



Level Design: Environmental Storytelling in first person video games

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Summary

In this paper, the focus will be on environmental storytelling in first-person games. The aim is to examine and understand why this technique is rarely utilised in the AAA industry, as well as explore the ways it can assist players in comprehending the intended explanations of the designers.

It will also analyse different video games that use this method of storytelling and how they deal with it, finding differences and similarities between them.

Finally, a small video game demo will be developed using all the things learned and explaining why and how they were used.

Keywords

Environmental storytelling, narrative, agency, immersion, understanding, mechanics, mise en scene

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Glossary

Environmental storytelling: the subject of the paper, a way to tell stories using only the video game environment.

Narrative: the way video games use to explain its story.

Immersion: feeling of being absolutely in tune with the video game.

Mechanics: how the player's interact with the game rules.

Mise en scène: The arrangement of the scenery.

Links

Link to the project trailer: https://youtu.be/aa2Q2_MgMjY

Link to the long version gameplay: <https://youtu.be/aChURgJalEg>

Introduction

Abstract

There are many ways to tell stories and each art form has its own rules and ways for doing so.

With the first video games, such as *Pong* (1972) or *Asteroids* (1979), developers could not tell **complex stories** in contrast with the movies of the same era, which had much more baggage and were a much more established medium. The most important difference was the **technological limitations** of computers, arcades and consoles. In addition, the vision that society had of the sector was not, not by a long shot, the one that exists today. Despite this, each video game had a **small narrative** part that served as a **context** to **differentiate** them from each other.

As time progressed, more complex games were developed that, in addition to proposing more **complex mechanics**, had a more developed **artistic section**, *Prince of Persia* (1989), *Super Mario Bros.* (1985). These advances allowed developers to **explain** more **complex** and **entertaining** stories, but they found that they had no methodology to do so. It was then, thanks to these limitations, that they had to **create methods** to explain to players the concepts they needed to know in order to play the new batch of video games. Many of these methods, evolved of course, still exist today.

Today almost all video games have some kind of story to tell, there are even **sectors** within the development studios that are dedicated exclusively to this section. Long gone are the days when video games were made by a single person who had to take care of all aspects of the game. Not all video games explain their respective stories in the same way. Video games, such as *The Last of Us* (2013), use a methodology much more **appropriate** to the **cinema**, so it is very **comfortable** and **easy** to assimilate for people who do not usually play much video games. Another system of storytelling is the one used by games like *Firewatch* (2016), which is **based** on **conversations** between two characters; this system is much closer and more intimate, perfect for the type of story it tells. This system involves the player much more and makes them feel much more immersed in the narrative of the game.

Another way of storytelling is the one we can see in games like *Bioshock* (2007), *Bioshock Infinite* (2013) and *Outer Wilds* (2019), which is environmental storytelling. This system is based purely on the players interpretations of the different elements arranged around the scenario. This is the most immersive way for players, as it places them at the heart of the narrative and makes them direct participants in it.

And it is on this basis that this work will be focused. The study and analysis will revolve around the execution of storytelling in various games. The examination will involve an analysis of the different approaches and tools employed to convey the narrative and engage the player's attention.

Motivation

The main reason why I want to deal with environmental storytelling is the introduction of Half-Life 2 (2004), since I consider it one of the best introductions to the world and setting of a video game.

The player finds himself in a train that is in bad shape, there are holes in the windows, the floor is full of rubble and garbage, etc... From only the first seconds of the game we can understand the socio-economic situation of the area where we are not the best and that the people who live there have long since given up hope of rebelling against their occupants. When the train finally arrives at the station, we are greeted by a drone that takes a photo of us, from here we can extract that the entire population is under total control all the time and cannot move freely. If we approach the NPCs that are in the station, they will ask us one of their relatives, if we stop to think about these conversations we can understand that the "Combine" is dedicated to moving the population from city to city to dissolve any unification attempt to try to rebel, this causes the population to have a lack of desire and interest to meet new people, since they know that in a short time all the people they have known will have disappeared from their lives.

Continuing on, we enter a corridor with several rooms. The doors to these rooms are armoured and have a small grate at eye level. When we look into one of the rooms, we see a civilian being tortured and they quickly close the bars. This reinforces the idea that the population is completely subjugated to the invader and that it is very difficult to resist.

This way of presenting the world, as I mentioned at the beginning, is called Environmental Storytelling, and although it is a very interesting way of explaining stories, it is not used in most video games.

After analysing the introduction of Half-Life, I wondered why other games of the same style did not use this mechanism, and why they preferred to use systems such as cinematics or dialogue, which, although not bad in themselves, make the player a simple observer of the story rather than an active participant.

The main problem

The problem of using Environmental Storytelling as the main narrative tool for a video game. This method, despite being very useful and powerful, is directly linked to the level design changes, also from the moment the game designer designs a prop, it must go to an artist to make it and later to the coder to apply it to the game. This process can take a lot of time because Environmental Storytelling is a process that's always changing (Albert van der Meer, SD).

Secondary problems

The problem of **teaching the players the rules and boundaries of the world** they find themselves in (Albert van der Meer, SD).

The problem of **using the same socio-cultural references** in different cultures (Albert van der Meer, SD).

The problem of **dealing with the player's focus** during the whole game (Albert van der Meer, SD).

The problem with **pretending that environmental storytelling works the same in all games**, no matter what type of game it is (Fern, 2020).

The problem of **basing the entire narrative of your game on environmental storytelling**, as it limits you when using other methods (Fern, 2020).

The problem of **differentiating which elements of the level are placed for narrative purpose and which are to decorate the stage** and make it not empty (Harvey Smith, Matthias Worch, 2010).

The problem of **allocating game resources to produce assets** specific to areas or levels that cannot be reused.

The problem of using **environmental storytelling in the design of the level**, for example, in many cases you cannot pretend that the player is attentive to details of the scene in the middle of a chase sequence (Steve Gaynor, 2013).

The problems involved in **using environmental storytelling when moving the player to different scenarios**, with different architecture, different operating rules, different gameplay, etc. (Steve Gaynor, 2013).

The problem of **designing all areas with a narrative load so that they are interesting to the player** and do not become repetitive (Steve Gaynor, 2013).

The problem of **making the player feel that they cannot interact with the world**, that they are simply a spectator of something that happened a long time ago, basically that they are riding a wagon through an amusement park set up for them (Harvey Smith, Matthias Worch, 2010).

The problem of **telling stories or putting in elements that are not of interest to the player**, that is, filling the world with narrative elements for the simple fact of filling the world with things, putting in, for example, two human skeletons that we find in FallOut 3, the player has no relationship with these skeletons and therefore has no reason to be invested in their story (Harvey Smith, Matthias Worch, 2010).

General objectives

The aim of this research is to learn about the factors involved in applying Environmental Storytelling to first-person video games. At the same time, to understand the design methods used by professionals in order to apply them to my own small video game demo.

In the demo, the aim is to apply all the factors learnt in the process of making this paper with a satisfying result.

Specific objectives

- Understand why Environmental Storytelling isn't used as a narrative pillar in AAA games.
- Have specific arguments to determine whether Environmental Storytelling is better or worse than traditional storytelling systems.
- Understand how the Unreal Game Engine works to create the demo.
- Understand the art pipeline to create the objects used in the demo.

Scope of the project

The intention of this work is to be published internationally, together with the work a demo will also be published, which will be much smaller in size, as it will be linked to the work, but will not be seen by as many people.

