kraan puzzle. Ik vind de perspectief puzzel leuk. Bij de plantenbak puzzle was het ook wel leuk om samen te werken. Bij de S curve had ik snel een idee waar we heen moesten zijn, maar ik wist het niet zeker. Dus het was niet duidelijk dat we het goed deden

Remarks
Dat stukje rennen was, tja we moesten best door rennen. Je moet bedenken dat er ook een opa bij kan zijn. Of iemand met een rolstoel. Flink doorstappen zou ook al werken. Voor mijn gevoel dacht ik dat bij de 0 de koffer zou exploderen. Het zou nice zijn als je van tevoren kan inschatten of mensen een beetje snel bent. Of timer sneller laat gaan als je dichterbij bent. En als je het eerste stuk langzaam doet, gaat de timer ook langzamer.

Wij hadden bij de boot bedacht dat het anker aan de achterkant zat, en bij de boot die het uiteindelijk was had een touwtje op de plek waar ongeveer het anker zat. Misschien kan je het anker gebruiken, want het was super geel en groot en duidelijk.

Terra energy was mij niet duidelijk, of leg het uit of noem het anders.

Interview Participant 3

Wat vond je van de ervaring?
Heel leuk, je had het goed voorbereid. Omdat mijn stage later was begonnen had ik alleen maar delen meegekregen van je project. We liepen nergens echt ergens tegenaan. Behalve de boot hadden we even verkeerd. De route was ook leuk, ook dat rondlopen op de NDSM. Als je de werf niet kent krijg je er zeker de sfeer van mee.

Wat was de leukste ervaring
Het leukste was de route. Dus op meerdere plekken komen. Dat je per puzzel een nieuwe route krijgt en het Venn-diagram was ook erg leuk. Per plek kreeg je een nieuwe aanwijzing waar je heen moest

Welke stap kon er beter
De plantenbak puzzel, omdat het niet echt werkt met papier. Het komt beter tot z'n recht op een scherm. Bij de tweede plek, met de koelkast kregen we de route. Ik heb nu nog steeds niet het idee dat ik weet hoe de s-curve zou moeten werken. Daar moet nog een clue bij om het helemaal te snappen waar we heen moesten.

Hoe voelde je je toen?
Ik dacht bij de route van oh, het voelde logisch om de vorm te pakken en op de kaart te leggen. De schaal was wel verwarrend. Het voelde of ik niet alle info kreeg.

Wanneer zat je er helemaal "in"?
Ik zat er in vanaf het moment dat je voor het knopje drukte en dat het meterje ging verschuiven. Dit was het eerste moment dat de tech liet merken dat stap 1 done was. Dat kwam vooral door de koffer en de lampjes die een voor 1 aan gingen. Bij het terugrennen, waar de timer begon af te gaan was ook echt leuk. Dan zit je er helemaal in want als er echt iets gebeurd dat voelt het heel immersivā.

Was er een moment dat je er "uit" was?
Rond de plantenbakken, dat was meer omdat Francine zei dat we naar de locatie moesten lopen (dit kwam door het prototype). Met meer context vooraf of tussendoor over wat terra levels zijn krijg je wel meer immersion.

Welke rol had je op je genomen en waarom heb je die gekozen?
Ik was team captain. Ik keek wat de rest wilde en deze was over. Ik vond het best wel leuk. Ik heb mijn rol niet echt gebruikt. Ik denk dat een rol die te maken heeft met route, of puzzles beter werkt. Iets van pathfinder ofzo.

Hoe vond je het gebruik met de bot
Nice, omdat je er fysiek was werkte het net anders. Het is nice om een contactpunt te hebben voor vragen of dubbel checken.

Wat had je graag anders gezien?
Iets van een extra hint bij de s-route puzzel, omdat dat nu niet duidelijk was. Samen tellen was grappig bij de planten puzzel, maar nu was het door de uitwerking daarvan niet zo leuk.

