TRANSFER DOCUMENT

Fontys Escape Room Project

Table of Contents

Preface

This document is created to make the transference of this project as easy as possible. The document will contain information about previously done research, created designs, the concept and worked on code in the end it will also talk about advice for the future and some other ideas. At the moment this project is turned in by the students of Fontys HBO-ICT the product will be an MVP (Minimal Viable Product).

The product we created consist of two parts. The Teacher CMS (Content Management System) is the place for teachers to create, manage and delete their rooms and where they can check on statistics and scores. The game is the place where students go to play and learn.

Research

Several researches have been done during the project, the full research of each will be attached at the bottom of this document. Here I will give a short summary of the research done and a conclusion for each of them.

What is an escape room?

For creating an escape room game you first need to know what an escape room is. This research talks about what an escape room is both in real live and as a video game. The conclusion is that escape rooms can be played both in person and online. Where in person escape rooms are almost always played in groups of two to ten players, online escape rooms can also be played alone. Both put a player in a functional location such as prison cells, dungeons and space stations and make use of puzzles, hidden compartments and secrets to create a way to escape the room. Escape rooms test the problem solving, lateral thinking and teamwork skills of participants by providing a variety of puzzles and challenges.

The full research and sources can be found in: Research 1: What is an escape room?

What makes a good escape room?

To be able to properly create an escape room game it is necessary to know what a good escape room is and needs. The research takes a look at several aspects of escape rooms; story & theme, immersive, problem solving, teamwork. The conclusion in the end is that to make an escape room interesting an fun there need to be certain elements present. These include: a story that resolves around a certain theme. It should give you a reason as to why you are where you are and something about the goal which in turn makes the game immersive. During the game you'll have to find clues and solve puzzles alongside the other players and work together to reach your combined goal; to complete the escape room!

The full research and sources can be found in: Research 2: What makes a good escape room?

How to play an escape room?

To make a game its also important to know how to play an escape room both online and in real life. This research looks into how escape rooms are played and what is important to look at. The conclusion of this research is that there are a few key points in playing an escape room, these are: Pick the right team, Understand the rules of the rooms, Listen to your team mates and Divide an conquer to search.

There also is some advice for the user interface as a result of this research. Players of the escape room should be able to interact with the game. The advice is that players can open questions by clicking on various items that can be seen throughout the room. By answering the questions they can unlock other questions that were previously locked or they could get cards with hints or information to help with following questions.

The full research can be found in: Research 3: How to play an Escape Room?

What does an escape room look like?

To design and build an escape room game its important to know what escape rooms look like an what is important in the design. This research focusses on the them and visuals of escape rooms of all types, from real life to online and VR. The conclusion of the research is that no matter what type of escape room you create the theme is very important, this can be done with a story and lore but for the game that is going to be created the advice is to just make use of themed rooms. Because the questions in the rooms can be themed towards anything from science to history and language. Using themed rooms makes it so a teacher can easily pick a setting for the room without having to deal with a story that needs to make sense.

The full research and sources can be found in: Research 4: What does an escape room look like?

Competitor Analysis

This research is carried out to investigate other products that are similar to what is going to be made for this project. This means that it will take a look at certain aspects of the product and compile them to see how we can use existing technologies, improve on them and compare them to the vision of the product. This includes escape room like games and places, but also online teaching games and applications. The conclusion of this research is the following. If the project where to use all the good aspects of the games and applications mentioned it would be a good and well rounded product. These good aspects are: Easy access and usability, Well designed assets and prefabs, Interesting environments, A slight competitive edge, Being able to make it complex without it being to beginner unfriendly. If the product would successfully check all these boxes, it would be better than other products that are on the market right now, focusing on a combination between education and escape rooms.

The full research can be found in: Research 5: Competitor Analysis

Multiplayer networking framework

The project needs to be playable both in single player and multiplayer, to know what multiplayer services fits best this research is done. Mirror and Photon, two multiplayer services, are looked at and compared. The conclusion goes as follows; The advantages of Photon are that its Easy to use, does not require hosing/Client to server and there is a lot of documentation and tutorials. Disadvantages are the scalability and that its easy to cheat. The advantages of Mirror are that its compatible with over a dozen low level Transports, Script Templates and that it works on the KISS principle making it easy to use. The disadvantages are that mirror is still very new, there is no chat support, and its designed for bigger lobbies than what the product is planned to use.

If the advantages of both Mirror and Photon are compared we see that Photon's mostly come down to ease of use and Mirror's are in quality and ease of use. So this concludes that both are quite easy to step into. However, Photon has the advantage of having a host to client connection which is easy to implement. Mirror has the advantage of having many low level transports including Simple Web Sockets which is going to be used to run the game on a website.

When comparing the disadvantages we see that Photon has a couple of big disadvantages namely scalability, hosing costs and cheating issues. Photon might be easy and nice to develop with right now but it's not very scalable and will cost money in the future. Compare that to Mirror which is free to use and you can set up a server yourself, meaning you can buy a server yourself or let it be hosted somewhere else. Mirror is more scalable than Photon. The big advantage Photon has over Mirror is that Mirror does not have chat support, which is a feature that will be implemented in the game. A disadvantage that isn't really that big of a deal is the fact that Mirror is designed and made for very big MMORPG (Massively Multiplayer Online Role-Playing Game) or Battle Royale lobbies that have a lot of players. However, that doesn't mean it won't work well with smaller lobbies.

In Conclusion, Mirror seems to be the best option, even though Photon is very easy to use for a small period of time, it will be harder the bigger the game gets. Mirror will be easy to use and will have good scalability, better compared to Photon. Photon does have more tutorials, but Mirror has enough and official tutorials, so even though Photon has a slight advantage above Mirror, it's not worth using. Both are easy to use and get into, but Mirror will be better for the long run, so Mirror is the networking solution of choice for this project.

The full research and sources can be found in: Research 6: Multiplayer networking framework

Management application technologies

For the Teacher CMS the possible tech stacks have been researched. This research looks at both Laravel and NodeJS to see what fits the project best. The conclusion is that Laravel is the best option for the Teacher CMS because of its huge community, all in one full stack solution, use in professional world, archive of tutorial sand documentations and it doesn't need as much maintenance on the project level because it is backed by major companies that constantly update and maintain Laravel.

The full research can be found in: Research 7: Management application technologies

Branding & Styling

The product mainly follows the styling of ROC Tilburg but it does have a separate branding guide. This choice is made because the branding guide of ROC Tilburg contains a lot of information that is not necessary in the project, by making a separate branding guide information regarding the styling of the product can be quickly found.

The full branding guide can be found in: Branding Guide

Designs

Design wise there are two parts. For the teacher CMS only a few wireframes have been created to give a general idea of what it should look like. For the game itself there are wireframes and a design. The wireframes and the design are created in Adobe XD. The design of the game has been user tested with 6 MBO level students of the ages 16-21. The results of the user tests where positive and the users liked the look and feel.

The wireframes for the Teacher CMS can be found in: Wireframes Teacher CMS

The wireframes for the game can be found in: Wireframes Game

The design for the game can be found in: Design Game

Concept

Students will be able to join a room by entering a room code that the teacher can create in the Teacher CMS, this works similar to Kahoot!. When inside the room a student will see the room they are in with on the right side of the screen a tab with their inventory and some other useful options. At the top of the tab there is a timer that shows how much time has already been spend in the room. Below that the 'Questions' button that will show all the discovered questions in the room. Underneath this in the middle of the tab the inventory is show where students can see all cards they have found. The other two options are Help and Hint. In Help a student can scroll through the tutorial that shows what they need to do to escape the room and how they do these things. The hint button will show the hiding spot of 3/4 questions or cards by putting a circle around them, this will help students when they get stuck and cant find any more questions or cards to continue.

When in a room the students are able to click on several items, think about posters, clocks, windows, doors, drawers, pictures and other furniture or decoration items. By clicking on these items they will reveal either a question or they can find cards. The questions that are found in the room are not always complete, and so can't be answered. To complete a question the player needs to find a matching question or answer card depending on what is missing. If the question is missing the player needs to find a question card that matches, if the answers are missing they need to find a matching answer card. Cards and incomplete questions can be linked by dragging the card to the question. If the two match the question will be completed and can be answered, if not the card will be placed back in the inventory and the player has to try again.

Each room consist of a main and a back room, where players can find questions and cards by clicking the objects. The other rooms can often be reached by clicking a door, a window or an arrow. Players

are free to switch between these two rooms as much as they want. When all questions are answered the player has escaped the room.