State of the Art

What happened here? Environmental Storytelling

(Harvey Smith, Matthias Worch, 2010)

The game environment guides the player through its own properties; to do this, it requires the player to understand the cues it uses to communicate boundaries and pathways. It also helps to create the image of the character in the player's mind.

The environment of a game is the one that leads the player to make decisions, taking into account the paths the player can take and the paths the player can't take.



F.2.1 - Bioshock 1 gameplay¹

- Through the familiar visual reference or affordance, the space itself communicates with the player.
- Here, the cash register implies money.
- The bar and booze signs imply alcohol.

¹ Source: <https://www.gdcvault.com/play/1012647/What-Happened-Here-Environmental>

Communicate Simulation Boundaries

The whole game takes place indoors, which means there are areas where the player can and can't go.



F.2.2 - Bioshock 1 gameplay²

Reinforces Player Identity

Most games require the player to play as someone else, one of the designers' tasks is to make the player believe in their new identity using the environment of the level, to do this they have to adopt some social norms and behaviours.

In the game Portal, Valve Corporation, 2007, the use of the environment, the colours, the lightning, etc... is used to reinforce the feeling of being trapped in a laboratory.



F.2.3 - Bioshock 1 gameplay³

² Source: <https://www.gdcvault.com/play/1012647/What-Happened-Here-Environmental>

³ Source: <https://www.gdcvault.com/play/1012647/What-Happened-Here-Environmental>

You are being used as a test subject for someone else's interests. This is a perfect example of how designers can use the environment to contextualise the player's experience and also to shape the player's identity.

Narrative context

We're saying that the game environment, which has been derived from a fictional

premise, can communicate

- The story of what has happened in a place
- Who inhabits it
- Their living conditions
- What might happen next
- The functional purpose of the place
- The mood.

And when environmental elements are used cohesively, no one has to say anything...the world speaks for itself as the player moves through it.



F.2.4 - Bioshock 1 gameplay⁴

⁴ Source: <https://www.gdcvault.com/play/1012647/What-Happened-Here-Environmental>

Environmental storytelling

Environmental storytelling is the act of adding elements to the level so that the player can understand them as a meaningful whole, and so that the player can learn the story of the game.

Environmental storytelling is closely related to the player's ability to interpret the whole scenario as a whole.

Environmental storytelling blends two different concepts, the player's ability to understand the environment and the player's ability to solve the problems presented by the designers in the level. The result of this mix is more investment from the player.

Interpretation

Jordan Thomas, designer of Bioshock 1, said, *each player will bring their own views, experiences and frame of reference to the scene and come to different conclusions*, speaking at Teesside University.

Environmental storytelling depends on the conclusions that the player draws from their experience.

Telegraphing

What Telegraphing means is to give a hint to the players of what's coming so they can prepare and elaborate a plan according to how they want to react to the situation.

We can take as an example Doom 3, where you can find a trail of blood in the ground which leads you to a room with an enemy of the game eating someone.

- **Law of Closure**, as humans, we have an innate need to categorise and fit visual elements into a larger framework. To do this, we draw conclusions.



F.2.5 - Doom 3 gameplay⁵

- **Chain of Events:** Environmental storytelling is often about cause and effect.
- **Player Opinion:** In good environmental storytelling the elements combine to a larger picture, but have individual significance as well. An anonymous rock wouldn't have worked as well.
- **Avoiding Disconnects:** Minimise disconnects between the player's possible actions and pre-scripted setups. Do create situations that are clearly outside the player's gameplay domain.
- **Echoes:** Environmental storytelling moments should draw from the story premise:
 - Self-reinforcing loop.
 - Premise spawns events, events remind players of premise.

Systematic environmental storytelling

The non-static actors of a game should ALWAYS be involved in the story of the game, and therefore its environment. The scenario should always react to the actions of the player and the characters. Not only because it makes the game feel more immersive, but also because it makes the game experience unique for each player.

⁵ Source: <https://www.gdcvault.com/play/1012647/What-Happened-Here-Environmental>

What is Environmental Storytelling & why it's important for you (Albert van der Meer)

A level is an area where anything goes and the rules of our world don't apply. Instead of the rules of the real world, the levels are governed by the rules set by the game designers. The player enters this space alone and must understand its limits and paths.

Each element of the scenario provides a context, it can be narrative or it can be boundary, the player by being in the level also gives context to what is happening, so we can agree that the player's identity is shaped by what they can see and experiment with.

Limitations, boundaries and context

How the designers and environmental artists decide to place each prop in the environment will lead the players to make certain choices or understand the story they are telling in a certain way, the way the players understand their environment and the props will also be determined by the context or experience the players have.

Identity buy-in

The scenario is directly related to how the players understand themselves within the confines of the game, the scenario must match the player's persona in order for the player to be involved in the world every time they interact with it. The feedback loop is the way in which the game must explain to the player the rules of its world, what they can and can't do, and how they must relate to the environment in order to get the most immersive experience.

History and buy-in

To get players to buy into the idea that the world and game designers need to use elements that will be familiar to everyone, you need to understand what kind of knowledge and experience your players are likely to have, and use that to explain the story.

Active engagement and coherence

All the elements present in the level have a narrative background. The player will use them to understand where they are and what has happened in the space they inhabit. This process puts the player in a state of constant active interest, which, in addition to the above, turns the player into an archaeologist who will try to solve all the puzzles present in the level.

It is therefore up to the player to draw conclusions and link the different situations presented to him in order to understand the narrative meaning presented to him.

Every time a player makes a discovery or realises something from the narrative, they get a sense of realisation and feel that their progress, their knowledge of the world, is growing. This feeling won't be as strong if the story is told through cinematics or explained directly through dialogue.

All of these points are only possible if the design team has worked and iterated to make all aspects of the level consistent and easy to understand.

The key to a good player experience is to make situations complex and engaging enough so that the player doesn't lose interest in what's happening in the game, and when things get complicated and difficult to solve, they don't notice that the game is solving everything for them because they're not smart enough.

Techniques In-Level Storytelling (Steve Gaynor, 2013)

Level storytelling means explaining the game's story using elements of the game during gameplay, not during cutscenes. It tells the story without taking control away from the player. It doesn't require any extra effort because the animation, staging, writing and voice acting are already in the game.

Overall, it's better integrated into the player experience and less expensive to produce. The only thing to keep in mind is that it has to be managed along with all the other gameplay elements the player encounters.

There are some important techniques that must be used to create level storytelling.

- **Framing**, design the level so that you will be able to guide the attention of the player where you want it to be, you have to think of the game as a movie shot and use this idea to guide the player.
- **Gameplay mechanics**, it is important to make the player focus on the story elements, so if you want the player to be focused in a certain area the best practice is not to add gameplay elements that will result in a loss of focus.
- **Light** is a good resource to guide the player without being aggressive.
- **Gating** means keeping the player from skipping the sequence if necessary.

Framing

Use the environment setup to visually guide the player towards the centre of the action so that they can grasp the action for themselves. The action should always be in the centre of the screen.

Mechanics

Give the player clues about what's important in each moment, when they need to focus on the story, don't add gameplay elements that will distract

them, and it's also important not to do anything else to draw the player's attention to things that aren't important.

Staging

All the parts of the story that are scripted are called stage play.

Use different techniques such as lighting, highlighting, using silhouettes, etc... to draw the players' attention to what you want them to focus on.

Good techniques include using spotlights to highlight certain elements of the scenario or silhouettes to isolate certain elements from what they have in the background.

Optional or Non-Optional?

