A Portable Escape Experience for Sustainability Empowerment

BLUE MIRROR

Key words
Sustainability, Escape Room, User Experience, Game Design, Empowerment, Festival Design, Storytelling, Narrative

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Preface

This report bundles the design and research done for my graduation project to complete my MSc degree Design for Interaction at the TUDelft. This project helped me branch out to explore new methodologies taken from Product Design, Experience Design and Game Design.

I just want to give a big thank you to my supervisors and company mentors to stick with me during the pandemic. And also want to let all participants that helped me during the different phases of the project know that I'm super grateful for their energy and inspiration.

-Meysa

Executive summary

This project is a collaboration between TUDelft and Sherlocked, one of the stakeholders of BLUE MIRROR. The aim of this project is bringing knowledge and fun together in a sustainability themed portable escape room experience.

During the Research phases, the current market of available experiences closely related to the new design was mapped out, looking at competitors, users and trends. Target users have been involved to cocreate the design, using context mapping, journey mapping and generative sessions. Which helped grasp the expectations and emotions during use, and gave valuable insights for the design.

This report delivers a full concept of the designed user interactions with the room itself and embodiment of these interactions within the room. This includes designing the interfaces, as well as the narrative that guides them through the experience.

The interface can consist of a combination of digital and physical components that together allow users to solve challenges within the room. Interactions of users with these objects will be designed so that the level of difficulty is suitable for the audience to achieve the goal within the allotted time.

The narrative will be the overarching structure and information layering of the design that helps to carry the educative message in a playful manner to ensure it is an engaging learning experience.

The report will conclude with suggestions for further research based on qualitative interviews with the target audience.

Glossary

AI	Artificial intelligence
BLUE MIRROR	A sustainability themed non-profit Escape Game initiative
DFI	Design For Interaction
The Drawdown project (DDP)	Sustainability initiative aimed to make the world reach Drawdown: the moment greenhouse gases see a decline
Escape room	A physical space where the gameplay is to escape from the room by solving challenges
Heijmerink & Wagemakers	The engineers behind the BLUE MIRROR project
Interaction Vision	A metaphor used to help guide what the future design should feel like
Identity Dissonance	When the narrative perspective clashes with the medium it is presented in
Future Today Institute (FTI)	A trend watching company that brings out yearly reports
Serious gaming	Playful interactions designed to teach you something or instigate behaviour change
Ludonarrative dissonance	When a story and a character's actions are not aligned
Millennials	People born in 1980-1994, in this report we will name the target audience (aged 18-30) and millennials interchangeably
NPC	Non playable character – in this case usually the host or background characters
Plastic Soup	Water pollution by plastics
SDG	Sustainable Development Goal setup by the United Nations
Sherlocked	An Amsterdam based Escape Game Company that aims to bring breathtaking mystery experiences
Serious games	Games with a learning goal integrated in its purpose, making it suitable for education or behavioural change activities
Triple Bottom Line	The balance between Economic, Social and Environmental value, together they make up sustainability. This is the basis for Circular Design
Urbex	Urban Exploring

REPORT STRUCTURE

INTRODUCTION

RESEARCH

DESIGN

USER TESTING

EVALUATION

APPENDICES

INTRODUCTION

In this segment the project, the stakeholders and the context will be introduced.

Our main stakeholder Sherlocked, was founded in 2014 after a successful Kickstarter campaign. Now, it has become one of the most popular Dutch escape room creators, aiming to re-enchant society through a daring exploration of the unknown.

Escape games are an everchanging market, making it imperative to keep innovating.

BLUE MIRROR

TURN THE TIDE

BLUE MIRROR Concept

BLUE MIRROR

The Project

BLUE MIRROR is a collaborative non-profit project set up by creative minds to design a thematic experience room focused on **climate change**. The goal of this escape game is was to **confront** users and serve as a **wakeup call** for people to spread **awareness**.

The Project
In the current BLUE MIRROR experience players will enter a type of "world control centre" where you get to influence the world in a sped up setting. Participants solve simple Simon Says style challenges with speed and accuracy in a race against the clock to escape the room while fighting against time and environmental effects to try to save the world.

The Assignment

During this project the initial ideas of the current BLUE MIRROR project will serve as a basis to branch out from to create a **new design proposal.**

This design should make users experience the impact of climate change with fun and fast gameplay and empower them to take action.

The assignment will be to make a new iteration of the room which is intended to be a travelling escape room, suitable to be placed on events and festivals. Due to this use scenario the escape room will have a shorter and more compact experience compared to standard escape rooms. The room will target a leisure based audience, focusing on a mixture of enthusiasts and youth.


BLUE
MIRROR

The current Design

Several meetings were held with game designers from Sherlocked and one with at the game lab of the Technology Policy and Management Faculty.

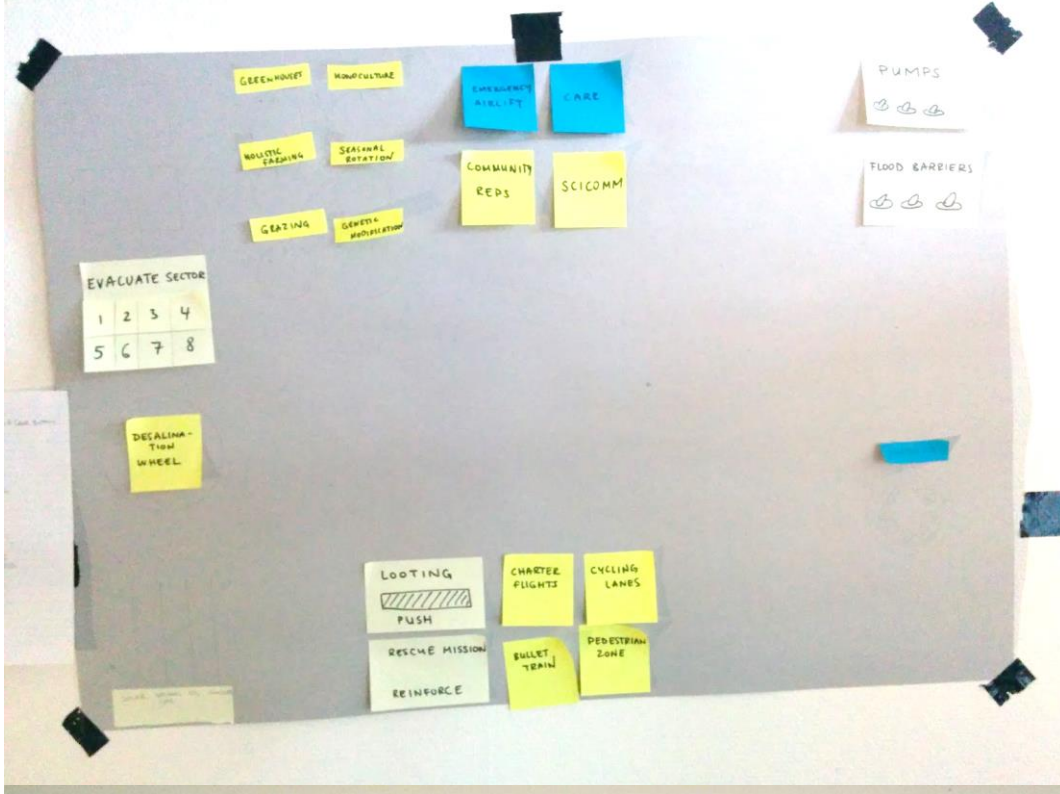
The current gameplay is a simple game mode where people rapidly follow commands that are given to them by switching dials and clicking buttons.

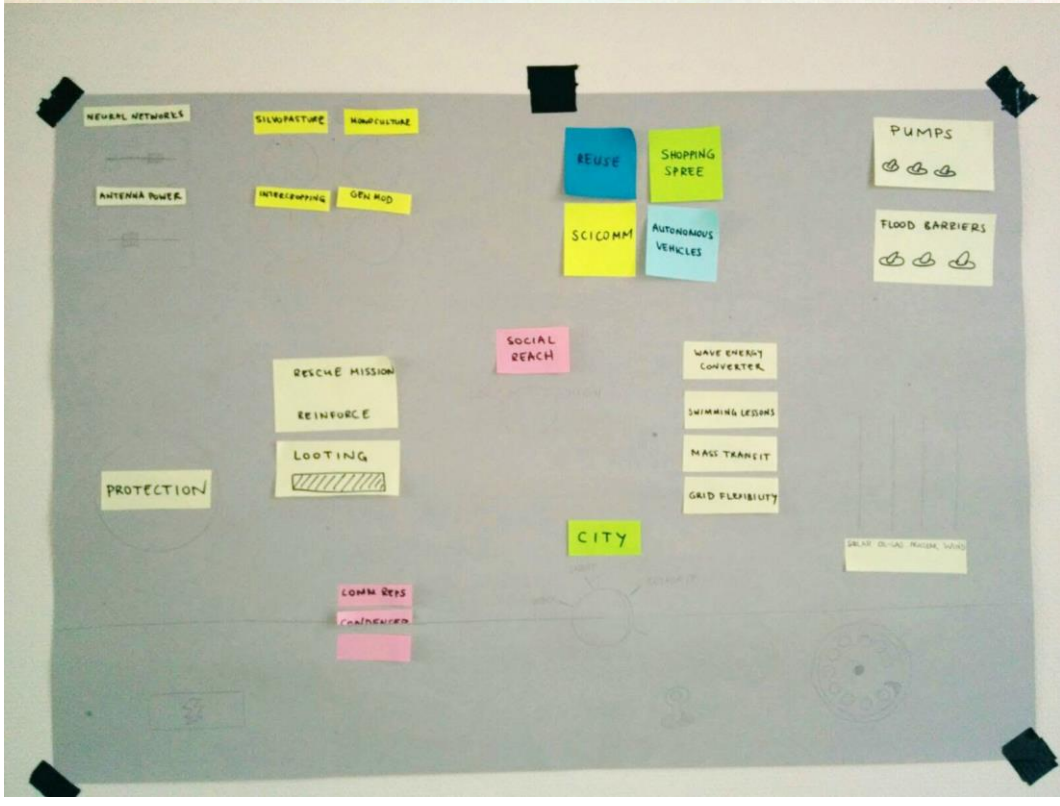
Overall the participants thought the initial design was fun and engaging to play, yet only for a limited amount of time. To create an experience room, participants expect more than the simple type of gameplay which they could also play in mobile games.

To optimize the experience, users should be able to take full advantage of them physically being inside the room.

Serious games

The interview with the games lab mainly focused on finding a balance between fun and education in serious gaming (more on serious games in appendix C). **One of the main challenges of this design will be to send a strong sustainability message while making the gameplay as fun as possible.**





Old BLUE MIRROR Paper Prototypes

Escape game of Sherlocked

Escape games

What people define as an escape room keeps on changing, but an example of a classic escape game can be described as followed:

"Escape rooms Are live-action team based games where players discover clues, solve puzzles, and accomplish tasks in one or more rooms in order to accomplish a specific goal (usually escaping from the room) in a limited amount of time. The escape room experience starts with the players meeting their gamemaster, who briefs them what will be happening over the next hour and gives them the rules for the game. If there is a backstory, the players may watch a video or be given a passage to read. The door is closed and locked and a countdown clock begins." (Nicholson, 2015)

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Context

The time escape rooms popped up everywhere in the Netherlands has come to a halt and we now see a steadier line in the number of escape rooms available. Each year a number of them close and a number of new ones open up.
This is likely due to escape rooms being a finite experience, no room will have the same effect of surprise or awe the second time it is played, therefore renewal on the market is only a logical result.

The Netherlands itself has a relatively high escape room density compared to other countries. In this context we will look for new opportunities where entertainment is the primary focus but edutainment is the next step: escape rooms as a medium with a purpose.

According to Sherlocked, the vast majority of their escape room players are enthusiasts, tourists and companies, who usually come for leisure or team building activities.

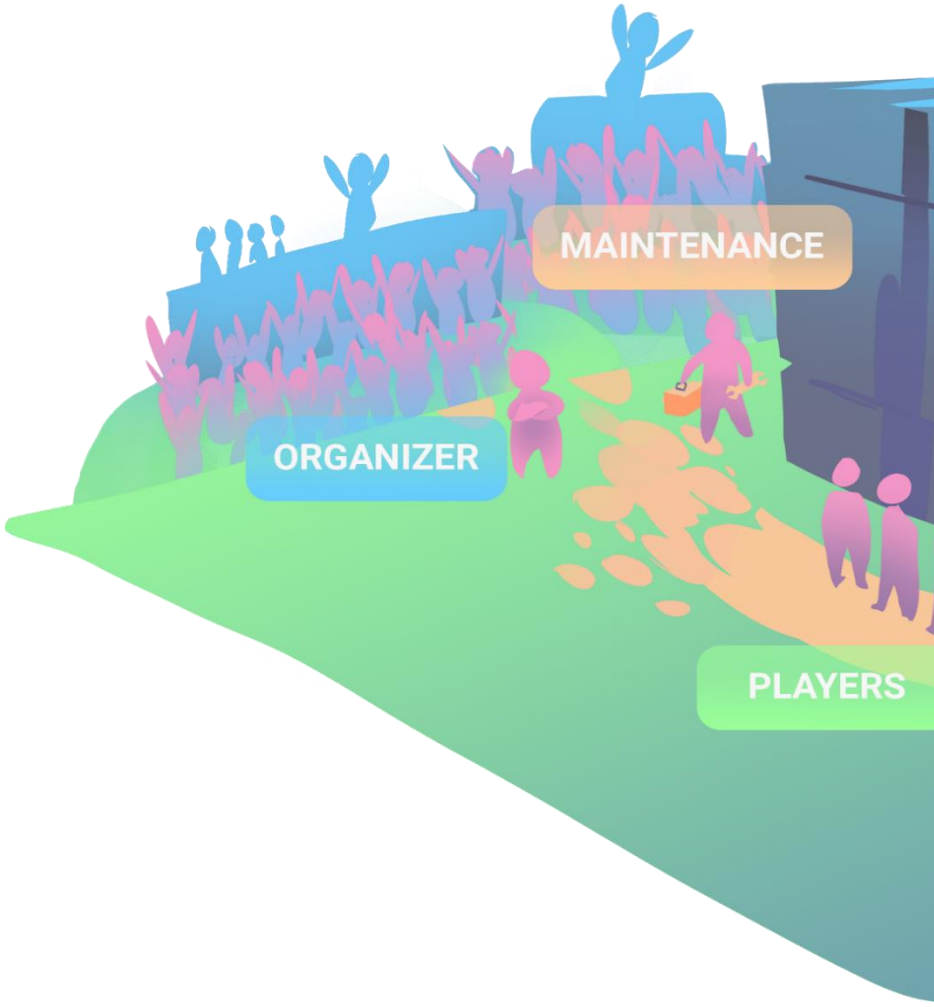
As of writing the report, The covid-19 pandemic is still ongoing, which has heavily impacted escape rooms worldwide, obliging the closure of many. This forces existing companies to innovate or prepare for future experiences, opening the market for new areas to explore and giving rise to new escape game variations.

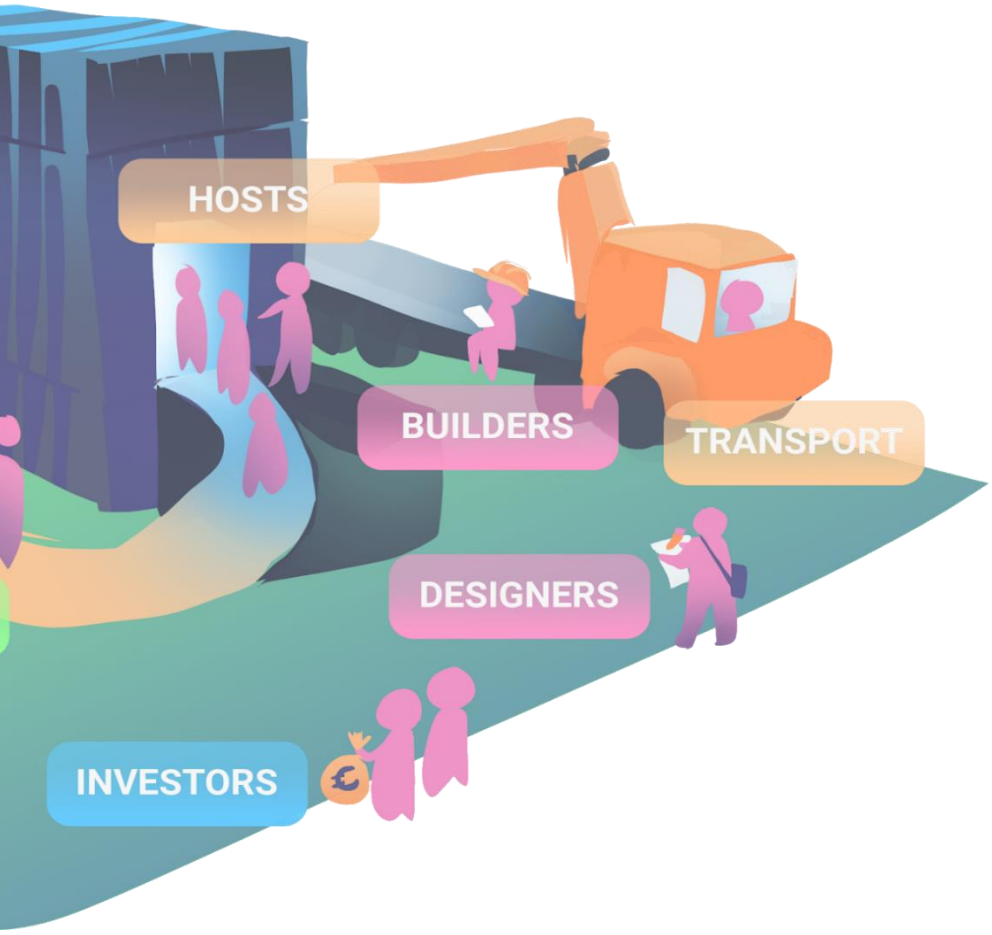
Stakeholders

In figure to the right we can see an overview of the stakeholders that can be identified for the BLUE MIRROR project. Although many roles were identified, some can be fulfilled by the same party.

Overview

The first group are the users, these are the players of the game and visitors of the festival.
The second group is operations This consists of various people. First the transport team moves the room to the desired location. Then the host locally facilitates the game for immersion and a smooth experience. Maintenance should regularly be done on the escape room to ensure it is always safe and operable.
The third group are the makers, these are the designers and creatives that bring in their ideas, and have them turned into reality by the engineers
The fourth group is management, they're the investors and organizers that put their trust and funding into the project. They have to be convinced this experience is worth their time and money.





Stakeholders of BLUE MIRROR

Blue mirror team

Blue mirror is a collaborative initiative of creative minds and builders who want to make something that will help change the future. It consists of Creatives, Designers, Architects and Engineers, that work together to make this project happen. Sherlocked is one of these Stakeholders and the main contact for this project.

Heijmerink Wagemakers

The engineers and builders of the project. These guys are the powerhouse of the technical department in the project and will make the vision into a reality. They are familiar with Sherlocked because of earlier collaborations.

Potential Investors

BLUE MIRROR is a non-profit project with a noble goal: spread awareness on sustainability and activate people to take action. Investors have to be convinced of the importance of our narrative before they invest in the project. If there are no investments there will simply be no BLUE MIRROR.

Festival organizers

Festivals planners decide which acts, speakers, stores, food and activities they offer. To make BLUE MIRROR successful we have to ensure booking the room stays affordable and is attractive to the planners of festivals. If any collaborations on the festival will take place, this can be the go to contact to make it happen.

SHERLOCKED™
MYSTERY EXPERIENCES

This project is done in cooperation with Sherlocked. They are one of the collaborators of the BLUE MIRROR Project and will be the main contact to the project. They are one of the first creators of escape rooms in the Netherlands, currently operating multiple escape rooms focused in the entertainment section. They have previously also collaborated with educational partners and companies to organise inspirational experiences. E.g.: trying to pique the interest in technical studies by making students do various tech challenges or a short escape room as a conversation starter on diabetes. They are an established company in the Dutch escape room scene and offer both permanent and temporary experiences.

In this project they will be the main drivers to make it happen. They have their creative team on board, manpower to operate as hosts and possibly also supply the transporting party.

Company Analysis

A SWOT analysis looks into the Strengths, Weaknesses, Opportunities and Threats. This SWOT analysis is an extension on the Studiomaps SWOT analysis that was done before the covid outbreak (2020)

STRENGTHS

- Great at collaborating
- Wide portfolio in escape experiences
- Attention for detail
- Open minded to new ideas
- Flexible, future proofing by looking for opportunities
- Enthusiastic team
- Great at storytelling

WEAKNESSES

- Dependent on many parties
- Mainly has physical escape rooms (weakness since the covid outbreak)
- Project hiatuses

OPPORTUNITIES

- Implementing new technologies. (VR/AR/MR) & Translating existing experiences to Virtual
- Physical quality time and experiences have gained increased value
- Covid reset what is seen as the new normal
- Virtual experience economy - many cancelled events and tours are replaced by virtual alternatives, Escape rooms look for new formats to fill the gap (podcasts, avatar controlled, online)
- Outside escape experiences (theatrical or scavenger hunts)
- Ambient wellness - health boosting measures implementations

Products sent to your house
Personalised experiences

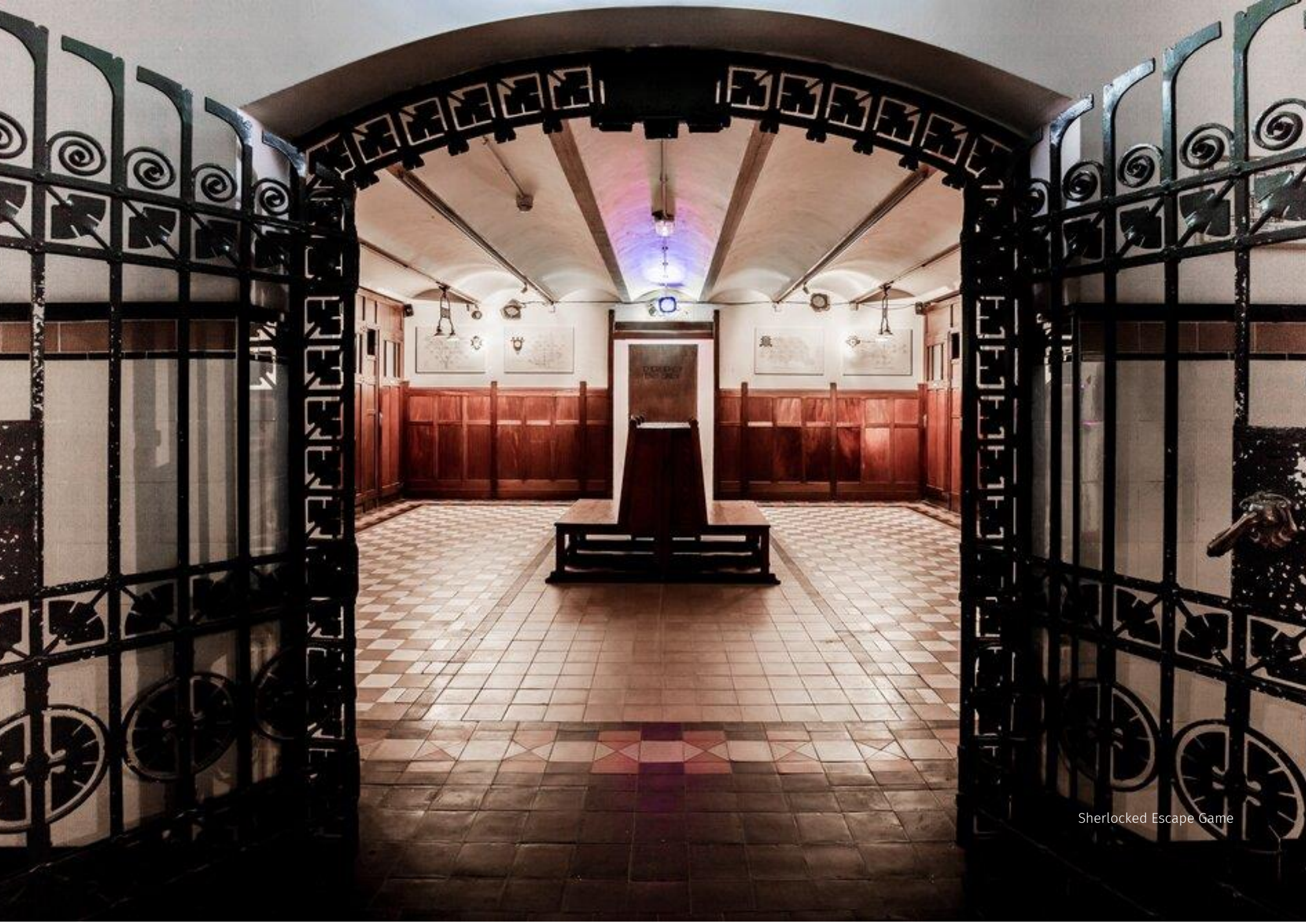
THREATS

- Technologies completely replace physical experiences (VR/AR/MR)
- Physical escape game market can have limited recovery from covid virus
- New entrants create more exciting or better experiences

Sherlocked SWOT Analysis

RESEARCH

In this segment a wide range of research topics will be presented. The first part will examine **escape games** more closely, looking at their structure, narrative and market. Further research is done on the **context** and its **users**, zooming in on the festivals and sustainability. Finally there will also be more research on **Storytelling** in games and experience design to look for a **structure** to build the design on.


Sherlocked Escape Game

Escape Games research

To differentiate between Escape rooms we will look at different structures and narratives of escape games and the market it's situated in.

Escape Game Structures

Many escape games follow a set structure, these include Linear, nonlinear, mixed, scavenger hunt and red herring.

Linear structures are usually found in classic rooms, in which the sequential tasks make it very obvious how to proceed to the next milestone.

Nonlinear puzzles allow for teams to split up and come back together, giving slightly more chaos to the challenge but also making it a more fluid experience.

Red herrings in rooms are a risky choice as they cause participants to waste time on fake clues.

Scavenger hunt rooms are all about finding clues or objects in the room and focus less on solving complex puzzles. These are often designed for a younger audience.

In a condensed experience such as BLUE MIRROR, throwing in red herrings or scattering too many items in a scavenger hunt should be avoided. We want to combine linear and nonlinear parts to maximize participation for all players but keep them on track due to the time constraints in the experience.

Room Narratives

Narrative is the overarching storyline, which heavily influences the level of immersion.

Puzzle rooms are places that just offer its participants gameplay without any overarching narrative behind it.

Thematic rooms offer a setting and character prompt to its participants but the minigame challenges are not necessarily related to the theme itself. (for example prison island in Zoetermeer)

Narrative rooms - Players have designed roles and narratives which allow for greater immersion into the story of the room. All the components in the room are connected to the story. Some examples of this would be the Dome, the dentist and the submarine.

Hyper narrative rooms, these types of rooms allow their players to influence the game itself, usually by either use of technology or by live actors. Different outcomes means that the room has more replay value. An example of this would be the prison escape experience which offers an interactive theatre production to its players.

To optimize immersion during gameplay, the room should at least be thematic, but obviously aim to get close to hyper narrative, giving players an influence on the outcome of the game.

Escape Game Market

Escape games are part of the leisure market. Therefore research was not limited to escape rooms, different experiences closely related to them were observed to assess its place in the current market and look into upcoming media.

One of the hardest parts in researching other escape games is the fact that people like to keep the content a secret as to not ruin the surprise. Therefore playing them is the best way to see what it's all about. Besides playing several escape rooms, papers were read, game designers were interviewed, and players were questioned about their previous experiences to map out available experiences that are out there.

The wide variety of experiences investigated ranged from simple board games at home to intricate VR experiences with roleplaying hosts and special effects. By mapping out these experiences, the level of immersion and it's accessibility could be assessed to have the greatest experiential impact and largest reach.

We then looked at an overview of all these games on two axes: Immersion and accessibility.

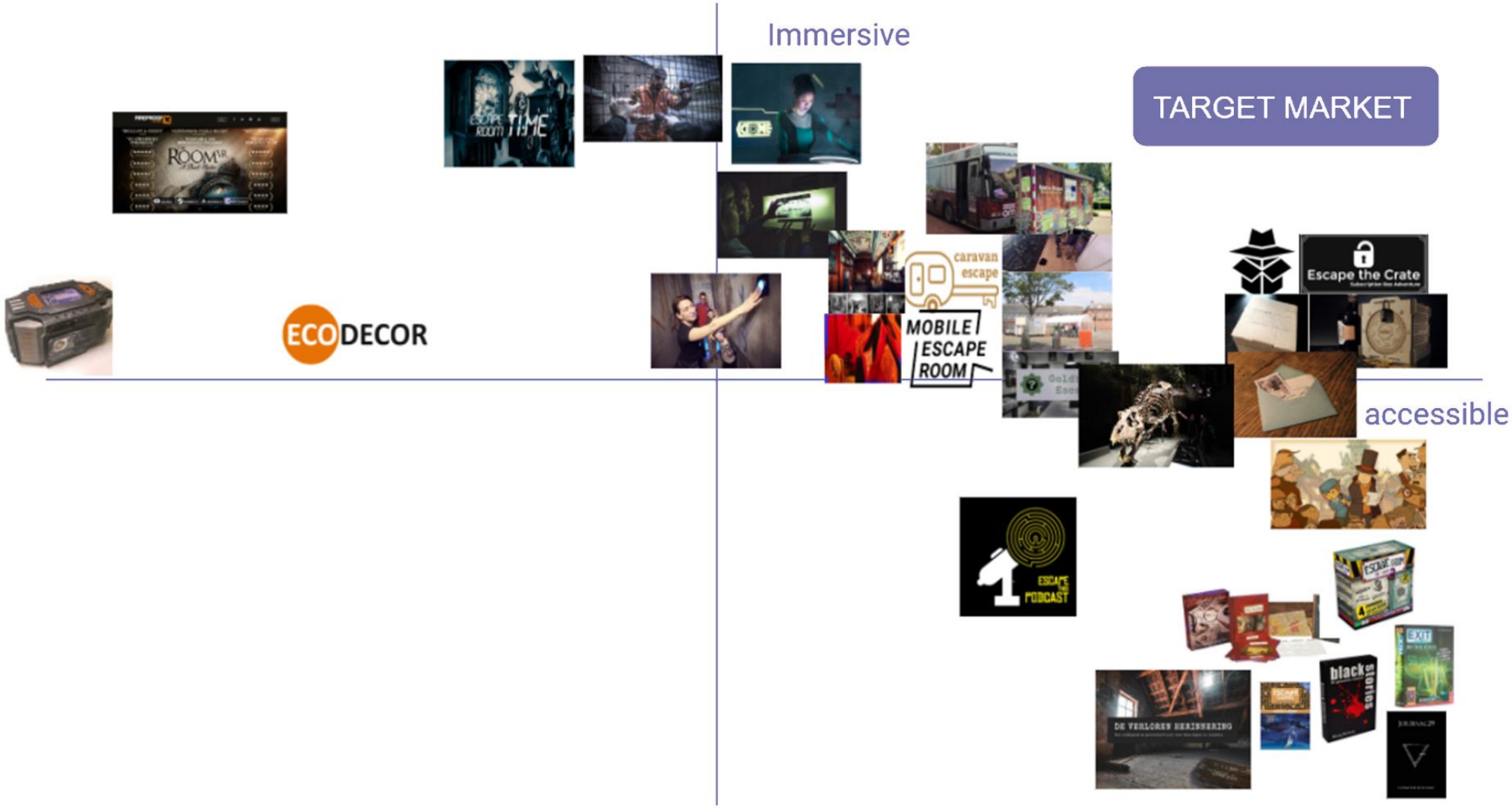
Accessibility

Rooms that are relatively cheaper or easier to do at a place of your choice are rated higher in accessibility, whereas rooms that require more funding, have less availability, where you need to book in advance or need specific gear such as a VR headset to access it score lower on accessibility.
Accessibility is key in this project because we want to maximize our reach to players.