Lengte van de totale experience
Was precies goed. Het was warm en ik had dorst. Ik had niet het gevoel dat het te lang duurde. Het voelde alsof we een echte experience hebben gehad en dat het ook echt klaar was aan het einde. Dat was ook prima.

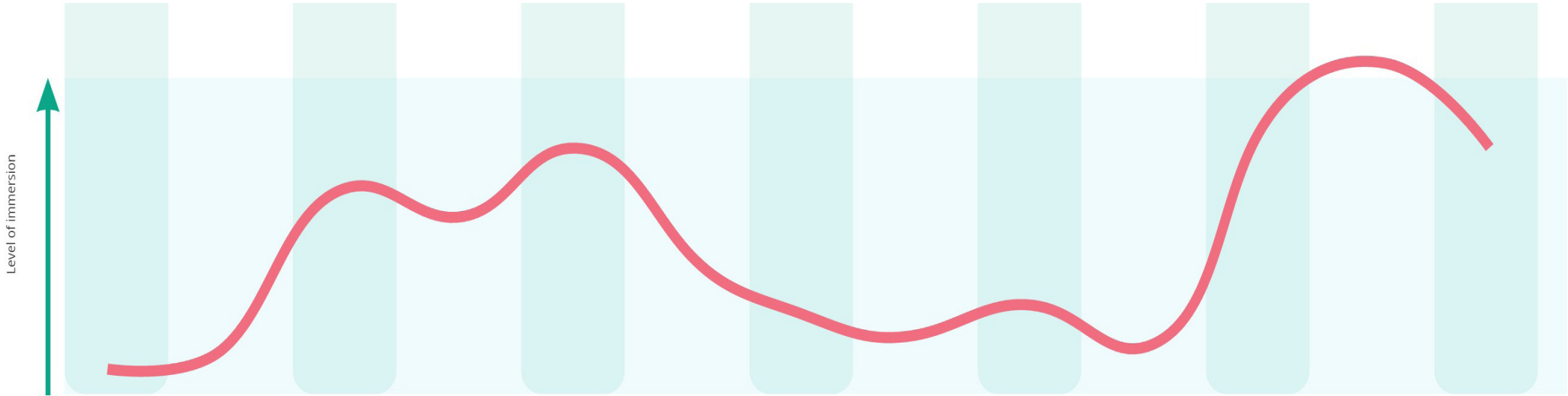
Lengte van het lopen
Ja was prima, ik had wel verkeerde schoenen aan. De afstand was prima. Het is leuk dat je een stuk ziet van de NDSM werf. De looproute voegde toe aan het geheel.

Welke puzzel werkte het beste?
Is lastig om te zeggen. De koelkast puzzel lag mij beter. De boot puzzel had ik snel door, alleen had ik niet door wat de voor en achterkant was. De hijskraan puzzle was nice dat je met z'n 3en gaat rondlopen en als team moet werken.