If the player has to watch, understand or concentrate on a sequence, it's crucial that they see what's going on, so some kind of gating has to be used.

Environmental Storytelling

Exists in the conceptual space between gameplay and scripted story. The story that the player derives from the game world itself.

If we had to describe the three types of story a game can have, there would be

- Gameplay stories, which are based on what the player is.
- Scripted stories, which are based on what the player watches.
- Environmental stories, which are based on what the player is.

The basic characteristic of an environment is that the player is always inhabiting it, i.e. the level is always telling the player something. With that in mind, designers have to think and place everything in a way that tells the player what they want to tell the player, because if they don't, the level will only give the simplest information it can give.

If you think about it, it's strange to force the player to pay attention when they don't want to, and that's the strongest point of environmental storytelling,

which is that the player can decide when they want to immerse themselves in the world of the game.

Inexpensive

If we see it from a practical point of view applying these methods of storytelling is a good idea since:

- Don't require to heavily modify the gameplay of the game.
- The only type of art it requires are props to add to the level.

Time-Agnostic

The classic approach to storytelling tends to result in static stories, meaning that all players get the same information and experience the same things at the same point in the game. This isn't a bad thing in itself, as it's a simpler approach from a design point of view, and it's also easier to follow if you're a first-time player.

But the environmental storytelling approach is more interesting because the time the player spends in the game, discovering its world, understanding how it works, and unravelling the story is entirely up to the player.

The Montage Effect

With a series of images, a viewer will always assign meaning to a given image based on the image that precedes it.

Environmental Narrative: Your World is Your Story

(Richard Rouse III, 2010)

A games story can be divided in three parts:

- Plot.
- Characters.
- Setting, here is where the environmental narrative takes place, these are little stories which are told via the world itself, this means to take away the focus from the protagonist and move it to the world itself.

Have a story to tell

To start designing a level, you first need a story to tell, and therefore a tone and mood to convey.

If you want to use environmental storytelling, be aware that you will need to make more iterations as you wait for each link in the chain to do its work.

A good place to start is to visit places that are similar to the ones you want to have in your game, as this will make it easier for the player to buy into your world.

There are four key questions that you will want to answer:

- What is this location?
- What is it used for?
- Who lived here, are they still here?
- Did some key event happen here?

When you have the answers to these questions you must find a way to communicate them visually.

Here are a few techniques you can use to make time to let the player experience the world:

- Puzzles.

- Resource collection.
- Retrace your steps, spend time in the level.
- Embedded story elements.

How Level Design Can Tell a Story (GMTK, 2020)

A different approach to the classic methods of storytelling in games is to embed narrative elements into the very spaces and places that the player visits throughout the game; these spaces can speak as loudly as the traditional methods of storytelling.

Environmental Storytelling requires a degree of deductive reasoning on the part of the player, as the main aim of the approach is to connect parts and aspects of the whole world in order to understand its story. This approach puts the player at the centre of the story and must be seen as an active participant. This approach allows players to focus on the gameplay of the game and skip the story if they wish.

Environmental Storytelling isn't just about static objects or paint on the walls, Environmental Storytelling can be anything that is connected to the world, which means that the player can find meaning in animations, conversations between characters or NPCs, notes in desks, etc...

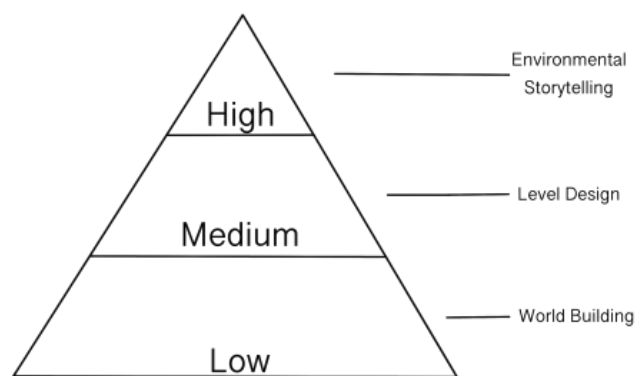
Most of the time Environmental Storytelling is used to explain what happened in a place before the player got there, but that's not its limit, Environmental Storytelling can also be used to reflect the player's actions in the world.

Structure

Environmental storytelling, micro-narrative vignettes, just one part of a larger structure of using the environment to suggest narrative, more intimate specific stories on the low level.

Level Design, individual places in a game, and the individual rooms on those spaces.

World building, architecture, layout, materials, scale can tell a lot about the people who use those spaces. Grand, systemic stories on the high level.



F.2.6 - Scheme of the different levels of the division of story elements⁶

Game design as narrative architecture: An exploration of the relationship between games and storytelling (Henry Jenkins, 2012)

This article discusses the ongoing debate among game fans, designers and scholars about the relationship between games and storytelling. While some scholars, such as ludologists, prioritise the mechanics of gameplay, others, such as narratologists, seek to understand games in relation to other storytelling media. Despite some scepticism from game designers and critics about mapping traditional narrative structures onto games, the author argues that meaningful comparisons with other storytelling media can still yield

⁶ Source: <https://www.youtube.com/watch?v=RwlnCn2EB9o&t=109s>

insights for game design. Games, he suggests, should be seen as spaces with narrative possibilities, not just as stories. While not all games tell stories, many have narrative aspirations. In order to create better game design, it is essential to understand the relationship between games and narrative.

The role of game design in creating narratively rich spaces is explored, emphasising that game designers are not only storytellers, but also 'sculptors of spaces'. Historically, game design documents have focused more on level design and the creation of immersive environments rather than plot or character motivation. Games fit into a long tradition of spatial narratives, such as heroic odysseys, quest myths, and travel narratives, that exist on the margins of literature and are not typically part of the literary canon. Structuring game space can facilitate different kinds of narrative experiences, and game designers should be aware of this when creating games.

The article also discusses how amusement park attractions and genre traditions already familiar to visitors can be used to create compelling narratives in games. Drawing on players' pre-existing narrative skills and painting their worlds in broad strokes can make games more immersive. Games can be seen as a form of transmedia storytelling, where each work contributes to a larger narrative economy and the richest understanding of the story world comes from following the narrative across different channels. In such a system, games can give concrete shape to players' memories and imaginations of the story world, creating an immersive environment with which players can interact.

Narrative enters games at two levels: in the form of broadly defined goals or conflicts, and at the level of localised events. While most game critics assume that all stories must be classically constructed, with each element tightly integrated into the overall plot, games can also be seen as spatial stories, held together by broadly defined goals and conflicts, and driven by the character's movement across the map. Narrative can also enter games at the

level of localised incidents or micro narratives, which are short narrative units based on stock characters or situations drawn from the repertoire of melodrama. Games can use narrative in different ways, and the themes of a game can be communicated through these discrete elements.

The article also discusses the concept of embedded and emergent narratives in games. Embedded narratives create a balance between interactivity and pre-authored narrative, while emergent narratives take shape through gameplay, as in *The Sims*. *The Sims* represents a fourth model of how narrative possibilities can be mapped onto game space, where the game is a sandbox or dollhouse game and players can define their own goals and write their own stories, but it still has narrative possibilities that are designed by the game designer. By exploring different models of narrative possibilities in games, game designers can create more compelling and immersive game experiences.

What is Mise en Scene — How Directors Like Kubrick Master the Elements of Visual Storytelling (Studio Binder, 2021)

Two basic traditions in Mise-en-scene, naturalistic and theatrical.