For the creation of rooms teachers will use the Teacher CMS. Here they have to give the room a name and select a theme like garage, house or laboratory. They then fill in the questions they want students to answer in any order they want. When finished they create the room. Rooms can be opened full time or on a time limit. The teacher can generate room codes for the rooms they created, by giving this code to the students they can enter the room. Rooms will put the questions in a random order so that every time a student plays the questions are ordered differently and hidden in different locations.

The teacher doesn't only use the Teacher CMS to create rooms though. They can also check how many rooms are started and completed, the amount of incorrect answered questions and the time students spend in a room. If they choose to make students fill in their name they can also see induvial scores of students. All information can be checked per room. It is also possible to search for rooms created by other teachers and to edit your own rooms if questions need to be added, deleted or changed.

Teacher CMS

The Teacher CMS is the place where teachers can create, manage and delete rooms. They can also view the room statistics like how many rooms are started and finished, the average time spend per room and how many questions where answered incorrect. The Teacher CMS is build using Laravel, php, react.js, Tailwind css, typescript, phpstan & larastan, inertia.js and MySQL. Laravel was chosen because it has a lot of functionality build in, it has almost everything you need in an application. Laravel also has lots of tutorials which are useful for development. The programs used to code it where php storm and Visual Studio code, but alternatives can be used in further development. The code is saved in a git repository that can be found here: Escape Room Management git

Game

The game is where the students go to play and learn. It is built in Unity with C#, Unity was chosen because of its beginner friendliness, the many available tutorials and libraries and the already existing knowledge within the team. Alternatives for Unity would be Unreal engine which is more complicated or html 5 canvas. The version of Unity we used is 2020.3.30f1 but if the project is continued in Unity any version newer then 2020.3.30f1 can be used. When continuing with Unity the recommendation is to first read the code before adding new functions. The game does have a few bugs that need to be fixed before deployment. The code is saved in a git that can be found here: Escape Room Game git

Rooms are first designed in a sketch to get an idea for the layout, after this the rooms are created using Blender. Blender is chosen because of the huge amount of free 3D models and the automatic shading an lighting engines. This makes it possible to create rooms that look and feel more life like and make objects feel like they belong together. Rooms are currently made in a 1680x1080 scale.

Alternatives for Blender can be; Photoshop or Photoshop like programs. If you have someone who is able to draw the rooms in a style that would fit the project the rooms can be hand drawn. The other option is to use free images from the internet, you will still need to fix the shading and lighting in these images if you want the rooms to look cohesive. Unity or alternative programs. Programs made to build games often already have an area or option to create visuals, this can be used to create rooms similar to how they would be created in blender.

Future

Advice

For the future we would first of all definitely advice to continue this project and create a finished product. Several people of both the target audience and outside of it liked the idea and would love to use it in the future. The people used in the user tests where eager to play the game and use it to learn.

We also advise to look more into the multiplayer capabilities of the system. They are currently run via Photon which is an option but might not be feasible in the future for pricing reasons.

For accessibility reasons the suggestion is to look into color blind options, during the user testing one of the users noted that the pink was not always visible for them. One way to do this would be to make several color blind options to change the color of the pink circle, another option would be to make the player themselves change this color to fit them the best. This would mean adding a settings option. Another accessibility feature is a text to speech option for the visually impaired or dyslectic students. Adding the possibility to use touch screens can also be helpful for those that aren't able to use a mouse.

Ideas

Other ideas that could be added to the system.

- Minigames/Puzzles; To open certain drawers, doors or boxes they players need to play a minigame or solve a puzzle.
- Items; Just like in mobile escape rooms, things they need to collect like a key before opening a door.
- 3D environment; The game is currently in 2D but in the future it would be possible to make it a 3D game in which the user can look around to find things. With this you can even add the ability to use VR (virtual reality).

Attachments

Research 1: What is an escape room?

What is an Escape Room?

An **escape room** is a game in which a team of players discover clues, solve puzzles, and accomplish tasks in one or more rooms in order to accomplish a specific goal in a limited amount of time. The goal is often to escape from the site of the game.

Escape Room as a video game genre

Escape the room is a subgenre of point-and-click adventure game which requires a player to escape from imprisonment by exploiting their surroundings. The room usually consists of a locked door, objects to manipulate, and hidden clues or secret compartments. The player must use the objects to interact with other items in the room to reveal a way to escape.

Game setting

The participants in an escape room normally play as a cooperative team of two to ten players. Games are set in a variety of fictional locations, such as prison cells, dungeons, and space stations. The player's goals and the challenges they encounter usually align with the theme of the room.

Gameplay

Escape rooms test the problem-solving, lateral thinking ("thinking outside the box"), and teamwork skills of participants by providing a variety of puzzles and challenges that unlock access to new items or areas in the game when solved.
Escape room puzzles include word games, numbers, and "arranging things into patterns" such as: substitution ciphers, riddles, crosswords, sudoku, word search, and mathematics; puzzles involving physical objects such as jigsaw puzzles, matchstick puzzles, and chess; and physical activity such as searching for a hidden physical object, assembling an object, navigating mazes, or undoing a rope knot.

References:
https://en.wikipedia.org/wiki/Escape_the_room
https://en.wikipedia.org/wiki/Escape_room

Research 2: What makes a good escape room?

Introduction

For this project we'll be creating an escape room game that will be played in the browser. To be able to do this properly we need to understand what is necessary for an escape room to become a well put together, fun and interesting one, a game that is educational and enjoyable. In this document we'll go over certain points that can help you achieve this.

What makes a good escape room?

An escape room has many elements which can make one interesting to play, the ones that catch the attention the most are:

Story & Theme

A story for the escape room, there is a reason why you are where you are when you start out. This can be anything from being trapped in a castle to being in a lab trying to creating a cure to some disease or maybe you're trying to pull off a heist. The story follows a specific theme which also fits in with the props/visuals of the surroundings, they all fit together.

Immersive

This is something that comes in because of the story and theme, but also things like sounds, effects props/visuals. Often escape rooms are supposed to be finished within a certain time frame (a deadline/countdown) which is done to make it more immersive. The intention of this is to make the players forget about anything else but the game, they're 'convinced' that they're in a hurry to achieve their goal.

Problem solving

This is the main mechanic of the game. The players progress through the story by finding clues and solving puzzles. This often starts at the very beginning and ends when the escape room is solved. The puzzles and clues are supposed to be somewhat difficult but not too much. When it's too easy the players will rush through it while if it's too difficult the players will become frustrated.

Teamwork

Most escape rooms aren't played alone, they require you to work together to accomplish your goals. Some divide the players into 2 different areas and allow them to talk to each other. This creates a gap in information between the groups, by working together and combining the information the puzzles can be solved. Another way is to have all the players in the same room and have them look at everything together. They can split their focus on multiple things so they can cover more ground to search for clues. Either way this adds most of the fun aspect to the game, having people work together and combining their strong points to solve the issues at hand.

Conclusion

To make an escape room interesting and fun there need to be certain elements present. These include: a story that resolves around a certain theme. It should give you a reason as to why you are where you are and something about what the goal is which in turns makes the game immersive. During the game you'll have to find clues and solve puzzles alongside the other players and work together to reach your combined goal; to complete the escape room!

Links

https://www.lockbustersgame.com/what-makes-a-good-escape-room/

https://mastermindescapegames.com/makes-good-escape-room/

https://www.otherworldescapes.com/blog-post/what-makes-a-great-escape-room/

Research 3: How to play an Escape Room?

Introduction

In this document I will document my research and outline key points on how to play escape room and I will give advice on basic user interface on how the game interaction could be implemented.

Research

Escape Room domain is very wide. It ranges from real life game, where you need to escape from the real building, to an online game, where the goal is the same, to escape. All of them differ in their own way and since our stakeholder wants to have an online Escape Room game, we will focus more on online games.

- It is important to pick the right team. It's not about what you know, it's who you know. You want a good group to play with. It's not necessarily about finding a bunch of smart people. You want to play with people you are comfortable with. Remember, there's a very good chance you'll be freaking out with 3 minutes left, scrambling around with your last hint alongside these people. Who do you want to be with in that situation? It's also a good strategy to pick a good group size.
- Understand the rules of the room. This is crucial. There may be certain items that you shouldn't touch in the room. Disrupting these can result in messing up a puzzle and causing lost time as confusion erupts as to why the device isn't working. A game master may have to enter the room to fix the problem. All of this leads to lost time and momentum. Other things to take note of are the number of clues you get and the length of the game. Also, understand how clues are given. Different games have different methods of providing help.
- Listen to your teammates. Escape room teams function best when they try everything. So if your teammate has a crazy but somewhat reasonable idea, listen to them and try it with them! If you think it's a bad idea, still encourage them to try it nevertheless. As long as the crazy idea is reversible, it might just move you closer to the final solution. At the very least, it will be fun!
  This helps spread apart your team and have each team member be maximally effective. There's a tendency to dismiss or skip over some puzzles that are "too hard" to do at first glance. This leaves some puzzles forgotten and undone until someone realises that they're needed.
- Divide and conquer to search. At the very beginning of each game, split the room into sections and assign different people to comb through each section, looking for objects of importance. This helps make sure that the room is thoroughly inspected, and helps prevent the case where certain areas are overlooked and certain other areas are repetitively combed over.