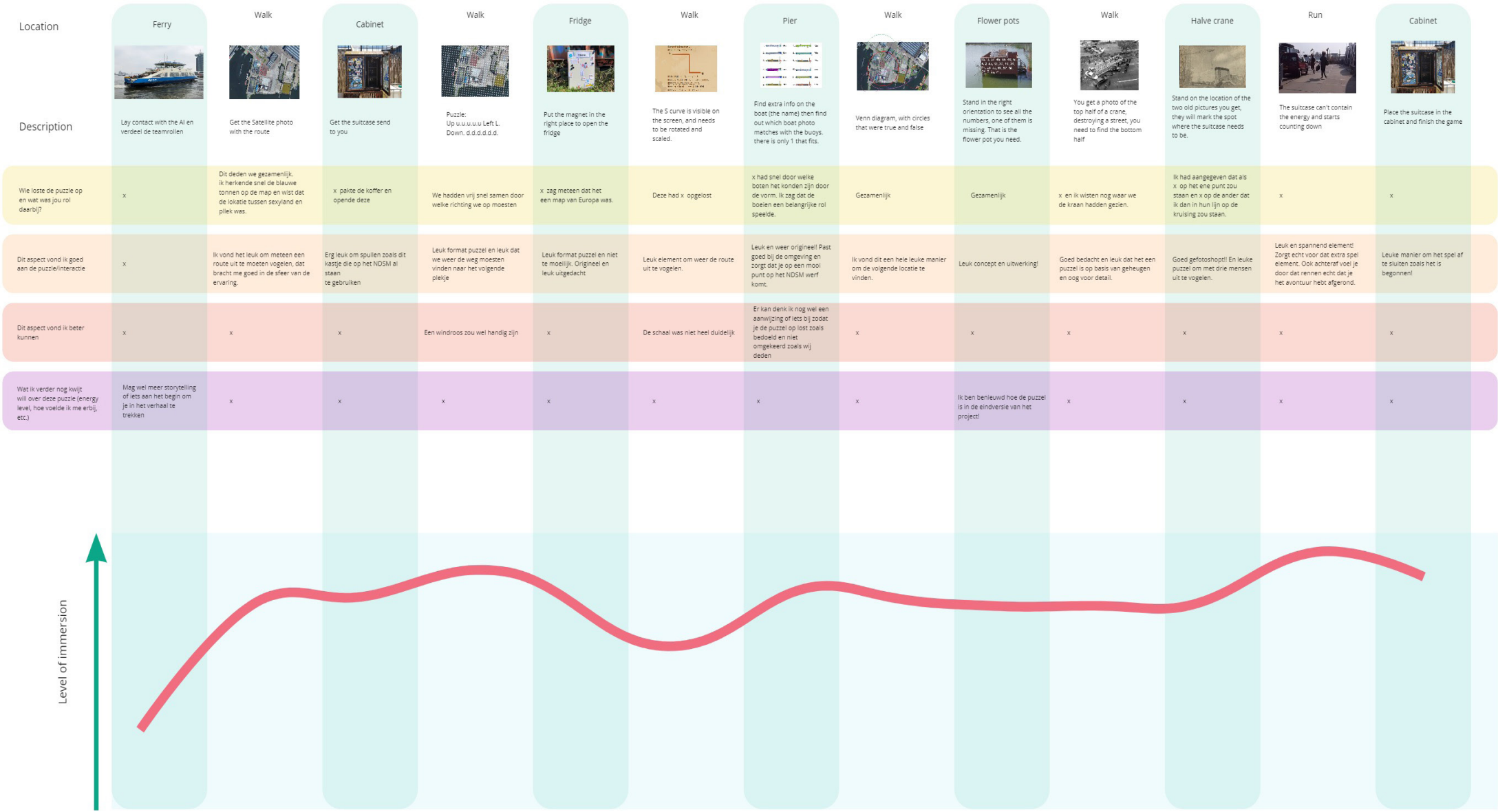
PARTICIPANT 1



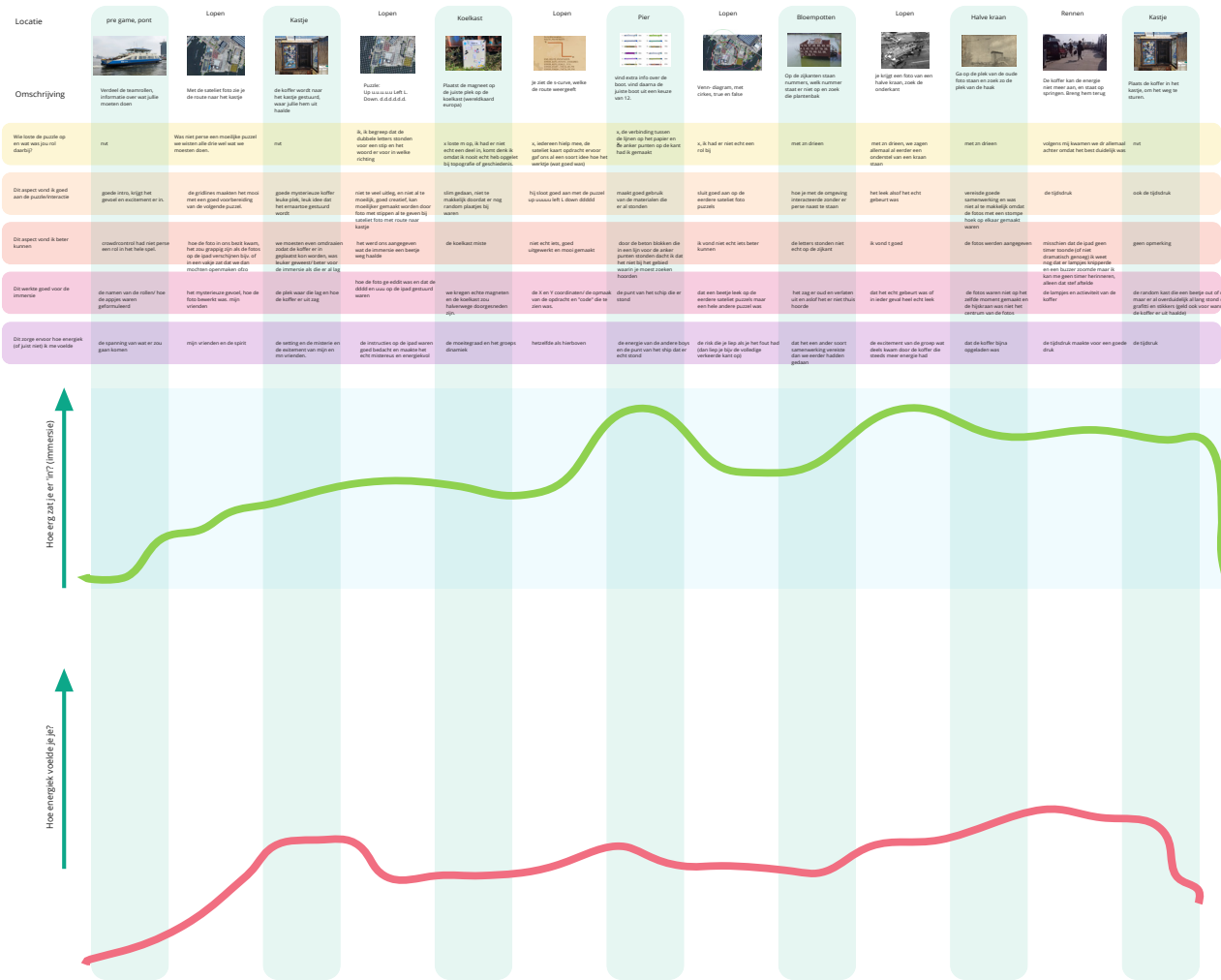
PARTICIPANT 2



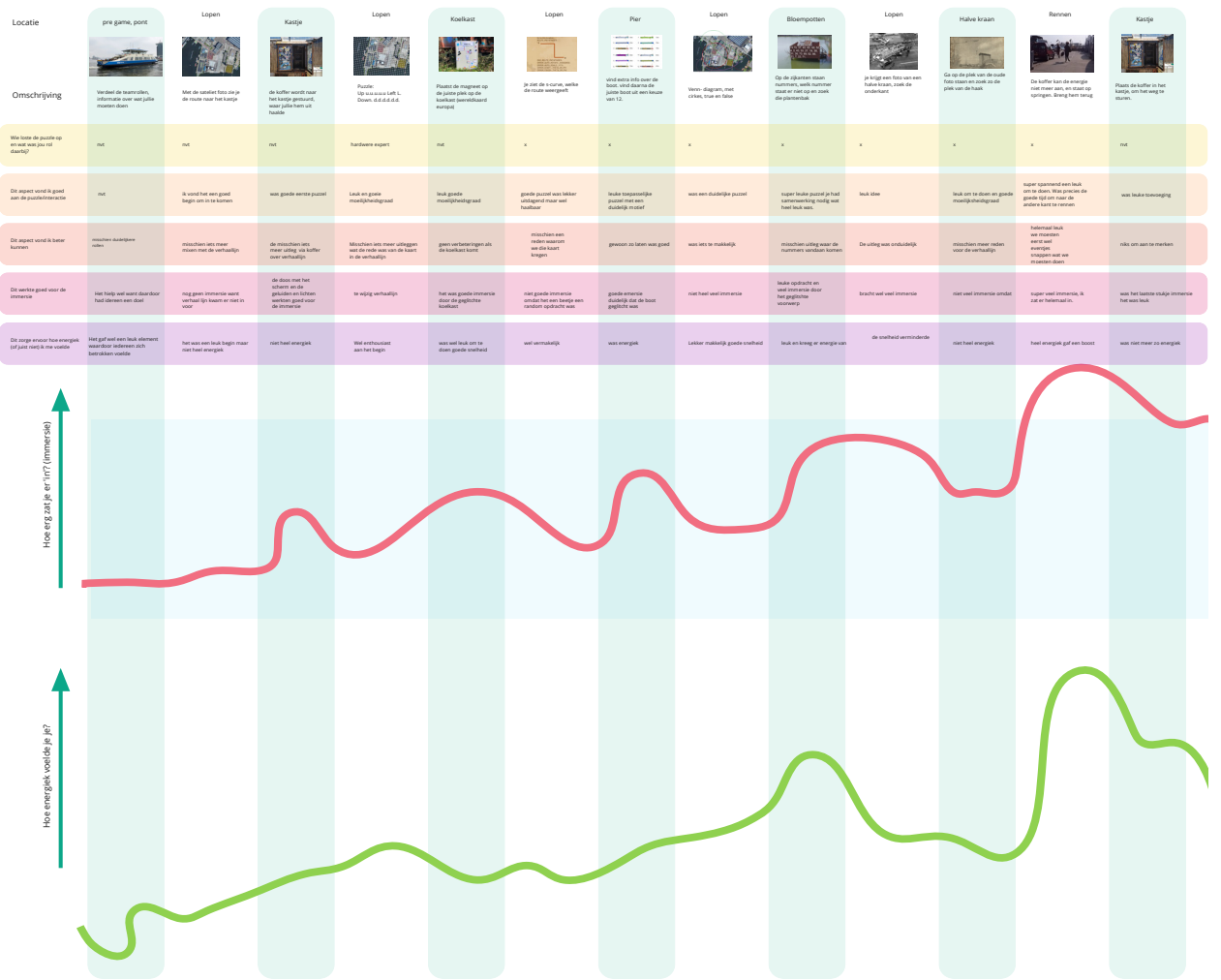
PARTICIPANT 3



APPENDIX I, INTERVIEWS & MIRO TEMPLATES



APPENDIX I, INTERVIEWS & MIRO TEMPLATES



APPENDIX J, PROJECT BRIEF...



Personal Project Brief - IDE Master Graduation

Achieving immersion in an uncontrolled environment project title

Please state the title of your graduation project (above) and the start date and end date (below). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

start date 21 - 05 - 2021 14 - 10 - 2021 end date

INTRODUCTION **

Please describe, the context of your project, and address the main stakeholders (interests) within this context in a concise yet complete manner. Who are involved, what do they value and how do they currently operate within the given context? What are the main opportunities and limitations you are currently aware of (cultural- and social norms, resources (time, money,...), technology, ...).

The starting point of this graduation project is escape rooms. These experiences are a group activity where the goal is solving puzzles in order to escape from the studio/room within a given time. As this concept exists for over a decade now companies are looking to innovate by moving the escape room outdoors. This fairly new experience will be the focus of my graduation.

Company
I'll be graduating with the help of Sherlocked; a company who makes/designs escape rooms. They are the ones who pointed me in the direction of creating an outdoor experience. Their main interests are a rich, compelling and fitting story to give users the best experience possible. They currently have two indoor escape rooms in Amsterdam. A new project for them is an outdoor escape experience at the former shipyard NDSM wharf in Amsterdam. See figure 1.