- Naturalistic is when the mise-en-scene must copy the real world and must feel realistic.
- Theatrical is when the set doesn't represent the real world and must give some magical or not real feel.

Three Problems for Interactive Storytellers, Resolved

(Ernest Adams, 2013)

The Challenge of Amnesia

Players regularly start a game with amnesia, unaware of their identity, location or task requirements.

The video game industry has made several attempts to overcome this problem, including the use of mentor characters, narrative passages and tutorial levels.

In the end, however, it is the quality of the writing and production that matters most. There is no justification for a poorly written opening in games, as they have more time to set up their universe than TV or film.

The Challenge of Internal Consistency

One of the main problems the industry has is balancing the amount of freedom given to the player with a consistent and well paced story. There are three main ways in which players can disrupt or interfere with the game's storyline:

- Introduce uninvited objects or actions.
- Break the character they are playing as.
- Break the story itself by doing something that ends up in nonsense.

Ultimately, the most important solution for designers is to be aware of what kind of story they are telling. If designers understand this, they will also understand the relationship they have with players, because if designers withhold a lot from the player, the player will act on that by doing the things I said before. But if the designers share their power with the players, they will return with a commitment to the story.

The Challenge of Narrative Flow

In interactive stories, players control the characters, making it difficult to ensure that they are emotionally and psychologically ready for the dramatic climax of the story. Three traditional solutions have been suggested:

- Limiting interactivity
- Creating a world that goes on regardless of the player's actions
- Advancing the plot along with the player's progress.

But every solution has its drawbacks, and they're not good. The ideal solution should be one that blends interactivity with the world and narrative flow. To achieve this:

- Don't let the players do all what they want at all times.
- Do not have only one dramatic climax.
- Advance the plot independently of the player, this means that there must be certain points that the players cannot control.
- Use procedurally-generated plots.

Where Stories Ends and Games Begin (Greg Costikyan, 2000)

For a long time, even now, most people don't think of video games as an art form or a way of expressing anything. The argument was that video games did not evoke the same emotions as a well-told story. This might have made sense in the very early days of video games, when the limitations of the technology made them seem like mere curiosity. But not today, because video games have shown themselves to be worthy of respect in their own right.

Video games, like music, for example, do not depend on a well-written story to be enjoyable. That's why designers have to make games stand out for

their own characteristics and differences from other media. One of these distinctions is, for example, the ability of players to make decisions and live out their own stories.

On the other hand, this does not mean that video games cannot tell stories. In fact, there are many critically and commercially acclaimed games that base their popularity and quality on the story they tell. The problem is finding the balance between a compelling story and fun gameplay.

While games and stories are different things, they can be successfully combined in certain contexts. However, designers must be careful not to prioritise one over the other, and should focus on creating a satisfying gameplay experience above all else. Ultimately, video games are a legitimate and important art form in their own right, and game developers should strive to create games of lasting value.

Walking Simulators: The Digitisation of an Aesthetic Practice (Rosa Carbo-Mascarell, 2016)

Rosa Carbo-Mascarell discusses the cultural importance of walking and its history in the context of Year Walk, a video game inspired by the ancient Swedish practice of Arsgang. The author explores psychogeography, a way of unconsciously and playfully exploring a landscape to reconstruct patterns and stories in the environment.

The approach that Year Walk takes to walking is also related to other movements and practices such as exploration and liberation, including flaneurs, romantics and psychogeographers. The interesting part of the game is how it deals with the mystical and occult aspects of walking, as well as the dangers of getting lost in the landscape.

The video game also creates spaces for the player to have room for introspection and subjective interpretation. It also has moments of insight and allows the player to travel to other worlds.

In the famous video game *Gone Home*, the player takes control of Kate, a girl who returns home after a year of backpacking through Europe. When she arrives, she finds the house completely empty and no one from her family waiting for her. The game encourages the players to be curious about the world that is presented to us, something that Bateman (2014) would categorise as the Seeker archetype. To feed this curiosity, the first piece of information the game gives is a note on the door.

It is no coincidence that the space to explore in *Gone Home* is a house, because exploring spaces that might be familiar and feed the Seeker archetype makes the player's curiosity grow. It seems that other games don't take this factor into account, as they limit this curiosity with a seemingly restrictive agent that prevents the players from leaving the main path and discovering the world at their own pace.

As the player discovers intimacies and information about the family, they feel more involved with the place and what is going on.

The video game "*Dear Esther*" takes place on a stormy island and with the voice of a narrator who accompanies the players on their journey. The experience from the game is comparable to the practice of deep topography and psychogeography. Walking gives the players the opportunity to explore hidden stories embedded in the landscape.

The use of environmental storytelling in video games is a great way to allow players to experience a sense of intimacy and spirituality reminiscent of the Romantic era, where the landscape itself is imbued with the spirit of something greater.

Walking allows the player to become immersed in the world on the screen, creating a heightened awareness of the game's spatiality and story.

Environmental Storytelling and BioShock Infinite: Moving From Game Design to Game Studies (Lindsay Tarnowetzki, 2015)

Game Environment

Environmental storytelling is a relatively new topic in the world of game studies, so there haven't been many scholars who have looked at it, which is why Smith and Worch's work is so important.

According to Smith and Worch, game environments serve four key functions:

- They constrain and guide player movement through physical properties and ecology.
- They use player reference to communicate simulation boundaries and affordance.
- They reinforce and shape player identity.
- They provide narrative context.

Smith and Worch define game ecology as "the placement of enemies and items within the game environment". The boundaries of the simulation define what the player can and cannot do and where they can and cannot go.

In BSI, the boundaries of Columbia, the game's floating city setting, are defined by its physical edges, and falling or jumping off would be considered suicide. The game also uses affordances, defined by Smith and Worch as "familiar visual references", to give players information about the purpose of an area and what resources might be available there. For example, a scene of cards scattered on a table, a knife and a smear of blood in BSI suggests that

someone has been punished for cheating at cards, revealing social norms and behaviours within the game environment.

Many video game environments are used to shape player identity and behaviour. Video games ask players to take on a particular identity and use the game environment to help the player buy into that idea. For example, BSI explains Booker's Civil War background, which makes it easier for players to understand his familiarity with guns and fighting in Colombia.

Video game environments also provide narrative context, providing information about the history of the place, the people who live there, their living conditions, what might happen next, the function of the place, and the mood. Smith and Worch emphasise that the game world should "speak for itself", eliminating the need for intrusive elements outside the game environment.

Environments in Bioshock Infinite

In Bioshock Infinite there are three different types of environments that contribute to the creation of primary and secondary narratives:

- Avatar's physical environment, which is in the diegetic space.
- Social environment is also in the diegetic space of the game, NPC dialogue, and Voxophone recordings are some examples.
- Extradiegetic environment doesn't exist in the game world but is also important for the game experience, this would be the original music made for the game.

These environments are constantly using and sharing each other's information to shape a complex matrix of narrative generation.

The Avatar's Physical Environment

The primary physical environment in BSI is the city of Colombia, which includes physical objects, licensed music, sound effects and weather. This

environment is the focus of environmental storytelling, which includes non-verbal and non-textual storytelling elements.

Objects

The physical environment is very important because, as I said, it is used to shape the identity of the player and to give a narrative context to what is happening.

There are also a lot of player guidance elements such as objects, symbols and areas that are used to guide the player and limit the player's usable area. All of these elements perform these functions while also providing information about the game world. In some cases, designers have chosen to use voxophones, which are in-game objects that play audio recordings, to convey micro-narratives within the game's storyline.