Conclusion

Key points on how to play escape room:

- Pick the right team;
- Understand the rules of the room;
- Listen to your teammates;
- Divide and conquer to search.

Advice on user interface:

Players of the Escape Room game should be able to interact with the game. My advice it would be that players could open questions by clicking on various items that they see and then they could enter the answer to the question. By answering the question they could unlock other question that was locked previously or they could get a card with a hint or some information that could help to answer other questions.

Research 4: What does an escape room look like?

Escape Room Visuals

To find out what an escape room looks like both in person and digital I decided to do research on escape room visuals. I looked not only at online rooms but also at all the other options like VR and in person to maybe be able to use some of the gained knowledge to create something new. The research can be read below

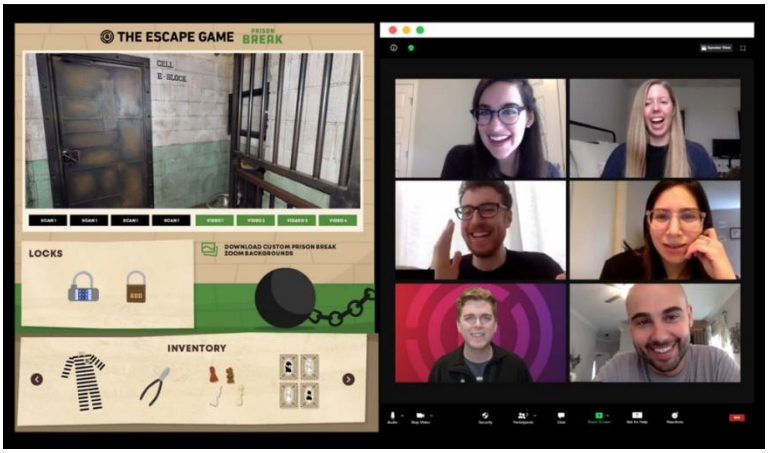
Research

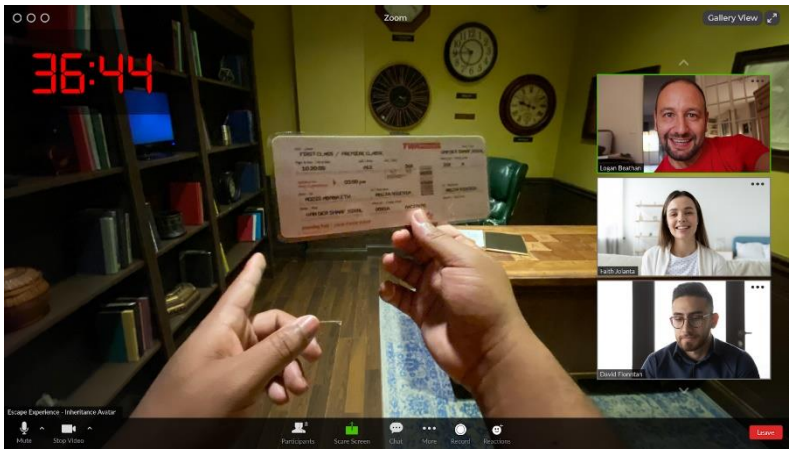
What does an escape room look like?
Escape Rooms often focus on a certain theme for the design of the rooms, this is applicable to not only real life escape rooms but also virtual rooms, online rooms and board games. Themes can be realistic but also futuristic or complete fantasy. Some examples of themes can be: Video Games, Nuclear Disaster, Treasure hunt, Future, Crashed planes, Lost on an island or even just a study/home from a person. These themes will be found all across the escape room not only in the design but also in the puzzles, making the objects inside the room fit into the environment and usable for solutions. Having this theme throughout the entire experience makes it feel more realistic and oftentimes more fun.

Because of the theme the visuals of an escape room van vary a lot from extreme futuristics with bright LED lights to a dark cabin in the woods or the study from a historian. Everything is possible.

In Virtual Reality escape rooms the possibilities are even more endless then in real life, you can do things that real life physics don't allow and make people really feel like they are in a different dimension or trapped on the moon.

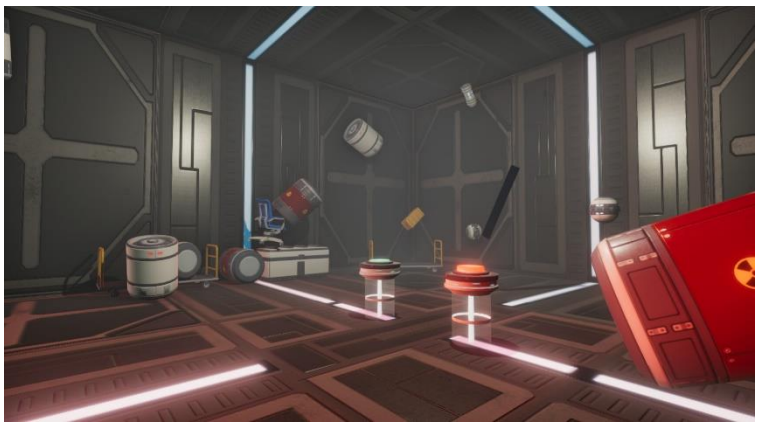
Another version is the virtual escape room or remote escape room in which players online can control a real life person trapped in an environment, this person is sometimes called the player character since they can be compared to a character someone can control in video games. The biggest difference between these virtual rooms and real life rooms is that the players aren't in the room themselves. Because the person in the room is an actor they can make the situation feel pretty realistic or pretend doors are locked and get unlocked with a correct action, theme wise these rooms can be compared to the in person escape rooms.





With the rising popularity of escape rooms also came the escape room board games or the escape room in a box. This is a kind of an escape room someone can play at home or other place. The at home escape room often doesn't require anybody to set it up and thus learn the solution, it's ready to go as soon as you open the box. Another type is more aimed towards schools or activity groups, someone has to set it up in a place and sometimes add some hints or small things. Both of these types of escape rooms make use of themes but they often aren't as immersive as the other types of escape rooms because they lack the room'.

Online escape rooms come in many shapes and forms but they all still have a theme. One version is the mobile game where people just have to click on areas that are often in a more old fashioned style where people have to escape a building with a lot of different floors or rooms. But there are also more 3D style games to play on a computer like escape simulator.



A Mobile escape room is an escape room that is often built in a shipping container, bus or the back of a truck but they can also be made inside of a tent. With these mobile escape rooms the outside of the vehicle also tends to be themed just like the inside so when people see them driving around or standing on a location they instantly know what it's about and if they maybe want to play.

Advice

When building an escape room in either real life or online it is important to make use of a theme, this can be done with a story and lore but for the game we are creating I advise to just make use of themed rooms. Because the questions in the rooms can be themed towards anything from science to history to language. Using themed rooms makes it so a teacher can easily pick a setting for the room without having to deal with a story that needs to make sense.

Sources

- *Escape Room Themes*. (z.d.). Escape Room Player. Geraadpleegd op 7 maart 2022, van https://escaperoomplayer.com/Escape_Room_Themes.html
- *Google*. (z.d.). Google Images. Geraadpleegd op 7 maart 2022, van https://www.google.com/?&bih=937&biw=1920&rlz=1C1VDKB_nlNL945NL945&hl=nl *For images*
- Shapiro, C. (2021, 27 oktober). *Types of Escape Rooms | Comprehensive Guide*. The Escape Game. Geraadpleegd op 7 maart 2022, van https://theescapegame.com/blog/types-of-escape-rooms/
- *Youtube*. (z.d.). Youtube. Geraadpleegd op 7 maart 2022, van https://www.youtube.com/ *Watching people play escape rooms*

Competitor Analysis

23/02/2022

Introduction

At the request of the stakeholder, this research is carried out to investigate other products that are similar to what is going to be made this semester. This means we'll take a look at certain aspects of the product and compile them and see how we can use existing technologies, improve on them and compare them to the vision of our product. This includes escape room like games and places, but also online teaching games and applications.

contents

Escape Room Games

Escape room simulator

Escape room simulator is a game where you can make and design your own escape rooms, using a fairly easy to use editor to make and design your own escape rooms. The game can be played alone or played with friends, and levels can be shared online. The versatility that comes with the editor in this game results in being able to create complex rooms while still being quite easily made in the editor. You can easily adjust the size of the room. This is possible because the room consists of blocks, and you can easily add and remove them.