Immersion
Immersion is a big aspect within the context of escape rooms. Therefore it is nice to know what this term means and how it can be achieved. Immersion consists, according to Roth, C., & Koenitz, H. (2016) [1] of a narrative and its ability to create and sustain the interests of users. Thus, a narrative/story is one of the most important aspects in creating an immersive experience. However, it is not the only aspect of immersion. It is also dependent on other factors like flow, presence and believability.

Stakeholder
A major stakeholder would be the group of friends/family who would participate. Their interests would be team building, having a good time, forgetting about daily life and being submerged in an interesting and compelling story.

By letting an outdoor experience be the central focus of my graduation project, there are many opportunities and limitations present. For instance the physical scale of the experience can be much bigger. There are no walls where you are physically bound to. This can however also be a limitation, as you have to keep in mind that teams of participants have to walk longer distances. Furthermore participants could be more easily distracted. Hosting an outdoor event will make it harder to reset the game for the next players.

Then there are also uncontrolled variables that you have to think of. The weather for instance is unpredictable and influences the users, but maybe also the puzzles or story in a way. Also the lighting differs every day making puzzles less (or more) visible. Furthermore, everything that is part of the experience needs to be weatherproof and vandal, idiot proof.

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IDE TU Delft - E&SA Department /// Graduation project brief & study overview /// 2018-01 v30 Page 3 of 7
Initials & Name S.M. Roskam Student number 4230817
Title of Project Achieving immersion in an uncontrolled environment



Personal Project Brief - IDE Master Graduation

introduction (continued); space for images



image / figure 1: NDSM Wharf

- TO PLACE YOUR IMAGE IN THIS AREA:
- SAVE THIS DOCUMENT TO YOUR COMPUTER AND OPEN IT IN ADOBE READER
 - CLICK AREA TO PLACE IMAGE / FIGURE
- PLEASE NOTE:
- IMAGE WILL SCALE TO FIT AUTOMATICALLY
 - NATIVE IMAGE RATIO IS 16:10
 - IF YOU EXPERIENCE PROBLEMS IN UPLOADING, COVERT IMAGE TO PDF AND TRY AGAIN

image / figure 2:

IDE TU Delft - E&SA Department /// Graduation project brief & study overview /// 2018-01 v30 Page 4 of 7
Initials & Name S.M. Roskam Student number 4230817
Title of Project Achieving immersion in an uncontrolled environment



Personal Project Brief - IDE Master Graduation

PROBLEM DEFINITION **

Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

Research question:
How can immersion be achieved in an outdoor experience, using synergy between story, puzzles and location?

Immersive storytelling in escape rooms is almost always done indoors, where it is possible to design the lighting, visibility, sound etc. Making an outdoor experience is much harder as designing for those parameters gives a real challenge. However, there are also benefits to an outdoor experience. By testing early ideas and designs about what works and what doesn't, I plan to design an experience that synergizes with the outdoors.

User experiences consist of many different topics. In order to go more in-depth I want to focus on only a few of these aspects, such as flow, presence and curiosity. These are all part of the term "immersion" [1]. By designing the surroundings, story, puzzle design, sound design, pre- and after game design etc. in such a way that they have the biggest positive impact on the immersion, people will get the best experience possible.

ASSIGNMENT **

State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

Design an immersive experience for participants that would be achieved by the right design choices regarding narrative, puzzles, etc. and has synergy with the outdoor location where the experience will take place.

The fact that it all plays out outdoors should not feel like a gimmick. It should have added value in such a way that people will, for a moment, look different at the world or will lay contact with other people. Meaning that the location should be complementary to the whole experience.