Weather and ruin

The role of weather in BioShock Infinite serves a gothic function, expressing the decay and ruin of Columbia as it has been and is being destroyed by war. As the game progresses, the sunny weather and idyllic lighting of the beginning of the game give way to a storm, symbolising the loss of Elizabeth's initial innocence and the destruction of the false world, but it also has a global significance as seen in the destruction of Columbia, the flying wonder. The theme of ruin is subversive, destroying the dominant ideology of ultra-nationalism and religious fanaticism, but also representing a return to the status quo. Ultimately, the end of Columbia represents Booker's redemption.

The theme of ruin can be seen as the end of a dream, the freedom of the oppressed people of Columbia, but in Booker's context it has a more optimistic interpretation as the earning of redemption.

Music

In Bioshock Infinite we differentiate two types of music:

- Original Music only exists outside of the game.
- Licensed Music, which exists in the game world.

The original music serves to create mood and cue events in the narrative, while the licensed music exists within the game's fictional world of Columbia. The licensed music is divided into three types:

- Original recordings
- Re-performed songs
- Retro covers.

The variety of licensed music in Bioshock Infinite is greater than in the previous BioShock games, and it establishes mood and comments on the narrative. Examples of licensed songs, such as "Will the Circle Be Unbroken?" and "Black Gal (I Don't Want No Jet Black Woman)," are used to remind the player that Columbia is an actual city in the year 1920, and is also used to cue important events in the games story.

Environmental Traces

Environmental clues are objects, artefacts, images or events deliberately placed in the game world to provide clues to the game's narrative or backstory. These clues can be anything from bloodstains on a wall, to notes left on a table, to graffiti on a building.

The player must use their own understanding and interpretation of these elements to make sense of them. This can require a significant amount of "ergodic effort" on the part of the player, as it's not a direct form of storytelling. Some multiplayer games offer an additional dimension to environmental clues by allowing players to leave their own marks on the game world for other

players to interpret. This creates a sense of community among players and adds an extra layer of immersion to the game.

The use of environmental cues is essential to effective environmental storytelling in video games, as it helps to fulfil several key storytelling functions.

These include:

- Association of elements: Environmental traces help to establish connections between different parts of the game world and the narrative.
- Active problem solving: Players must use their own analytical skills to piece together the meaning of the environmental traces, which can create a sense of agency and investment in the game.
- Interpretation according to player experience: Different players may interpret the same environmental traces differently based on their own experiences and perspectives, which can lead to varied and unique playthroughs.
- Telegraphing: Environmental traces can foreshadow future events in the game, creating suspense and anticipation for the player.

The Avatar's Social Environment

While environmental storytelling is a crucial part of Bioshock Infinite's DNA, it is not the only way the game tells stories. The social environment of the game is constructed through NPC interaction and voxophone recordings. NPC dialogue provides the player with information about the lives of the citizens of Columbia, expressing their views, how Columbia has changed over time, and how Columbians live on a day-to-day basis. These elements help to create the social environment of Colombia, giving the player insight into the lives of the people who live there and contributing to the richness of the overall game environment.

In terms of constraining and guiding player movement, dialogue and voxophones guide the player's narrative movement and exploration more than

physical movement. New areas of Columbia provide Booker with new information about the narratives, foreshadowing the outbreak of the class war later in the game.

In terms of affordance, this is represented verbally in the social environment by the way NPCs respond to Booker and react to his actions.

Functions of Environmental Storytelling

Some of the most important characteristics about environmental storytelling were described by Smith and Worch,

- Reliance on the player to associate disparate elements.
- Integration of player perception and problem-solving.
- Invitation to interpretation of situations.
- Ability to help the player navigate an area by telegraphing.

These points can be applied to female sexuality in Columbia. If we take:

- The way female characters interact with Booker when he walks by.
- The way female characters interact with each other in certain animations
- Certain voice lines.

The player can make an idea of how female sexuality works in Columbia only by listening and seeing NPCs act.

There are some elements that also are involved in the Environmental storytelling process that are extradiegetic, for example the menus or the loading screens.

Environmental Storytelling: Creating Immersive 3D Worlds Using Lessons Learned from the Theme Park Industry (Dan Carson, 2000)

Theme Parks and the Virtual World

While the audience demographics of video games and theme parks may be different, both industries face the same challenge of bringing people into their created worlds and keeping them entertained. The growing popularity of multiplayer and internet games has allowed computer environments to enter the realm of the physical world. These two seemingly unrelated worlds should share knowledge, especially considering that amusement parks have been entertaining people for much longer than video games, roughly 150 years, and theme parks such as Disneyland have perfected the art of spatial entertainment to new heights. The designers of these parks have developed methods, tricks and secrets that would be very useful to video game designers.

Environmental Storytelling

Is the trade secret of designing entertaining themed environments: infusing the story element into the physical space through the use of colour, lighting and texture to convey emotions to the audience. Designers manipulate audience expectations based on real-life knowledge and media exposure to enhance the adventure experience.

The Importance of Story

One of the most important aspects of designing a themed environment, such as a game or attraction, is having a strong story. The story should be all-encompassing and guide the project team towards a common goal. For example, in the case of a pirate themed attraction, every aspect should

reinforce the concept of "pirates". It is important not to break the established rules of the story, as visitors may feel cheated and lose immersion in the experience.

"Where Am I?"

When designing an immersive world you must always answer two questions:

- Where am I?
- What is my relationship to this place?

The audience must be able to answer these questions within the first 15 seconds of entering the environment. This requires the designer to create a space that gives a sense of place and purpose.

Once this is achieved, they need to be given clues to help them understand their role in the environment. This can be achieved through subtle design choices, such as leaving clues and story elements throughout the environment. The aim is to create a sense of self-discovery, rather than having the story spelled out for them in the opening credits.

Half-Life, for example, is a game that successfully plays on the player's desire for self-identity, leading them to conclusions through their experience of the physical space and encounters with peripheral characters. By using design elements to help the audience answer these two questions, designers can draw them deeper into the created world and increase their immersion.

Storytelling Through Cause and Effect

Cause and Effect is another good example of how to engage the audience in a story environment. By using:

- Broken doors.
- Explosions.
- Crashed vehicles.
- Charred remains of fires.

- Etc...

The players can easily understand where they are and what to expect of the place. These elements can also depict the passage of time or be triggered by the actions of the game player. Another type of Cause and Effect is the use of "Following Saknussem," where players follow a trail left by a fictitious preceding character.

The Power of Designing the Familiar

Another important point is answering the audience's first questions, such as "Where am I?" and "What is my relationship to this place?" The use of "cause and effect" vignettes and familiar elements can also help pull players into the story.

Remember, This is a Theatre!

Texture maps are like canvas sets that game designers can use to trick the eye into seeing depth and detail in a two-dimensional space. Designers should avoid using complicated visual elements, instead following the "less is more" mantra, because the important thing is to direct the player's attention to where it's needed. It's also very important to use lighting and detail to create dynamic scenarios..

Using Contrasting Elements to Your Advantage

The architects of medieval cathedrals and great ancient churches deliberately forced visitors to enter through a small space before revealing the vast interior to create an effect of contrast. Contrast is also an important tool for environmental designers to create variety in their spaces. They should give their audience the experience of disorder before delivering them to a place of order and, where possible, asymmetry. Perfect symmetry can make an environment look fake, so designers should make one element unique from the rest to bring life to an otherwise dull environment.