One thing to note:

What the game does right or wrong is only compared to our vision, and seeing how certain features would be good or bad for *our* product.

What does this game do right:

- Simplicity while being complex

The editor used in this game has a lot of options, while still being easy to use. This is done through self self explanatory and clear visuals and easy controls.

- Prefabs

This game offers a bunch of prefabs for making a level, making it easy for you to decorate and design a room. For each prefab you can customize a lot about the object itself.

What does this game does wrong:

- No beginner friendliness

The only downside to the editor being still easy to understand yet complex, is the fact that it's still very complex. To make a big room, it takes a lot of time and effort to create a proper escape room. The downside of that compared to what our product is aiming for, is that it can't be used effectively immediately. It takes time to be mastered and that hinders its effectiveness for teachers.

De Verloren Herinneringen

De Verloren Herinneringen or The Lost Memories translated is a non linear online escape room game where you try and uncover the history in an old house and places related to the house. The game is a 2d web game where you click, type and drag to complete puzzles and other obstacles to in the end fill out a code to open a chest.

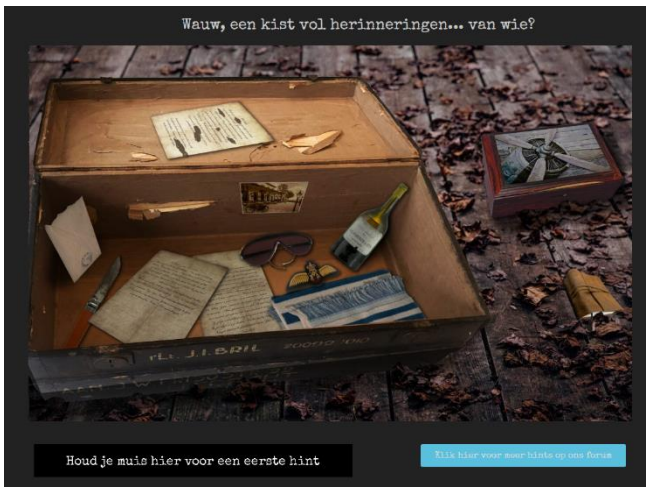
What does this game do right:

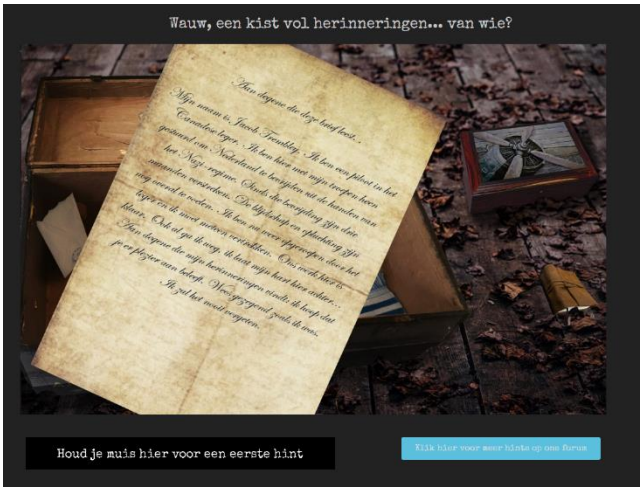
- An interesting environment, while being 2d

The game conveys a story in different rooms. The environment and puzzles itself play a big role in how that story is being told. This escape room uses a theme effectively while still being 2d, and it really helps with the storytelling and puzzles.

- Objects grow in size upon hovering

It's a pretty small function, however, it is a very good mechanic to have in an escape room game like this where the room is in 2d. For example, you can hover a letter and it will show the full letter instead of having to constantly click on it if you want to take a look at it.





What does this game does wrong:

The only problem with this online escape room, is that it doesn't feel very polished, and that mostly comes down to the picture quality and the assets that were used. The assets that were used were the right ones as objects, but it's obvious that all the pictures were not taken by themselves and thus created some weird assets sometimes. This can be fixed by making every asset yourself, and making the look of every asset consistent.

Teaching Games and Applications

Kahoot

Kahoot is a very popular quiz game, used globally in varying teaching practices. With kahoot you can make quizzes yourself, or play quizzes that others made on varying subjects. The quiz is shown on one screen and other participants can join on their phone, laptop, or any other device with internet access.

What does this application do right:

- Competitiveness

When playing kahoot, the main reason for answering the questions correctly is that, at the end of the game, you'll be shown on top of the leaderboard at the end. You'll get a little animation and see the top 3 contenders of that game.

- Easy access and usability

Kahoot can easily be picked up by a teacher and make it a useful learning tool in a classroom in a matter of seconds. Making a quiz yourself is also a fairly easy process.

Conclusion

If we were to take all the good aspects of the games and applications above, we would have a good and well rounded product, inline with our vision of it. Most notably:

- Easy access and usability
- Well designed assets and prefabs
- Interesting environments
- A slight competitive edge
- Being able to make it complex without it being too beginner unfriendly

If we were to have these boxes checked in our product, it would be better than other products that are on the market right now, focussing on a combination between education and escape rooms.

Multiplayer networking framework research

3 march 2022

Introduction

The project requires the use of some kind of multiplayer implementation. To find out what multiplayer networking works best for us, we'll take a look at some of them and their advantages and disadvantages. This document will look into Photon Unity (PUN2) and mirror, and Niels's document will describe Unity Multiplayer Networking

contents per networking solution

1. Description
2. Advantages
3. Disadvantages
4. Testing Experience

other contents

1. Conclusion
2. Sources

Photon

Description

Photon is a global cross platform multiplayer game backend as a service such as SaaS or Cloud for synchronous and asynchronous games and applications. Photon is very tightly integrated with unity to easily develop and launch multiplayer games. The service can be used for free, or bought for more capacity and power for your games. It supports any type of game, whether it be an FPS, RPG, MOBA etc. It works client to server with Reliable UDP, TCP, HTTP or Websockets making it a fast and solid foundation for your game.

Advantages:

- Ease of use

Photon is by far the most easy networking solution to pick up and get started with. It's simplicity means that setting up a multiplayer game with lobbies can be done in less than an hour with barely any unity experience and just the documentation

- Does not require hosting/Client to server

This means that users can still continue a game, even after their host disconnects. This makes it very reliable in scenarios where the game doesn't have the same ending time for all the users in that game.

- Documentation and tutorials

The easy usability of Photon made it that there are plenty of tutorials, documentation and other information available to learn from and use in your own project. Not only that but it also ups the quality of the information given and will speed up the learning process, time that can be used to develop the actual game itself.

Disadvantages:

- Scalability

Photon is meant for more small projects with not that many players, and thus makes it hard to scale the project with it. With this it's also a fact that there is a maximum of 20 players using the Photon cloud service per game for free, which makes it harder to use if the user count is ever gonna be over that amount. Compare that to other networking options like unity's own multiplayer networking, that can be done completely free, apart from maybe hosting your own server

- Cheating

It has been proven that when using Photon, you do lack some anticheat, and if you're not coded anything against cheaters or made some kind of anticheat, it's easily hackable. For a project this scale it might not be the biggest problem, however, if this game will go on to be used by more people and get bigger, photon is not the right networking solution when it comes to anti-cheat and cheaters.

Testing Experience

Photon has been tested to the point where you can move 2 different players on a screen and see them move on another through networking on a localhost. In my experience, it's really simple for the most part, and most resources to get to this point were relatively easy to find. Plus there were many follow up tutorials that I could watch and try next after doing the basics. The overall experience was quite good, and easy to step into.

Mirror

Description

Mirror is a high level Networking API for Unity, supporting different low level Transports such as Simple Web Sockets, KCP, Telepathy and many others. Mirror is built and made for large scale games such as MMO's BR's and big survival games, being able to handle 480 clients in a single lobby. Mirror is made to be optimized for easy use and tries making networking easy and maintainable. With Mirror, the server and the client are one project.

Advantages

- Compatible with over a dozen low level Transports

What is especially interesting for us in this case is that it also support Simple Web Sockets which is a WebGL transport layer for mirror that targets browser clients, which is exactly what we need for this project

- Script Templates

Mirror offers a bunch of scripts that can be used right off the bat. This is especially nice to have for beginning users such as us. Not only is it nice for beginners to have to explore and learn different variables and classes, it's just convenient that Mirror does a bunch of work for you.