Immersion

On the other axis we have immersion, which is related to how well the props or role players allow for immersion in the story, what level of narrative they use, and whether the game is able to captivate and trigger multiple senses.
This is important to maximize the impact of the game, where a higher level of immersion can create stronger memories to inspire and empower players.

The examined game experiences and categories can be found in appendix B


Immersive
TARGET MARKET
accessible
ECODECOR
caravan escape
MOBILE ESCAPE ROOM
Escape the Crate
black stories
DE VERLOREN HERINNERING

Design Context

To reach a large audience within a small period of time the **festival** is an excellent place to start. It's a great **leisure** activity for **groups** and **accessible** to all kinds of people.

Scope

Festivals find their origin in feasts and are usually a day or period of community celebration about culture or religion.
The scope of this design will be on **cultural festivals**, not aimed at religious events. These festivals can range from art festivals such as music, historical, science, and film to food and health festivals. Our scope will first be limited to the Dutch festival climate as this will be within the initial area of operation. Later the scope of operations may widen as the escape room travels internationally (or perhaps gains a virtual clone).

Visitors

The average age of music festival goers is **18-30 years** (Statista, 2020), meaning the majority of this group consists of millennials at this moment. These visit 2.6 festivals a year on average, with the vast majority only visiting 1 or 2 festivals each year.

What we offer to a festival

Festivals are a place where we spend our valuable time and money, therefore their offerings should be **authentic and diverse** in order to prevent substitution (Porter's Five Forces, 2008), as there are plenty of other activities which can replace the time we spend on festivals.
To appeal to our festival stakeholders, we looked to find a **raison d'être** for the design.

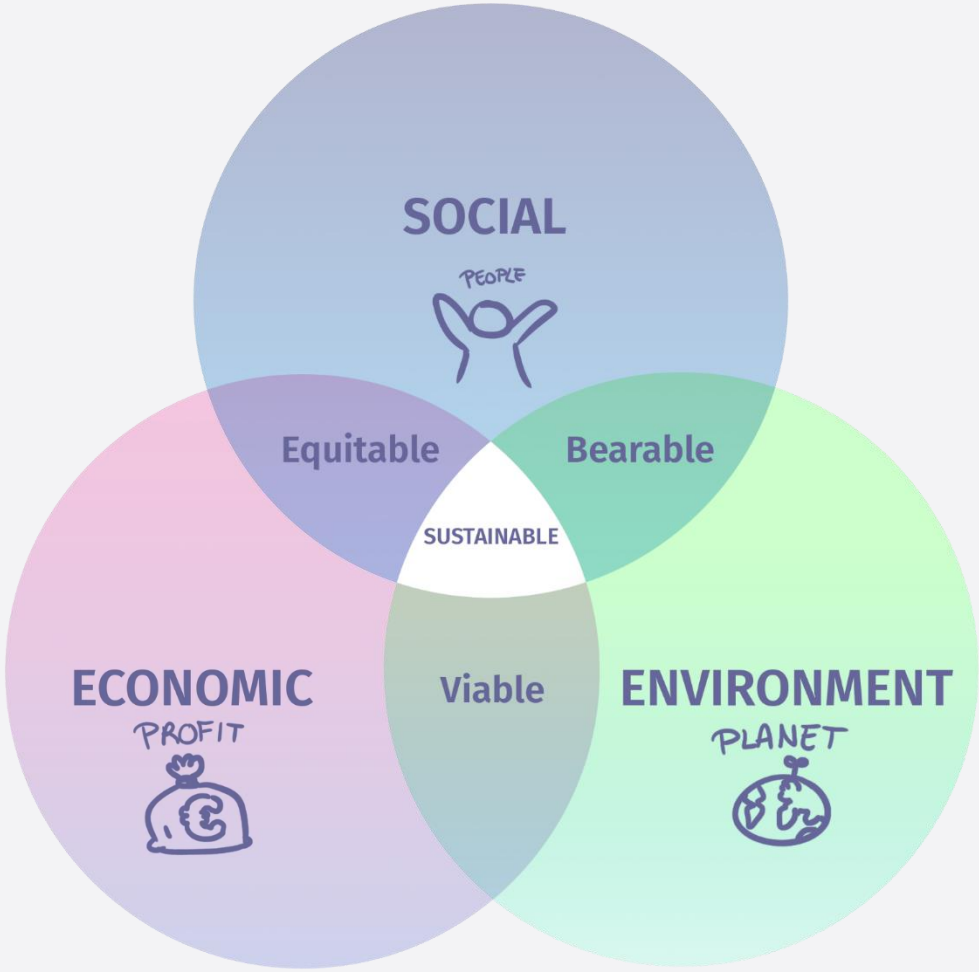
Sustainability is a hot topic within all companies nowadays, this obviously includes the festival scene. According to Rich (2011) special events [such as festivals] can be enhanced for the participants as well as the community. In addition, measuring the environmental impacts of an event will become increasingly important as more and more events are encouraged to "go green" and reduce their impacts on the environment. Methods of **festival evaluation** slowly move from merely measuring the economic side of things to ensuring a triple bottom line. The triple bottom line focuses on the Profit, People and Planet, so that corporate benefits, social responsibility and environmental friendliness are all taken into account. (Kenton, W, 2020)

Furthermore novel experiences can add to the **loyalty** of festival goers as many repeatedly visit various festivals. Tangible [festival] attributes [such as activities] are experienced "in the moment" and contribute to attendees' satisfaction with the [festival] experience. Given its strong relationship with loyalty, overall satisfaction may in turn influence intentions to return. Escape and socialization may evoke an emotional reaction, such that attendees later remember feelings of excitement and the enjoyment of being with friends. (Tanford, S. & Jung, S., 2017)

Sustainable Escape Design for Festivals

These **memories** of social events and excitement with friends are key to our design, as we want people to remember the experience vividly as we hope to impact the future with this experience. As this escape experience will allow for spontaneous queuing and offers a high pressure environment, we expect a lot of social interaction to occur where you get to know yourself and your teammates better.

In conclusion, an escape experience like this may add an authentic new experience to the festival landscape. In addition to its positive impact on triple bottom line evaluations, loyalty and experience memories may also be strengthened by this.



The Triple Bottom Line underlays Circular Design principles

Target audience: Millennials

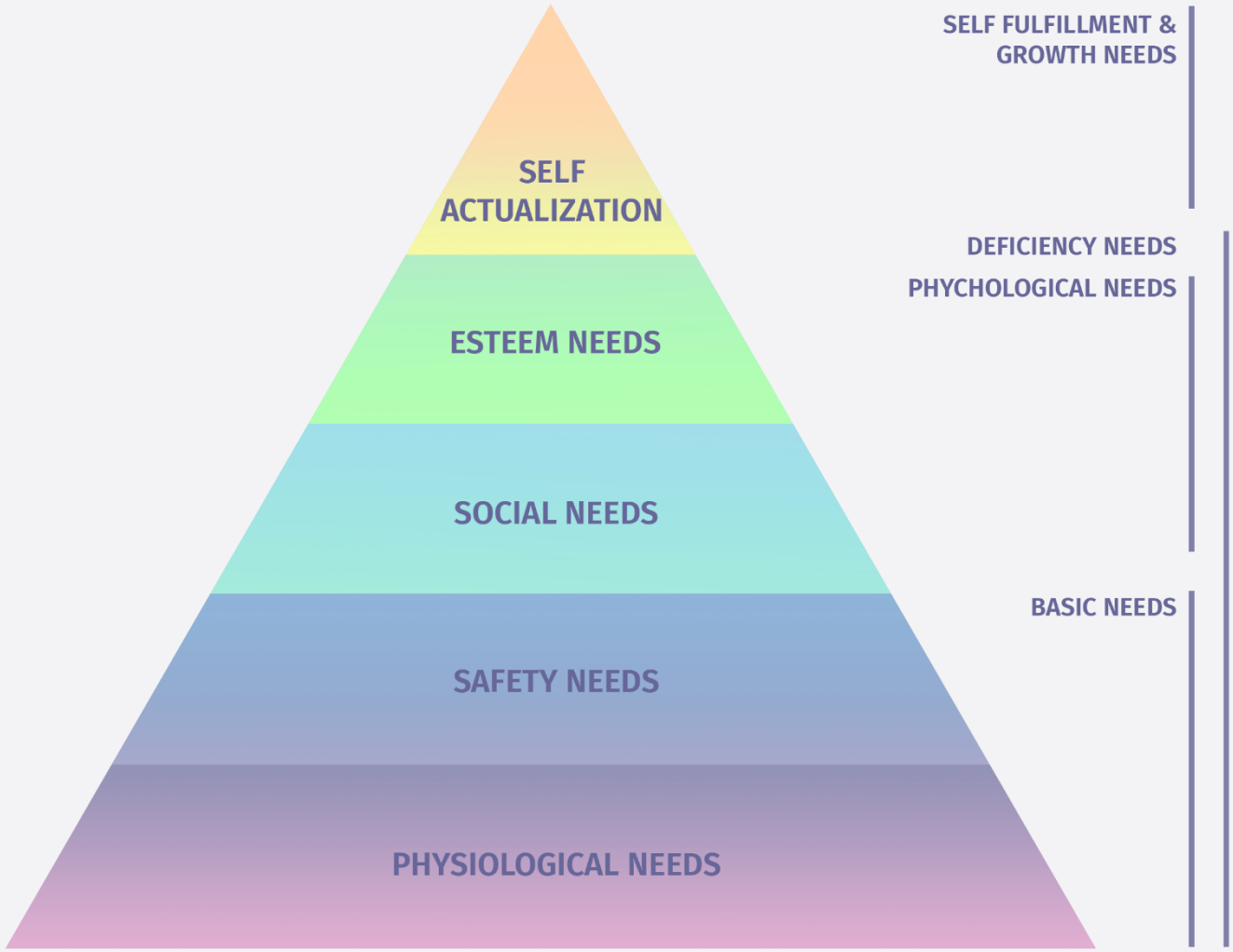
Since the majority of our festival goers fall into the category of millennials, it is obvious that they will also be the players of our escape experience.

Millennials, as compared with previous generations at the same age, have been shown to be higher on positive traits such as self-esteem and assertiveness (Twenge and Campbell 2001). They are highly connected through social media, and able to find likeminded people easily.
Having the luxury of their daily needs being met, we find our average millennial to struggle at the top of Maslow's pyramid (1943) which gives them the need for self-actualisation. To achieve this, many seek ways to find purpose, looking into new directions such as lifestyle design, responsibility and sustainability.

When looking at sustainability, "The optimism, engagement and willingness of millennials across cultures to take action will contribute to the confidence of future generations to persist in making earth systems resilient and sustained." (Hanson-Rasmussen & Lauver, 2018)

We can categorize our Festival Millennials as energetic, adventurous, curious, positive and assertive.

Further user research will target users aged 18-30, focusing on the Millennial demographic.



Maslow's Pyramid of Needs

Context mapping

To gain deeper insights on the target audience, 12 festival goers aged 18-30 were asked to fill in a make booklet at their leisure. This booklet was based on the "Say, Do, make methodology (by Sanders and Stappers, 2014) to see if we could grasp more of the latent knowledge people have about our topics of interest. (The booklet can be seen in appendix F)

Participants were asked to tell something about themselves and their previous experiences before we asked them to imagine a future festival escape game using the Path of expression methodology (Sanders and Stappers, 2014).

An overview of discussed topics can be seen in the figure on the right.

Insights

All participants saw themselves as trying to be at least a little bit sustainable, showing different topics they were familiar with including Transport, food, recycling, consumerism and children.

All participants that had experienced escape rooms before mentioned they had only played them with friends before.
Young people usually visit festivals together with friends no matter what type of festival it is, it's just a great group activity.

Always consider if something will be considered part of the room or not. "I have no idea whether this is a feature of the puzzle or the button that activates the sprinklers." You want people to feel immersed as if everything is part of the puzzle but also keep things safe.

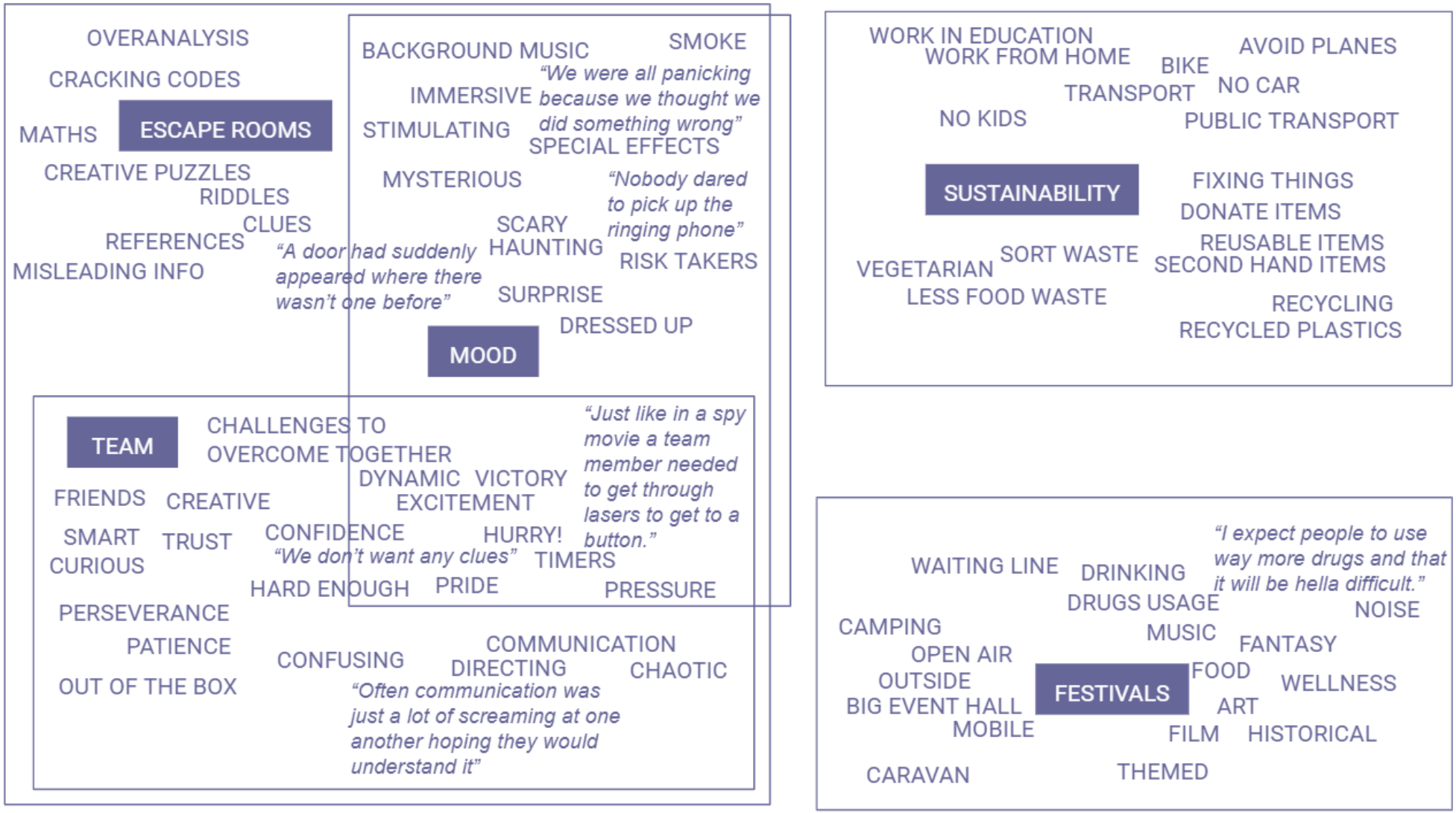
"A great story. That is the part that really sells the whole experience in my opinion." "A more cohesive story, a lot of escape rooms tend to have somewhat surreal storylines, or a sharp disconnection between the story and the puzzles in it, it's cool if everything was a more connected."

Unpredictable story, plot twists "The best memories I have are ones I didn't expect. For example the room changing after exiting and re-entering or having to go behind the walls to escape the room. Creating an expectation first and then shattering it."

Don't reference external materials as a knowledge test too much. "An escape game should be difficult, but the answer should be in the room."

Teambuilding "Get to know yourself and your team members even better. Learn things about them you didn't know they'd do in a small room" Experiences should have a fitting ending for the adventure - "When we made it through the dynamic and interactive rooms we had to fill in four questions to create a code that did not really make sense and kind of made the end of the escape less victorious". (Think of customer journeys and how they focus on highs and lows in experiences)

Anticipate on drug or alcohol usage on festivals (especially music festivals) to add extra safety or checks at the entrance



Clustered topics from make booklet discussions

Storytelling

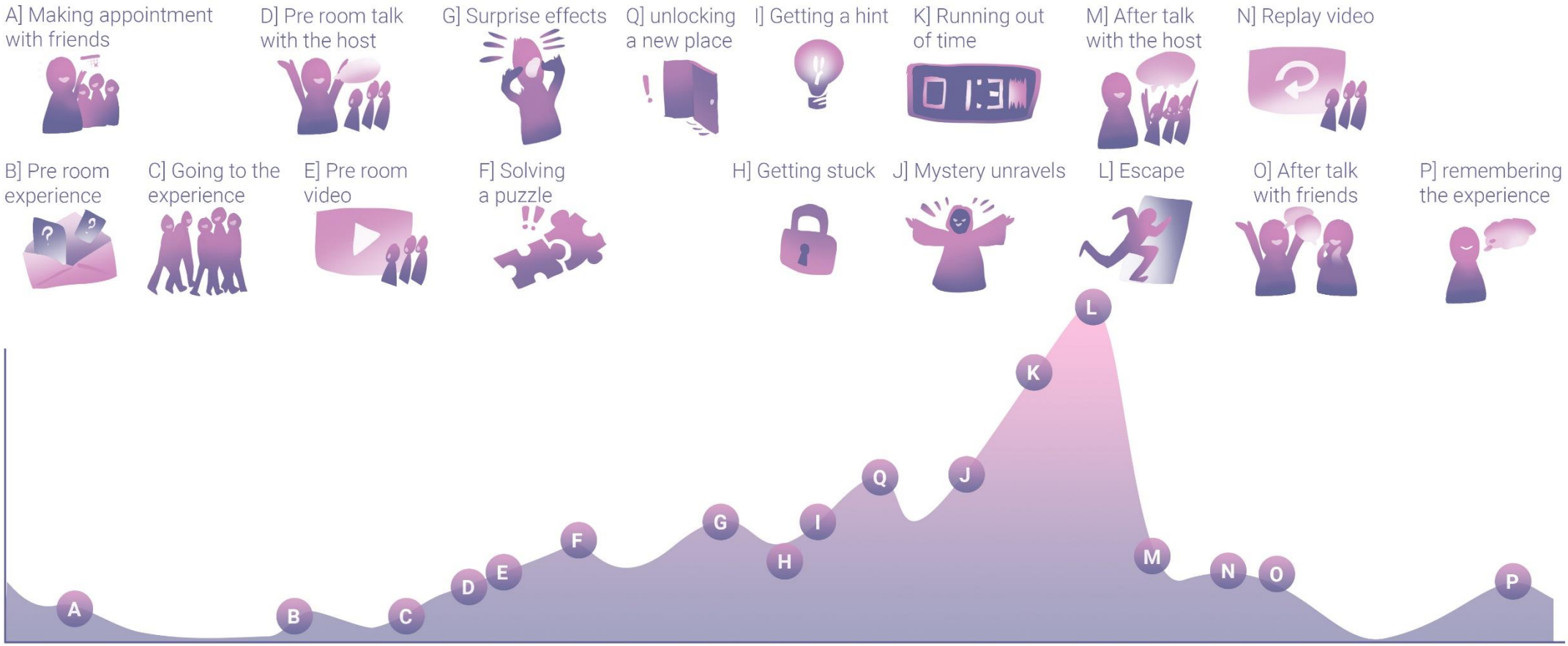
Escape Stories

Unlike one might think, an escape experience doesn't always start at the door of an escape room. Usually it starts as a messy idea among friends to have a get together. Planning and chaos ensues until a date is picked and the wait begins for that date to arrive. In the meantime, room owners might choose to give a pre-experience, consisting of sent messages or riddles or even whole events to prime people for the experience.

Then they arrive at the location. They get introduced to the rules and regulations of the place, and then get their first taste of the story. The host tells them energetically who they are and what their purpose is in the story, or a video is played to give them a more consistent impression with visuals and music.

The room is closed behind their backs and the timer starts. This part is where the good rooms really separate themselves from the bad ones. There are many ups and downs during this period of stress and chaos. Unlocking locks or solving riddles brings us new highs as we get closer to the next milestone. Getting stuck really gets everyone in a rut and gives contradicting opinions on whether we need hints or not. Surprise and shock is used to spice up situations and change up the scenery. As the mystery quickly unravels towards the end they are exposed to the reasons for the events that unfolded.

Making it out of the room in time gives a final boost to their adrenaline before they settle down for a talk with the host. This time it is the team that radiates all the energy, just having gone through so many hardships in such a short time. Days after we would still reminiscence over the greatest moments during these games.



A user journey, mapping the main experiential components of an escape experience and in intensity graph. Both are based on tests of existing escape rooms.

Story structures

Looking at classic escape experiences, we can neatly overlay the structure of it with storytelling structures used in books, games and experience design. Countless stories follow the same structure for their story, such as the Hero's Journey or the Three Arc Structure. A summary of the three arc structure was extracted from the Video Game Storytelling book by Skolnick (2014).

The Three Act Structure

Act I - Setup
The character and setting is introduced and we encounter an inciting incident: the reason why the rest of the story will unfold.

This part exposes the users to the world, the characters and its storyline. Players in an escape room are introduced to the scenario, and their role in the story, as the story sets into motion

Act II - Confrontation
This act is filled with hardships, there are crises and challenges for the main characters to tackle, each crisis being followed by a small period of relief before the next one shows up. The tension in the story keeps rising until it finally reaches its climax.

This is the moment when players encounter obstacles, puzzles and challenges to overcome. The story arc is set up to provide a rising tension, with its ups and down in gameplay being signified by small wins and milestones reached during gameplay. This all comes together during the climax, the moment all the pieces fall into place and unravel the mysteries of the room. This is the moment of escape you've been struggling and fighting for.

Act III - Resolution
The final act that shows how it all ends. We see how the actions and decisions from the earlier acts impact the world. The main character has triumphed or failed his quest.

This is the relaxed part after the story, where players can reminisce over their game result of a win or loss.

This three act structure can serve as a backbone for the new interactions that have to be designed, giving them a structure of rising tension, featuring milestones and narration to lead the way.

Story Structures, The Hero's Journey in Experience Design
& The Classic Three act Structure with rising tension

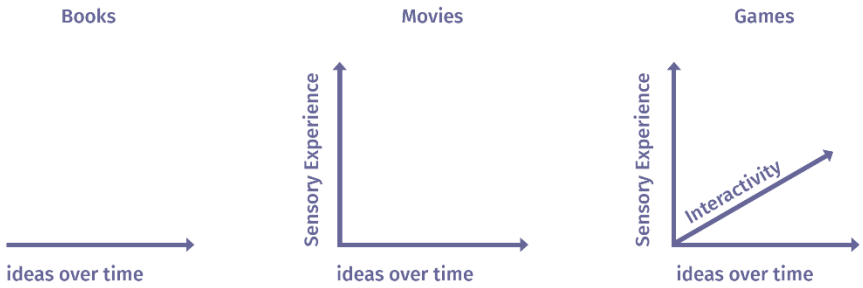
Environmental Storytelling

To successfully immerse the player you want them to feel the story when they walk into your environment. “First try to find a way to let the player do it; your second choice is to show it. And finally, your last resort is to tell it” -Evan Skolnick (Video Game Storytelling).

To do this, environmental storytelling can be used, which embeds information of the story in the environment, this can be found in physical items, documents and logs that are scattered around a room.

But the room should not become cluttered with red herrings make players stray too much from the storyline, there should always be a rationale why an item has to be in the room. Areas of inspiration on how to fill the room with artifacts can be found when looking at the characters and the world of the story. Who they are and where they are greatly affects how items in the room are arranged and chosen.

In this case the design of the future world is mainly based on trend research, following sustainability (DDP) trends and technology trends (FTI).



Game narrative

Narrative is used differently when you switch between mediums. To understand game narrative better different story mediums were observed to see the differences and what types of problem might occur.

Mediums

To have great storytelling, it is imperative that you take maximum advantage of the medium of expression. Books, films and games all have their own strengths. Written story tells us about events and richly describes characters, but leaves a lot of room for the imagination. Film actually allows for our senses to be activated, body language, voices, cinematography and sound design giving new meaning to a scene, a single frame being able to tell more than a thousand words. Even when our main character is unaware of it, a well-designed medium takes all its aspects into account, for example the colour grading of movies has great impact on the mood but can go unnoticed to the viewer. Games allow for us to explore the story by giving the power to interact, we are no longer framed or forced to look anywhere, we become one with the character, taking the power of choice and action into our own hands.

Dissonance

What we don’t want is to break immersion of the players, therefore any dissonance should be avoided at all cost.

Ludonarrative dissonance is when the story doesn’t add up to what the player does in the game, here you will carefully have to balance giving more freedom to players with guiding them through a coherent story.

Identity dissonance occurs when the narrative perspective clashes with the medium. Written stories are often told from 3rd person, movies are

watched by observing others experience the story in 2nd person, and games are done in first person, by taking on the role ourselves. When the story deviates from this setup, you will feel disconnection from your character as it feels like they take away freedom during cutscenes. For movies “Show, don’t tell” keeps you on track, for games this would translate to “*Do, don’t show*”.

Good Gameplay

In a good game, the player’s desires (implicit) are synchronized with the in game character’s objectives (explicit). This happens when the next step you want to take as a player lines up perfectly with what the story wants you to do. By leading the player through the story without forcing them, we can make them believe in their own wit and strengths, giving their player narrative value with personal achievements.

Emergent narrative

Emergent narratives are a relatively new and unexplored way of gameplay. In emergent narratives, we don’t focus as much on creating the story for the players, instead the focus lies on creating a world where the story can naturally unfold. Here events and opportunities are brought to life by game mechanics. This facilitates the players to interpret them freely and allows for interactions between them to occur naturally.

Characters

Creating a character

To create a character we have to look at what makes them believable. To do so we can look at how characters are written in stories. Usually there are very basic identifiers but also deeper underlying thoughts and motivations.

Attributes

When designing a character there are very basic attributes to them such as name, sex, race, age, intelligence, education type and level, profession, vocabulary or way of communicating, backstory etc. Going one level deeper, we will see more about how a character thinks, think of character development, desires, likes, dislikes, values, beliefs and flaws. Next to those characteristics, we also have the visual attributes including the physical attributes of the character, clothing and items they wear.

Character types

There are two types of characters in games: the players and the Non playable characters (NPC). In escape rooms the participants will be the players and the NPCs will add to the narrative of the story.

NPCs can fully be designed. These characters can be physically there when they’re roleplayed by the hosts. Or the environment can help to reflect the existence of other characters, these can be seen as artifacts in the room or messages, video logs and comms to reach out to the players.

Players can be prompted to immersive themselves into a role - giving them a backstory and goals, or even a choice in what they will wear during their adventure. However there are limits to how much you can design a player, as they will always have their own beliefs and ways of handling things. In this case it would be wise to not over design, but rather facilitate a certain openness to the roles assigned to these characters.

Experience Design

To give players the best possible time, experience design was examined more closely. Using museum and expo design as a reference for edutainment.

In experience design we can identify four levels according to Erik Bär and Stan Boshouwers: body, mind, heart and soul. (2018) Which can be linked to the four types of pleasure that Don Norman has identified (2005)

Body-	Physio-pleasure -	five senses
Mind-	Socio-pleasure -	interaction
Heart-	Psycho-pleasure -	mental state
Soul-	Ideo-pleasure -	reflection

Inspiration touches people on all levels and to make something inspiring all you have to do is make your space beautiful, interesting, feelable and meaningful. To ideate with these levels, a card set was created to keep them in mind (appendix F)

The levels of experience design card set in use

Sustainability

Sustainability is a complex topic which closely connects different aspects of society. To have a truly sustainable world where we can realise a circular economy we would need to make sure the three pillars of sustainability are in balance: economy , environment and society. (circular ecology, 2020) This coincides with the triple bottom line model where corporate benefits, social responsibility and environmental friendliness are all taken into account. (Kenton, W, 2020)

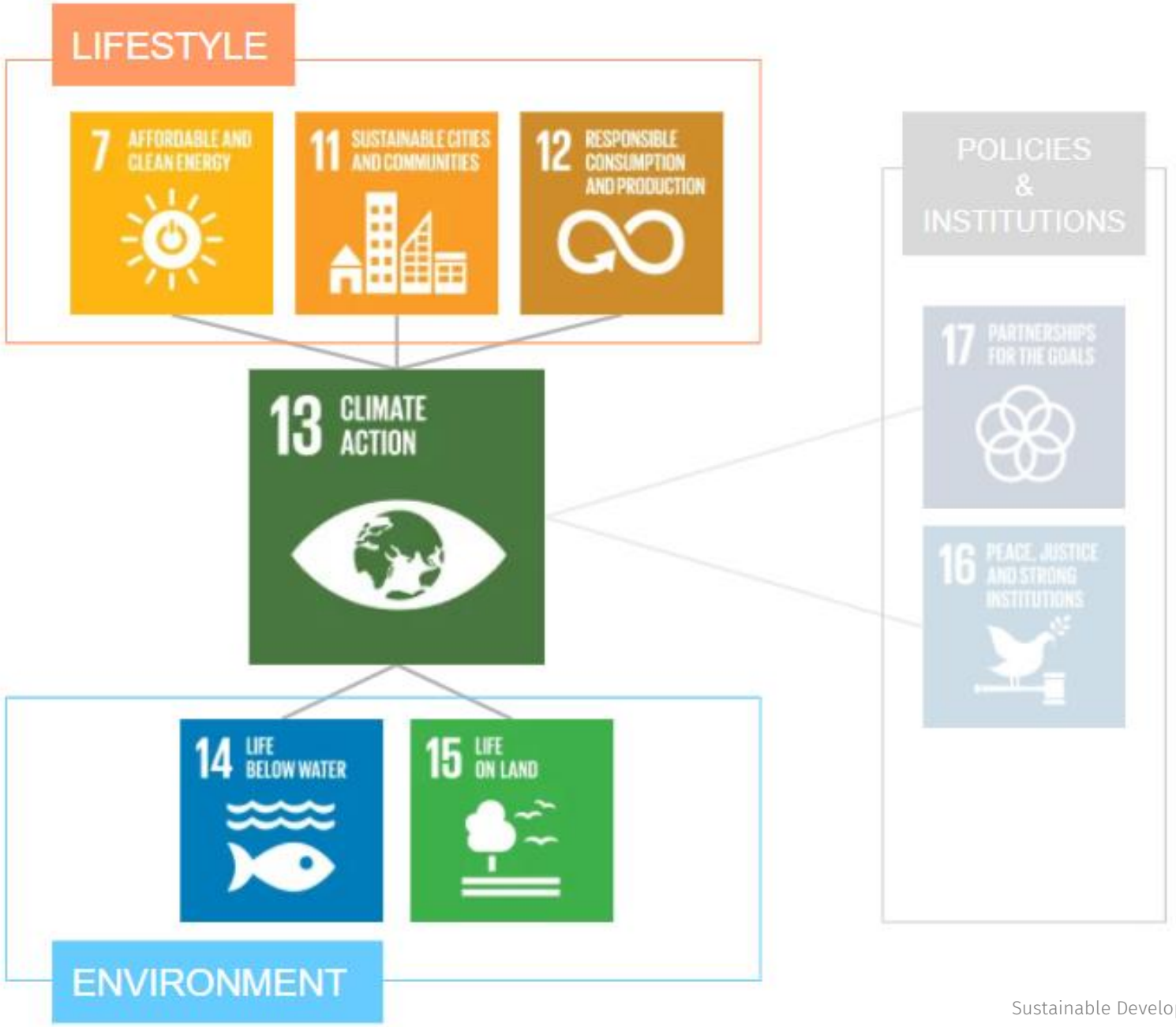
Sustainable Development Goals.