The Paradox of Designing Environments for "Gamers"

Designing successful environments for video games is a very tough challenge, because it's really hard to meet players' expectations. For example, in an Indiana Jones game, they had to make the environments as realistic as possible, but the lead programmer had made the torch flames flicker at an unrealistic speed to show off the game's remarkable frame rate. This is an example of how coders and designers have to break with expected realism to meet player expectations.

While stunning environments are important, the gameplay must be enjoyable to attract players. Since you can't have one without the other, the design of a given space must be consistent with the enjoyment of the game. For example, when designing gladiatorial battlegrounds, the most important aspect of the design must be to make the space easy to understand and easy to navigate.

When working with a team, it's very important to have a strong story that everyone agrees on. When this happens, the only things that are discussed later in development are minor details rather than drastic changes to the look of the game, and this gives everyone more time to work on their area.

Environmental Storytelling

EMBEDDING A GAMES NARRATIVE INTO THE WORLD (Fern, 2020)

Environmental Storytelling is a technique used in video games to explain stories by using the game world to tell the story. It involves the conscious and subconscious communication of information to the player through various

aspects of the environment. This technique not only teaches players about the world they are exploring, but also makes them active participants in the story.

Environmental storytelling exists in the space between scripted story and gameplay, telling the story of what happened in a place, who inhabits the world, what their living conditions are, what might happen next, the player's identity, where the player should go next, and also the overall mood or theme of the game. This type of storytelling is also useful for explaining to the player the rules of the world and where they can and can't go, relying heavily on the player's own experience and knowledge. The feeling of "show don't tell" is one of the key aspects of this method.

On the other hand, it is a non-intrusive way to build additional world lore and a way to involve the player directly in the narrative, building player investment. As environmental stories are not scripted sequences, they are open to interpretation by the player, making the stories more meaningful and memorable, as they are often unique to each player, depending on their own personal experiences as mentioned above.

Using environmental storytelling in games has many advantages:

- Inexpensive.
- Time-agnostic.
- Meaningful and memorable.
- Does not require unique game mechanics or budgeting.
- Relatively short creation pipeline.

One of the things that most players like about environmental storytelling is that it allows them to choose how much time they want to spend on a narrative moment, and allows them to focus on the action without the story getting in the way.

Visual storytelling is an ancient technique that has been used for over 50,000 years, and there are many established techniques for visually conveying the narrative of a story.

Mise-en-scene, is a term used to describe the setting of a scene in a film or play. It refers to everything placed in front of the camera, including people, and creates a sense of place for the audience.

A good example of how all these elements are used to convey narrative is the film "Children of Men". The film is set in a dystopian future where a series of disasters have rendered most of the world ungovernable or uninhabitable. The film is able to convey so much information to the audience through its clever use of setting and props, such as televisions showing the news and the ubiquitous propaganda found throughout the environment. All of this information comes from the setting of the film, without any of it being told to the audience by the protagonist.

There's a scene where the protagonist is surrounded by newspaper clippings that are very old. This is done to show the audience what happened before the events of the film, to increase the tension for the audience and to make them more emotionally involved in the story.

The **use of colour** is another powerful method of communication in many different art forms. Different colours can evoke different psychological responses in the viewer and can be used to draw attention to important details, set the tone of the narrative, represent character traits, and show changes or arcs in the story. However, it's important to remember that the meanings associated with colours are cultural, not universal, so it's very important to study the target audience and what cultural associations they have with the colours you want to use.

Lighting is another very important technique used in film and games to convey narrative. It can draw the viewer's attention to what is important in the environment, enhance the mood and atmosphere of a scene, create depth, convey the time of day and season, reveal character personalities and foreshadow future situations. The amount of light used and the mood it

conveys will depend on the situation the character is in and the subject of the narrative.

Contrasting elements are also used to tell a story. By understanding how they create emotions in the players, these elements can create moments of pressure followed by moments of relief, and can be achieved in an environment by having a cool lit room followed by a warm lit room, a place of disorder and chaos followed by one of order, or by using asymmetry and angles wherever possible.

Moreover , **cause and effect vignettes** can be staged to lead the viewer or player to draw their own conclusions about a previous event or to suggest a possible outcome.

The **use of the familiar** is an important part of the player's interpretation, allowing them to instantly understand the world they are in and make connections and links between objects.

Interpretation transforms the player from a passive observer of the story to an active participant. By allowing them to discover the story at their own pace, the narrative becomes more immersive and complex.

The use of the familiar can also be used to establish social norms within the game world. Familiarity with certain objects or concepts can influence the player's behaviour and make certain actions more or less acceptable within the game world.

The **montage effect** is another technique used to convey a lot of information to the player through a series of images or visual cues. This technique clusters important information and events to create a more immersive narrative experience.

Interactive Storytelling - Narrative Techniques and Methods in Video Games (Mike Shepard, 2014)

The use of narrators in video games is not new, but it is still relatively rare. In the past, narrators were mainly used in fairy tales or gritty old detective movies. In recent years, however, narrators have begun to appear in video games, and they are rarely used as omniscient storytellers. The most effective narrators in recent games are those who are characters in their own right.

An example of this type of narrator is the Cave in Double Fine's *The Cave*. The Cave introduces itself as the cave in question, and then introduces the available characters. Once the characters have heard their stories, they venture into the Cave, where the voice of the Cave accompanies them on their journey. The Cave adds humour, thought and motivation to any situation.

Another example of this type of narrator is Rucks in Supergiant Games' *Bastion*. Rucks is an old survivor of the worldwide cataclysm who tells the story of the Kid's exploits around the world. The entire narrative is told as a story told by Rucks to another character while they wait for the Kid to return from his final mission. Rucks reacts to the player's actions and talks about them as they happen. He is a character in and around the story and has his own personality.

The dynamic narrator, who reacts to the player's choices in the game, helps to immerse the player in the world they are exploring. Breaking the fourth wall in video games is not a new phenomenon and can be used to frighten players, read the player's mind or communicate information past a character to the player.

However, *Spec Ops: The Line* uses and breaks the fourth wall to mentally tear down a player. As the player progresses through the events in

Dubai, the loading screens change to remind the player of the consequences of their actions. The loading screens speak directly to the player in a way that the in-game actions simply don't.

Game Spaces Speak Volumes: Indexical Storytelling

(Clara Fernández-Vara, 2011)

Environmental storytelling is a term used to describe how spaces can create a narrative experience for visitors. The concept comes from theme park design, where designers infuse the physical space with story elements to construct a narrative for the visitor. However, borrowing from theme park and amusement ride design can be problematic because these designs focus on navigating the space, providing a continuous sense of the topography of the space, rather than the active participation of the visitor.

Jenkins (2004) discusses how game design can use environmental storytelling to create a narrative experience for the player. Jenkins lists several strategies by which gameplay can become a narrative experience, focusing on two main concepts: evocative spaces and micro narratives. Evocative spaces refer to stories or genre narratives that the player may already be familiar with, while micro narratives are short scripted events that are integrated into the player's interaction.

Nitsche (2009) builds on Jenkins' concepts of narrative by qualifying these devices as evocative narrative elements, building blocks that structure the player's experience and help them understand how the game world works. As Nitsche defines them, 'such elements can be anything and any situation in the game world that is structured to support and possibly guide the player's understanding'.

Richard Rouse and Smith and Worch propose techniques for environmental storytelling in game design. Rouse focuses on world design and defines environmental storytelling as "the story told by the game world as if the player weren't there". The techniques he suggests are having a clear idea of what has happened in the world, considering what has happened in each location, and controlling navigation, puzzle design, and revisiting the space. Both focus specifically on the player as an active agent in the space, making sense of it and piecing together the narrative.