- It works on the KISS principle making it easy to use

KISS (standing for Keep-It-Simple-Stupid) makes it a more easy and accesable compared to other options. With KISS you avoid complexity wherever you find it and try to keep it as simple as possible, guaranteeing high ease of use. This will be really nice to have for this project, cause everyone is a beginner on this subject.

Disadvantages

- Mirror is still very new

Mirror being new brings a couple of problems with it such as limited or incomplete documentation, and little to no tutorials on some basic subjects. However, the community does seem to be very active, making it pretty easy to find people and ask for help and discuss topics related to Mirror

- No chat support

Though this is a minor inconvenience which can most likely be worked around, it's still quite a disadvantage. In our game it's very important to be able to communicate with others in your escape room. A chat feature would be very welcome.

- Mirror is designed for bigger lobbies than what we are gonna use

Mirror is mostly designed for big games like MMORPG's or Battle Royale. This game has about 30 people per lobby maximum. This does mean that you can optimize your game well for that many players, but it can be a bit overkill.

Testing Experience

In this case the experience of getting to a minimum multiplayer game has been easier than with photon. The huge advantage Mirror has over Photon is that they offer tutorials themselves, and the tutorials that they offer are very high quality. The tutorials offered can get you up and running in no time with a lot of very clear explanations. Even though Photon offers a bunch of user made tutorials, having it made by the project officials is a lot better. This makes it very easy and a good overall experience of getting to the basics of Mirror.

Conclusion

Let's quickly go over the Photon and Mirror advantages again:

- Photon

Advantages: Ease of use, does not require hosting/Client to server, documentation and tutorials

Disadvantages: Scalability, Cheating

- Mirror

Advantages: Compatible with over a dozen low level Transports, Script Templates, It works on the KISS principle making it easy to use

Disadvantages: Mirror is still very new, No chat support, Mirror is designed for bigger lobbies than what we are gonna use

- Advantages Compared

If we take a look at Photon's advantages, it mostly comes down to the ease of use of the solution itself. Mirror's advantages mostly lie in the quality, but also the ease of use itself. So what this concludes is that they are both quite easy to use and to step into. However, Photon has the advantage of having a host to client connection which is easy to implement. Mirror has the advantage of having many low level transports including Simple Web Sockets which is gonna be used to run the game on the website.

- Disadvantages Compared

Looking at the disadvantages, Photon has a couple very big disadvantages, which are scalability, hosting costs and a cheating issue. Photon might be easy and nice to develop with right now for a small time, but it's not very scalable and will cost a lot of money in the future. Compare that to Mirror which is free to use, and you can set up a server yourself, meaning you can buy a server yourself or let it be hosted somewhere else, which will be cheaper.

Mirror is also more scalable than Photon. The big advantage Photon has over Mirror is that Mirror does not have chat support, which is a feature that will be implemented in the game. A disadvantage that isn't really that of a big deal, is the fact that Mirror is designed and made for very big MMORPG or Battle Royale lobbies that have a lot of players in a single lobby. However, that doesn't mean it won't work well with smaller lobbies.

- Conclusion

In conclusion, Mirror seems to be the best option, even though Photon is very easy to use for a small period of time, it will be harder and harder the bigger the game gets. Mirror will be easy to use, and will have good scalability, better compared to Photon.

Photon does have more tutorials, but Mirror has enough and official tutorials, so even though Photon has a slight advantage above Mirror, it's not worth picking the solution over.

Both are easy to use and get into, but Mirror will be better for the long run, so Mirror is the networking solution of choice for this project.

sources

- photon

https://www.photonengine.com/

https://blog.unity.com/technology/choosing-the-right-netcode-for-your-game

https://forum.unity.com/threads/what-are-the-pros-and-cons-of-available-network-solutions-assets.609088/

- Mirror

https://mirror-networking.gitbook.io/docs/

https://www.juegostudio.com/blog/unity-multiplayer-or-orleans-or-mirror-which-framework-is-the-finest-for-your-upcoming-unity-game-project

Possible tech stacks:

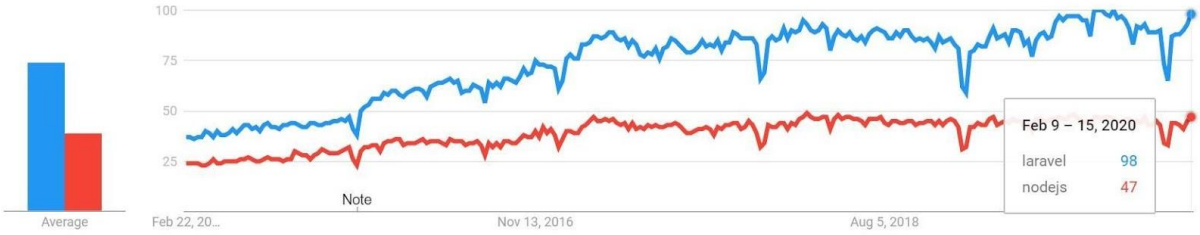
- **Laravel**
  Pros:
  - Huge Laravel community
  - All in one full stack solution
  - Provides CSRF tokens, hashing, and other security layers by default
  - Backed by major companies, constantly updated and maintained
  - Extensive documentation that can be found in a single place

  Cons:
  - You probably won't need every provided feature, thus creating overhead.

- **NodeJS**
  Pros:
  - Whole application is written in same programming language
  - Faster than Laravel

  Cons:
  - Some packages can be not maintained and deprecated
  - Relies on a lot of packages that

Popularity 2015-2020:



get pdf via: https://1drv.ms/b/s!AmFYulmQzsOTaRierSX2od5QveY?e=Y0a3aD

Escape Room

Branding Guide

02 Table of Contents

03 Introduction

This branding guide is made for the Escape Room Game of ROC Tilburg. Because of this the styling is based on the current style of ROC Tilburg.

The Escape Room Game is a system to make students learn in a fun, creative and playful way with the help of an online escape room.

ROC TILBURG

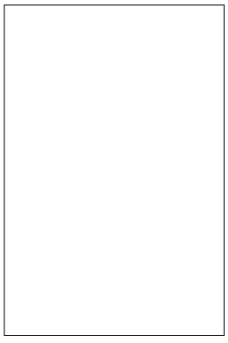
04 Colors

The main colors are the basic colors of ROC Tilburg, Cool Gray and Magenta. Magenta will be used more as an accent color.

Cool Gray
CMYK: 0, 2, 0, 60
RGB: 134,134,137
WEB: #666666

Magenta
CMYK: 0, 100, 0, 0
RGB: 226, 0, 122
WEB: #E2007A

White
CMYK: 0, 0, 0, 0
RGB: 255, 255, 255
WEB: #FFFFFF



05 Typography

The fonts used are two of the main fonts of ROC Tilburg. ITC Avant Garde Gothic BT is for use in headings and titles. Rockwell is for the overall texts.

ITC Avant Garde Gothic BT

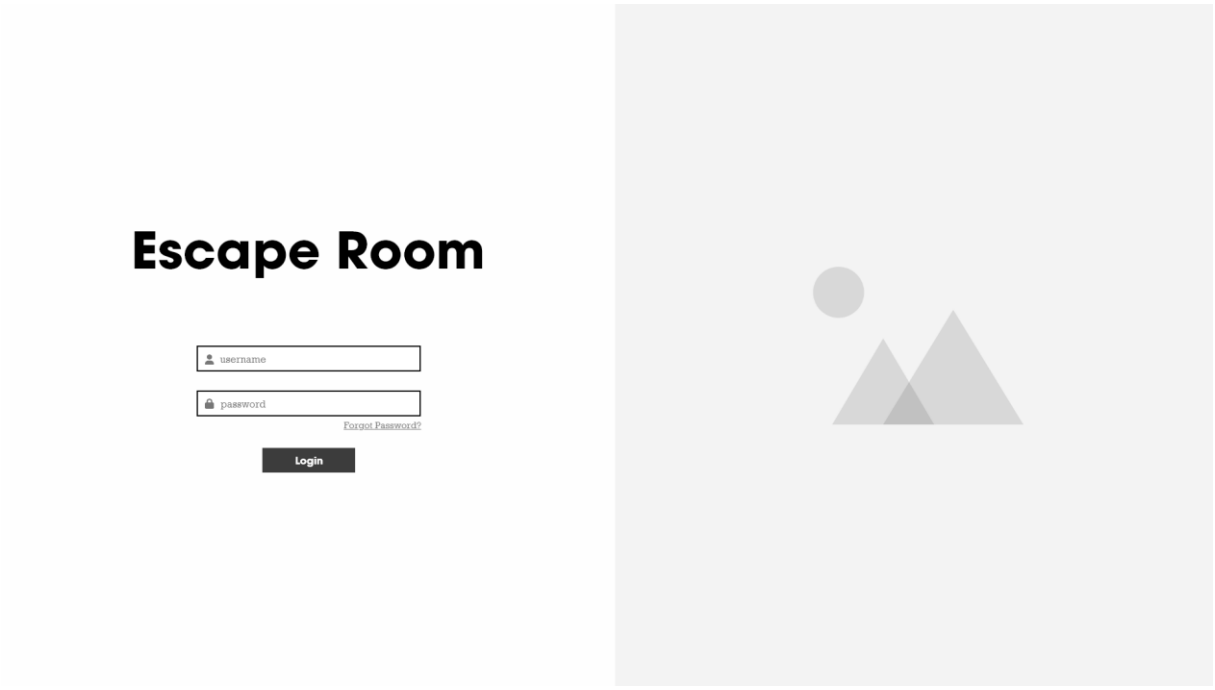
The font ITC Avant Garde Gothic BT will be used for headings and titles.