To understand how the world looks at sustainability we have to look at sustainable development.
“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987, p. 41). To ensure the world remains liveable in the future, the United Nations has defined 17 distinct sustainable development goals (SDGs).

The focus of this design will be on the 13th SDG, climate action, as the core mechanic of the gameplay is centred around experiencing the rising water level in real time.
Closely related SDGs were into three categories:
Lifestyle - Affordable and clean energy, sustainable cities and communities, responsible consumption and production.
Environment - Life below water, life on land.
Policies & institutions - Partnerships for goals and peace, justice and strong institutions.

From these SDG clusters, Lifestyle has the closest relationship to the target audience which are festival visitors. Environment has the closest link to our main goal namely climate action, therefore these two categories will be the scope of the design. Policies & institutions are still very relevant SDG’s to the target audience, but are a hard topic to connect to and tackle in daily life.

To design the new interactions that incorporate sustainable values, The United Nations SDGs, The drawdown project and future trend reports and articles such as Future Today Institute were consulted.



Sustainable Development Goals Selected for this Project

Purpose

What we want from gaming is more than just fun, we want it to have impact and value. Games are an excellent method of active learning and many types of (serious) games have been tested in the past. An escape room will encourage communication among its players offered in a more entertaining format. (Dietrich, 2018)

Team based achievements

Cooperative physical games structured to make group cooperation essential proved successful, encouraging pro-social skills in players. (Street, 2004) The key of this success was that it was not determined on an individual basis, but rather as an overall group performance. Previous research has found cooperative games offer more benefits because it enables people to focus more on the experience of play rather than only on the outcome (Orlick, 1982)

Knowledge retention

Immersive games proved to be superior in knowledge retention over a prolonged period of time compared to offering information the traditional way. (Chittaro, 2015)

The BLUE MIRROR experience has to make team play essential to beat the challenges in time so that players can focus more on enjoying the experience.

Surprise

BLUE MIRROR incorporates surprise moments in its gameplay which is a technique used to boost user attention and evoke strong emotions. Work in neuroscience and psychology show that emotional intensity (especially negative) has a positive effect on knowledge gain.

Consequences

Another way to make something more emotionally engaging is showing the consequences of users' actions. (Chittaro, 2015) Direct feedback in the blue mirror game is given in animations, water level, task list tracking and the AI commenting on performance.

Surprise events and consequences will boost attention and increase knowledge gain and retention.

Empowerment

The goal of the full experience is to make players feel empowered afterwards. Empowerment is a highly interactive process that requires communication and education in which knowledge, values and power are shared (Alegría, 2008).

Players will need to feel knowledgeable, able and motivated about sustainable action to feel empowered.

To guide the players of the escape game through the complex material, the hint and continue system manages the level of difficulty for the players to optimize flow.

DESIGN

In this segment the Design Vision is laid out, introducing the Interaction Vision and desired Styling. BLUE mirror version 2 will be presented in this new design proposal, covering the intended interactions, interactive components and implemented systems.

A group of Urban Explorers

Interaction Vision

An interaction vision aims to create a rich representation of the moods, feelings or experiences that the interactions with the future product should bring for the user. This interaction vision can be expressed by using analogies or **metaphors**, with the desired design qualities. (Vision in Product Design methodology by Hekkert, P. 2014)

The interaction vision has been established from the insights gained during the context mapping sessions with people aged between 18-30 using a make-booklet. Participants were prompted to tell about their previous experiences and their ideas about escape rooms to look for new opportunities.

A selection of words inspired the interaction vision of **Urbex groups**, which captured many of the aspects that were envisioned for this new experience. It is **adventurous** and **mysterious**, and **cooperative** making you reminisce of time travel.

Styling

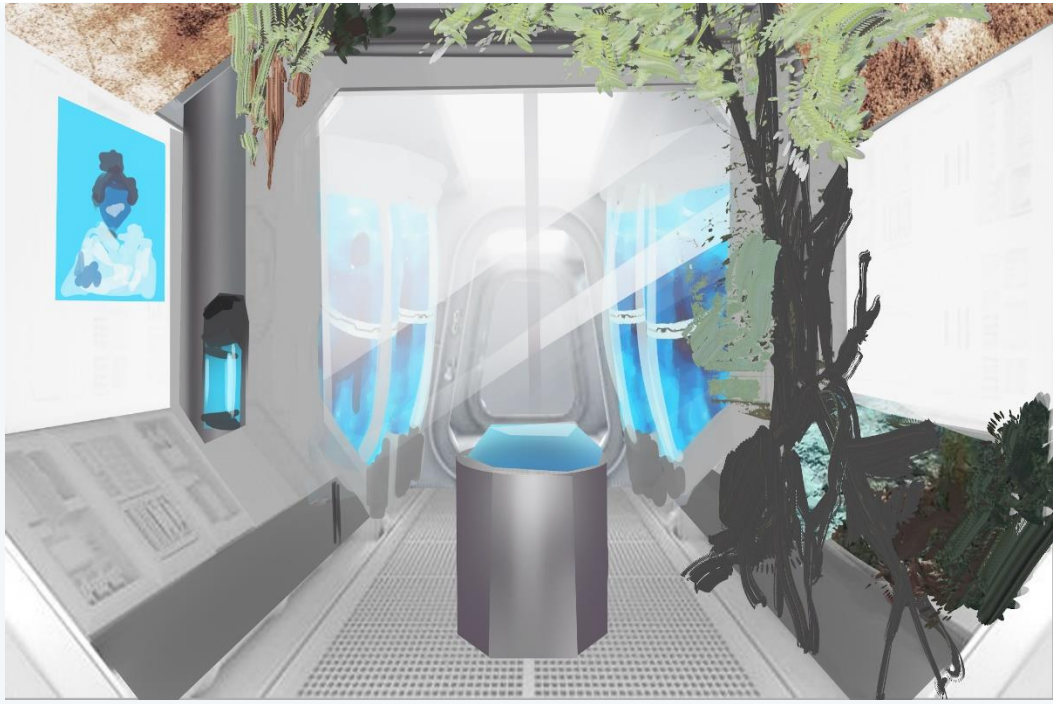
Styling boards inspired by **Sustainability** and **Urban Exploring** were created which can be found in appendix H. Together, these shape the styling of the escape room: a juxtaposition of Natural materials and clean **futuristic** aesthetics.

Natural and **recyclable** are the materials of choice to manufacture the different components of the room, as this project aims to lead by example.

Abstraction and **minimalism** are the basics for the futuristic science fiction aesthetic, focusing on clean and simple surface designs.

Environmental storytelling

To immerse the players into their journey to the future, we wanted to implement futuristic looking elements. But time travel should not only be reflected in objects that look like they could belong in a science fiction setting. It should also show the **passing of time** in a physical sense. During Urban Exploring the time element shows through in its stages of decay and decline as time has passed which can be seen in things such as the settled layers of dust, overgrowth, rust and deterioration..



Style impression of an escape room

A collage of Sustainability juxtaposed
with futuristic aesthetic

Design Setup

A list of Requirements and wishes set up boundaries for the design proposal. (The full list can be viewed in appendix A) Some of the important boundary conditions for designing are as follows:

The game is suitable for **2-4 players** and will have a maximum duration of **30 minutes**.

The game should be easy to transport to the festival, fitting within the allotted space (**2200*3500*2300** respectively W x L x H).

The game should reflect the **Design Vision** including the Interaction vision & Styling.

Setting

After observing various plots and characters of **time travel** media, the plot for the design was created. (More on time travel can be found in Appendix G). The Time travel device of choice is a time capsule engineered by scientists. When entering the time capsule, time will flow faster outside the capsule, keeping the players in a type of time statis. While traveling into the future, participants are able to trigger alternative timelines with their actions during gameplay. At the end of the experience we want to ground the character in reality again, sending them back in time.

Characters

Our main characters are chosen because they are young & strong allowing them to stand the tests of time. They are requested to keep watch and collaborate with an Artificial Intelligence, to manage the future resources of the world. The background story of the playable character is kept quite generic as to avoid ludonarrative dissonance with players.

Story

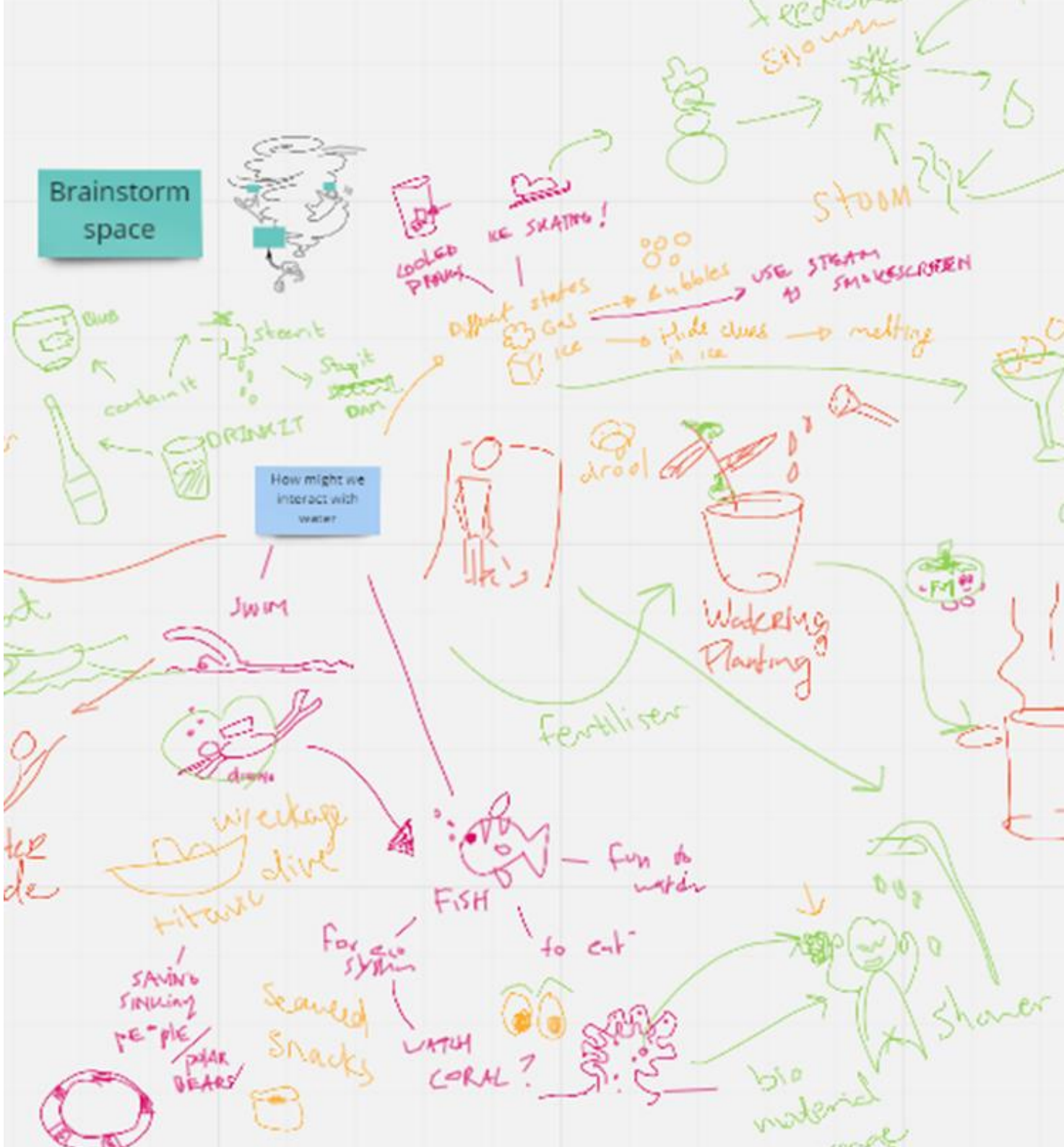
The world our story takes place in is not far off from the world as we know it; and faces a similar climate crisis in the near future. To solve this, teams around the world are sent out to the future to help collaborate on solutions and try to save the world.

Our story starts with our heroes entering a time capsule. They start managing the world, through the control panel interface, keeping check on the AI. Solving problems while battling against the intensifying forces of nature. Water levels rise and quickly start to seep into the capsule. Over time, various components get damaged or need managing within the capsule, distracting its users from managing world processes. In the end, users arrive in a future heavily influenced by climate change. When their battle fails, time capsules are sent back in time to harvest large amounts of data and give it another try. Using their last resorts, the AI powers the time reversal sequence, sending the team back in time to warn others and improve the next loop.

Ideation

To start out the ideation phase, a generative session was organized, to cocreate new ideas with future users. This session focused on how we might tackle specific challenges about this new escape room. Participants were asked to sketch out ideas (brainwriting) based on ‘How might we’-prompts and invited to present and discuss their favourites based on a voting system.
These were later used as an inspiration for further ideation.

After this, several ideation sketching sessions were done to create a wide array of ideas, which delivered the first concepts to iterate on during the rest of the design phase.



An Snippet of the Brain drawing session

Visit Stages

Using the experience story structure extracted from Worlds of wonder (Bär and Boshouwers, 2018), the different stages of experience design were iterated on shortly to see if they could be integrated with the core experience, which resulted in some design recommendations seen in the figure below. The time that the players spend inside the escape room until they exit will be the scope of this design.

Design Scope

Invitation

This is the moment we want to invite players. As the escape room is situated on a festival, the benefit exists of being able to lure them towards the room.

Think of sustainable fliers such as edible or compostable options, and pathfinding tools such as waypoints or trails

Transition

The outside of the escape room can be designed to invite arriving players.

Think of options such as an external hull or tent made with an origami structure or an inviting decor for people to lounge and relax, creating a warm feeling of home when you wait to jump into the room. Waiting doesn‘t have to be boring with the pre-game card set that is provided to make you think about the future.

Introduction

Players get introduced to the experience by the host, equipping them with wading suits and instructions.

A changing room may be supplied here, which could be integrated within the external hull.

Exploration

Visitors are guided through the room with a variety of interactions as the story progresses.

Interactions are based on sustainable development goals and sustainability research, to have them users directly interact with the learning material

Admiration

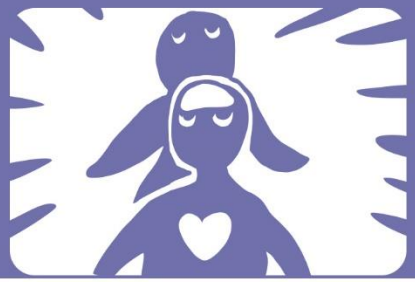
The moment of the unexpected. The room captures the attention of its players by using moments of surprise.

Think of the lights turning off, sudden plantgrowth simulations and the tipping point of the water reaching its maximum height.

Immersion

The escape room touches on multiple senses and allows participants to reach a state of flow by changing the difficulty accordingly.

To immerse players, various effects are used including audio, visuals like animations and lights, and physical such as water or steam. To keep players immersed hints will be given subtly and gameplay will never come to a standstill.



Connection

The main stage of the experience is obviously the room itself. Everything comes together to touch people‘s heart, body, mind and soul.

Recollection

The ending of the experience. Players get sent back to their own time period.

Within the flashing screen when time is reverting, we can see other players also trying their hardest, giving players a message that they are not alone in their fight.

Integration

Players will get feedback on the card they picked in the pre-visit stage.

Players could take away a memento of the experience such as photos or videos to watch, an incentive for more sustainable choices (coins for vegan food stands) or invitations to a sustainable platform. Another interesting option would be to invite them to a follow up experience outside the festival.

Visit Stage – Transition & Introduction

The part of the escape game that takes place outside should feature a welcoming area where the host can greet new participants to join in on the experience.

This area should provide new participants with lounge facilities so the wait for the game to start is a pleasant experience.

The outside of the escape room can be decorated with materials that reflect the design vision, such as recycled materials or clean and glossy features such as mirroring panels.

An external hull can be added to the room to expand the facilities of the users, this could provide users with shelter from the sun during the hot seasons, or give players the ability to conceal themselves while they change into their game outfits. Extending this external hull a bit more, would allow us to make a playful exit such as a slide, climbing wall or stairs to let users exit the experience through the roof.

A concept idea for an external hull and lounge area

Visit Stage - The room

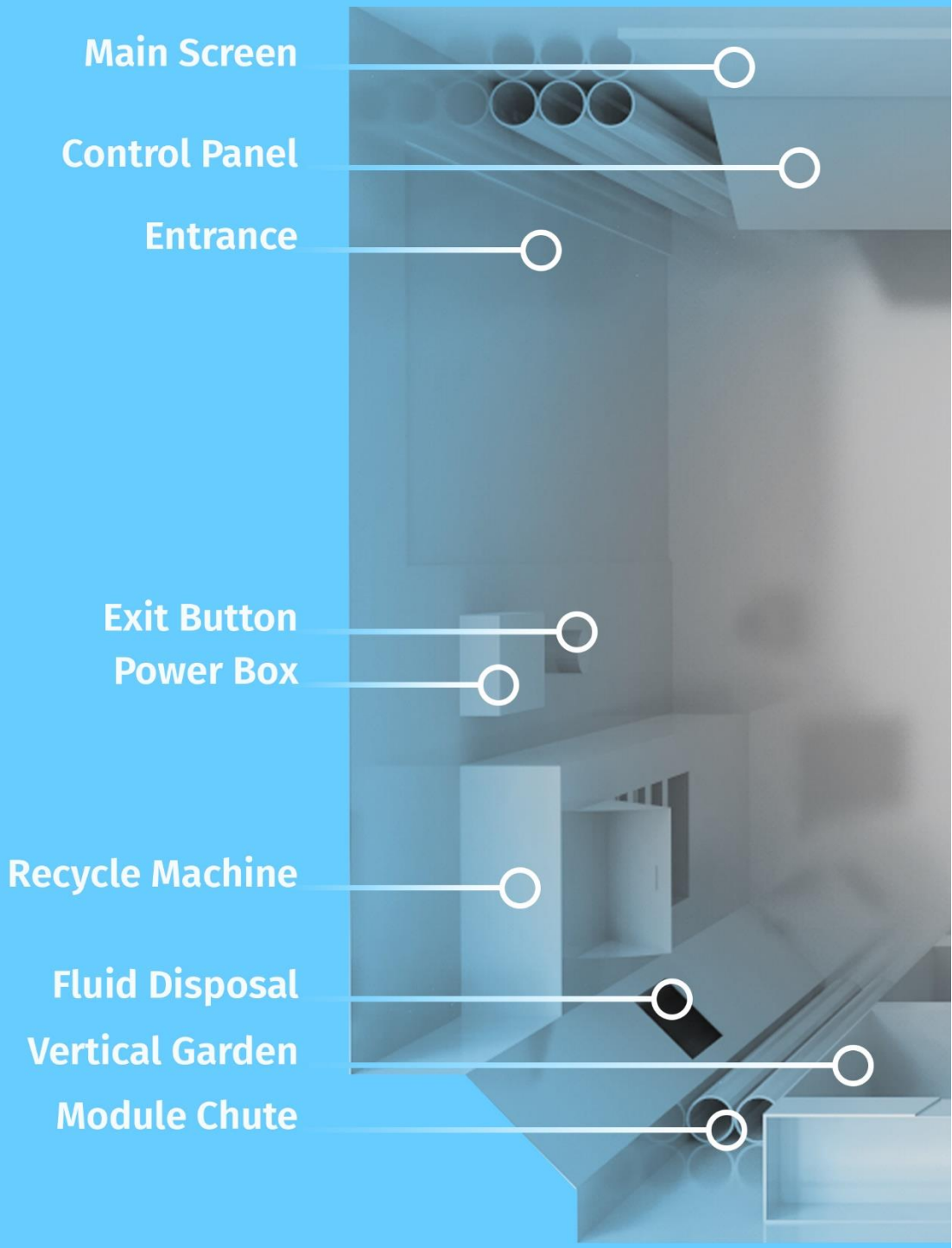
The core of the design stays true to the original style of gameplay following a fast paced command based playstyle with an AI voice guiding the players through the challenges.

All the interactions within the scenario take the aspect of water into account. Some puzzles directly use it as a component to solve the challenge, whereas other parts use certain properties of water (e.g. its density causing floating/sinking or physical state steam effects and ice components).

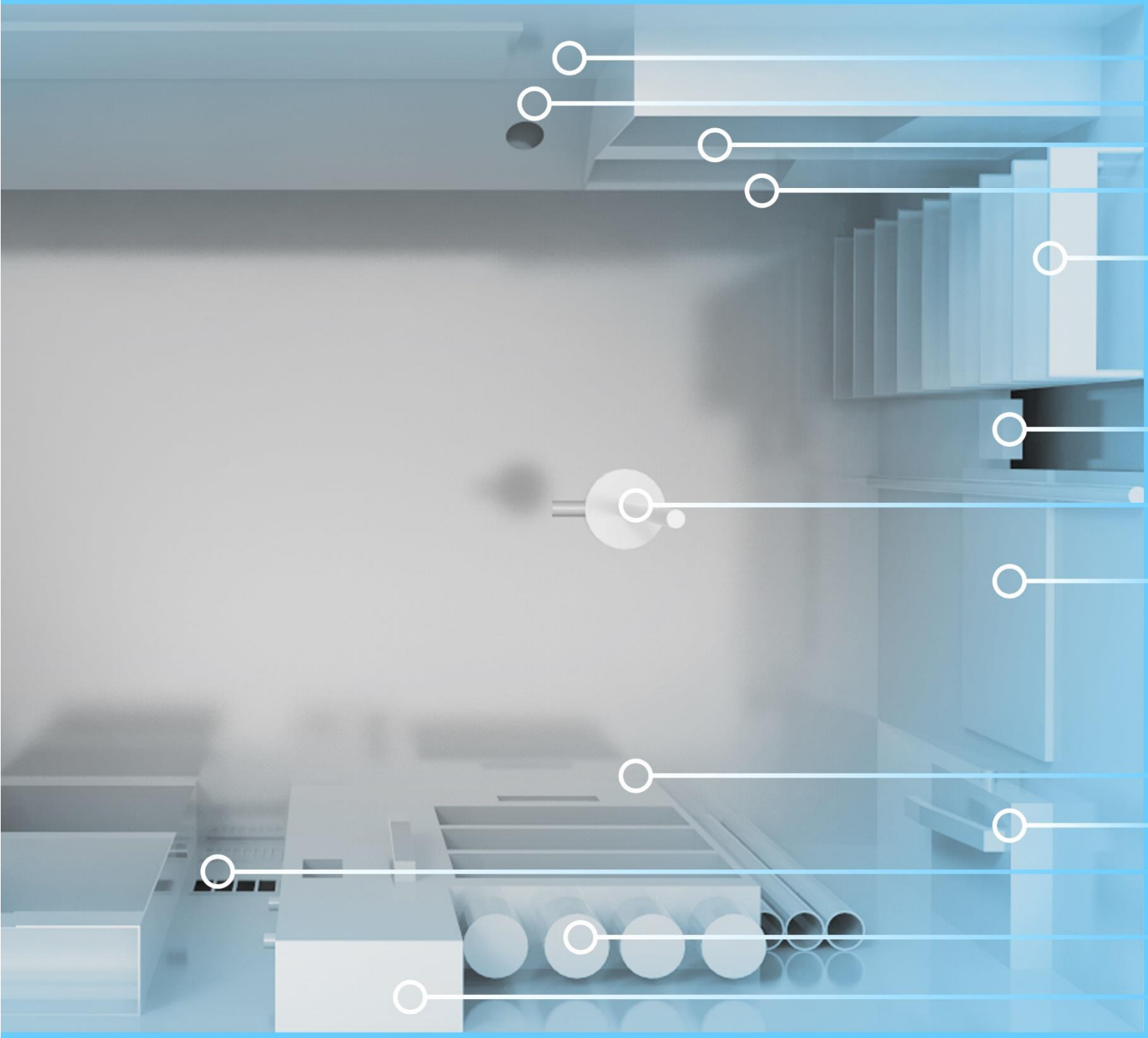
Overview

The room design itself is very compact to allow the full installation and water management facilities to fit inside 2 containers. The allocated game space is 2200 mm wide by 3500 mm long and 2300 high. A concept overview of the space can be seen on the right.

A full, more elaborate walkthrough of the interactions can be seen in appendix J



Top view of the Escape Room


Window
Transport chute
Storage
Sequence Machine
Exit Stairs
Sequence Machine
Water Cannon
Tube puzzle
Refrigerator
Water pump
Vents
Buckets
CO2 Machine

Guidance System

To ensure that the gameplay can fit within the allotted time limit, a guidance system is implemented. This is to ensure that players will get the most out of their gameplay and increase flow

Guidance

An AI voice will give you instructions what to do next and comment with feedback on your performance.

Hints

Tasks are shown on the main screen to show users what to do. After a set amount of time, subtasks accompanied by voice instructions will be added. Other hints can also be included such as light effects and example hints.

Continue

After another set amount of time, the game gives you a fail for your slow performance and urges you to move onto the next part of the game. This is reflected in the water level rising once more and designed to keep up the pace in the game.

Water sources and effects

Water Effects

The whole room is designed with a focus on water. Special water effects include simulations of pipes breaking, cracking of windows, steam, breaking ice and water spilling from vents and cracks. Water flows into the room at a steady pace, but is also used as a feedback system that gives players an audible extra splash of water each time they make a mistake.

Water management

The water level is limited to 90cm high, which allows players to stand and breathe at all times. The emergency button is present to stop the experience and drain water within 30 seconds. The water level is able to rise from 0cm to 90 cm within 5 minutes.

Fake Sense of Danger

Even though the room has a maximum water height limit, the participants should get the idea that the water can go higher than this. This is done by adding details such as diving gear within a display that “might be unlocked later” and adding an exit sequence where players leave the room through the top while the water rises to its maximum height. Water pours into the room at the maximum rate, but will be drained to keep it right at the limit.

Introduction

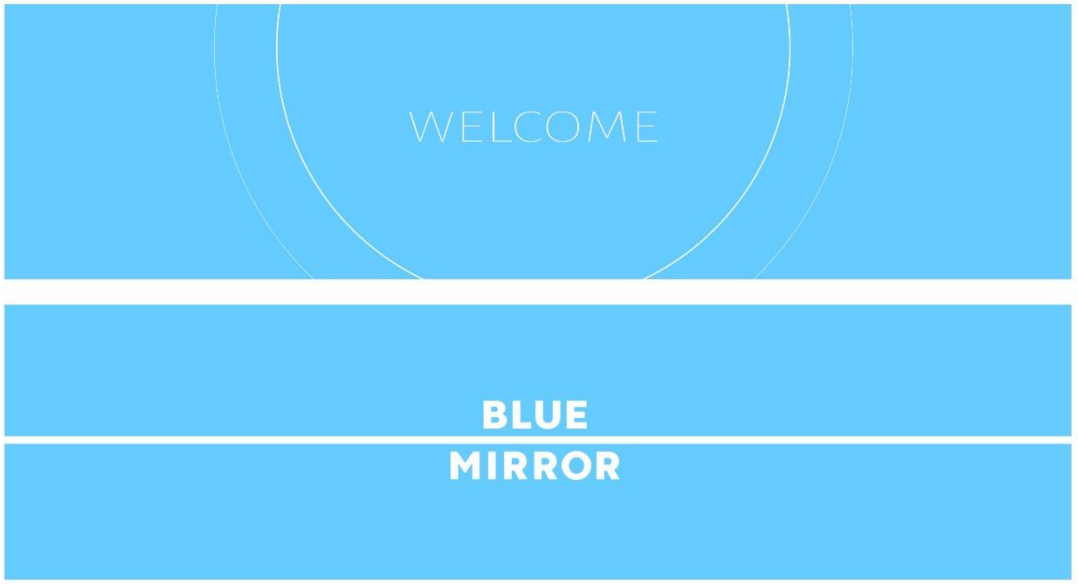
Escape rooms don’t exist in a vacuum, before entering the experience room you get a brief from the host and are outfitted with the tools and knowledge to begin your journey. In this case a wading outfit is provided to keep the participants relatively dry.

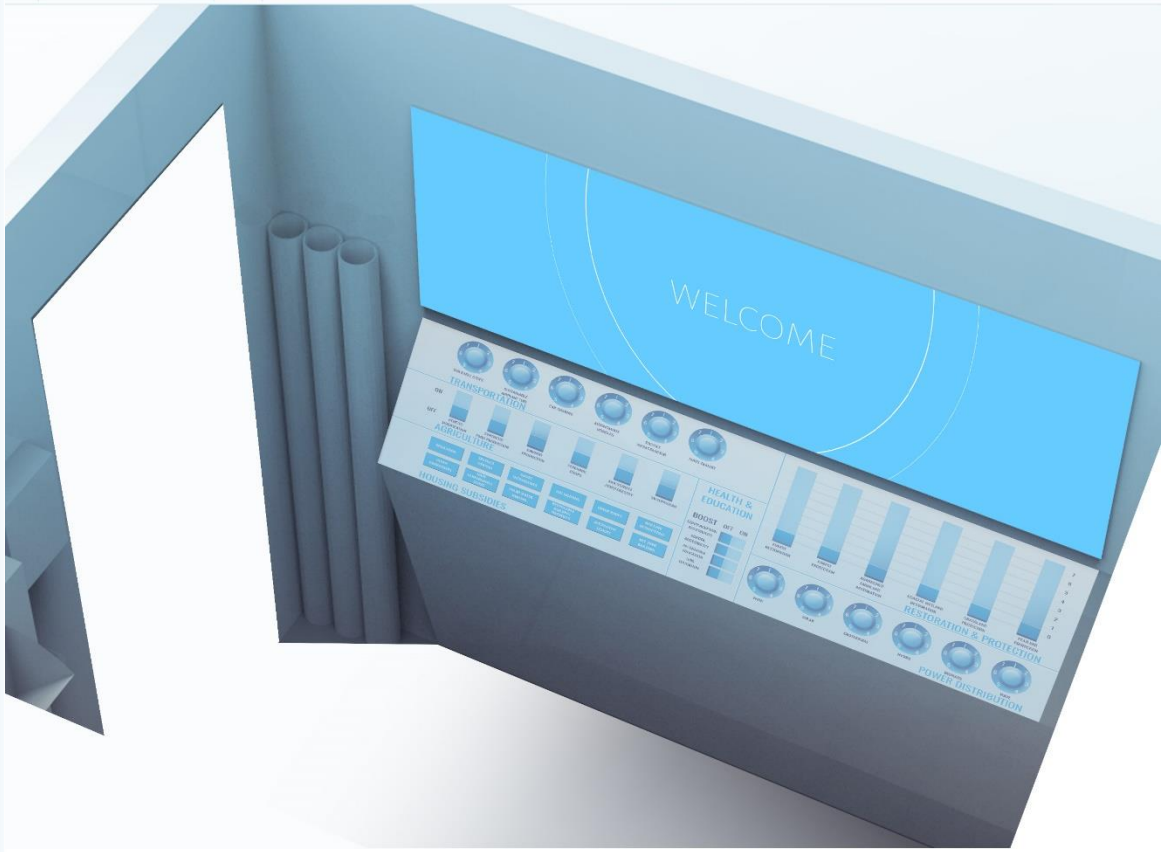
Functions

This sequence is used to assess the number of players and prepare them for the game. The wading suit will prime them what to expect of the room, so that the water effects will not be a complete surprise. Futuristic features such as the biometric scanner and AI interface will start immersion into the story context.