Indexical Storytelling in practice

Indices are consequences of events, meaning that they point to something that has happened or is happening, and invite the player to reconstruct what happened. Indexical storytelling is more about story building than traditional storytelling, as it involves the integration of different pieces into the game's narrative through interpretation and reconstruction by the player. Indices can act as clues to what should be done in the game, or to what happened in the world before the player arrived. They can be constructed through the design of the game or through the actions of the player.

This approach to storytelling is a refinement of environmental storytelling because it specifies the ways in which story and game are integrated based on the traces left in the game world. By using this method of storytelling, game designers can create narratives that not only provide narrative context, but also create player identity.

There are two main types of indices:

- The story of the game world, this type involves examining the environment, reading documents and reconstructing past events.
- The interpretation of remains, this type of indices focus on the analysis of elements left behind by other agents who were in the place before the player. These objects were modified by the other agents and they provide clues about what happened in that space. For example, the

graffiti on the walls in Portal or the audio recordings in Bioshock provide insights into the world and its inhabitants. However, interpreting remains can be challenging as it requires the player to piece together the story based on their own interpretation of the events.

The use of indexical storytelling is a very powerful way of encouraging specific behaviours and actions that move the plot forward.

One of the places where it's harder to use indexical storytelling is in the video game tutorial. The main problem is that designers are forced to refer to objects and actions that do not exist in the game world, which completely breaks the player's immersion.

History of the Player: Player's Traces

Player's traces are the remains of the player's actions and choices in the game world. This is especially important in online games where the narrative and player decision-making can evolve based on all the players actions.

Conclusion

Environmental storytelling has become an important technique in the games industry, with various authors and game/level designers exploring its potential to enhance the player experience. Game environments can guide the player by using their properties and references to communicate boundaries, paths and character identity. To do this, designers need to keep in mind that all players need to understand the cues they are using. (Harvey Smith & Matthias Worch, 2010).

In the process of developing an engaging game environment, designers must consider elements such as colour, lighting and texture to convey emotion and set the mood (Carson, 2000). These elements are not only aesthetically pleasing, but also contribute to the player's understanding of the game world and its story (Tarnowetzki, 2015). In addition, designers strategically place objects and arrange spaces to create an immersive experience that can evoke emotions and tell stories (Carbo-Mascarell, 2016).

The different elements placed on the level to convey a particular narrative are called indices (Carbo-Mascarell, 2016). These indices invite the player to reconstruct what happened, making the narrative more interactive and engaging, and thus making the player feel more involved in the story. However, some authors argue that games should not rely solely on storytelling techniques, as the pleasure derived from games comes from the player's ability to make choices within the game's structure, rather than the game's ability to tell a linear story (Costikyan, 2000).

One of the most important aspects of understanding how environmental storytelling works is to be aware of the skills of agency and interpretation. Most authors emphasise that environmental stories are open to player interpretation, making them more meaningful and memorable, as they are often unique to each player, depending on their personal experiences and backgrounds (Smith & Worch, 2010; van der Meer, 2022; Gaynor, 2013; Rouse III, 2010; GMTK,

2020). This idea resonates with the argument that game developers should provide a platform for players to create their own unique experiences, rather than forcing them to follow a pre-defined plot (Adams, 2013).

While some authors debate the relationship between interactivity and storytelling, they all agree that creating immersive, interactive, and emotionally engaging game environments remains central to the development of innovative and memorable games.

Lindsay Tarnowetzki (2015) highlights the importance of environmental storytelling in BioShock Infinite (BSI) and how this is achieved through elements such as music, environmental traces, and indexical storytelling. Music can be used to create mood, add irony, and provide narrative context (Tarnowetzki, 2015). In addition, environmental traces help players make connections between different parts of the game world, engage in active problem solving, and interpret situations based on their experiences (Tarnowetzki, 2015). This approach emphasises the player's role in interpreting the game world, empowering them to make sense of the environment and story on their own terms.

Dan Carson (2000) suggests that game designers can create immersive environments by using "cause and effect" vignettes, familiar elements, contrasting elements and texture maps. Carson (2000) highlights the importance of balancing stunning game environments with enjoyable gameplay to meet player expectations. While Tarnowetzki (2015) does not explicitly mention these specific techniques, both authors seem to agree on the importance of creating engaging and immersive game environments. In particular, the concept of 'cause and effect' vignettes complements Tarnowetzki's (2015) focus on environmental traces by emphasising the importance of showing the consequences of actions within the game world.

Integrating environmental storytelling into game design requires a strong understanding of player expectations and preferences, which can be achieved

through effective communication and collaboration between designers, developers and players.

Clara Fernández-Vara (2011) argues that indices in indexical storytelling allow for narrative construction rather than traditional storytelling, contributing to player identity and behaviour. This approach aligns with Tarnowetzki's (2015) discussion of environmental traces in *Bioshock Infinite*, suggesting a shared understanding of the importance of integrating story and game through environmental elements. The concept of indexical storytelling further emphasises the importance of player interpretation and agency, as the narrative is constructed through their interaction with the game world, rather than being presented to them in a linear fashion.

Furthermore, environmental storytelling has the potential to bridge the gap between gameplay and narrative, creating a more seamless and immersive experience for players. By integrating story elements into the environment, designers can create a more cohesive game world where story and gameplay are intertwined.

Returning to Carson's (2000) ideas, the use of familiar and contrasting elements in game environments can further enhance environmental storytelling. Familiar elements provide a sense of familiarity and recognition, allowing players to connect with the game world on a personal level. Contrasting elements, on the other hand, create visual interest and stimulate curiosity, encouraging players to explore and uncover the narrative hidden within the environment. Texture maps, another technique mentioned by Carson (2000), contribute to the visual richness and depth of the game world, potentially making it more engaging and immersive for players.

Case Analysis

While the main way to tell the story of Firewatch is via the dialogues Henry and Delilah have, the use of environmental storytelling elements is really important, they are used to keep the player focused on the game and expand on its world building and the relationship the player has with the game.

One of the many good parts of Firewatch is how environmental storytelling is used to reflect the players actions on the elements of the world. For example, at the start of the game when Henry goes to the lake to stop the girls from throwing fireworks the players have the option to take some of their drinks, like the whiskey bottle, if they do so, the next time they are in the cabin, the whiskey bottle will appear. Another great example of environmental storytelling is that the players can see Henry still wearing the wedding ring in his finger, indicating that he still remembers his wife.

If some flaw had to be found, one part that could bother players would be that the UI spoils some elements of the game that could easily be understood or discovered by the users. For example, yet again, when Henry goes to the lake before talking with the girls the UI already warns the players that they are drunk, a fact that could be understood by listening to the conversation they have with Henry. But at the same time this part has a really good use of environmental storytelling, before talking with the girls, some of their clothes can be found all over the floor along with their backpacks.

Another good example is when Henry finds the lone man using a flashlight to blind him. It is a really well done moment because it gives a feeling of not being alone.

To finish, in the last beats of the game, when the player finally gets to Ned's hiding spot it's a very masterfully crafted moment because it generates a desire to explore who this man was that's truly magical.

Gone Home presents a curious case. The player assumes the role of Kaitlin Greenbriar, a 21-year-old individual who has recently returned from backpacking through Europe. The game commences on a rainy night, situated on the porch of an aged mansion. The objective revolves around comprehending the absence of the family members and their whereabouts. Although the brief introduction, coupled with simplistic gameplay mechanics, may not captivate most players, it undeniably stands as a masterpiece.