Rockwell

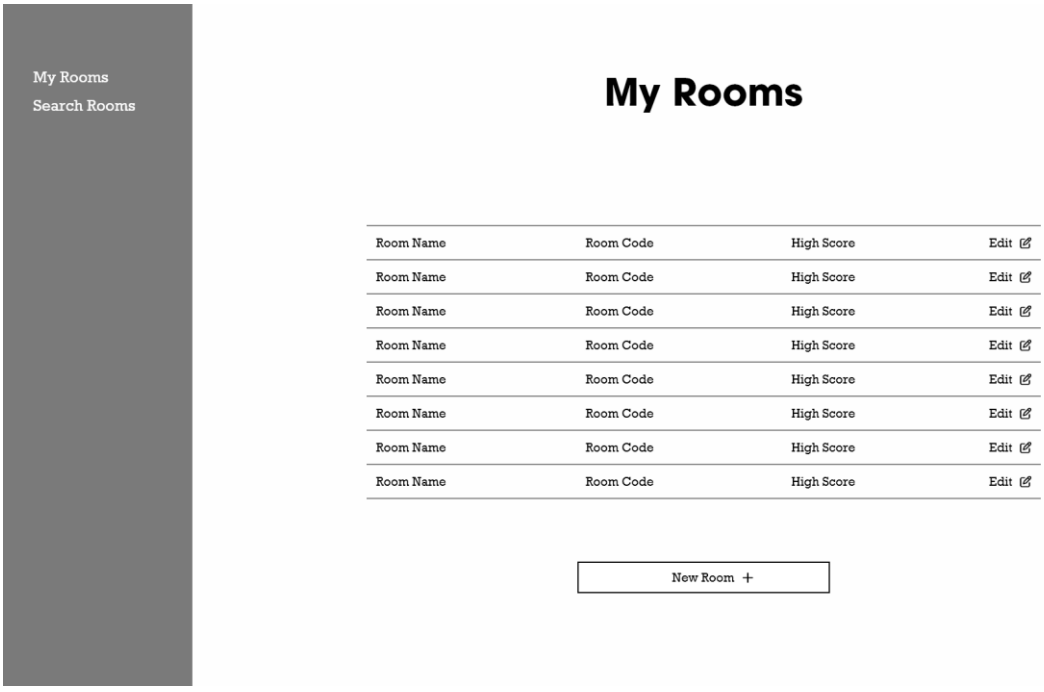
The font Rockwell is used for the main text.