Themes

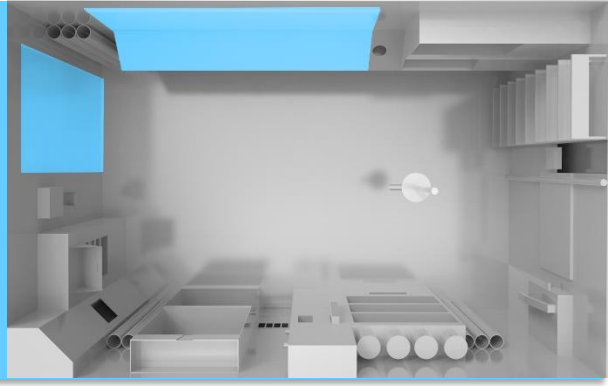
This part exposes the players to the futuristic scenario, entering a time machine you interact with biometric technology and artificial intelligence.



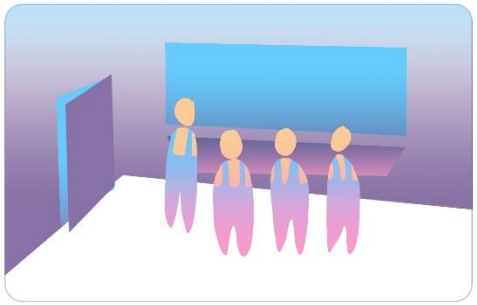


Interactive elements:

Screen
Control panel
Entrance

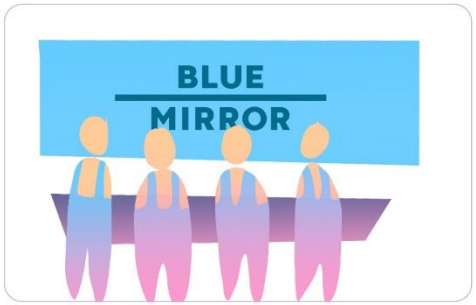


Players put on their wading suits and are guided to enter the room



The door closes and the screen requires players to log into the control panel

Players scan their hands on a biometric scanner, which initiates the game and starts the clock



An introduction sequence plays, welcoming the players and introducing them to the gameplay

Control center

The control center is where our players get to interact with the outside world as times goes by. They get instant feedback on their actions showing what their future destination will look like through a newscast based on extrapolated results. A timeline and check list allows players to keep track of their tasks.

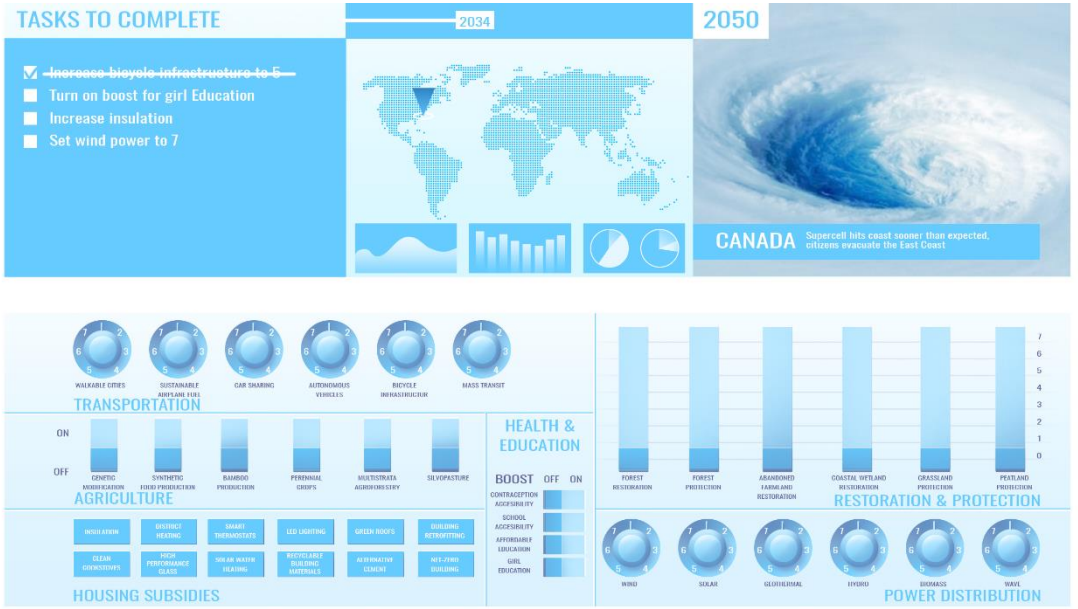
The interface touches on different topics of sustainability, such as transportation, agriculture, housing, power, health, education, restoration and protection.

Functions

This phase is made to introduce users to the style of the gameplay where they have to follow commands. The main feedback mechanic is shown during this stage of play – the rising and falling of the water level based on player performance.
Serious games gain part of their effectiveness from repetition. This part introduces users to the topics which will have more in depth interactions with other parts of the room, thereby increasing the chance of knowledge retention among users.

Themes

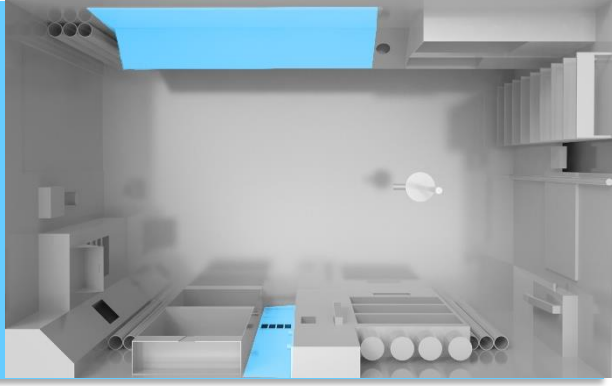
This Part has the highest information density of all the parts touching upon various sustainability factors such as Transportation, Agriculture, Power, Green technologies, Restoration, protection, health and education.



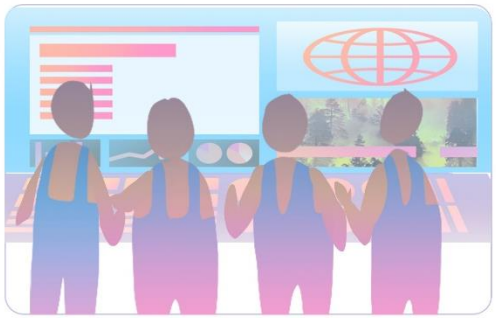
The main screen with control panel and physical interface

Interactive elements:

Screen
Control panel
Vents



The interface boots up, showing a world overview, current future status, a task list and certain metrics.



Players are prompted to manage sustainability factors by correctly pressing buttons and sliders quickly

Water starts flowing into the room steadily as time passes

The increase or decrease of water added is influenced by player performance

Coolant

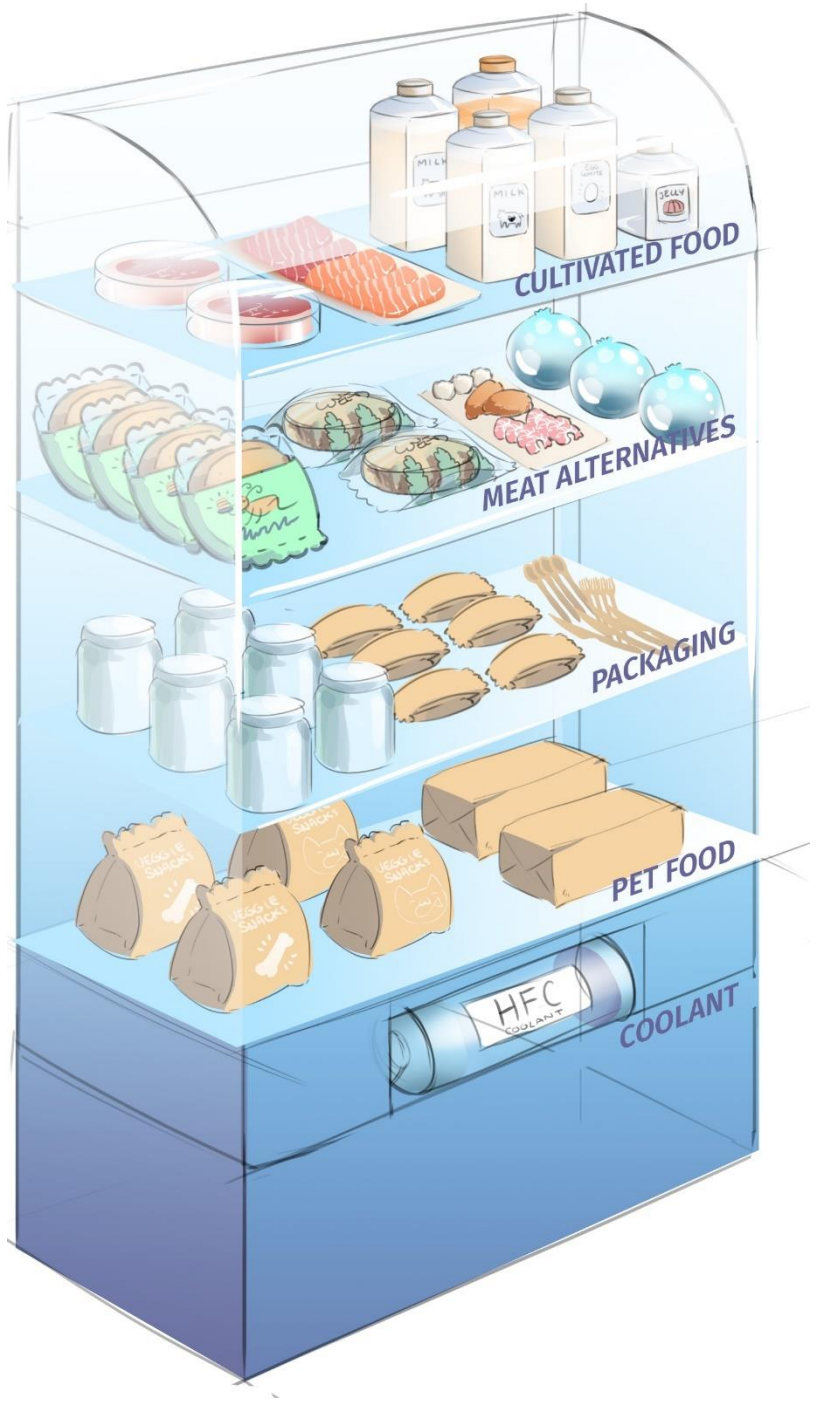
The fridge is not just a prop but a showcase new options of sustainable food in the future. We may have heard of lab grown meat or insect based diets, but there is so much more we can show. This section features new possibilities in the near future: e.g. insect flour pancakes, seaweed packaging, synthetic milk and fish. Favoring the more uncommon samples to inspire users.

Functions

Expose users to new food ideas before they hit the market. Introduce players to a gameplay sequence with simple physical interactions within the room

Themes

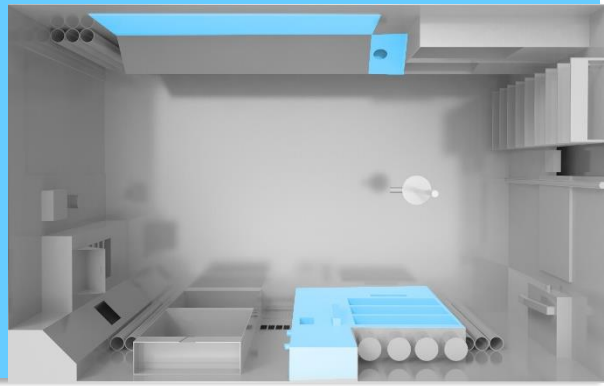
The main theme of this interaction is that coolant is a relatively unknown polluter with a big environmental impact. Some other themes besides coolant are, synthetic food, sustainable packaging, cultivated food, bug based meals, modular design and CO2 use cases



Fridge Concept

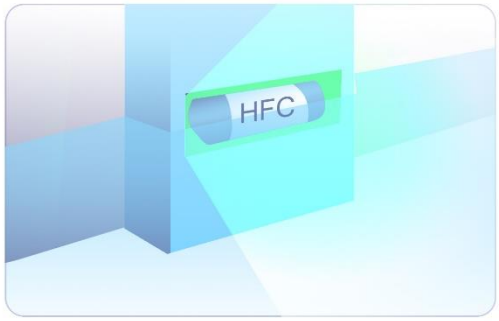
Interactive elements:

- HFC module
- CO2 module
- CO2 pump
- Screen
- Transport chute



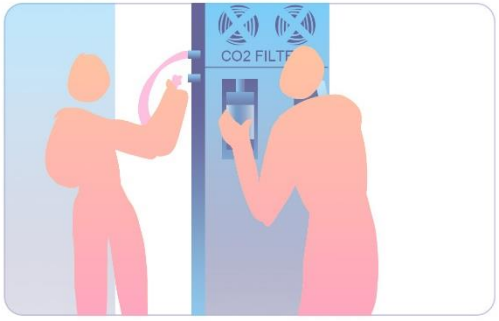
The game shuts down and an alarm sounds

A scanning light goes over the room to locate the contamination



The coolant cell in the refridgerator is highlighted and new tasks appear on the screen

Players remove the coolant from the refridgerator



Players connect the hose of the CO2 filter to the empty module

Players pump the CO2 into the module until the bar is completely filled up

The new CO2 coolant cell is placed in the refridgerator

The old coolant is disposed by sending it to a chemical processing plant

Plastic Soup

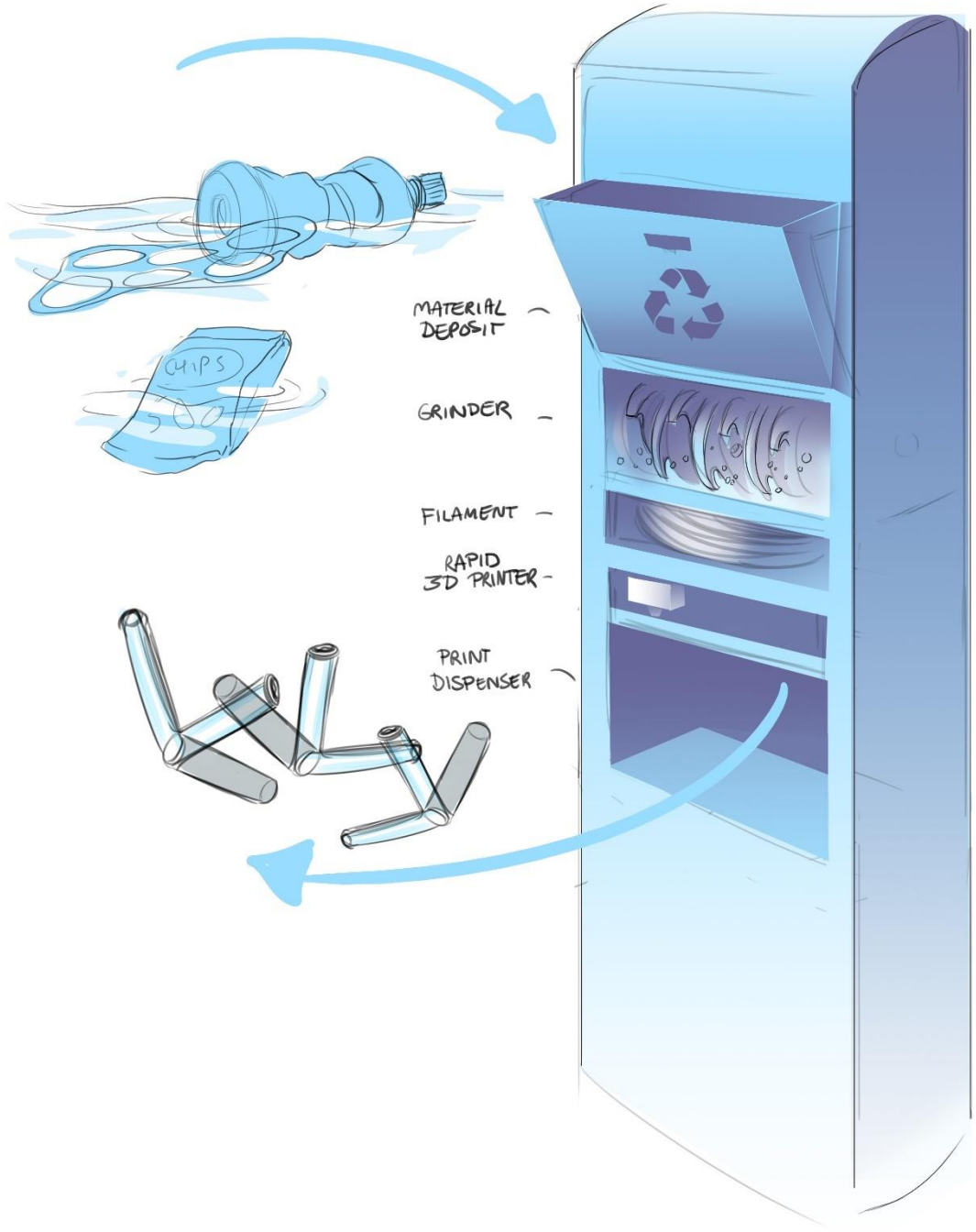
This machine shows its users the value of common materials by recycling it into useful objects. Most of these actions are simulated to keep up the speed of the game, but it's a clever way to deliver puzzle pieces to the participants.

Functions

This simple interaction takes full advantage of the water medium and allows for Immersion in the problem. Plastic soup is usually a problem that is far away from daily life, this puts the players right in the middle.

Themes

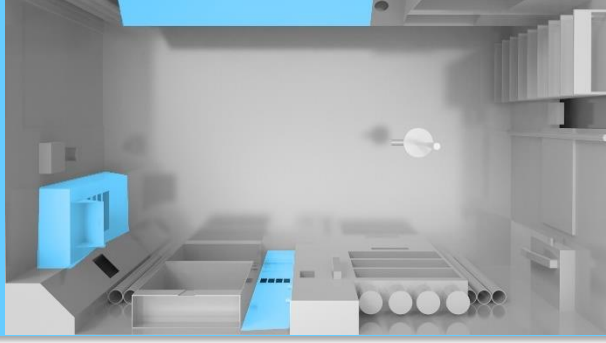
This part of the design touches on topics such as the plastic soup that endangers our environment and recycling steps through additive manufacturing

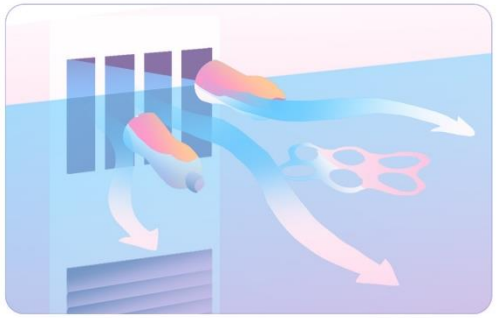


Recycle machine concept

Interactive elements:

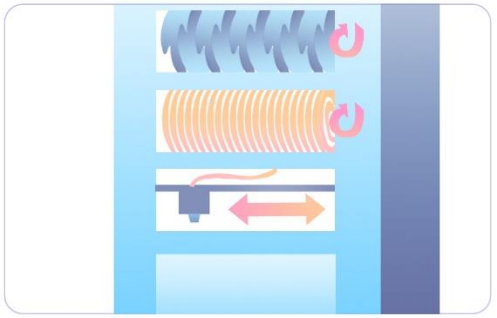
Water Vent
Recycle machine
3D prints



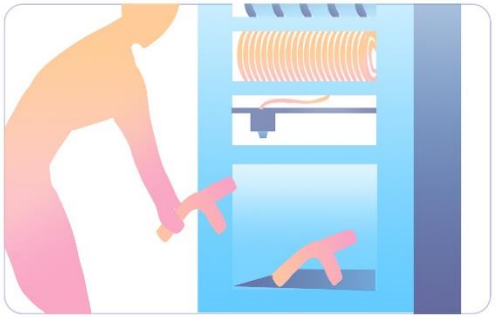


Plastic waste flows into the room towards the players

Players are prompted to recycle the waste by throwing it into the grinder



The recycler shows the grinding process, turns it into filament and rapidly starts printing



Players receive recycled plastic components that are dispensed from the printer

Vertical gardening

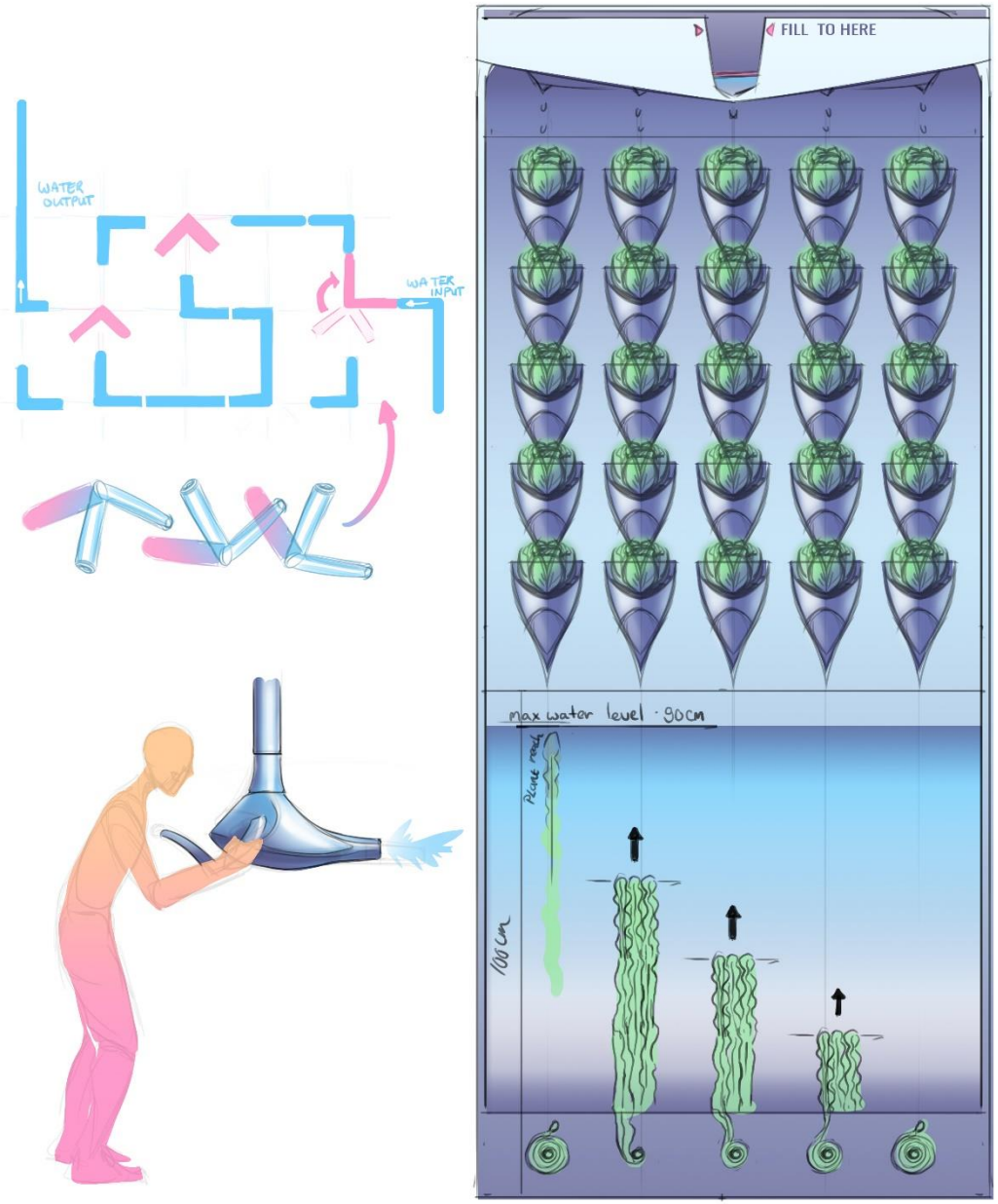
The vertical gardens show us a future where urban and agricultural life can be combined. Simple floating mechanisms will simulate plant animatronics to emulate time passing by quickly and change the player environment.

Functions

This part of the room forces people to cooperate to solve the puzzle, aiming to increase focus on experience and supporting pro-social behavior.
The room will not force anybody to get wet inside the room, but the interactions are made to invite you to be playful. Depending on user familiarity to each other we want to offer a space that allows for emergent narrative and play with water.

Themes

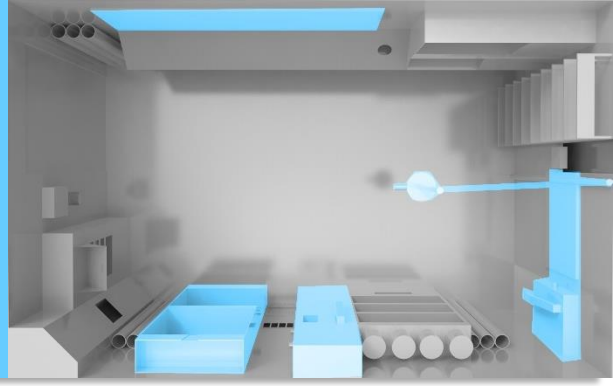
This Part shows people how plants can serve as land and water CO2 sink, refreshing the fact that CO2 is not inherently evil but merely part of an unbalanced cycle. It also touches on agriculture, vertical farming and upcoming food sources.

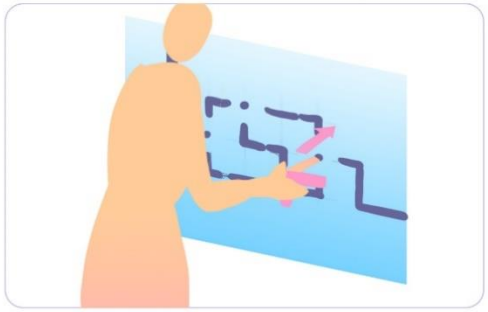


Vertical Garden Concept

Interactive elements:

Screen
3D prints
Water cannon
CO2 Filter
CO2 Pump
Vertical Garden
Tube Puzzle

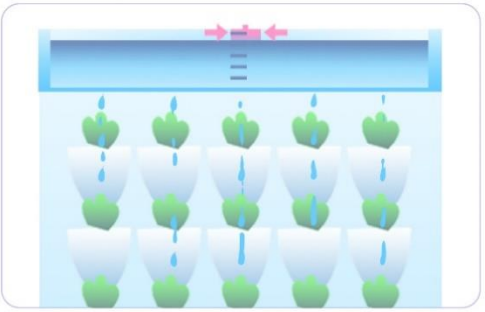




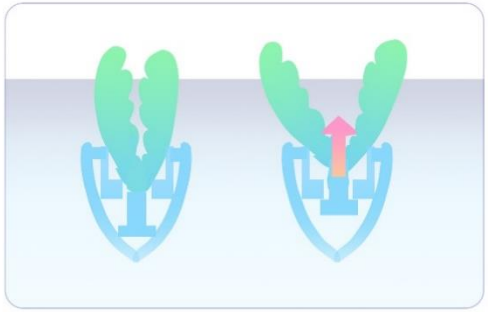
Players insert the 3D printed objects into the pipe puzzle

All pipe parts have to be held in place while another player pumps the water through the pipes

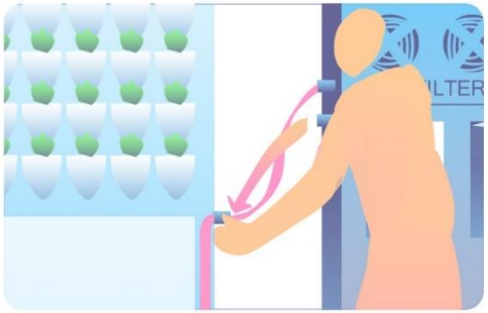
The water cannon is activated and can be used to water the vertical farm



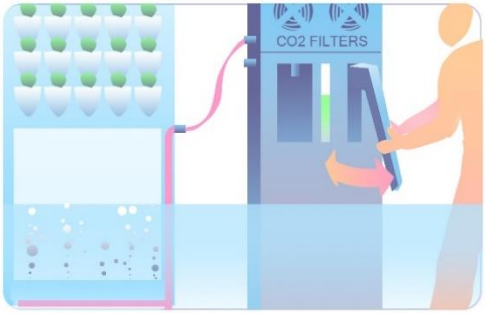
When the threshold is reached, water starts dripping down onthe the plants



Plants are pushed up slowly by the water level to simulate animatronic plant behaviour



CO2 has to be pumped into the vertical farm by reconnecting the hose



CO2 is pumped into the vertical garden from the filtering system and makes the seaweed grow

Seaweed growth is simulated by having a small float inside the tip of each plant that unrolls itself as the water rises

Sequences

This part zooms in closer on agriculture to showcase several different types of farming and reconnect people with sources of food.

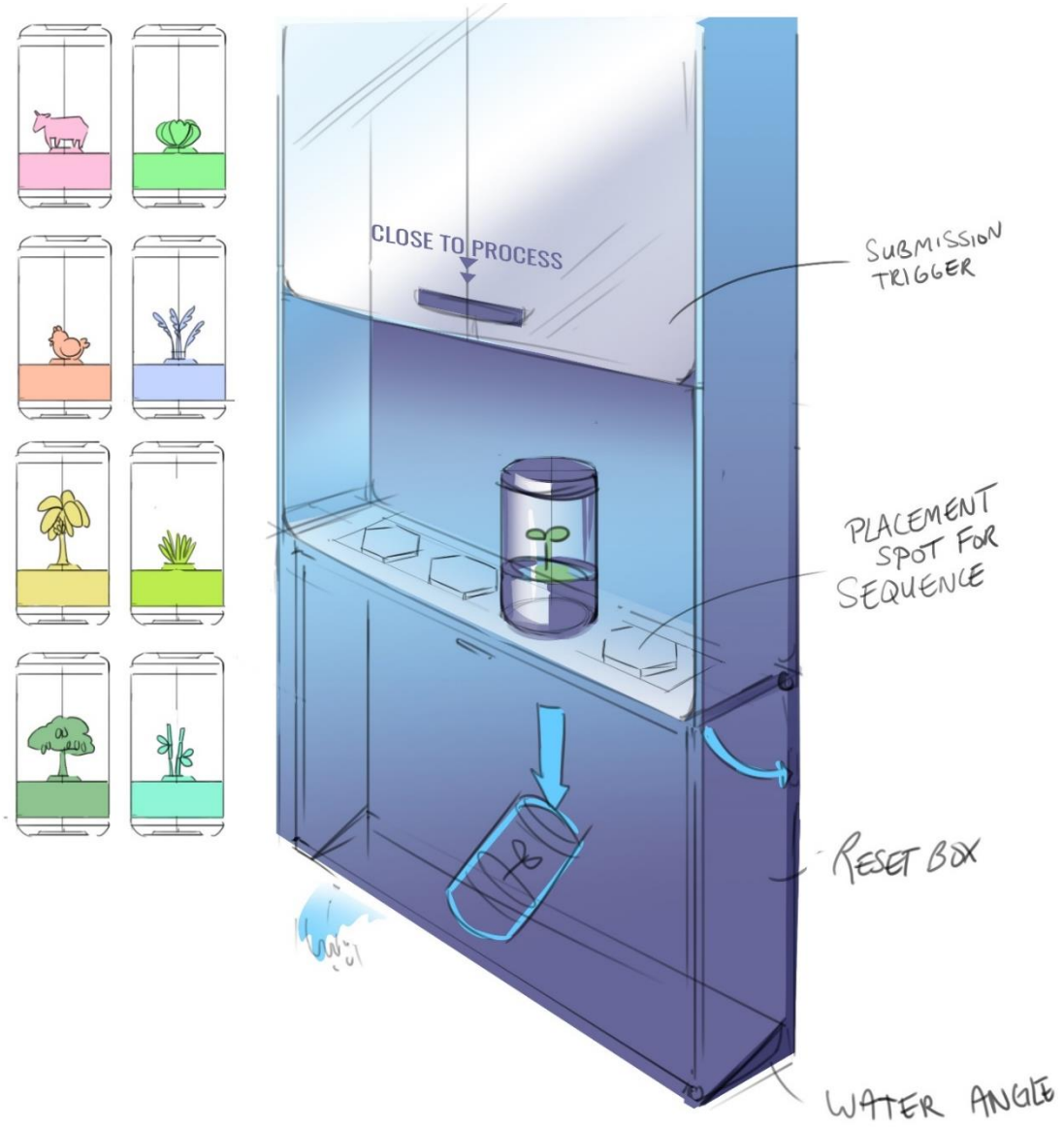
Functions

Locations are spread out through the room, to get all the modules within the time limit teamwork is a must. This interaction offers place for emergent narrative as players figure out their preferred way to handle the water.
This part features an Aha!-difficulty puzzle, which will give players greater satisfaction if the are able to solve it autonomously.