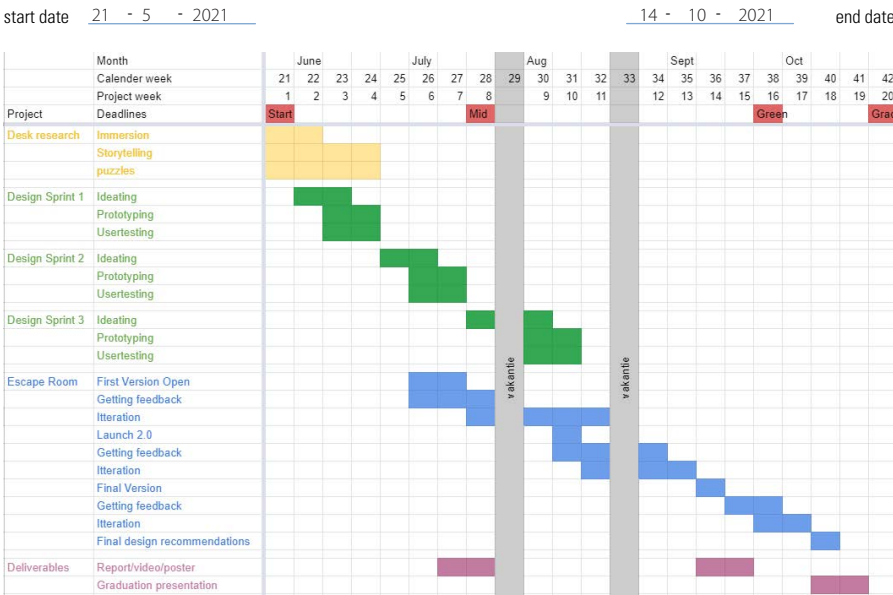
At the end of the twenty weeks I want to be able to present a narrative, puzzles, ect. that fit an outdoor location and tell why each design choice contributes in a positive way. These design choices will all synergize with each other causing an immersive experience.



Personal Project Brief - IDE Master Graduation

PLANNING AND APPROACH **

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any, for instance because of holidays or parallel activities.



Within my graduation project I want to research what immersion means, how people perceive this and how to improve an experience to make it more immersive. I also want to find out what would break an immersive experience and how to avoid that. To find out I'll be doing desk research, interviewing people and doing/recalling immersive experiences myself.

Next, I want to implement my findings to create a compelling and story driven outdoor escape room. This means designing puzzles and coming up with a narrative that would form a complete and immersive experience. To improve on storytelling and puzzles, I'll be conducting a lot of user tests. Setting up, conducting and gathering results will be a big part of my graduation.



Personal Project Brief - IDE Master Graduation

MOTIVATION AND PERSONAL AMBITIONS

Explain why you set up this project, what competences you want to prove and learn. For example: acquired competences from your MSc programme, the elective semester, extra-curricular activities (etc.) and point out the competences you have yet developed. Optionally, describe which personal learning ambitions you explicitly want to address in this project, on top of the learning objectives of the Graduation Project, such as: in depth knowledge a on specific subject, broadening your competences or experimenting with a specific tool and/or methodology, Stick to no more than five ambitions.

During this project, I plan to dive into the participants' perception of physical interactive elements, gathering more information on what people think is a matching puzzle to the story. Therefore I want to know what makes a good story and intrigues people. Getting their attention is something I'll design for. When a puzzle is well designed, and fits in the story people will appreciate the whole experience more.

Because user testing was an important aspect of multiple MSc courses (Exploring interaction, Interactive Technology Design) I want to test and improve my ability to conduct proper user tests and thus improve on my designs.

Also I find it interesting to know why something works, and why it sometimes doesn't. To find this out I'll by critical thinking and setting up the right test setting.

Personal ambitions:

- I want to improve on presenting my work in an aesthetically pleasing way.
- I want to improve my conceptual thinking.
- Be able to take the lead, and manage people who can help during my graduation.

FINAL COMMENTS

In case your project brief needs final comments, please add any information you think is relevant.

References

[1] Roth, C., & Koenitz, H. (2016, October). Evaluating the user experience of interactive digital narrative. In Proceedings of the 1st International Workshop on Multimedia Alternate Realities (pp. 31-36).

The background of the slide is a photograph of a two-story brick building. The building has large, faded letters on its facade, possibly spelling 'EN' and 'EP'. In front of the building is a low wall covered in colorful graffiti, including cartoonish faces and abstract designs. A purple rectangular box is overlaid on the right side of the image, containing white text.

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