Wireframes Teacher CMS

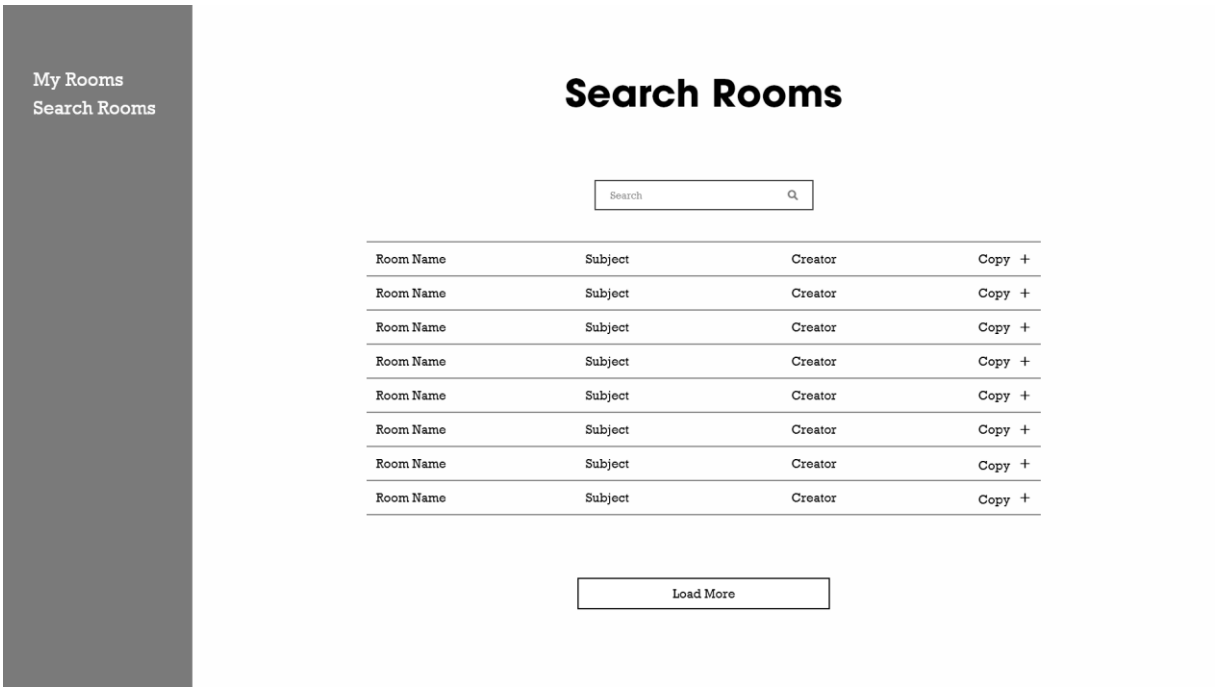
Login screen for the teachers



Room list

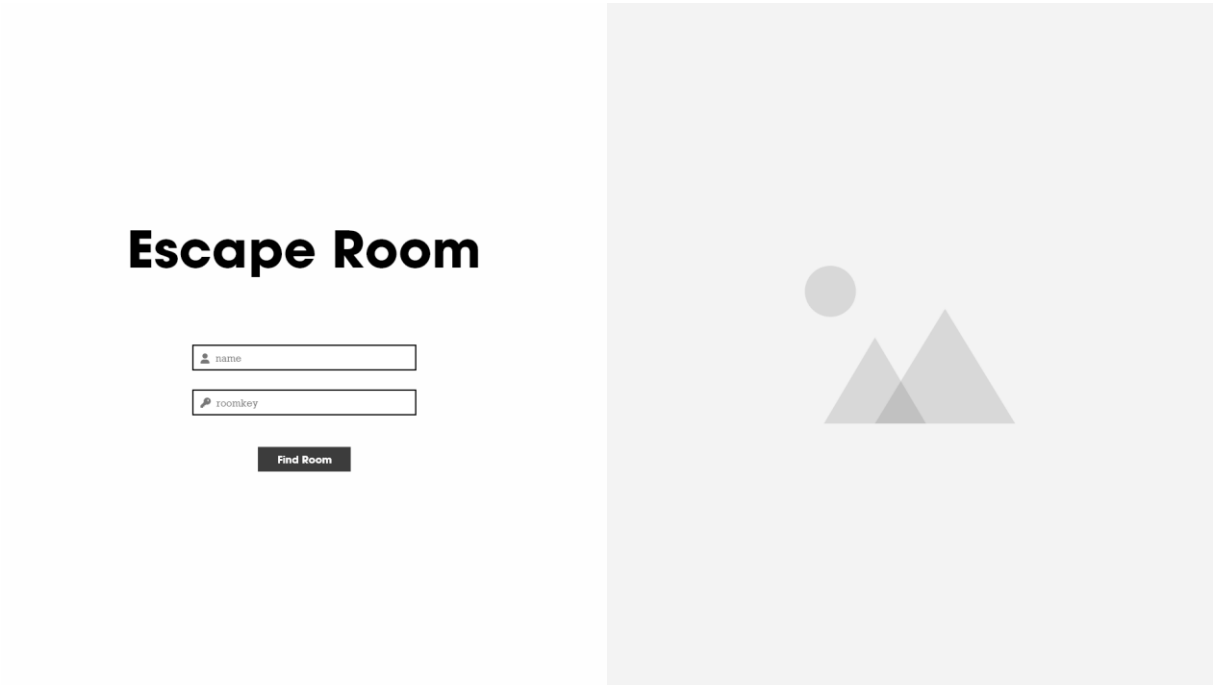


Search existing rooms



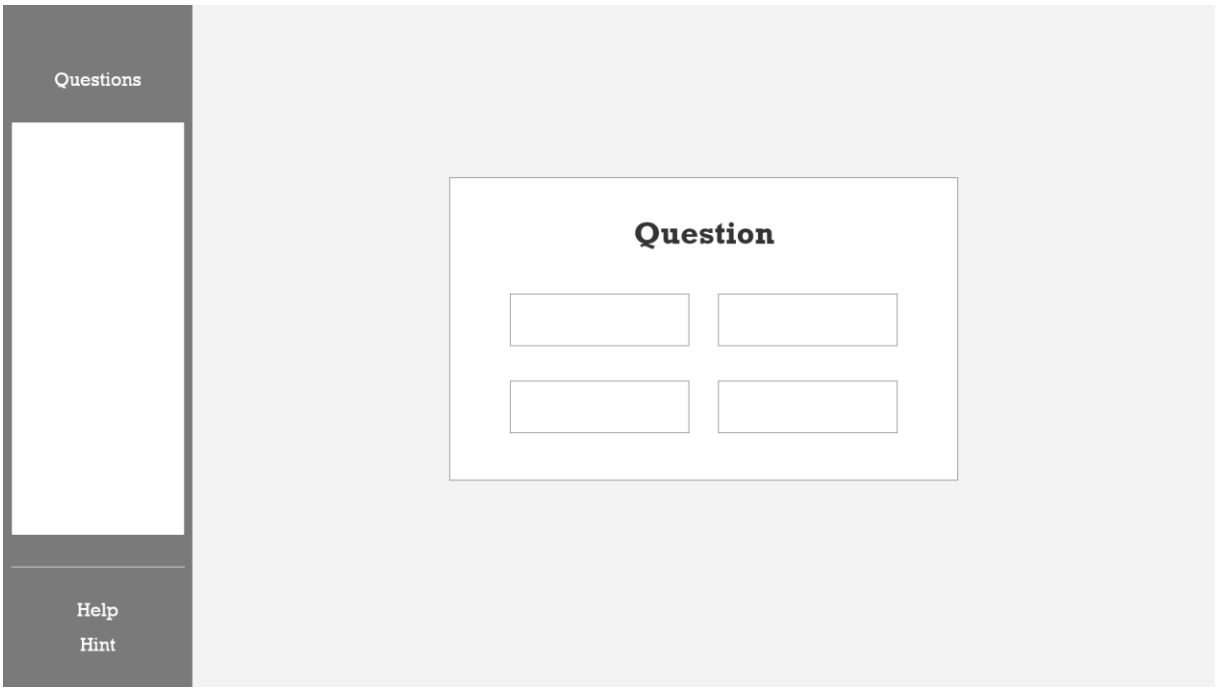
Wireframes Game

Login screen students



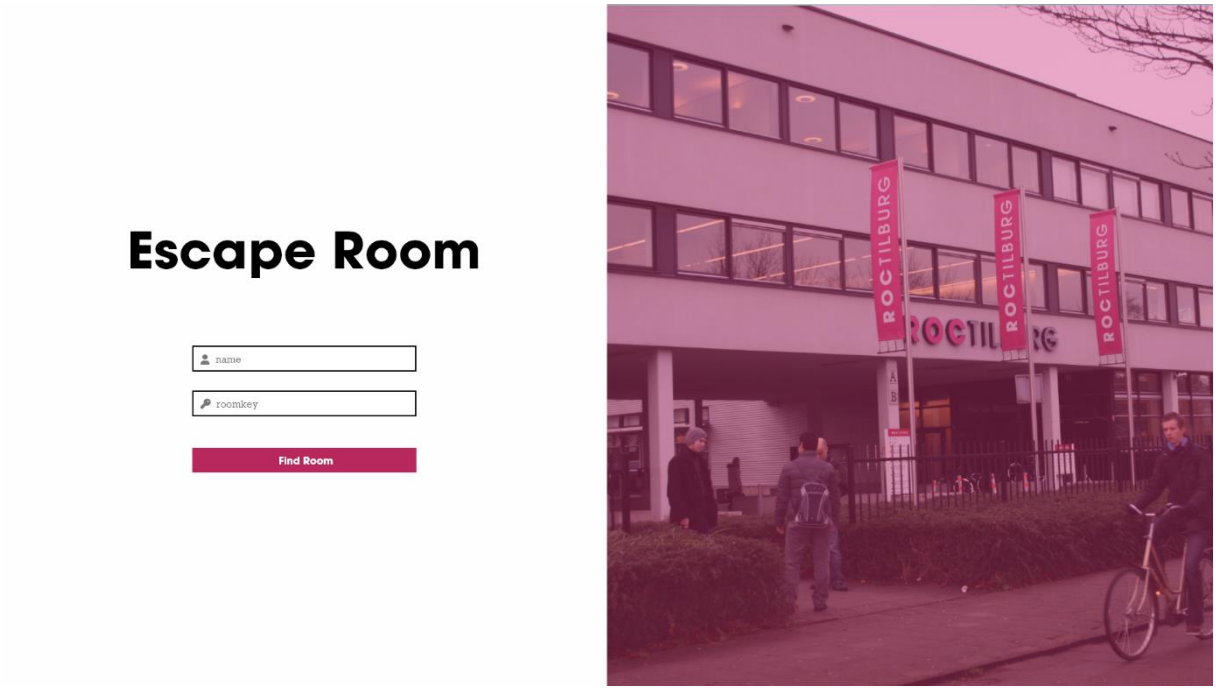
Main game screen

Question pop-up



Design Game

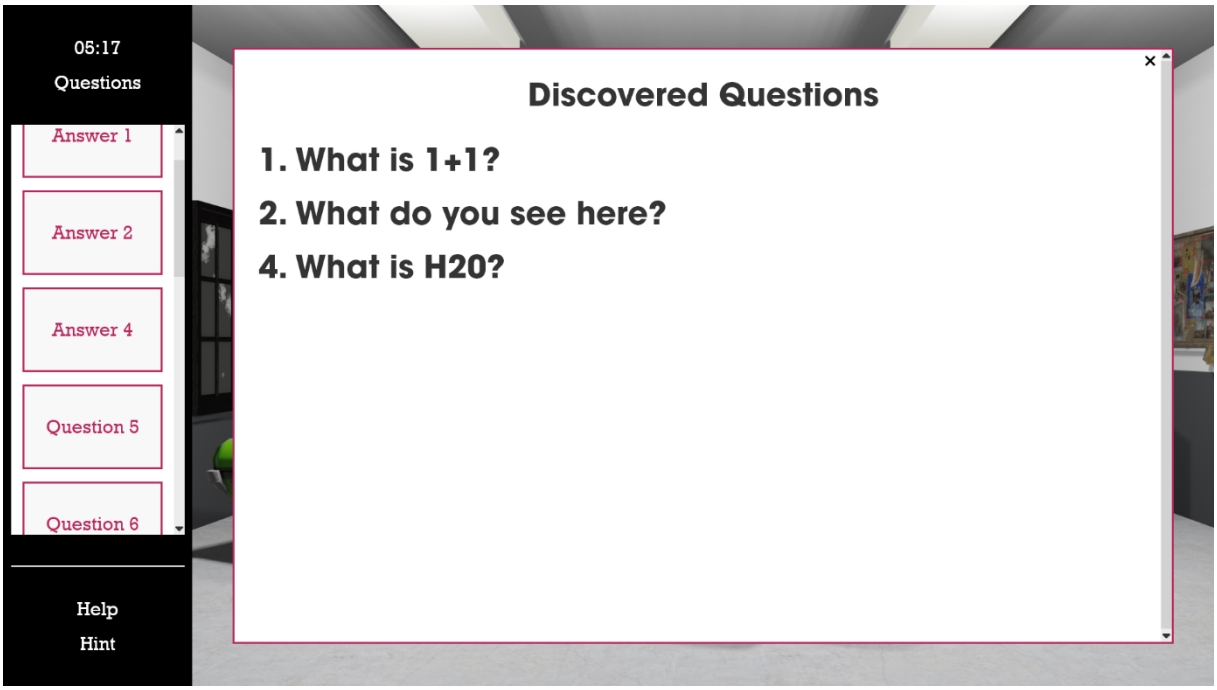