The animations feedback on the screen offer a way to connect the inner world within the capsule with the outer world.

Themes

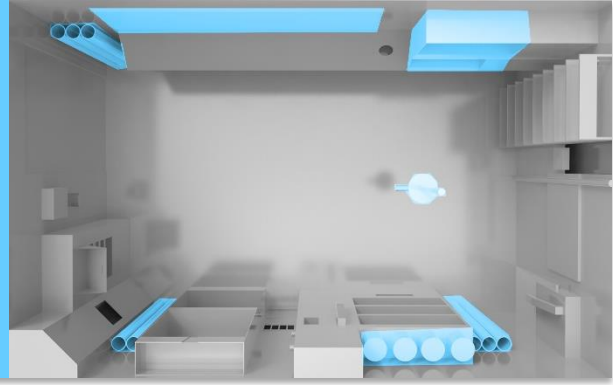
Agriculture, silvopasture, perennial crops, multistrata agroforestry, bamboo production, managed grazing, tropical forest restauration, improved rice production, drone swarms, autonomous systems,



Sequence Machine Concept

Interactive elements:

- Screen
- Sequence machine
- Module chutes
- Water cannon
- Buckets
- Modules



Module sequences are shown on the task screen

Modules can be acquired by filling up pipes with water

Modules are lifted from the pipes when the level rises to a sufficient height

Modules can be placed in the sequence analysis machine and submitted by pressing the handle

Feedback is shown on the screen (e.g. farming robots planting the sequences)

Power

With just limited space available we have to make do with only one room in this experience. Turning off the lights gives us an opportunity to change up the scenery and make the players rely on one of their other senses: touch.

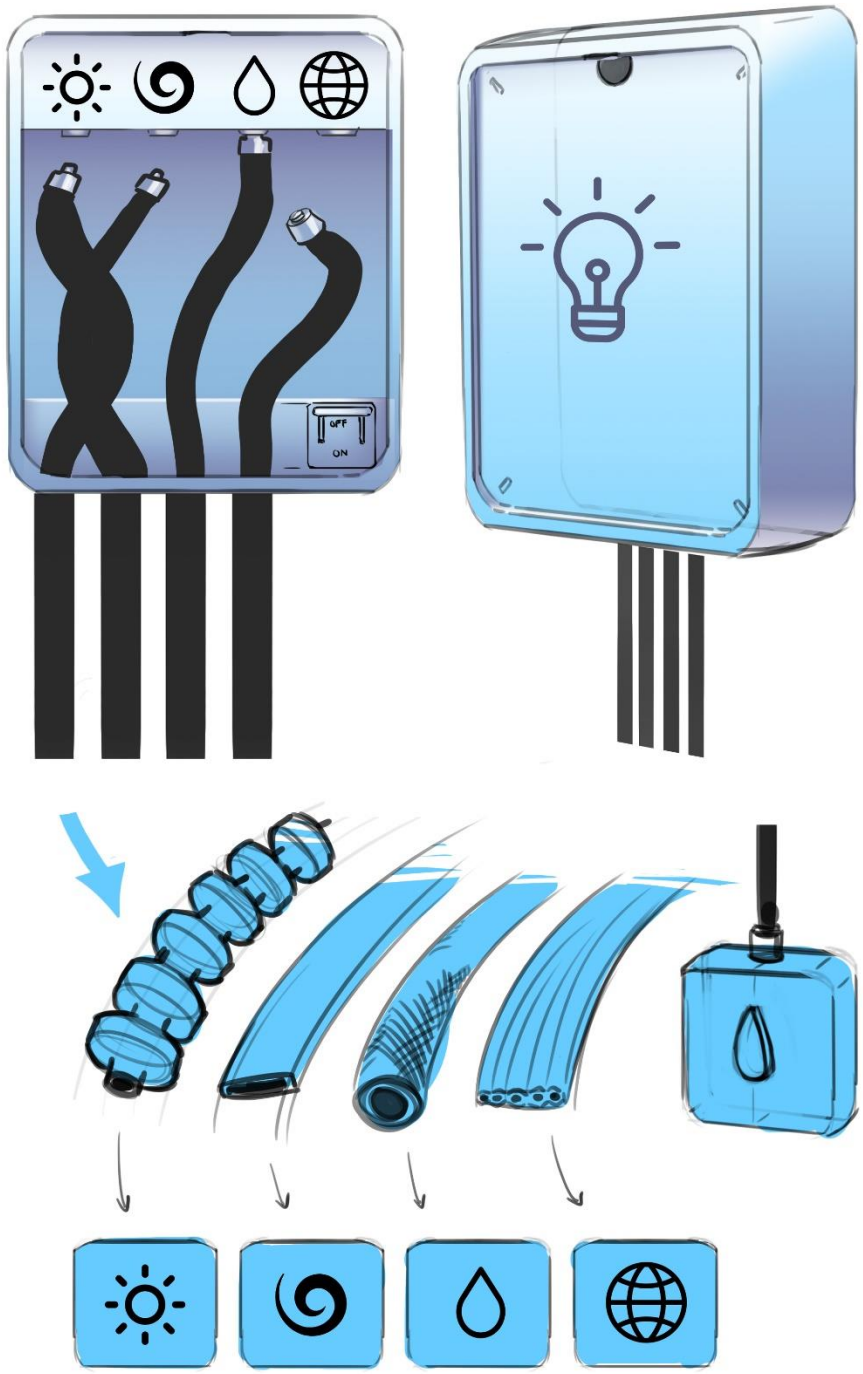
Functions

This is one of the main surprise moments, surprise and fear are proven to induce strong emotions. This will increase knowledge retention, which is great for an educative experience.

The heating of the room will make algae and plants appear over the ceiling and walls of the room, simulating passage of time.

Themes

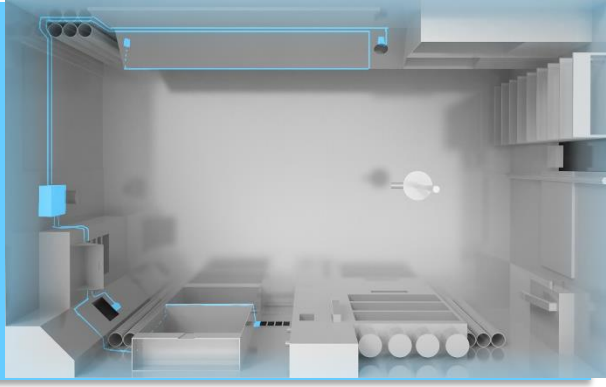
Sustainable power sources are the focus of this interaction wind, solar, hydro, geothermal.



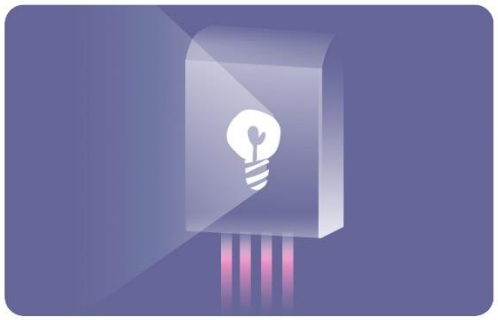
Power Box Concept

Interactive elements:

Power box
Cables
Heat Panels



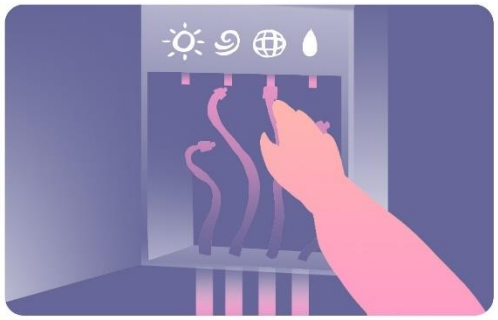
The light suddenly turns off



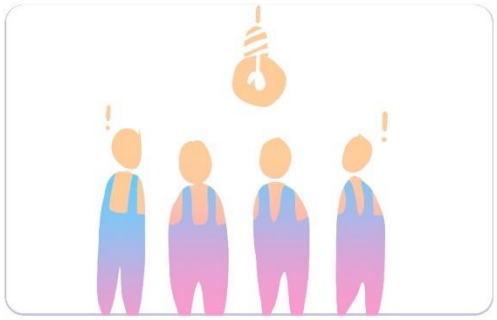
The power box lights up to reveal its location

Players explore the room in the dark by following the textured cables

Small protruding icons can be felt in the dark



Players connect the cables to the correct icons in the power box and submit their answer by flipping a switch



The light turns back on

Thermochromic inks reveal plant growth throughout the room.

Exit

Players are sent back in time, giving them a second chance in this timeline.

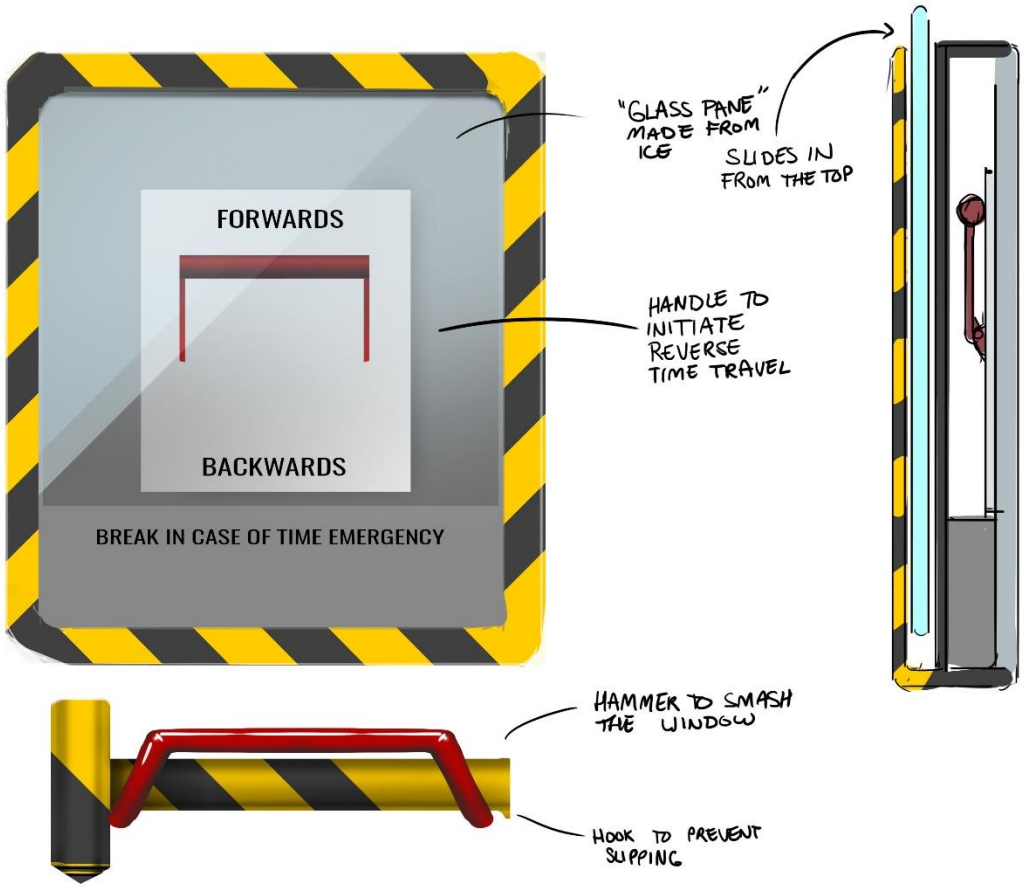
Functions

Footage of other players flashes on the screen as the time reversal is activated, this part shows players there is more than just their team, you are not alone in your fight.

It also serves as a convenient step to ground players back into reality again. Ending in the future would give players ludonarrative dissonance when exiting the experience.

Themes

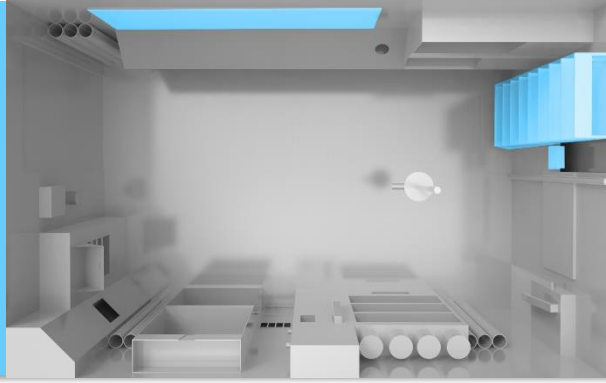
This part illustrates the tipping point, time travel, impacts of global warming, teamwork,



Emergency handle concept

Interactive elements:

Screen
Time emergency panel
Windows
Stairs
Hammer



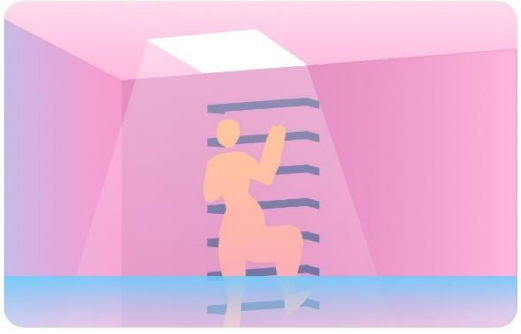
Warnings show up and the alarm sounds. Players face the tipping point emergency.

All water sources are activated: Windows crack, pipes burst and vents are flooding with steam

Players break the ice to reveal the emergency handle

The emergency handle allows the players to travel back in time.

The top exit is revealed and light pours in from outside



Players exit the room by climbing the ladder, while water seems to keep on rising.

Water disposal

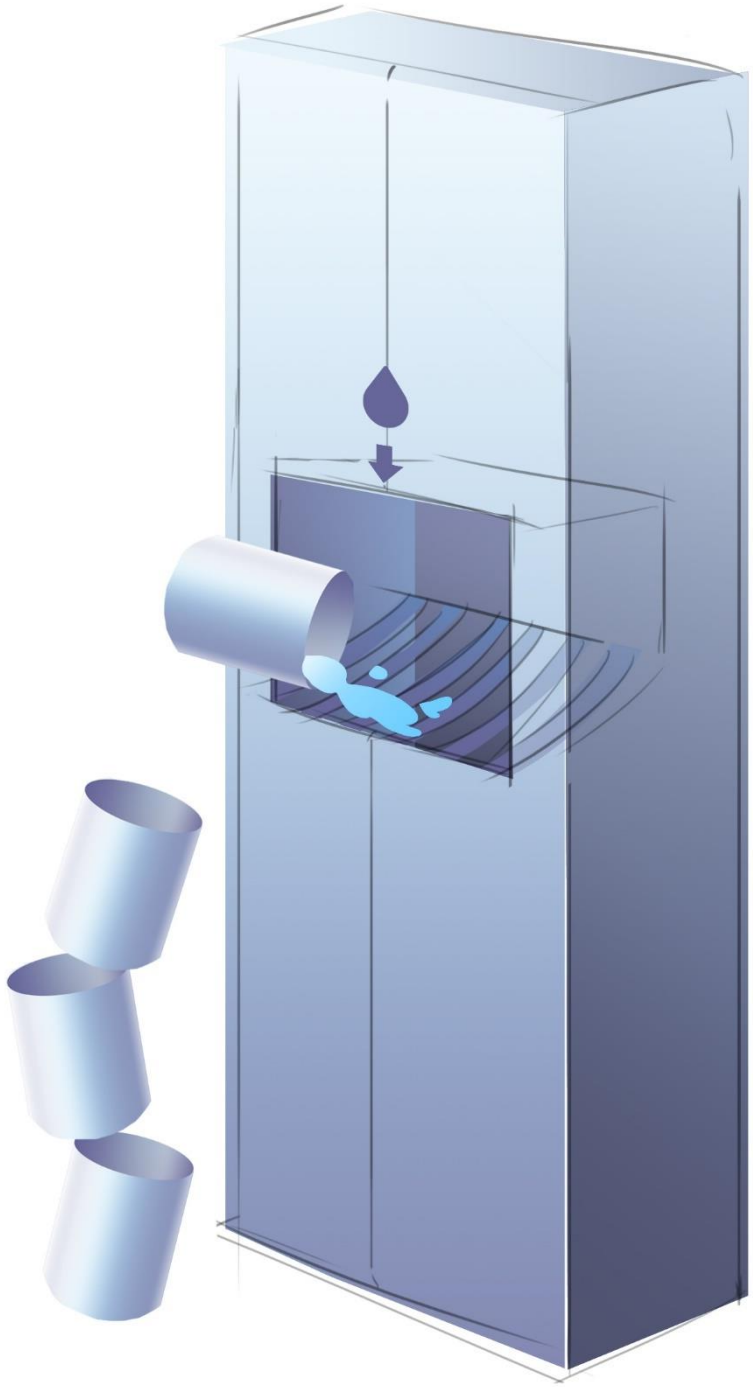
Buckets are provided for the “sequence” interaction, yet there is also a place found where water can be tossed out of the capsule. In this case players can do a lot of effort with little impact to illustrate the Dutch saying: “Dweilen met de kraan open”. Which is made to show that it is better to prevent than to keep patching something after it has broken.

Functions

We want this escape game to be a place where emergent narrative occurs, meaning we hope to see interactions that are not specifically designed within the scenario to give people space for their own ideas.

Themes

Teamwork, emergent narrative



Water Disposal

Emergency Button

A simple red button that is situated right next to the entrance door to exit in case of emergency.

Functions

The main security feature to instantly stop the whole experience and drain the room. Water starts draining to empty the room within 20 seconds, and the ceiling door opens to allow people to enter/leave before the drain is finished.

As this is an escape room with higher stress levels than some regular rooms, this button has to be extremely easy to spot and use.

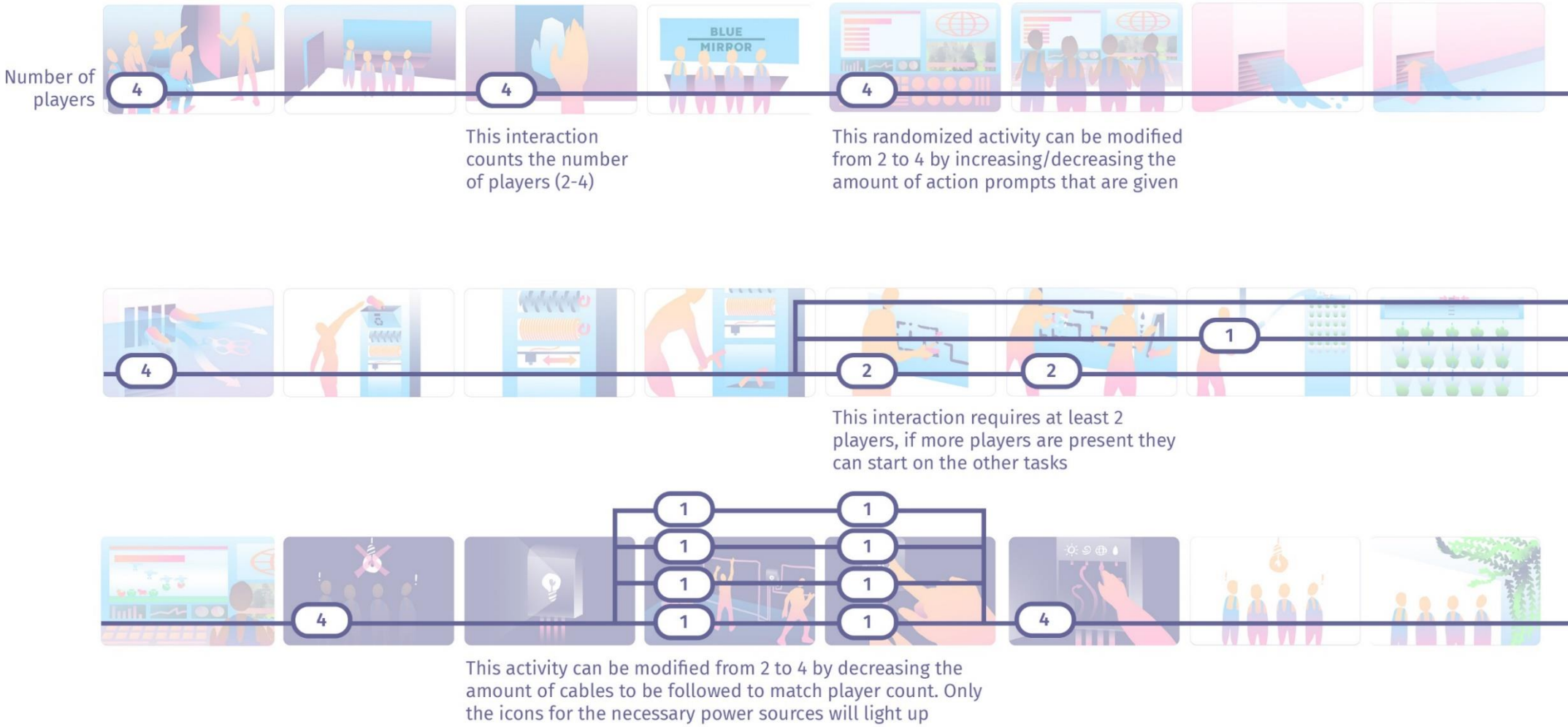
Themes

Safety, emergency

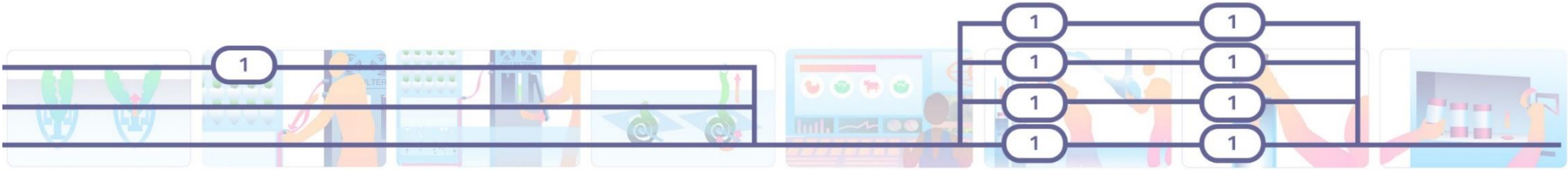
Emergency Exit Button

User Timeline

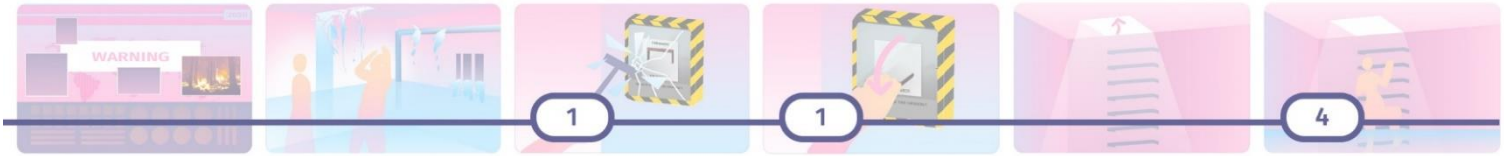
The Game is designed to keep the variable user count of 2-4 players in mind. Each game segment can be finished with the 2 player minimum. Some parts can be changed to fit player count or to randomize interactions for more replay value.



Players can split up to finish the interactions faster or finish them sequentially



This activity can be modified from 2 to 4 by changing the difficulty of the sequences (includes more module types for more players)



Timeline with amount of users participating in each interaction

Experience Design

The four levels of experience design: body, mind, heart and soul (Erik Bär and Stan Boshouwers, 2018) were taken into account when designing the interactions

The Body covers the sensory perception, encompassing all the things you can sense such as the aesthetics or music.

The design appeals to the sense of sight with minimalistic and clean design. Makes you focus on touch when you wander through the dark and feel the changes in temperature. And speaks to your sense of hearing using spoken instructions and various sound effects. The scent has one of the strongest links to memory and can easily be linked to memories of water attractions such as in Disney Land.

The Mind is influenced by thoughts which come from the content or story of your experience and needs excellent communication.

Games are a very accessible medium, making it easier to connect to topics. Information is layered in the environmental storytelling, the plot and the interactive elements. In this experience you are the main character, and for a brief moment, the world really revolves around you. The room challenges you in a race against the clock, help is only provided to those who need it and the continuous guidance system, allows you to stay in flow.

The heart is touched by emotions, seeking to redefine your relationship with the topic with openness and honesty.

Even though the room is just a simulation, all the interactions are based on hard facts and research. It allows us to directly feel the impact of something that is so much bigger than us, speeding up time makes it more tangible than anything in real life. The design is made to evoke strong emotions to open up new opportunities for discussion afterwards.

The soul seeks out value and purpose, trying to extend beyond the experience to a larger meaningful whole.

The pre and after experience are fully designed to connect the experience to you as an individual. The main room puts people in a state of flow while they touch on different subjects. We want the players to realize that even though the problem seems to be way bigger than us, we can still beat the problem together.

USER TESTING

This segment presents feedback on the concept and insights on the design, extracted from interviews with the target audience.

Interview

Qualitative interviews were done with 12 potential users of the escape room. This interview consisted of 2 main parts: a walkthrough of the escape room and a questionnaire.

The walkthrough made people acquainted with the interactions within the room including 2 endings, and was used to make participants rate and explain their thoughts on the different parts of the scenario with emoji stickers and explanations.

The questionnaire polled how empowered people felt about climate change by breaking the topic into easier sub questions rating them on a Likert scale (1-5). This was done before and after the experience walkthrough.
It also asked people to rate whether the room was physically challenging, difficult, immersive, and whether it made you feel responsible for the outcome.
Lastly the interview asked them to select 5 words that best describe the feeling of the experience to them

The research was done through an online interview, using an interactive slide deck to have both interviewer and interviewee work together. All parts of the questionnaire had follow up questions to gain extra insights on why participants gave certain answers. Some example slides can be seen on the right

Top view of the escape game
with a human for scale

How **knowledgeable** do you feel about climate change. Why?

Not at all knowledgeable	Slightly knowledgeable	Somewhat knowledgeable	Moderately knowledgeable	Very knowledgeable

How **able** do you feel about doing something about climate change? Why?

Not at all able	Slightly able	Somewhat able	Moderately able	Very able

How **motivated** do you feel to take action on climate change? Why?

Not at all motivated	Slightly motivated	Somewhat motivated	Moderately motivated	Very motivated

Do you feel like the escape room is physically challenging to you?

Not at all challenging	Slightly challenging	Somewhat challenging	Moderately challenging	Very challenging

Do you feel like the escape room has a high difficulty?

Very easy	Easy	Normal	hard	Very hard

Do you feel like the room is immersive?

Not immersive at all	Slightly immersive	Somewhat immersive	Moderately immersive	Very immersive

Do you feel responsible for the outcome of the game?

I don't feel responsible at all	I feel slightly responsible	I feel somewhat responsible	I feel responsible	I feel very responsible

Lights off 😱

Kortsluiting wtf, ik ben niet zo'n held in het donker dus ik ga sowieso schreeuwen.

Power box 😌

Oh je kan de powerbox nog zien, dit was dus wel de bedoeling ok duidelijk, dan ben ik weer een beetje opgelucht

Following cables 😅

Positieve angst, in het donker met je hand ergens overheen gaan is toch wel een beetje creepy maar ook weer wel van "ooeh wat voel ik nou?"

Feel icons 😏

Ooooh, ohja, dit is een zonnetje, oh slim leuk zo voelen dan voel ik me wel slim.

Pick at least 5 words that describe what you think the experience feels like

Adventurous	Cooperative	Historical	Resourceful	Thrilling
Agile	Courageous	Imaginative	Responsible	Touchy
Alert	Dangerous	Immersive	Ridiculous	Travelsome
Amusing	Dependent	Impressive	Risky	Uncertain
Analytical	Dextrous	Impulsive	Scary	Vigilant
Artistic	Discovery	Intelligent	Scenic	
Attentive	Dramatic	Inventive	Secretive	
Brave	Efficient	Magical	Sharp	
Capable	Emotional	Methodical	Smart	
Careful	Energetic	Mysterious	Subtle	
Charming	Enthusiastic	Nervous	Surprising	
Clever	Exciting	Persevering	Suspicious	
Clumsy	Explorative	Playful	Talented	
Confused	Funny	Practical	Thoughtful	
Cool	Haunting	Quick	Thoughtless	

Sample pages of the online interview

Results

Questionnaire Insights

The highest ranked words to describe the escape game were **Adventurous** **immersive** and **surprising,** which aligns with the interaction and the design vision.

Empowerment

Generally the empowerment of users **goes up** after they play the experience, with the most notable factor of improvement being the motivation. 10 out of 12 users noted they would feel more **motivated** to act on sustainability "getting a boost" to do something.

Most participants already felt quite **knowledgeable** about sustainability before the experience and noted many things they could do to improve their impact on the environment.

The issue that prevents people from feeling **able** to do something about the environment is the impact large companies and institutions have on it. The general consensus among participants was that their impact was just too small in comparison to the pollution that companies produce.

Likert scale (1-5)	*Average before*	*Average after*
Knowledgeable	3.666666667	3.7
able	2.875	3.041666667
motivated	3.333333333	3.741666667

Physically Challenging

The experience was rated as **slightly** physically challenging because all participants are in good health. The most challenging aspects are wading through the water, pumping and climbing actions.

Difficulty

The difficulty of the room was rated as being of **Normal** difficulty because the hint system will help you to solve the challenges in time and only activates if you need more time. Having done other escape rooms is definitely seen as an advantage to make it easier, but all participants agreed it would also be doable without experience. The water effect will likely cause stress to participants which will make challenges harder to do.

Immersion

Very immersive, Immersion is mainly attributed to special effects and the fidelity of the room (water effects, lights, plants, and the level of realism). All puzzles and components have to be directly connected to the theme: "Things keep on happening and changing, you completely immerse in the room when there are no distracting or strange elements that are randomly placed in the room, everything is part of the story". One participant even mentioned "I'd just start roleplaying I travelled back in time when I'm back on the festival after the experience".

Responsible

Participants felt responsible for their choices, because they felt it was their own fault if they could not reach the "good ending" Feedback systems such as the water effects and newscast helped participants to feel assess their score during gameplay.
Responsibility was felt stronger when they played with friends, because it's easier to blame it on random players.

Likert scale (1-5)	*Average*	
Physically Challenging	2.141666667	Slightly challenging
Difficulty	2.816666667	Normal difficulty
Immersion	4.733333333	Very Immersive
Responsible for outcome	4.075	Feels Responsible

Walkthrough Insights

Participants often noted safety and health concerns, mainly about the hygiene of interfaces such as the biometric hand scanner and the wading suits.

The wading suits definitely make the participants anticipate something might happen in the room.

Some participants mentioned they would rather just go in with their clothes than be in a filled up wet wading suit, especially during summertime events.

Sci-Fi elements such as the biometric scanner and AI will definitely help with immersing participants in the sci-fi setting of the experience.

Participants showed impatience at the start of the experience with the host and introduction story “I’ve heard this before, I just want to start playing already”.

A rising water level will definitely be stressful for most of the participants, but is mostly seen as an exciting and new “Never seen such things before in an escape room”

Several participants really feel like the control centre part is quite passive and are excited to do active things within the room. (playing with digital interfaces is passive vs interacting with physical objects) Some participants mentioned that physical tasks suit their playstyle better than standard code cracking linear gameplay.

The control centre was mentioned by a few participants that it would give them a bit of an information overload at the beginning.

One participant mentioned he expected a personal ranking because he signed in on the biometric scanner. Suggesting wanting to see a global ranking to see how well he did compared to others.

Multiple participants have mentioned wanting actual influence by being given choices: good and bad options instead of only finding the correct one in time. (testing skill vs engagement)

The guidance system was received positively because it prevents a game over without ending (11 out of 12 participants thought the guidance system was a positive addition). All participants thought it was valuable to the experience to be able to play through the entire story. “I play escape rooms for the experience rather than the puzzles, which is why it’s nice this room allows you to always get the whole story instead of just a part, otherwise I could just buy a puzzle book somewhere.”

Some participants were worried they might need components for other parts of the room as well when they had to dispose or submit items.

Multiple users have still shared their worries about being immersed in a liquid and working with electronics.

“Nice to see action and reaction directly”, participants noted that their actions in the game were sometimes more visible than in real life situation. (e.g. directly seeing recycling after your gather effort or planting after sending off the modules)

Two participants mentioned the room doesn’t really feel like an escape room, but more like Nemo (a playful science museum situated in Amsterdam).

Several participants mentioned they wanted it to be clear the trash could be theirs, so either something available on the festival or localized brands.

All participants showed interest in being more playful with the water when they noticed there would be a water cannon in the room. Especially when only playing with friends, they were very tempted to throw around water with the buckets or the cannon.

Some participants expressed their fear that water interactions (such as pumping water and the water cannon) would add additional water to the room, increasing the water level even faster.

One participant mentioned wanting a way to measure the level of water to keep track of changes more accurately.

The majority of the participants showed they were happily surprised that parts of the room could be reused in multiple interactions. “not just a one-time key thing”

Multiple participants felt their actions within the gameplay had impact on the ending and saw an added value in having multiple endings.

Having the climbing ending with rising water will leave a stronger impression on the participants than the additional “good” ending where the water goes away again. Decreasing the water level gives a kind of mental closure on the water issue, but having the water stay high when you exit leaves a stronger impression. Some participants mentioned this mental closure was not necessarily positive because the real-world problems do not disappear when you finish the game.
All participants showed a big favour towards climbing outside or leaving through an alternative exit, calling the normal exit anti-climactic or dull.

Their reactions did indicate they preferred to have multiple endings because it strengthened the idea of having impact on the game outcome.

All participants showed they liked the ideas of milestones, experiencing small wins or moments of relief throughout the experience.
Participants all picked different parts as their favourite element in the room, this ranged from water effects and surprise moments to the little plants growing and water cannon mayhem. There was no specific part that stood out the most.

Participants noticed that the extra ending created for the test seemed unnatural and confusing within the current storyline.

Emotion Overview

EMOJI STREAM

An overview of participant reactions and emotions on the experience room walkthrough using a selection of emoji stickers to guide the thoughts and explanations of interviewers.

Excitement
Anticipation
Impatience

Curiosity

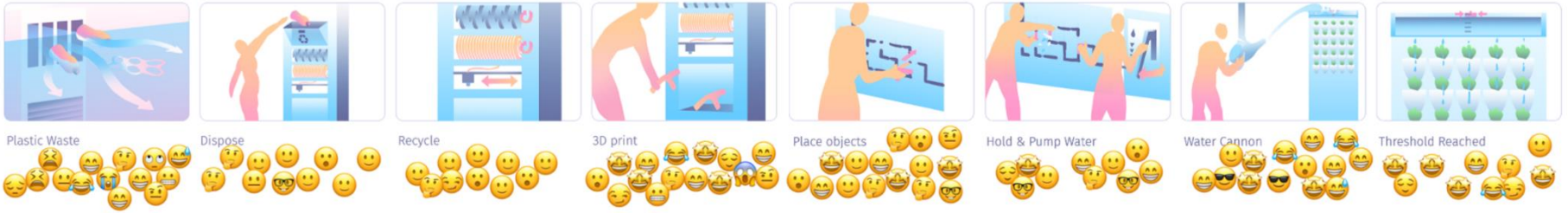
Excitement
Immersion

Excitement
Impatience

Information overload
Excitement

Focus

Excitement
Stress
Shock
Adrenaline



Awareness
Guilt
Discomfort

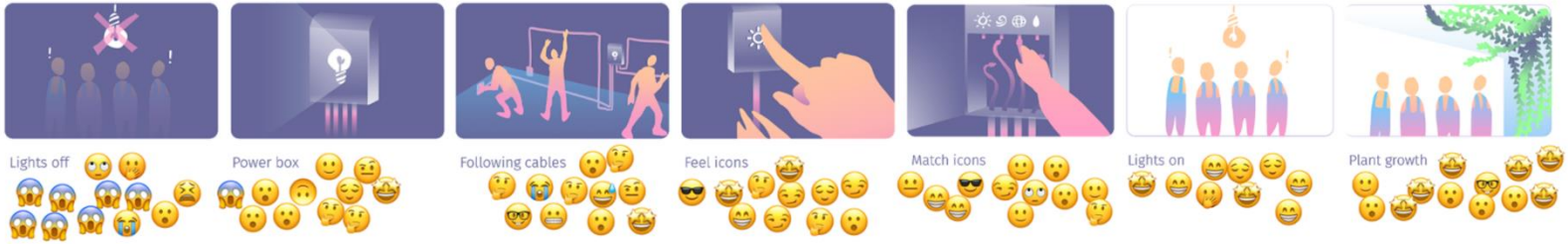
Surprise

Curiosity
Surprise

Fun
Excitement
Teamwork

Unruly
Fun
Excitement

Happy



Shock
Surprise
Stress
Excitement
Panic

Calm
Logical

Fun
Excitement
Concentration
Focus
Scary

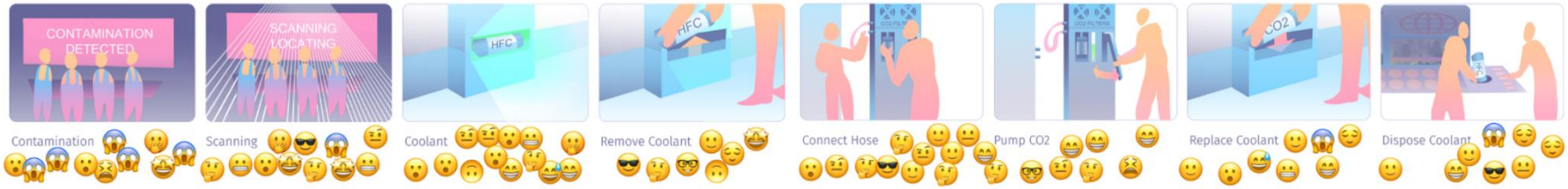
Satisfaction
Smart

Happy
Hesitant
Teamwork

Happy
Satisfaction
Relief

Happy
Surprise

Emoji stream with the aggregate of all emotions and main drivers for them



Stress
Shock

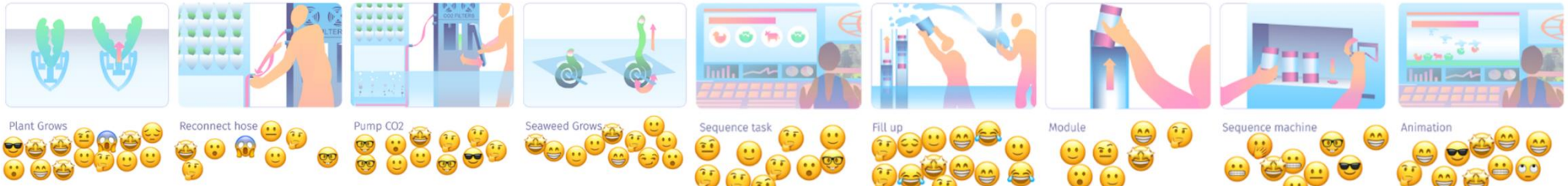
Excitement

Exploration

Exploration
Questioning

Excitement

Satisfaction



Amazement
Excitement

Smart

Simple
Thinking

Excitement
Fun
Satisfaction

Satisfaction
Easy

Happy
Cute
Satisfaction

Worry
Shock
Confusion
Excitement

Stress
Shock
Uncomfortable

Hesitant
Rebellious
Fun

Dramatic
Surprise
Disappointment
Glad
Fun
Excitement

Confusion
Surprise
Relief
Anti climactic
Happy

EVALUATION

In this segment recommendations and tweaking for further development will be presented

Requirements & Wishes

The design succeeds in fulfilling the desired requirements that were listed in appendix A.

From the interviews we could confirm that the design has a structure of rising tension ramping up to the tipping point, participants said they anticipated more stress towards the end, as water effects become more intense and surprising events are accumulated near the end of the experience.

Surprising elements included both positive surprises (plant growth) and negative surprises (such as increasing water levels and the lights turning off).

The design mainly touched its users on the first 3 levels of experience design: body, mind and heart. Soul is mainly integrated in the cards and after experience, which fell outside of the design scope of this project.

The design featured various challenges such as collaborative puzzles and speed challenges that could only be finished with teamwork.

Overall the design was very successful in its goals, even reaching its goal of increasing sustainability empowerment of users.

Recommendations

No Design is perfect on the first try, therefore a list of recommendations is proposed to give suggestions for further improvements of the design in the next iteration.

Keep the introductions and exposure at the beginning **short**, “we don’t want to listen we just want to start playing already”.

Definitely take precautions to have the wading suits dry and clean before each use, covid has really increased how much people value of **hygiene**.

Feedback on actions is desired at all interactions of the design. Some example suggestions to add were pneumatic door sound effects, clicking feedback when placing an object, audible feedback on reaching thresholds or making disposal/submission of items clear by having a sending animation playback on the screen. Interactions where water is added to the room (such as the pump and water cannon) should clearly show where the water is coming from,

Because different **endings** impact how players experienced their gameplay, it would be advisable to consider adding an additional positive ending to the room. This room should have the same kind of dramatic effect as the original ending (so the intensity of the climbing action and rising water have to be kept in the story, but the storyline has to be rewritten to make more sense)

If players are able to play without **wetsuits** during summertime, additional facilities to allow players to dry themselves after playing are advisable.

A measurement line on the wall to see how high the current **water level** is will allow participants to estimate their performance more accurately (This does not necessarily include numerical values and can extend beyond the playable water level e.g. having 2.00m tagged with worst case).

The **control panel** interaction may be changed to give participants more choice over time, starting out with easy options to get a grasp on gameplay and later adding good and bad options that need decision making. This will make players more engaged with the content and less a test of skill, it may also increase ideo-pleasure within the room. Recyclable trash items that float into the room need to connect as close as possible to its players, this includes switching the items out to local brands or products available on the festival. In this way it is easier to for users to start questioning if it is actually their waste, and attach more **responsibility** to the interaction.

Many participants also mentioned that the entire escape game should have a consistent level of **fidelity** to maintain the best immersion. (for example more realism could include climbing plants behind a layer of plexiglass instead of thermochromic inks)

Some parts are best **sealed off**, tubes for modules should not allow people to stick their hands in them.

It is definitely advisable to see if the design can integrate the “**Politics & Institutions**” SDGs as well. All participants mentioned their concerns about the impact of large companies and policies, which make their efforts seem small or meaningless in comparison. This caused them to lower how they felt about ability to do something about sustainability, causing their total empowerment to remain at somewhat able.

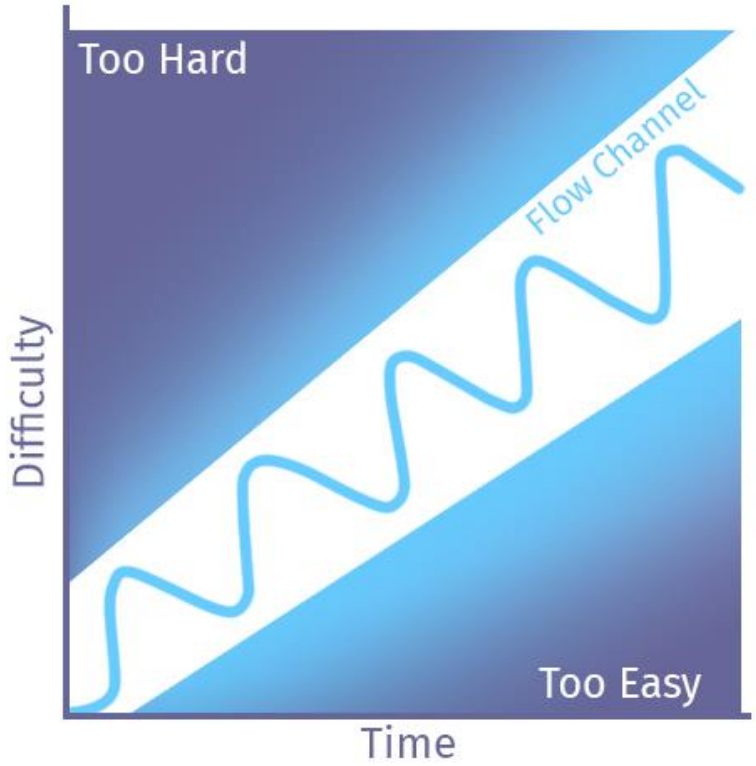
Difficulty

Escape rooms should have a combination of different types of puzzles with a variety in difficulty to optimize flow for the best experience (Csikszentmihalyi, 1990). Puzzle difficulty levels can be categorized as followed:
Easy: Task (no solving required just a task to complete)
Medium: Process puzzle (thought deduction, and logic to solve)
Hard: Aha! Puzzle (Insight and inspiration to solve, hidden connections) (Elumir, 2015)

The users rated the room as having a normal difficulty after doing the walkthrough interview, which included puzzles of each difficulty level.

None of the parts were seen as being too hard, but some were mentioned as being too easy. Of course doing the walkthrough is not exactly the same as doing a physical user test, since users get all the answers served to them. However, we can assume that some parts might need to be turned up a notch to make the room challenging.

This part contains recommendations for tweaking gameplay difficulty of the various escape room parts. Increasing the amount of times tasks are done is not a preferred option as this will just increase the Tasks and as much the process or Aha!-puzzles.



Optimal flow for the best experience (Csikszentmihalyi, 1990).

Difficulty tweak table

	Easier	Harder
Control panel	The number of sliders and buttons can be decreased	More buttons and sliders can be added, covering even more topics
	Buttons and sliders can light up to reveal the location.	More Tasks can be assigned, so that participants have to work faster
	Less tasks can be assigned when less players login to scale the difficulty down to player count.	Players are given good and bad choices and will be given more vague tasks so that they will have to contemplate their choices under time pressure.
	The text heavy control panel can be outfitted with icons, which will be added to the task screen and buttons to make it more visual.	The wrong buttons can light up to lure people to press them in their haste.
Plastic flow	Fewer plastic items are added to the room	Instead of having it as a timed event, plastic can flow in over the course of multiple other interactions, only to be prompted to clean later
	Very easily visible and larger plastics can be used within the room. (Rigid colourful plastics)	A variety of harder to spot plastic types is used, including smaller items, transparent items and flexible items such as plastic bags.
3D printer		Users need to make choices within the printer interface which pipe part they want to print for the pipe puzzle
Pipe puzzle	People no longer have to hold the pipes as they will snap into place and stay there.	A more complex pipe puzzle can be realized with more moving parts (amount of players needed has to be taken into account)
	The amount of pipes that need to be added can be decreased	A more complex puzzle can be made using the third dimension for the pipes as well
	Players no longer have to pump and can just use water that flows out of a random pipe to connect to the puzzle.	Activating the water cannon can be done remotely by another player with a button instead of directly from the water cannon
		Red herring pipes and pipe noise can increase difficulty of the puzzle.
Sequences	Modules types available in the room are decreased to only the ones that are necessary (removes clutter/red herring)	More sequences have to be done consecutively
	One tube will always be filled up by leaking water, giving players an example to work with	More modules can be added to the room, adding more tubes to find them in or randomizing in which tube they can be found
		Modules need to be ordered from an external source through a menu, dispensing them in a container you have to float it from.
		Make a logics puzzle where certain modules cannot be placed next to another.
Power box	Cable count that is unplugged is decreased to the number of players	Adding clutter cables in the room will make it harder to follow, especially if you leave out cable texturing
	Cables have distinct textures to them making it easier to recognize by touch	Making the symbols less distinct from each other may increase confusion about the correct solution
		Players have to feel the symbols underwater or on hard to reach places
	Taking out certain tasks to shorten the full experience and give users more time to finish the other tasks	Adding riddles or puzzles to readily available information within the room – e.g. schematics for agricultural sequences with rules, patterns on the ceiling connecting tubes
	Give players more time to do interactions	Give players less time to do interactions

Limitations & Further testing

Due to the pandemic there were a lot of unforeseen limitations to the testing that was possible in the design process of BLUE MIRROR V2.

User testing was limited to qualitative interviews from users. Doing physical user testing with prototypes will give a better understanding of difficulty and fun for the participants. Physical test would validate the difficulty of puzzle elements and clarity of interactive components.

Furthermore, most of the metric data retrieved for festival research is done on music festivals, even though our scope on festivals is broader than that. Further research should include data from other festival types as well.

User tests were done with participants that had followed education at a University or equivalent (HBO) level education, which might have made them rate the interactions differently than people from a more varied background.

Before starting further research on BLUE MIRROR version 3, implementation of recommendations is strongly advised. There is a lot to do to make this project into a reality, but I look forward to seeing what's next.

Acknowledgements

Firstl off I would like to thank my mentors Arnold & Martijn for always being available and ready to help, always thinking of solutions to make this project better. You are definitely the reason for me to be able to keep going during the pandemic.

Secondly I would like to thank my mentors from Sherlocked, Meggy and Victor for being so welcoming and enthusiastic about new ideas. Special thanks to you Meggy for stepping in at the end giving tons of useful feedback during our sparring sessions.

Thank you Simon for making time to chat and helping me get more acquainted with serious gaming. And thanks Marijn for bringing me in contact with the company, I wouldn't know what kind of project I would've ended up with if this wasn't the case!

I would also like to thank all my participants, helping me to get valuable insights (you know who you are! Yes you.)

Lastly I'd like to thank all my wonderful friends and family that have been very supportive of me doing this project!

Thank you all!
-Meysa

APPENDICES

This segment contains all appendices, including the program of requirements, tables, numbers, research materials, collages and references.

Appendix A – Requirements & Wishes

PROGRAM OF REQUIREMENTS

Practical:

The design should be suitable for 2-4 players
The duration of the experience should have a maximum of 30 minutes
The hosts should be able to reset the experience within these 30 minutes (during prep/after talks)
The design should be durable, so only a minimum of components need repair/replacement after usage (hufter proof)
The design should be easy to transport.
The experience should be open to spontaneously join on the spot without needing a long term booking or reservation.

Experiential:

The experience should maximize interaction with the water and its physical medium.
The experience should allow its players to create different outcomes
The experience should minimize red herrings or clutter to keep people focused on the tasks.
The design should be a narrative room that connects meaning to gameplay (All components and puzzles in the room are connected to the overarching theme of the room)
The experience does not require the use of external knowledge to complete the tasks

Feel

The design should have a structure of rising tension (to ramp up to the tipping point)
The design should incorporate moments of surprise
The design should touch its users on 4 levels of experience design: body, mind, heart and soul. (Physio, Socio, Psycho and Ideo-pleasure)
The design should have collaborative puzzles that can only be finished with teamwork

Hosts

The design should be operable with a maximum of 4 hosts.
Hosts should have a control room area where they can monitor and access the players.
Setup of the room should be manageable by max 2 people

Arrival

Visitors who enter the experience do not see the players that exit (to prevent spoilers/ good visitor flow)
There should be a waiting space designed for at least one full group (4 people)
There should be a storage space for valuables/electronics that should not get wet
There should be a possibility to keep the majority of your clothing dry during the experience.
There should be some type of screening to safeguard the use of the experience. (possibly by host assessment)

Exit

There should be a discussion moment after the experience
There should be feedback on choices made during the pre-game/game
Visitors should take something home to remind them of the experience

Water management

The playing area will fill with water with a maximum level of 90cm
The water level should be able to rise from 0cm to 90 cm within 5 minutes
Water should be drainable within one minute
Used water should be recycled as best as possible on location
The panic button should drain all the water within 20 seconds
Transport of the escape room should be without the water
Water reset time should be as quick as possible (30 min max)

Container:

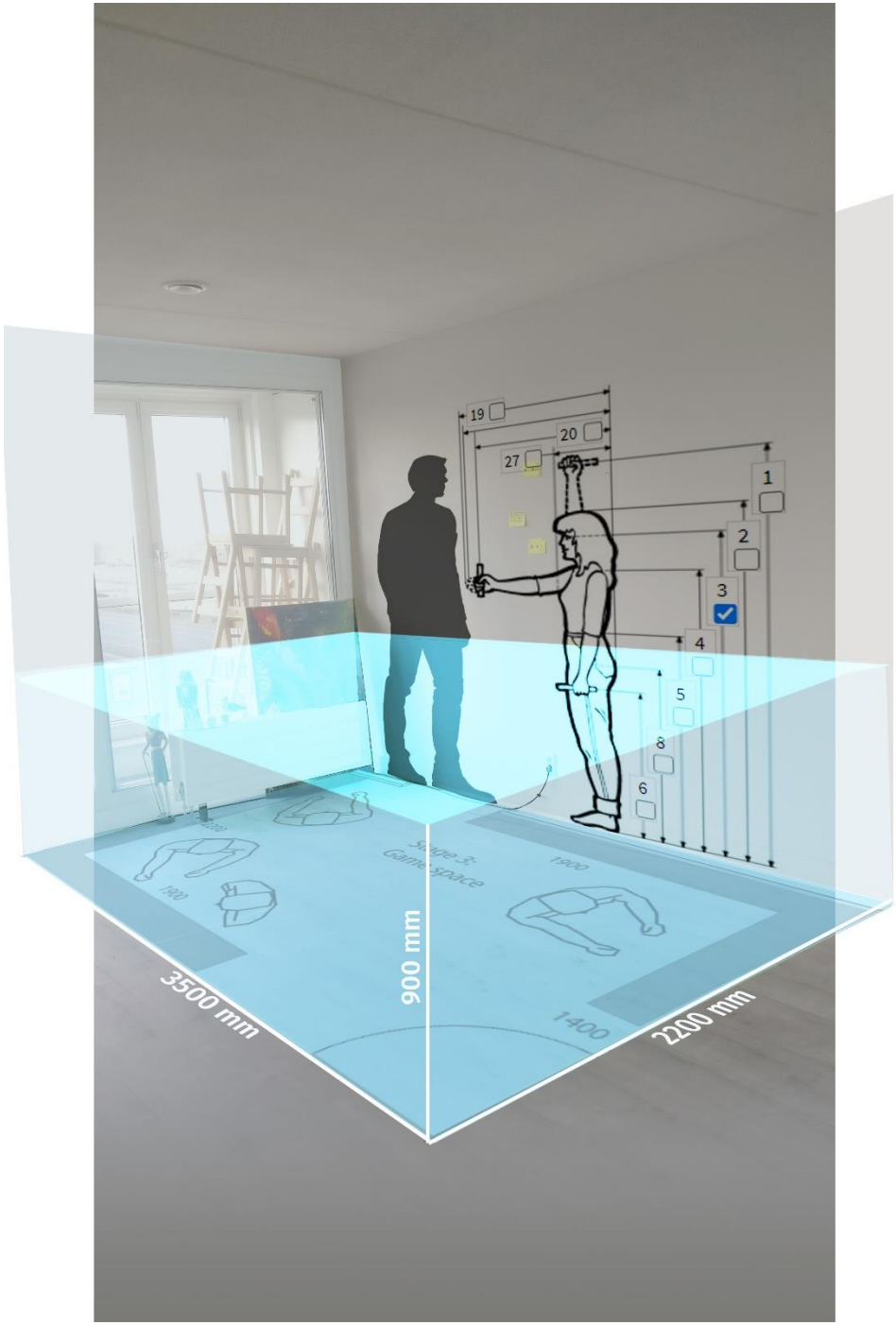
The play space is dependent on the container size:

Size:	Standard 20ft Container
External dimensions:	6.10m long x 2.44m wide x 2.59m high
Internal dimensions:	5.898m long x 2.352m wide x 2.393m high
Capacity:	32.6m3

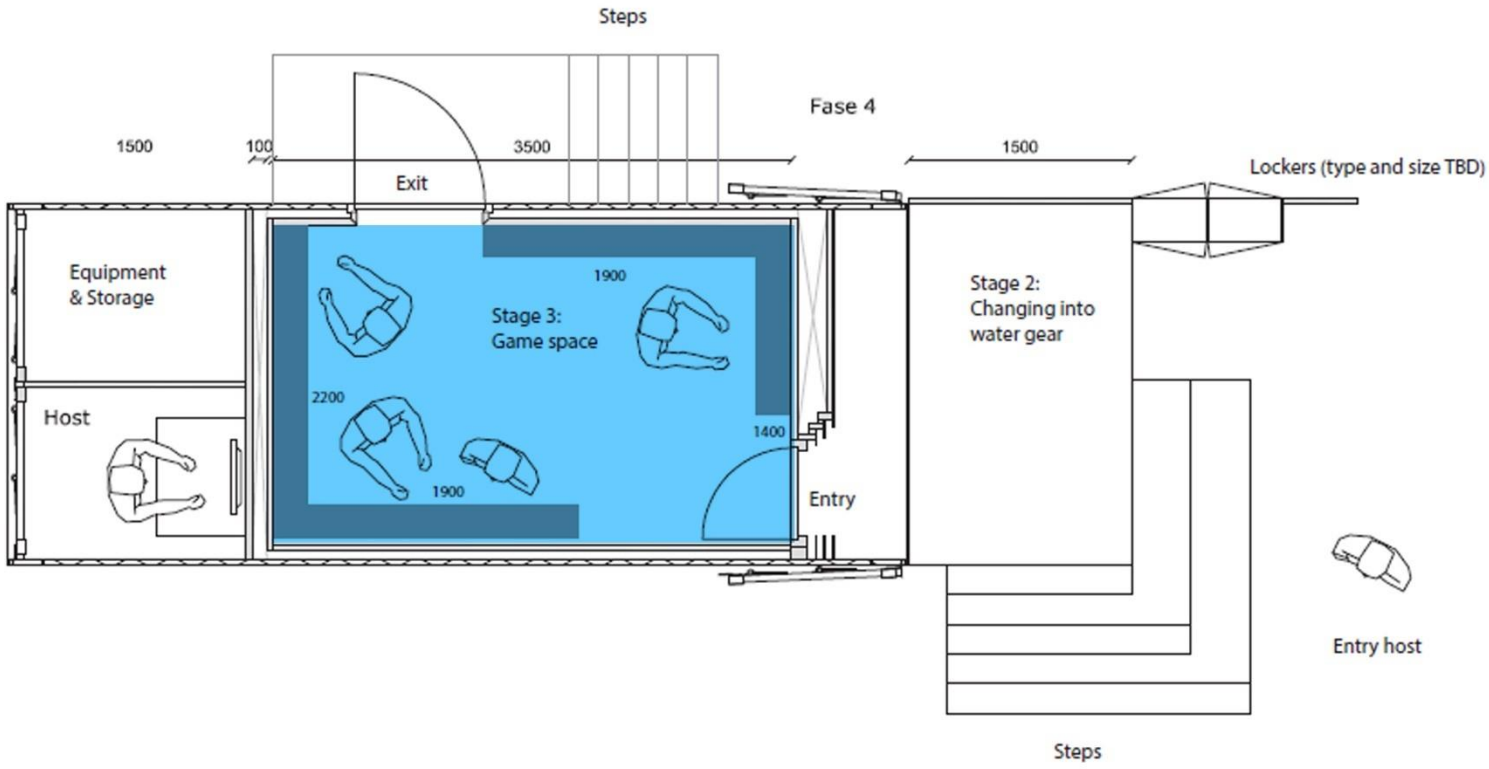
(https://www.icontainers.com/help/20-foot-container/)

Room size:

Play space:	maximum of 3500 by 2200mm
Water storage:	minimum of 1 meter in length
Amount of water:	minimum of 2x the necessary amount (depends on playspace size and height)
Host control room:	used space should be minimized (maximum of 60-90cm in length)



Floor plan:
Available space for the game experience supplied by the engineers.



FLOORPLAN VERSION B2

ALL SIZES IN DESIGN TO BE CHECKED

PROJECT	**SH 17005**
FASE:	DRAFT
SCALE:	A4 1:50 [mm]
DATE:	23-11-2020
DRAWING:	SHLCKD05

ATELIER TEN KATE

Haarlemmerweg 506-516
1014 BL, Amsterdam
0031 6 12960933
www.ateliertenkate.nl

LIST OF WISHES

Side doors on containers are preferred as they are more budget friendly to the project.
Visitors should have a separate entrance and exit to the experience
There should be a waiting space designed for two full groups (8 people)
During nice weather we provide an experience where players enter with their own clothing. This does ask for a way to heat and dry themselves afterwards.
A dressing room may be provided to fit the wading suits
There should be a picture moment outside or during the experience
Maintenance should be possible but ideally minimal and doable by non-engineers
Local parties should be used for offloading containers
Water reset time should be as quick as possible (ideally 15 min and 30 min max)
Ideally the same water can be used for multiple days in a row
After use, water should ideally be put to practical purpose on location (irrigation, for instance)

Maximum water is adjustable per team
After use, water should ideally be put to practical purpose on location (irrigation, for instance)

Look & Feel

The design should use sustainable materials where this is possible (be the example) This includes the water system.
The design should reflect the interaction vision
The design allows players to experience pleasure activism or hopeful visions of the future
The design should use saline water to emulate the experience of sea water more closely (feel & smell) but also has good hygienic qualities.

Appendix B - Overview of escape games and related media on the market

Use of technology

With VR entering the mainstream, escape games start offering rich experiences in mixed realities. This includes rooms that use physical spaces to play virtual games (time) , completely virtual games (the Room VR) or augmented experiences. Practical and special effects are also on the rise to bring the best immersive experiences to the players.

Play from home

Especially during the covid period where quarantines became commonplace, escape room owners frantically searched for new ways of offering escape experience to their player base. Some variations we've seen were avatar based games (where the host walks through the room controlled by video callers), digitized escape games or riddles (completely online experiences to complete with your friends), escape podcasts (creating a mental escape room to roleplay through), escape games outside or scavenger hunt experiences, mailed escape boxes (to unravel at home). Some of the digitized escape experience struggle in this market against established digital puzzling games (such as professor layton).

Board games

Escape games have also entered the board game market, where they compete with various other riddle and murder mystery games and early precursors such as roleplaying games. These games have various formats and usually a lower price point in the market than boxed escape experiences.

Pop up escape games

Mobile escape games have been appearing more widespread on a more temporary basis. Experiences such as these are usually offered in a smaller, more compact version of an escape game, packaged in caravans, buses, or containers to ease the transport of the room.

Sustainability rooms

There are already a few precursors on the sustainable escape room market. Although most of these rooms are sponsored by an external party who decide the theme of the room. These themes range from games about power, consumption, production, awareness to simple solutions for students.

Serious games

If escape games are to be a learning experience, serious games and gamification are the next best thing to look at. Serious games differ from normal games because they have a defined learning goal. They offer a safe environment for new experiences and experimentation but at its core are usually made for behavior change.
In museums we can also see an increase in the focus on experience and interactivity in content. Museums allow visitors to change what they see and interact with exhibitions in new ways.