Login Screen students



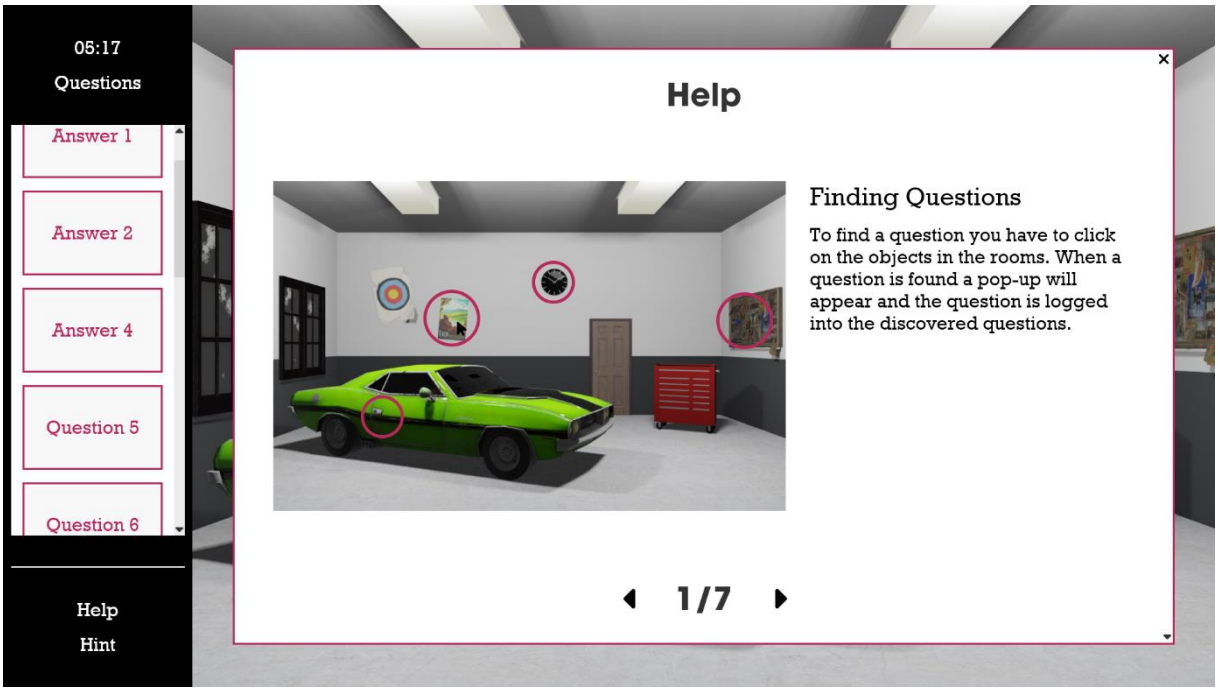
Main game screen

Back room

Discovered Questions list

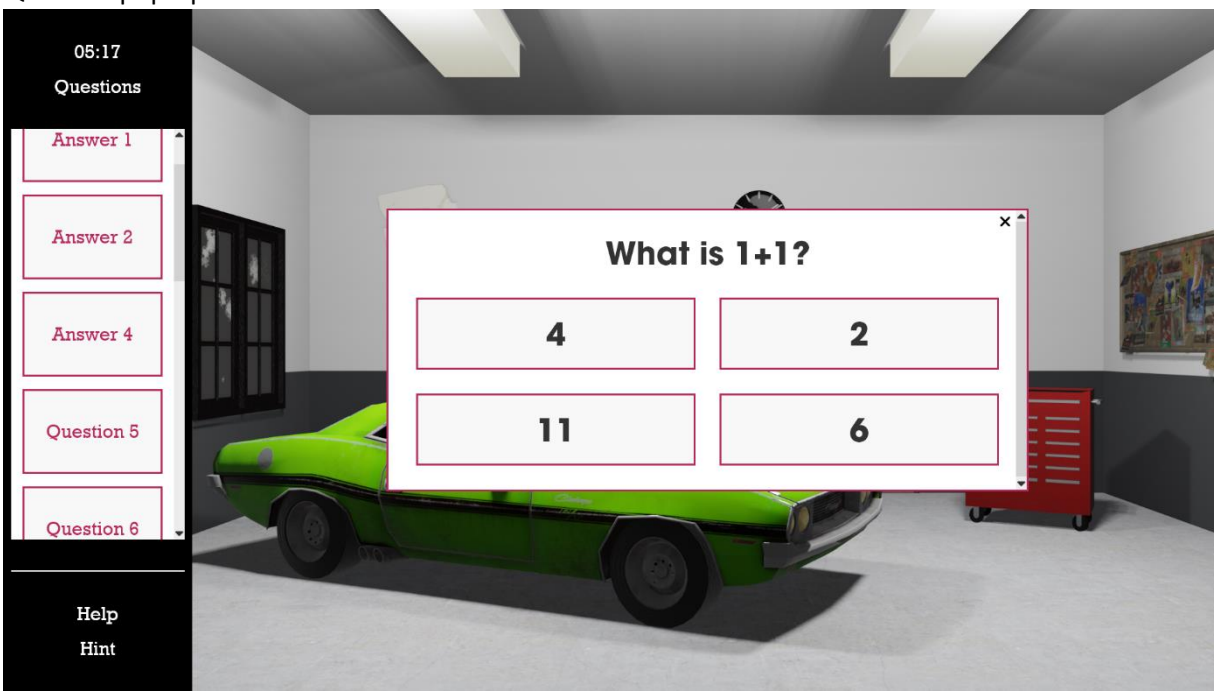


Help/Tutorial layout

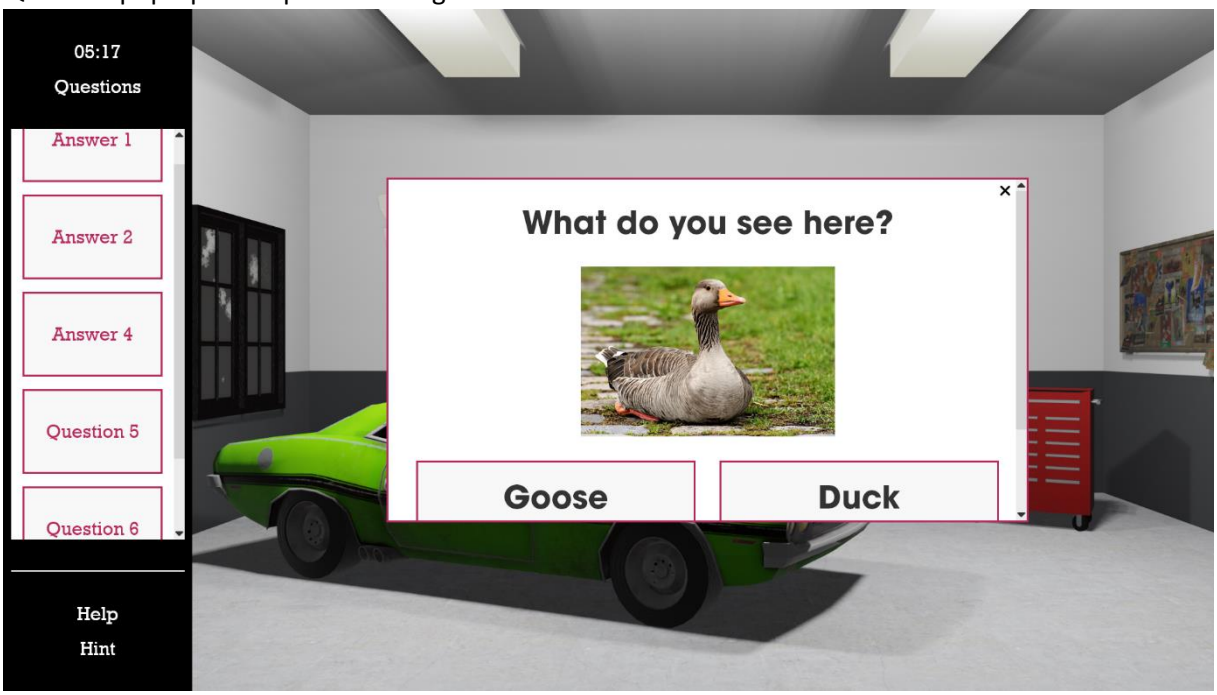


Hints layout (3-5 Random circles will pop-up on click)

Question pop-up



Question pop-up with space for images or text



Answer Card

Question Card