Water rooms

I looked around online and asked various escape room enthusiasts what kind of implementations of water they had experiences in escape rooms to get a better idea of the existing market. Usage ranged from components of a puzzle to special effects, but some take it to another level such as the escape room that can only be reached with scuba gear.

Observed escape room variations

[played] Prison island - competitive minigames - Prison themed area where people compete for points which can be earned in different cells. The amount of players that can participate is large and you can compete against other teams while playing.

Time - VR escape game in a physical environment - lets players free roam in a physical space together while playing in virtual reality. Adds another layer to the virtual world by providing haptics.

[played] The dome - transforming escape room - very surprising escape room with many different elements and puzzle types. Uses different types of technology to immerse the players and makes smart use of storytelling to improve the suspension of disbelief with its disconnected elements.

[played] The dentist - classic horror escape room - classical linear escape room with horror elements. One of the older rooms available in the netherlands.

Prison escape - interactive theatre production. Players can roleplay and make choices to escape the prison. Very high intensity of roleplaying from hosts and players. Many players and hosts participate each round.

[played] Locked Amsterdam the submarine - submarine themed escape room with multiple rooms. Likes to make use of many codes.

[played] Secrets of valhalla - Very old school and simple escape room with number codes, blacklights and thematic props where you have to look for various items in the room. Not very hard to play.

[played] Escape room hovenpassage - very large escape room, featuring two whole floors of an old office building. Uses cables to make people follow them and run around the building. Some places were not properly locked or sealed off making participants able to get “backstage” which really broke the immersion.

[played] Escape game Rijksmuseum - a combination of an old museum with many artifacts and a scavenger hunt escape room. Search for clues in the museum and get to special event locations where roleplaying and puzzles are key. Also used a very cool way of interaction between different player groups of the game.

Digital games

[played] The room VR - VR escape game, uses the power of the digital medium to its advantage such as advanced animations of objects.

[played] Professor Layton - puzzles and mysteries - Very cute and thematic styling of a puzzle mystery game with puzzles that can be very close or unrelated to the story. Also contains a hint system and progression.

[played] Escape this podcast - imaginary escape games. One person is the room and host at the same time and the other people will roleplay as if they're in the escape room. Can make use of props such as maps or descriptions to help the players immerse more.

[played] De verloren herinnering - creators united online escape game - spontaneously created to serve people at home during the pandemic, but poorly executed, unknowingly entering the digital games market that has better alternatives.

Pop up escape games

caravan escape

Caravan escape

La fenomena logica

Circus escape

MOBILE ESCAPE ROOM

Mobile escape room - Modular escape room

Diabetes fonds -escape container (sherlocked)

Het lab - escape 48

Goldberg escape groningen -container

Physical escape games at home

Escape the Crate Subscription Box Adventure	Escape the crate - subscription box adventure
	Crimibox - detective game
	Kraeck - escape gift box
	Puzzelpost - letter based puzzle game
ECODECOR	High end custom escape games
	High end one of a kind boxes (Labsterium for chris ramsay) built to order.

Mystery board games

	[played] Sherlock Holmes Consulting detective - Mystery board games - Become sherlock holmes himself as a story unfolds bit by bit. You uncover new facts over time before you deduce how the murder has happened. Very nice props for a board game but some of the hints and conclusions can be farfetched.
	[played] Black stories - murder mysteries - very simple text based mysteries that are solved by asking simple questions to solve strange murders.
	Escape room board game
	Escape room books - linear & non linear escape stories including puzzles.
	Exit legacy escape room board game
	Journal 29 - book full of riddles

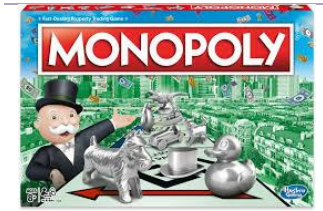
Sustainability rooms

	The green escape - saving & sustainability (harvard). Students try to escape a simulated student room by doing simple energy saving and sustainability challenges. A roleplayed student lives in the room for feedback and hints.
	RSM escape room - sustainable consumption and production patterns (plastic, clothing and cardboard). Is offered for free on a monthly basis for students.
	Cocreate impact - Sustainability through play - still in the process of making
	Sunken city - sustainability solutions (solar, water, soil and recycling)
	Escapebus - sustainable power, created in cooperation with OM sustainable power company and can be rented to spice up your event.
	Sustainable Business Battle 2018 - sustainability & flooding winning concept to create sustainability awareness
	Operation earth - sustainability awareness
	Climate escaperoom adapt or btrapped zwolle, mainly about flooding and the impact on the netherlands.

Serious Games

[played] Adaptive planning game - Serious game to introduce its users to flood risk simulation and urban planning for a small fictional town. Makes use of stakeholder feedback about property, safety, economy and nature. Shows input from stakeholders on decision making and data output in graphs and tables.

Serious game Aqua quest - simulation game of water management, involves building of various structures to prevent spilling and weather events. Uses event card sets of different levels to increase the difficulty of the gameplay.



Serious game Monopoly - a classic board game about real estate and the workings of the market. Introduces a vast amount of people to various concepts of this in a simple simulated version.

[listened] Serious game podcast - a podcast by serious game makers about serious games and its origins.

Empathy game Papers please - serious game about working at the border checkpoint to see who enters the country. Evokes questions about morals and choices made to keep a country safe.

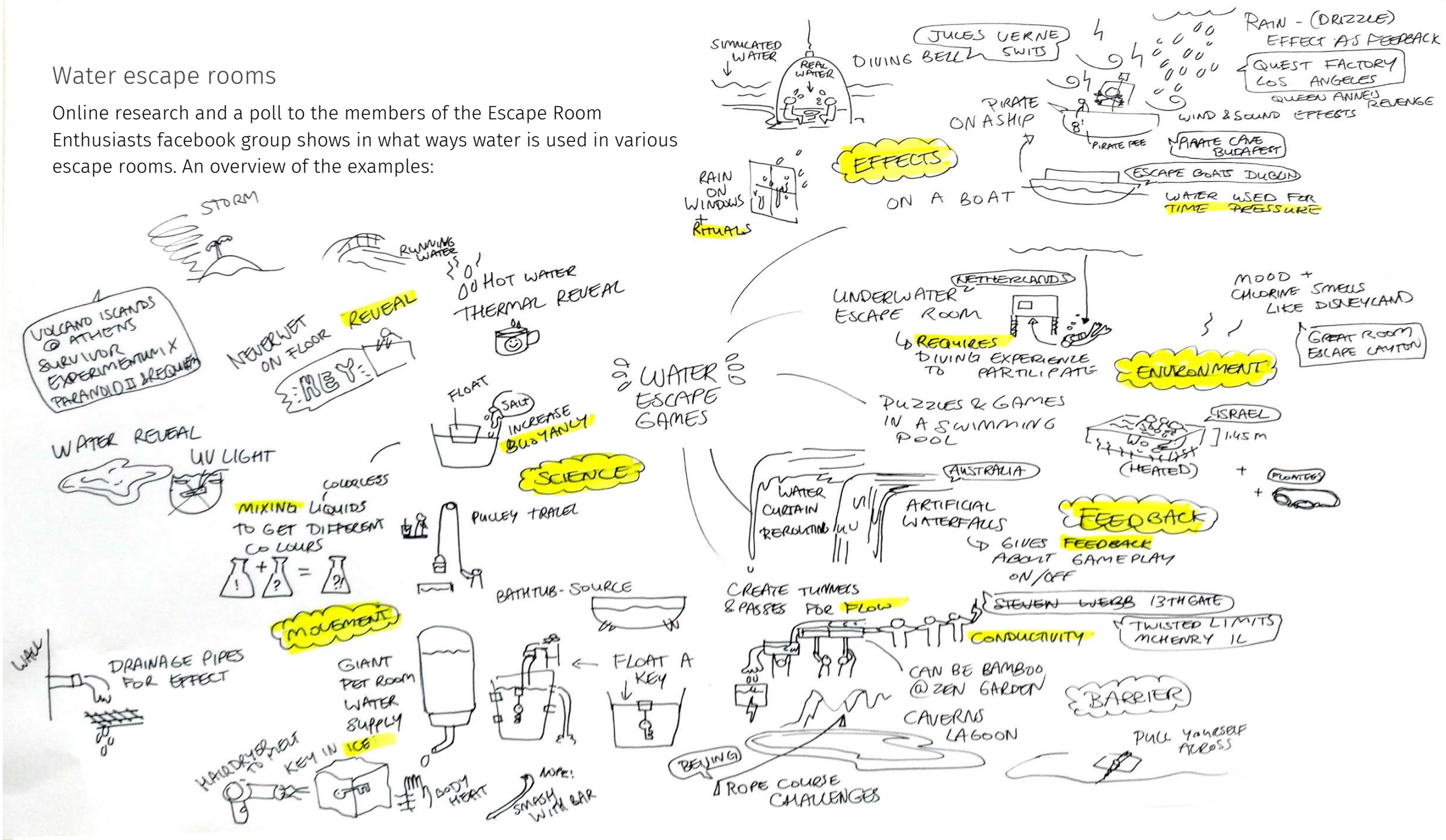
Museums

[visited] Naturalis museum - recently renewed interactive installations, allows people to interact with and view information through telescopes, panoramic screens and, creatively uses space to depict underwater areas differently. Offers a workroom for kids to build strange creatures out of different materials.

[visited] Boerhaave museum - uses creative projection mapping to immerse you in the story. Questions its visitors and gives feedback on your view compared to theirs in interactive videos. Makes use of special screens that show depth but can also remain see through.

Water escape rooms

Online research and a poll to the members of the Escape Room Enthusiasts facebook group shows in what ways water is used in various escape rooms. An overview of the examples:



Appendix C - A short history of serious games

Some of the earliest board games such as Senet had obtained a religious status among its players as outcomes of games were often interpreted as a way of telling the future. Such games were often designed for the elites, but quickly found their way to all layers of society as it became used for mystical as well as entertainment purposes. Over time more gameplay mechanics developed which gave way to a plethora of new board games that were possible.
Nowadays we can still see games that were created as simplified models of reality, monopoly being a prominent serious game that still sits among the bestselling games nowadays. Initially it was created to understand real estate and the workings of the housing market. Nowadays we can see serious games enter the digital realm with even more possibilities. But we can also see an increase in traditional board games in the corporate scene, focusing on connecting people through change making processes.

Why so serious?

What makes serious games different from normal games is the fact that there is always a clear learning goal that has been defined.
Serious games are made to put you in the right mindset, so that you are open for this new message or mindset. This is made easier by the fact that games are often seen as a separate learning space from everyday life, which is more lenient to experimentation and failure. This allows players to take more risks in a safe environment without being limited by direct consequences. This environment puts its users in an unknown situation, when nobody has played it before, everyone starts off at the same level, making it easier to communicate in hierarchical companies.

Serious games are bound to a certain timing, giving a sense of urgency to its players to keep going, which will evoke more realistic responses because there is no time to overthink every step.
This type of game often consists of two parts: the game itself and the feedback system. The feedback system ensures that the learning goals are met and that the gameplay is interpreted by its players as intended.

How gamification has been upcoming in the last few decades and changes how educators cater to their students.

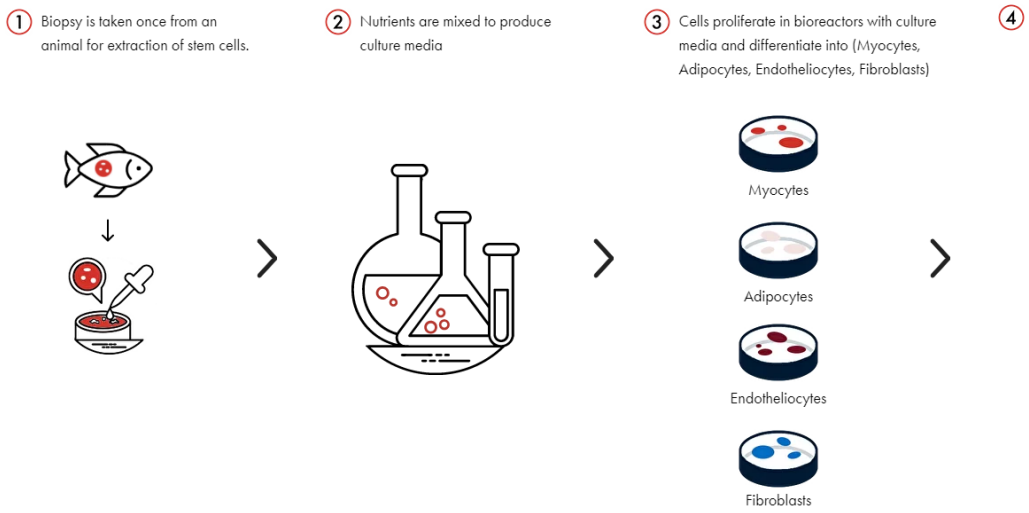
Serious games often feature repetitive elements which will allow your neural networks to be used over and over so that efficiency goes up because you will expend less energy repeating actions. Using different senses strengthens the usage of the neural networks to make it easier to learn skills in a sense rich environment.
It's often cut into small pieces like milestones that can give you dopamine for reaching them. Seeing these milestones will make the players feel like they can do it, this type of empowerment will give the players motivation to keep going.

According to Manenschijn & Oude Veldhuis (2020), serious games are used in a variety of settings but most common are in education and companies. Education usually focuses on more skills and knowledge based games whereas companies use it for a very wide array of options. This ranges from onboarding to marketing and from skill training to creating awareness but at its core it is always about behavior change.

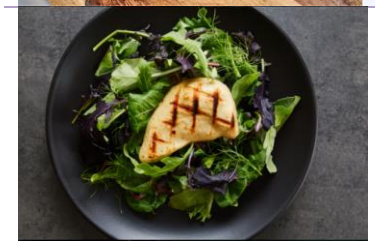
Appendix D - Synthetic foods

The fridge section in the escape room gives a lot of flavor text to the users of the room, showing them examples of greener alternatives they may encounter in the future.

Cultured process:



	Company & products
	Perfect day - milk and dairy products such as cheeses and ice cream (https://perfectdayfoods.com/)
	TurtleTree Labs – cultivated breast milk https://turtletreelabs.com/

	Clara foods – egg whites and baking products (https://www.clarafoods.com/) Just - plant based eggs (https://www.ju.st/)
	Finless foods – cultivated tuna https://www.finlessfoods.com/
	Shiok meats – Cultivated seafood based dumplings https://shiokmeats.com/
	Avant meats – Cultivated seafood https://www.avantmeats.com/
	Goodmeat - cultivated beef and chicken (chicken exclusively available since 2020) (https://goodmeat.co/) Mosa meat - cultivated beef burgers https://mosameat.com/ Aleph farms - cultivated steak

https://aleph-farms.com/

Supermeat - cultivated chicken
https://supermeat.com/

Gourmet - Cultivated foie gras
(https://gourmey.com/en/)

ArtMeat - cultivated horse meat burger
http://artmeat.pro/

Peace of meat - Cultivated animal based fat
https://peace-of-meat.com/

Geltor- gelatine and designer proteins for foods and cosmetics
(https://geltor.com/)

Cybele - skincare
(https://cybelemicrobiome.com/)

New wave - plant based shrimps
(https://www.newwavefoods.com/)

Spintex - Artificial silk for sustainable fashion textiles

Bond Pet foods Fermentation and plant based
https://www.bondpets.com/

more

https://www.pivotfood.org/companies
Indiebio.co

Appendix E – Metrics

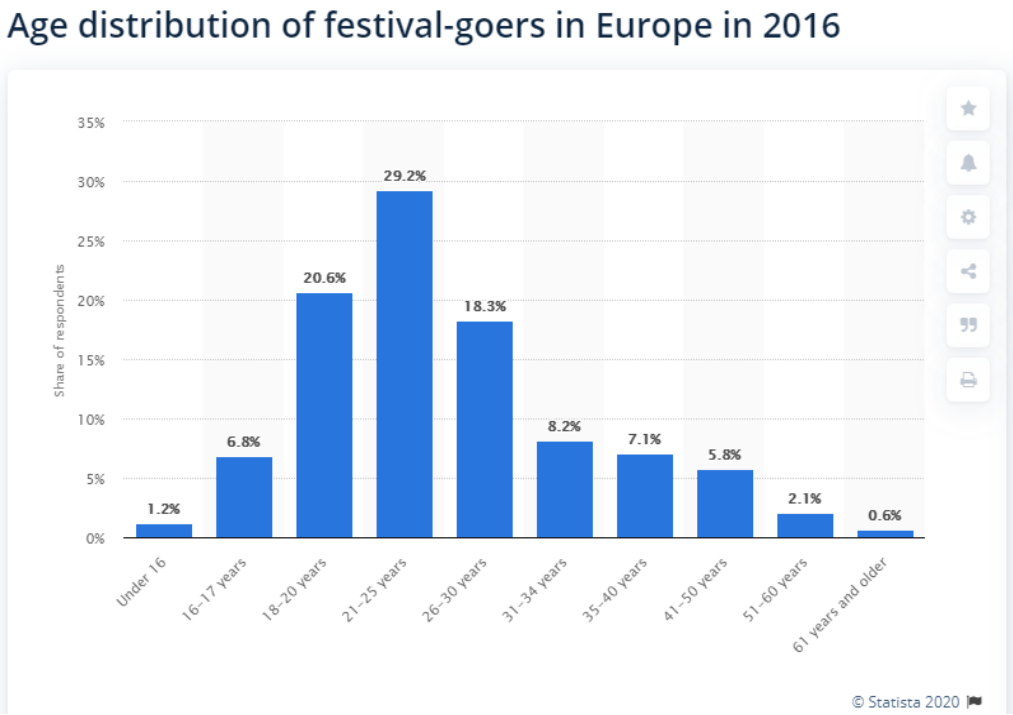
Anthropometric Data

These measurements were used to create basic sizing for prototyping and design purposes. Based on Dutch and American demographics.

Population	Percentile	Measured length	Amount
Dutch female 20-30 years old	P5	Shoulder height	1281mm
Gordon, Claire C. et. al 1988 Anthropometric Survey of U.S. Personnel: Summary Statistics Interim Report. March 1989. female	P5	Vertical grip reach	1808mm
Dutch female & male 20-30 years old	P50	Elbow height standing	1097mm
Dutch male 20-30	P95	Shoulder height	1637mm
Dutch female 20-30	P5	Shoulder height	1281mm

Data on Festival goers

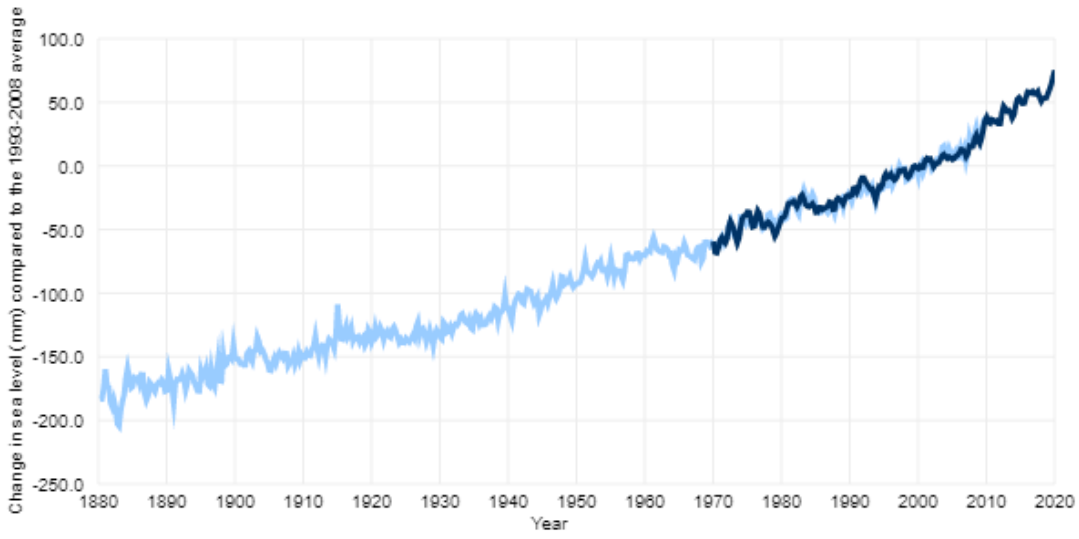
Some metric data on the festival goers:

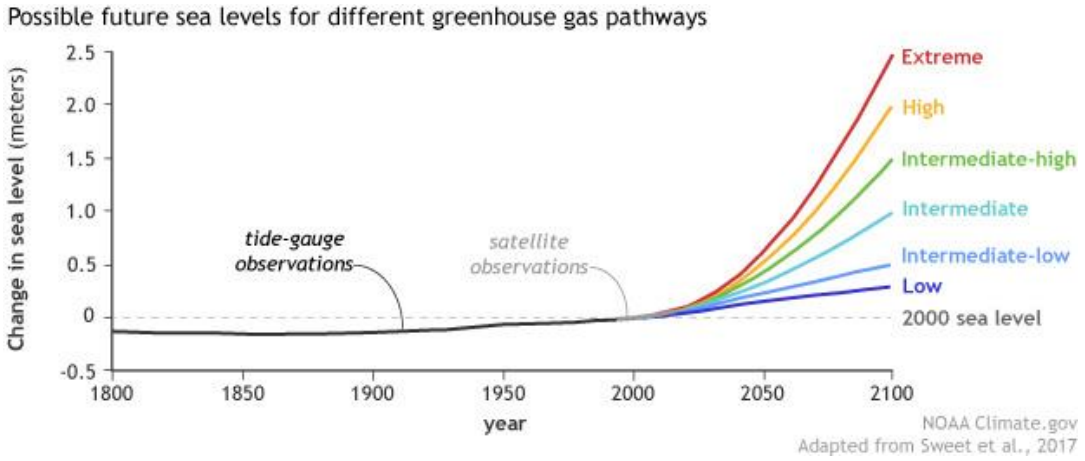


Metric	Value	source
Average age	18-30 years	https://www.statista.com/statistics/438157/age-distribution-of-festival-goers-in-europe/
Festival type	live music with bands (67.7%) and live DJs (60.1%)	https://ndarc.med.unsw.edu.au/sites/default/files/ndarc/resources/DPMP%20Bulletin%2028%20-%20Profiles%20and%20policing%20of%20Australian%20music%20festival%20attendees.pdf
residence	73.5% city, 22.2% regional. 4.3% rural/remote	https://ndarc.med.unsw.edu.au/sites/default/files/ndarc/resources/DPMP%20Bulletin%2028%20-%20Profiles%20and%20policing%20of%20Australian%20music%20festival%20attendees.pdf
Festival ticket expense	Averages spending of 150 euros per ticket	https://www.statista.com/statistics/438157/age-distribution-of-festival-goers-in-europe/
Demographic	59%male 41%female (N america)	https://www.eventbrite.com/blog/music-festival-demographics-ds00/ https://ndarc.med.unsw.edu.au/sites/default/files/ndarc/resources/DPMP%20Bulletin%2028%20-%20Profiles%20and%20policing%20of%20Australian%20music%20festival%20attendees.pdf
Visits	2.6 festivals a year on average Majority only 1-2	https://www.eventbrite.com/blog/music-festival-demographics-ds00/ https://ndarc.med.unsw.edu.au/sites/default/files/ndarc/resources/DPMP%20Bulletin%2028%20-%20Profiles%20and%20policing%20of%20Australian%20music%20festival%20attendees.pdf

Rising sea levels data

The main simulation in this experience room is the rising of the sea level. The Figures on the right show the rising sea level of the last few decades and future predictions of different scenarios respectively. This shows the water level of 90cm used in the simulation is an extreme but realistic scenario within the next 50 years.

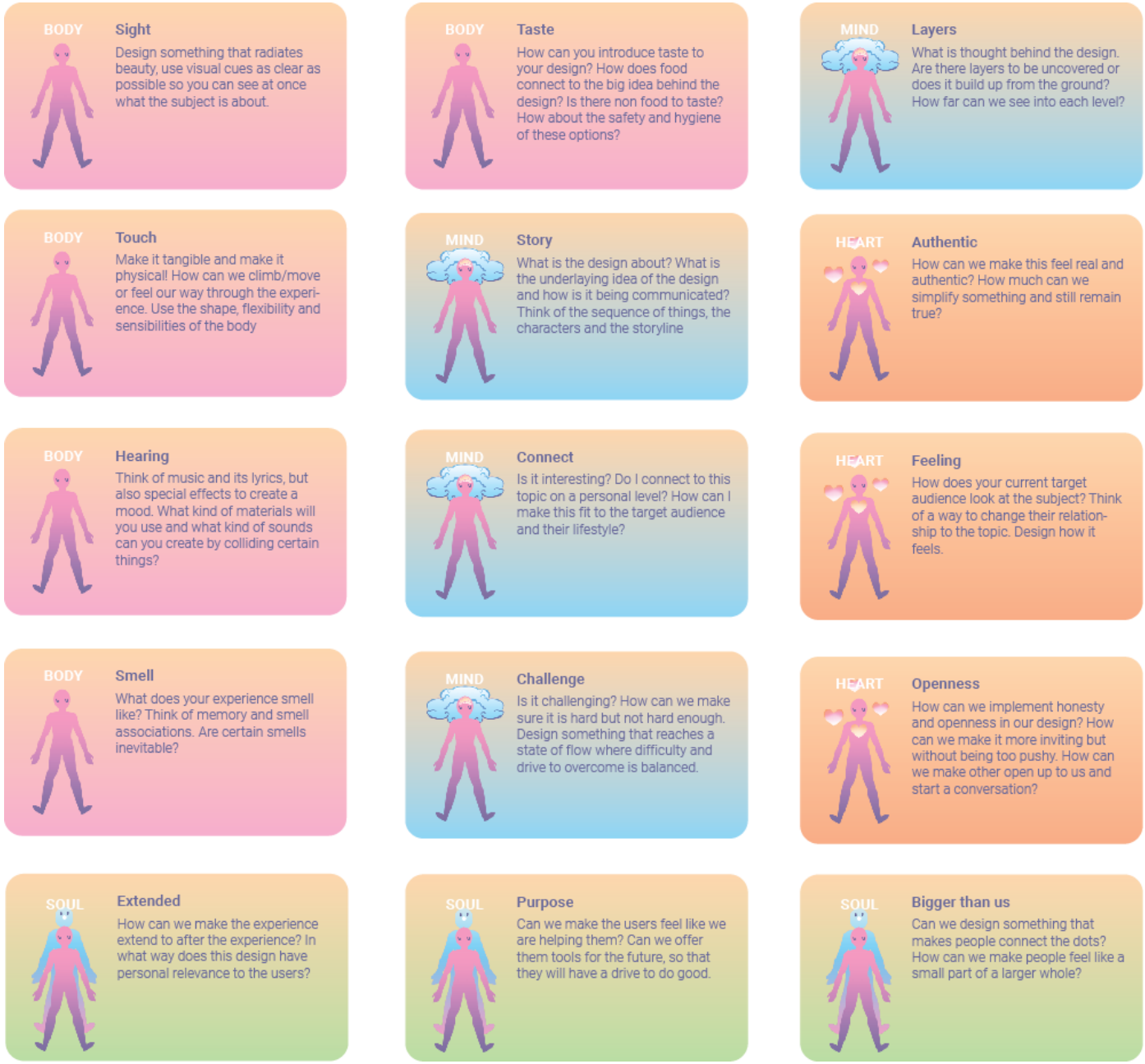




Appendix F – Research Materials

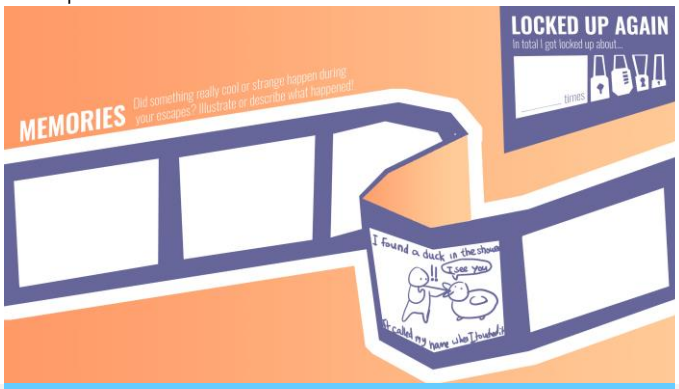
Experience design cards

A set of simple cards were created that list aspects of the Body, mind, heart and soul based on the book Worlds of Wonder (Bär, E, & Boshouwers, S., 2018) These can be used during the ideation and reflection phases.

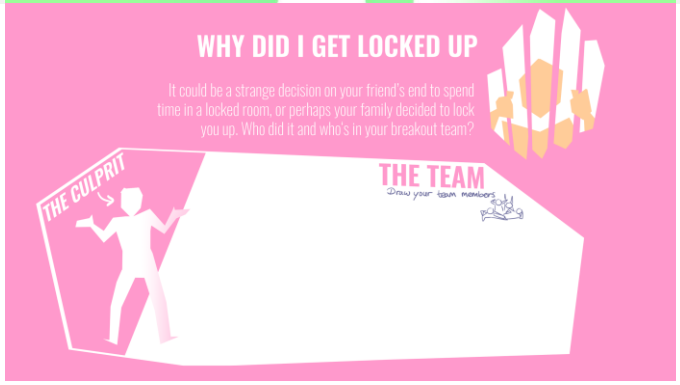


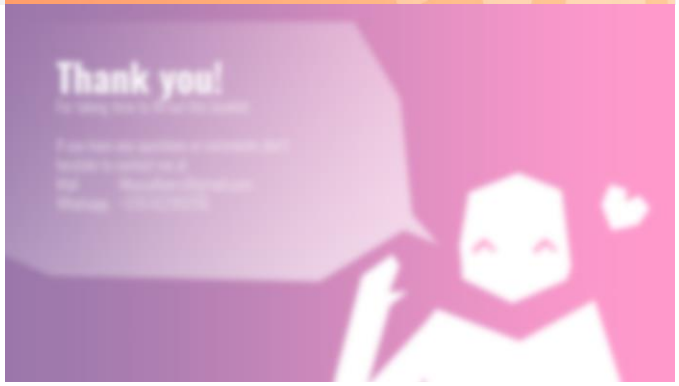
Context mapping booklet

A tool for a generative research approach with make-activities as described within the convivial toolbox by Sanders & Stappers (2014). This booklet was used to test with several millennials (20-30 years old) how they felt about escape rooms and what kind of festivals they visited. It is used to give a quick peek into their lifestyle, ideas and escape room experiences.



What do you think would be different when you do an escape room on a festival?





Design suggestions from context mapping booklet

A festival escape room could possibly:

- Be a shorter experience think maybe 10-30 minutes
- Have the experience tailored to each participant.
- Have fewer people in just little space so max 2-4 participants.
- Use less space to make it easy to implement and move
- Spread clues all over the festival grounds to make people visit all sorts of venues on the terrain."
- Have less invested players because they didn't sign up beforehand
- Have spontaneous team compositions
- Be a more classic escape room with more physical clues and locks instead of highly technical sensor activated puzzles.
- Space conscious

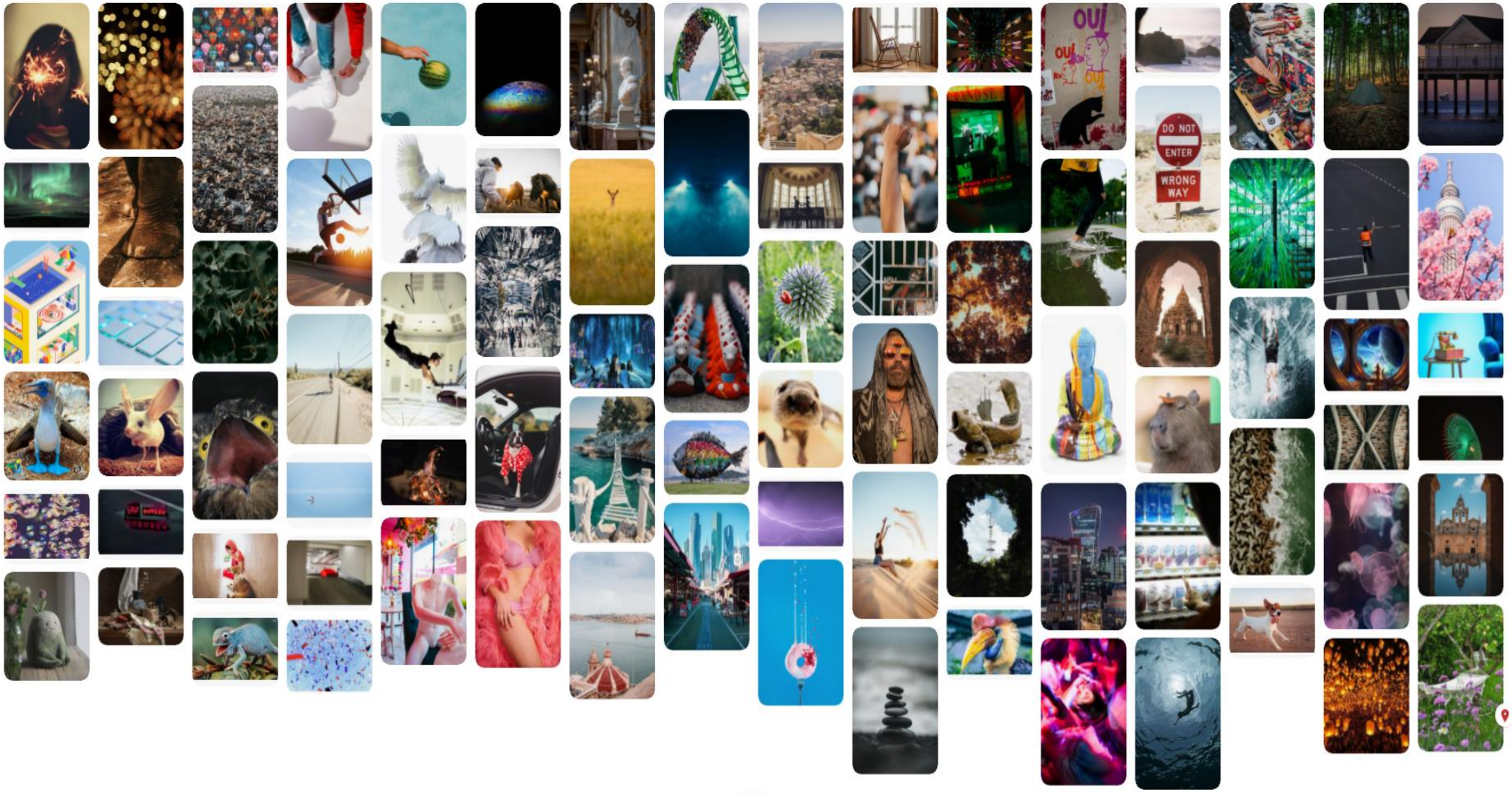
Previous popup escape room experience: "It was a caravan set up on the camping grounds, with a bunch of actors outside setting up the story. They had to be very space-conscious puzzles, so there was a lot of dexterity play and re-used elements from previous puzzles. It also broke down a bit too easily. I tried to check behind a window, only to walk away with the window in my hands. Slightly awkward."

Other than that we could also have
Make festival specific challenges, for example food themed challenges on a food festival or more sound based puzzles on a music festival..
Make use of the space that is available on the terrain. You could build up multiple rooms on the festival, or use various places on the festival grounds as a place to find clues.
Challenges where you really have to work together, not only by communicating but also physically impossible to solve without each other's help.
Design Something that is not just puzzle-related, but maybe requires some timing and coordination

Create physical interactions to take advantage of the fact that it is a physical medium (push/pull/climb/etc)
You could also think of involving multiple senses. Think of special effects such as light, sound and crazy installations. Also consider the implications of colours for mood and influence on players: "Timers... they make me nervous.. Especially when they are red coloured, they seem angry and in a hurry. White coloured timers wouldn't make me feel any better though."
We always like to be rewarded for doing a good job. These "actual rewards" could be as simple as a sachet of candy or festival coins, just.. Something to work towards". "At the end of the "escape" room we were invited to become members of a very secretive group which was kind of fun to conclude the puzzle route with
Add something that sounds way too ridiculous, so that the players are in for a surprise

Collage materials

A random selection of photos was collected and presented to the participants to help inspire them to create a collage



Appendix G - Time travel in stories

There are many types of stories that have parts of time travel and they all use the element of time travel differently. Common tropes of time travel were observedd to see how I could implement it into the escape room narrative but keeping it easy to understand.

The flow of time.

Time travel usually picks one theory to base their flow of time on. These can include timelines with **alternate realities**, where the characters can change the timeline from its original course by changing things in the past or future. This can completely change the origin of the main characters when major events have been caused or prevented, sometimes erasing their existence entirely. Another version of time we see is to use a form of **predestination**, where everything that happens is already set and characters just fulfill their role eliminating any type of free choice. (As seen in the predestination movie and Dark season 1) Another interesting mechanic that is used in movies is **time loops** (which we can see in movies such as groundhog day, edge of tomorrow or games like minit). Some people don't actually travel through time but only catch **glimpses** to the future or past (Minority report, Source code, your name, future diary) and use this knowledge to their advantage in their current time. Some movies allow time to **flow differently** for different characters (theory of relativity in interstellar and cryogenic time travel in many scifi movies)

For this project I would like to focus on giving people a feeling of choice in their experience as this would rule out predestination.

Time travelers

Each story has their heroes, and time travel is no different. Because time travel is still something we have to daydream about, we can often see researchers step into the role of time traveler. They often search for knowledge such as advanced technologies and medicine or foresight on events. Characters common to scifi movies are therefore also common such as astronauts, aliens and (partial) robots. Law enforcement, special agents or soldiers can often be seen trying to protect the timeline or capture criminals that try to mess with it. Whereas wanderers such as teenagers and kids stumble into a time rift that opens up new adventures or romances.

Travel Devices

Using a special time portal that is engineered using technology or magic. Changing your own flow of time relative to others by relativity or cryostasis. Sending your own conscious through time without having to physically travel (body exchange like in altered carbon and your name or avatar control like in Avatar or assassins creed)Appendix G - Tips and suggestions for escape room design

Tips retrieved from “The Art of Game Design” by Schell (2014).

- An escape room should definitely have a balanced **flow**, not too easy to keep it **challenging** but not too hard that it will discourage players.
- Ease players in and out of the experience by changing the difficulty accordingly. The hardest parts are right in the middle.
- avoid **bottleneck** puzzles at all costs to keep everyone involved in the process.
- Avoid red herrings and the necessity for outside knowledge
- puzzles are never isolated
- puzzles should give feedback (actions give reactions and players know when it is solved)
- Puzzles can have **checkpoints** to inform players they’re on the right track.
- Try not to break **the 4th wall**.
- “The **player** should have the fun, not the designer, programmer, or computer.”- Bruce Shelley
- To immerse the player all the connected elements should be **consistent**: genre, world, narrative and characters.

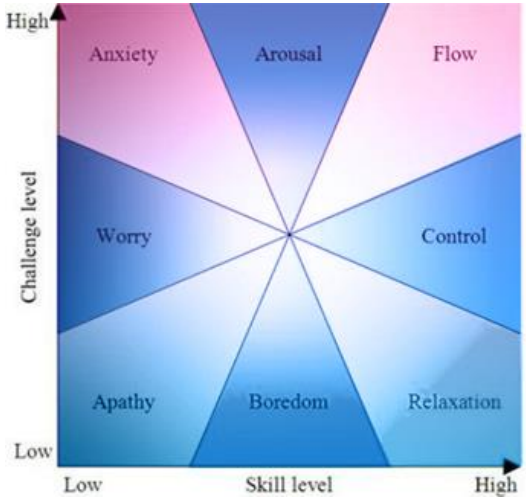


Figure: Optimal experience Csikszentmihalyi, M. (1990)

Studiomaps Golden rules

These rules were made by the studiomaps (2020) team from TUDelft that conducted several interviews for an earlier collaboration with the Sherlocked team.

- Need for surprise (unexpected events)
- Everybody needs to contribute
- What is next is unknown
- Have order in Chaos
- People need to be able to get immersed in the story
- People need to be and stay motivated
- Balance between different elements
- People need to see and find the links/connections
- The experience
- The experience and the results need to feel useful
- Be aware of the negatives

Puzzle variations:

Escape rooms have a great variety of puzzles that are spread around the room. The most common puzzle variations were found in a large escape room survey done by Nicholson (2015) and can be seen to the right.

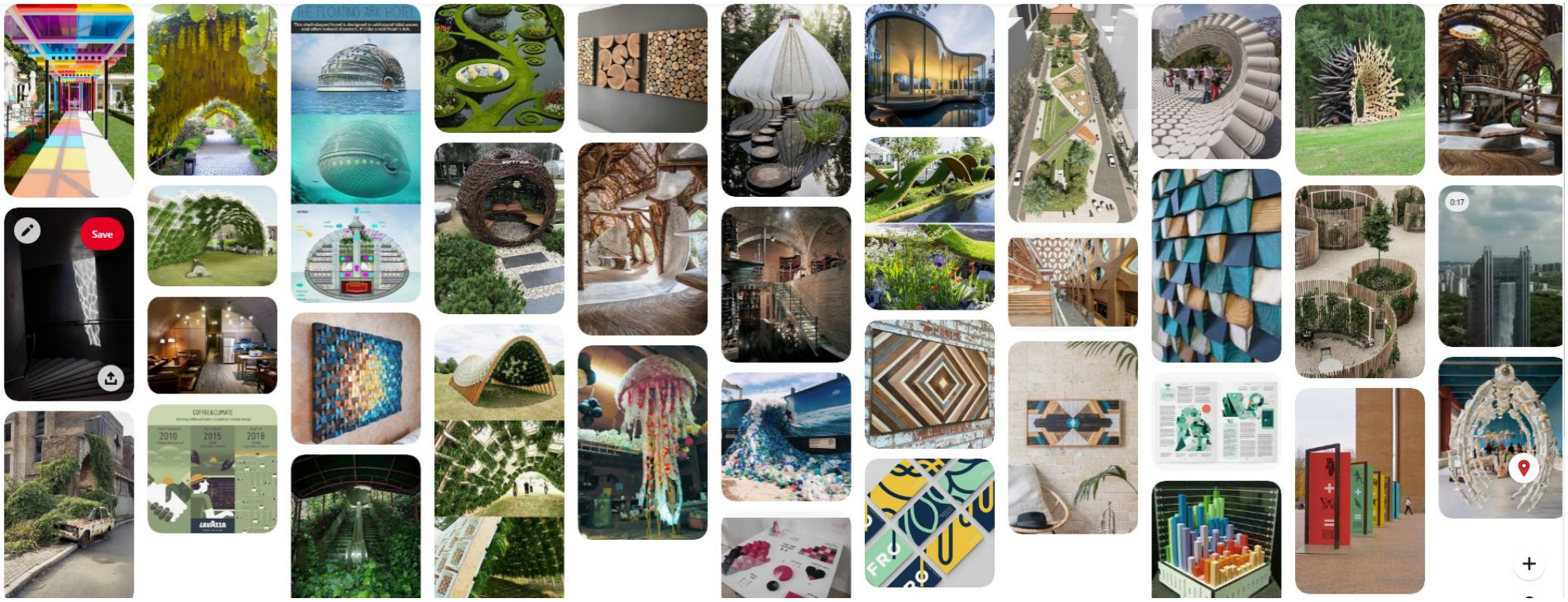
Escape rooms should have a variety in puzzle difficulties, one way to categorize them is as followed:
Easy: Task (no solving required just a task to complete)
Medium: Process puzzle (thought deduction, and logic to solve)
Hard: Aha! Puzzle (Insight and inspiration to solve, hidden connections)

78% Searching for physical objects		175 Escape Facilities Surveyed
58% Team Communication	37% Riddles	14% Mazes
54% Light (e.g. blacklight)	35% Ciphers without key	13% Agility (laser maze)
53% Counting	26% Hearing	12% Touch
49% Observation (obvious in room)	26% Mirrors	11% Trivia (outside knowledge)
47% Cipher with key	22% Abstract logic (e.g. Sudoku)	11% Shape manipulation (matchsticks)
47% Aha! Use of object	20% Research within room	9% Liquids
43% Searching in images	20% Strategic thinking (e.g. Chess)	7% Actors - Social engagement
40% Assembly of object (Jigsaw)	17% Hand-eye Coordination	4% Actors - Physical engagement
39% Algebra and other math	16% Untangling ropes or chains	3% Smell
38% Pattern and tracing	14% Traditional Word Puzzles	1% Taste

Appendix H - Styling boards

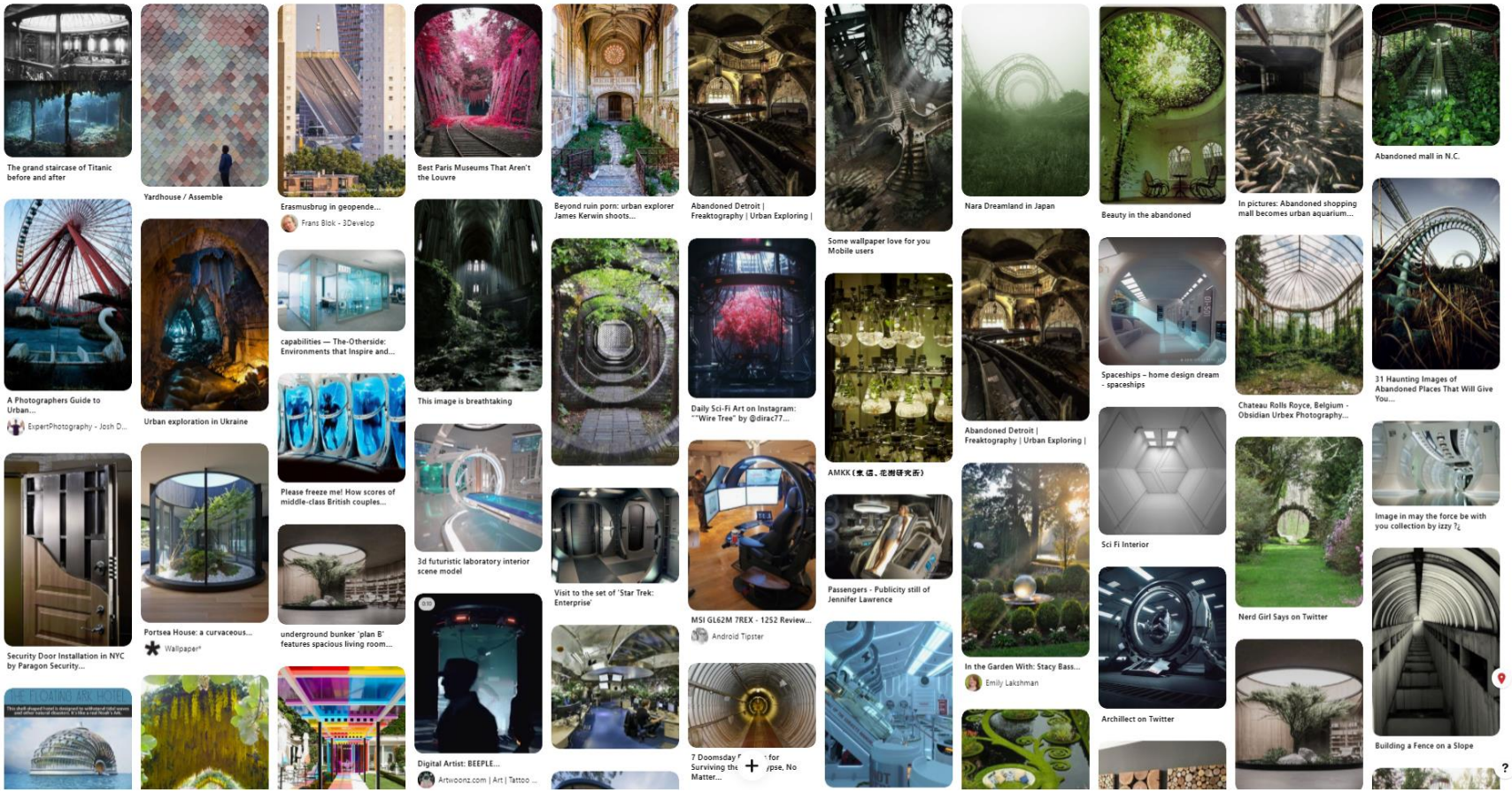
Sustainability

A board that reflects naturals material usage and colours, but also looks at sustainability and shape design



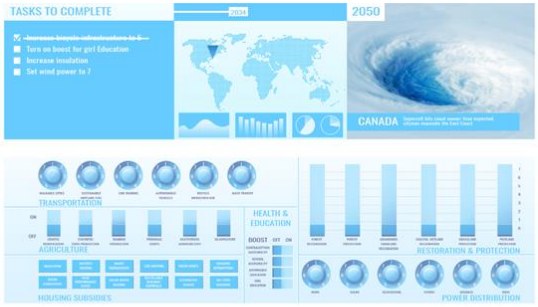
Scifi / UrbEx

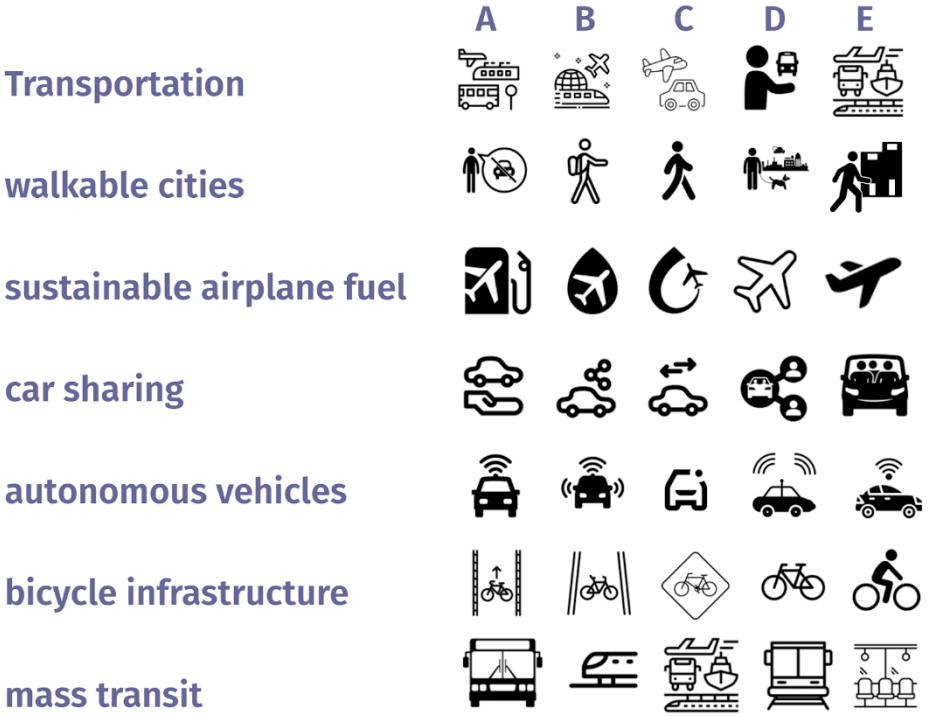
Clean and minimalist sci fi juxtaposed with urban decay from UrBex scenery. These images signify contrast and change of technology and nature within the game environment.



Appendix I – Icon Research

A redesign of the physical interface can be done to counter the information overload that some participants have mentioned to get from the current interface. Something that may help with this would be to add icons and colorations to the different topics
On the right we can see a potential testing method: using existing and newly made icons to test for communication clarity.





Appendix J – Timeline of Interactions

Maps out an estimated timing for interactions, system instruction voiceovers, The interactions of the players with the components, Screen display commands, special effects such as lighting and water, and a rationale for each component in the system including.

Activity	min time (m)	System (voice instructions)	Interactions	Screen displaying	special effects	water effects & score	discussion	Context & themes	Why?
failure						Passive water increase	HINT system is displayed in orange		
						a lower water score means a lower water level (- is a positive thing!)			
enter			players enter the room		room is dark with little illumination. Buttons light up		We don't want people to wander off around the room yet. We want to guide them, so we will first only have the main area light up		
closed			the host closes the door and the game is started		sound effect of an air lock door				
login		Please identify at the biometric login panels	players each hold a scanner in the room at the main panel		Scanner beam goes over the room.room lights up and screens are turned on.		Counts the number of players. This can be used to properly spread users before the room splits or can potentially be used to lower the difficulty of the room if necessary. In this case it will influence the amount of tasks that is given per round.	biometric technology	
welcome		initializing system. -bootup sound - Welcome to the Blue mirror project. You are chosen to help us create a brighter future.		blue mirror logo,			users are introduced to the style of the gameplay where they have to follow commands	gameplay information	
intro	0.5	Our AI assistant will help guide you in your journey through time. Here we have an overview on the world which we will manage together from this capsule.		AI embodiment optional, overview of map, timeline at the top, metrics and task list		0		world information, exposure	
press button		Let's start by improving housing by adding high performance glass	users click the correct buttons	Tasks: High performance glass	computer reads out what you should do and buttons light up	water slowly starts rising as the timer starts +0.5		agriculture	
dials and sliders	0.5	Great, now increase transportation by car sharing to 4 and start genetic modification processes		Tasks: Car sharing 4, genetic modification on	feedback on the screen with bar charts and animations		This is done to show people the water level can be influenced by the user	exposure to new terms	Surprise - Even if you've been told there will be water, you don't know to what degree this is true beforehand and how much it will be.

Activity	min time (m)	System (voice instructions)	Interactions	Screen displaying	special effects	water effects & score	discussion	Context & themes	Why?
fast sequences A		Increase Bicycle infrastructure to 5, turn on boost for girl education, increase insulation, set wind power to 7		Tasks: Bicycle infrastructure 5, boost girl education on, insulation on, wind power 7		if you make a mistake water will flow in through a pipe or side panel	increase the energy level/attention of the users by giving them fast paced interactions	connect new topics to sustainability. (you often think of recycling and CO2 but not about childbirth and education)	
B		excellent, now ..					sequence tasks are randomized but will always come in a certain number		
C		perfect,							
D	1	well done,				(+4 or -2)			This part is done to show participants that their actions have consequences and that this goes two ways. So good performance and choices will lead to a better future, and bad ones will make it worse.
failure		we have to move on	failure to follow instructions fast enough			Water increases by +0.5 for every mistake. Water decreases by -0.5 for every correct move. Moves that were too slow count as a mistake +1			
Bucketing	1		players can use small buckets to scoop the water out of the room. in a chute that leads outside			water is decreased by a little bit, but the additional chance of failure of incomplete tasks does not make using the bucket to scoop out water a beneficial activity in the long run	The water that you scoop out into the disposal could be shown to people on the outside outside. Although there is no context on the outside what this water means. This activity literally shows people how "dweilen met de kraan open" (mopping with the tap running) is how we handle sustainability right now.		Emergent narrative - what we want is to create playful learning environment where they can make their own choices. Although the majority of interactions is quite literally spelled out for them, we want to offer small opportunities for emergent narrative to happen: people create their own stories and interactions.
						passive water increase +2			
security protocol		contamination detected. Scanning source.			scanner beam goes through the room		The room is split in two, meaning people will have to communicate to get things done. For now we will use a repetition of an earlier assignment to keep it simple. The water level will have risen a lot at this point.	one of the most contaminating but lesser known factors that influence sustainability.	This part is added to introduce people to a lesser known factor that influences global warming on a large scale at this moment. (everyone knows at least a little bit about recycling or sustainable materials, not much is known about coolants, even though most of us own a fridge)
Chemical spill					green light emitting at the HFC module				

Activity	min time (m)	System (voice instructions)	Interactions	Screen displaying	special effects	water effects & score	discussion	Context & themes	Why?
		The HFC Coolant from the fridge seems to be spilling. Get rid of it quickly and replace it with a CO2 cooling module		Replace the Coolant cell in the fridge and process the old chemicals					
replace fridge cell		Remove HFC Coolant module from fridge.	Remove Coolant module from fridge. Send coolant module to chemical lab through a chute.		coolant module location lights up with green.	-1	modules are magnetic to make it easier to place them correctly	contaminating coolants and replacement.	
		Fill module with CO2	reconnect CO2 hose to empty module. Pump CO2 into module.		bar fills up when the CO2 is pumped into it.		introduction to pumping		
		Place module	Place CO2 module into the fridge.		fridge light turns back on	-1			
		decontamination in process						chemical processing neccesities of old solutions, use cases for CO2	
	1			Send HFC coolant module to chemical processing plant, fill empty module with CO2, Place CO2 module in the fridge.					
failure			failure of instructions within time limit			failure +1 per subtask			
						passive water increase +2			
		In the meantime,							
		We need your help with some manual tasks within the capsule.							
plastic soup 1		Could you clean up that mess over there?	plastic waste flows into the room through a water vent	recycle plastics	Plastic flows in through a side panel of the room in a splash of water	splash of water	Easter egg messages can be hidden inside one of the waste bottles.		Connected - This part was added to simulate the fact that you are not just in an isolated body of water but that it connects to the outside sea and the waste problems we face.
		Let's use that	the waste is thrown into the grinder which feeds the materials to a printer. The printer spits out pieces for the next puzzle.	Printing	The machine makes a grinder noise and starts turning the grinding gears and filament roll. The printer head starts moving and a pipe part is dispensed from the machine.		Grinder and printer are merely a simulation. Pre-made printed parts are dispensed to simulate a printed result. A bin can be placed on the outside of the blue mirror capsule to simulate the waste actually comes from outside.	Water contamination and wildlife protection. Recycling and additive manufacturing	For fun I would like the chute on the inside to be on the same side as a garbage bin on the outside (was this my waste?) Always use localized brands for the waste material. (what is available here?)
	1			Recycle plastics - Gather the plastic waste, throw the plastic into the grinder		-1			
failure		I think we missed some, but I'll use the materials we have				1			
						passive water increase +1			

Activity	min time (m)	System (voice instructions)	Interactions	Screen displaying	special effects	water effects & score	discussion	Context & themes	Why?
vertical farming		I have recalculated your oxygen usage in this capsule, and we will need to boost our internal CO2 sinks. Water the vertical farm if you want to live	connect the hoses by solving a simple puzzle and holding it in place	water the farm	animated plant growth?	a pipe bursts and starts pouring water from the top		CO2 land sinks, water sinks, agriculture, vertical farming	Cooperative - This part cannot be finished alone, working together is key to reaching your goals. Cooperative games encourage pro-social behavior.
			pump the water through the hose			water flows through the pipes and can splash out at the user if its not in a correct angle or not that precisely manufactured	water will flow from the pump to the pipes. This will fill up a small basin at the end to signal an ON sign to the water cannon. As we cannot guarantee sufficient water pressure from manual pumping alone.		
			aim the water cannon and shoot the water at the water basin of the vertical farm		A sound will play when the plants are watered sufficiently.	Water shoots out of the water cannon into the vertical gardens. A see through basin will collect the water and will start dripping onto the plants when reaching the threshold.	playful hooliganism - players can choose to get more wet and play with the water at this stage. It lowers the threshold for people to play with the water or prank their friends. This part is included to invite players to get wet but not force them to do so.		Fun - Working towards making better choices doesn't always have to be super serious business, you can have fun on the way to your destination. This interaction is based on social dynamics (how welll do I know the other players and will they be ok with a little water prank).
			Connect and pump CO2 into the bottom of the gardens	Supply CO2 to the farm	seaweed will unroll itself by floating upwards				
	1			Water the farm - Solve the pipe puzzle, pump the water, fill up the top basin. Supply CO2 to the farm- reconnect the hose, pump the CO2 until the seaweed grows		if done correctly -1			
failure		We need your help with another task now				1			
						passive water increase +2			
Sequences		We need to send out new agricultural data modules to the outside. Use our data modules to build the correct sequences	visual code sequences can be selected on the main screen.		clues what to use lights up during usage.		This step is made to connect the things that happen inside the escape room to future outside the time capsule.	agriculture technologies, silvopasture.	
		We have a request to send silvopasture data to the farms, please look at the following diagram	Modules have to be taken from the module chutes. These modules are spread out over the room. To access the modules, the chutes have to be filled to float up the modules. This can be done by water cannon or by bucket.	Create Silvopasture module sequence					

Activity	min time (m)	System (voice instructions)	Interactions	Screen displaying	special effects	water effects & score	discussion	Context & themes	Why?
			Modules are brought to the sequence programmer. and submitted by closing the panel		modules entered in the sequencer will activate a coloured light.	sequences have to be submitted with a handle, correct sequence -1 incorrect sequence +1			
						a pipe above one of the chutes bursts and starts filling it up			
				Create Silvopasture: Access the modules with water, Collect modules, place modules in sequence,					
failure						1			
						passive water increase +2			
	1	Our farmer robots are now executing your new agricultural program	screen feedback		An animation plays of the robots succesfully planting/managing farmland.			drone swarms, autonomous systems	
		Oh no,						algae	
power outage		It seems we are Offline, luckily we have a little backup power, But we'll need you to Rewire the mainframe to renewable energy sources		off-	lights go off and emergency instructions are given to reconnect the power source, singing ice soundtrack			sustainable power sources, wind, solar, wave energy	surprise/fear - surprising effects show positive effects to knowledge gain and retention according to neuroscience and psychology, negative emotional arousal is especially effective.
redirect power	1.5		users follow the cables by feeling the structure of the cable. (all cables are the same color) they can then slide the slider to connect the right cable and turn the power back on with a handle		the cable panel is lit up where the slider is.		This part is added to make people use their other senses more activily and stimulte the body to feel.		
		Follow the cables and connect them to the right power sources					because the subtask hint system is off at this point, we switch to voice hints until the lights are back on.		
		There should be icons that we can match				sequences have to be submitted with a handle, correct sequence -1 incorrect sequence +1			
algae	0.5	Peculiar, it seems our time hull has been damaged, it is dangerous to stay here like this.			heated panels turn on revealing thermochromic inks that have algae and plants printed on them.		shows the passing of time in a physical way, giving cues that the environment keeps changing within the pod as well	shifting of environment	surprise - surprising effects show positive effects to knowledge gain and retention according to neuroscience and psychology
failure						1			
						passive water increase +2			
tipping point					alarm sounds, host video plays			surprise	

Activity	min time (m)	System (voice instructions)	Interactions	Screen displaying	special effects	water effects & score	discussion	Context & themes	Why?
contact	0.5	there is no time, we can't go back from here. we have to try again. If we use all our power sources we can send one module back in time. Please use this knowledge in the past so our next mission will be a success.				more water spots at the top start bursting open and the fake window starts to crack.			
		more people?			screen shows other escape room users in the same situation.	active water increase +2	This is done to make people connect to other players, and show them that they're not doing these challenges alone. We are all in the same boat. Even if this may be sinking at this moment.		its not only your group in the capsule that is working towards a better future, all the others that come before and after you will also walk this path. You are not alone!
			smash the emergency glass with a hammer			glass is made from ice	This is the final state of water: ice, I wanted to let people interact with all shapes of water as it the main focus of the escape room mechanics.		
		Smash the emergency glass QUICKLY		Smash the emergency glass					
	0.5	take the emergency exit	climb out the roof	USE THE TOP EXIT		All water sources are open, water rises to maximum (90cm)	players exit from the roof so the water level can remain high at the end of the experience.		This is not a failure, this is your chance to shine. This game focuses on cooperative gameplay rather than a competitive one because it enables people to focus more on the experience of play rather than only on the outcome (Orlick, 1982)
							in worst case scenario (when players have already reached a high water level, we can consider draining the water whilst having an active increase to simulate an increase in water)		
	9 min								

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