Environmental storytelling serves as one of the narrative elements utilised in this game, similar to Firewatch. However, unlike Firewatch, the reliance on audio files is not as significant. It should be noted that one aspect that detracts from the overall atmosphere is the arbitrary nature of audio file playback. These audio files play upon the player interacting with a vital story element, such as the red colourant, without any explanation of their origin. This particular detail disrupts the immersive ambiance the game diligently constructs.

Nevertheless, Gone Home excels in meticulously explaining every minuscule detail within the game. For instance, the house constantly emits eerie noises, creating an atmosphere of mystery and horror. This phenomenon is elucidated by a discovered document, a recipe for electric insurance, which explicitly states that the house's antiquity is the cause of these peculiar sounds. Additionally, a diary belonging to Sam also mentions this aspect, offering reassurance to the player and alleviating their anxiety.

Bioshock Infinite represents the third instalment in the Bioshock video game series, which belongs to the FPS (First Person Shooters) genre. The game unfolds within Columbia, a floating city traversing the skies of the United States of America. The player assumes the role of Booker deWitt, a former member of the United States Pinkertons, who is enlisted by the Lutece brothers to rescue a girl named Elizabeth.

The environmental narrative elements in Bioshock Infinite are utilised effectively. One prominent element is the Voxophones, audio devices capable of recording and playing back sound for a limited duration. However, excessive repetition often leads to dialogue overlapping with Voxophone audio, causing a somewhat uncomfortable experience. Voxophones primarily serve to expand the game's world building, offering context regarding the inner workings of Columbia and the thoughts of various characters prior to deWitt's arrival.

Conversations among the city's inhabitants serve as another noteworthy environmental narrative element. Through listening to these exchanges, players gain a direct and diegetic understanding of Columbia's different factions and their systemic racism towards individuals who do not conform to their ideals. These conversations also shed light on the unwavering devotion towards Comstock, the city's leader and religious figure. Furthermore, soldiers' conversations provide insights into upcoming challenges, such as the arrival of formidable enemies.

Bioshock Infinite also demonstrates strong level design through a technique referred to as "Telegraphing" by Matthias Worch and Harvey Smith (Harvey Smith, Matthias Worch, 2010). This involves subtly hinting at future encounters or events through small clues. An excellent example occurs early in the game when a police officer showcases a new weapon to a colleague—a glove-hook that deWitt will later employ as a melee weapon.

Half-Life 2 stands out as one of the finest games when it comes to environmental storytelling. Its introduction serves as a masterpiece in its own right, effectively conveying information to players who possess the ability to comprehend the presented elements. This approach instils a desire within players to explore the presented world and continue their gameplay.

The introduction employs a combination of static elements within the setting, such as the state of the underground, the presence of bullet-ridden

glass, and dirt scattered on the ground. However, it extends beyond these fixed components, incorporating dynamic elements of equal significance. Notably, the posture and expressions of accompanying NPCs, the act of photographing the player upon exiting the train to maintain control, the aggression displayed by security forces, and the presence of Dr. Wallace Breen's face on the train station screen all contribute to the immersive experience. Dr. Breen's appearance on the screen serves to explain the perceived benefits of the alien presence and justifies his decision to establish a command centre in City 17. Interactions with characters encountered in the station, who inquire about whether the player has travelled alone, imply a lingering anticipation for someone who is unlikely to arrive. Furthermore, the interactions between police and citizens expertly establish the backdrop of the game's narrative and the nature of the world in which the player finds themselves.

These achievements are made possible due to the profound and intricate nature of Half-Life's world, distinguishing it from Firewatch and Gone Home. It is essential to acknowledge this distinction, while also recognizing the merits of the other two games.

Despite all this, NO, environmental storytelling is not the main way of telling the story that Half-Life 2 has, as the story is told through conversations with different characters, but it is a very important point in the narrative.

In Firewatch, environmental storytelling props play a role in guiding the player through the scenario. An illustrative example is the utilisation of electrical cables, which Henry must follow to locate the girls camp. This approach effectively keeps the game's guidance within the in-game map and environment. The electric cables also serve as landmarks, ensuring that the player always maintains a sense of direction and location.

Conversely, in *Gone Home*, environmental storytelling elements primarily serve to enhance the narrative and evoke emotions. Since the house is not particularly large, there is no explicit need to guide the player towards a specific destination. Instead, players can discover the correct path by simply exploring their surroundings.

Bioshock Infinite underwent a somewhat uneven development process. Originally conceived as an open-world game utilising rails to access different areas of the map, the final version turned out to be more linear in nature. Nonetheless, the game employs numerous environmental storytelling elements to guide players throughout the scenery. Voxophones, for instance, often indicate less crucial areas focused on exploration rather than direct combat. Additionally, announcements pertaining to locked salts are employed to indicate the direction players should proceed. Like the previous examples, all these elements within *Bioshock Infinite* are justified within the game world, maintaining narrative cohesion and preserving the desired atmospheric experience.

One of the contributing factors to the enduring popularity of *Half-Life 2* is its implementation of diegetic tutorials. These tutorials effectively explain game mechanics, weapon operation, and enemy AI. Each player thus enjoys a unique experience, discovering solutions to puzzles and overcoming challenges. A notable example is the instruction to use the gravity gun and saws to defeat enemies. Through the clever use of a halved enemy mesh cut by a saw, players can make the connection to employ the gravity gun. Alternatively, players may devise alternative methods to progress through the area. This instance is among the well-known cases, yet *Half-Life*, *Half-Life 2*, and their sequels extensively utilize the game environment to teach, guide, and explain to players, contributing to their current standing.

In *Firewatch*, environmental storytelling elements extend beyond specific areas. An evident illustration is the presence of notes within supply boxes.

While these notes may not directly impact the main plot, they provide additional context to the game world and unlock new dialogue options with Delilah when picked up and read. Furthermore, numerous elements indicate that the current location was previously inhabited by others.

In *Gone Home*, particularly in the early stages of the game, environmental storytelling elements serve to provide context regarding the family's experiences during Kaitlin's absence. These elements go beyond simply conveying stories directly related to the game's setting. While certain objects fulfil this function, such as the electrical insurance note, which explains the source of the peculiar noises throughout the house and the technician's inability to resolve them.

In the case of *Bioshock Infinite*, similar to many others, the player arrives in the city with the same knowledge as the main character. Therefore, it becomes crucial for the game to effectively communicate the past, present, and future events surrounding the character's arrival. *Bioshock Infinite* excels in illustrating how the player's actions impact the world and reveals the unfairness within Comstock's utopian creation as Booker and Elizabeth strive to escape. Additionally, the game skillfully portrays themes of racism, classism, religious fanaticism, and their influence on everyday conversations and subtle details. The elements of environmental storytelling in *Bioshock Infinite* extend beyond mere exposition of each individual scenario, tackling deeper and more intricate questions.

As previously mentioned, *Half-Life 2* surpasses the conventional use of narrative in level design. Valve's visionary approach has left a lasting impression on players. This serves as clear evidence that not only does this method of storytelling resonate with people, but it also enhances the overall gaming experience. It is important to note that not all games can effectively employ these storytelling techniques, as *Half-Life*'s narrative is uniquely suited to this approach.

In both cases, the environmental storytelling elements seamlessly integrate with the game world, devoid of a sense that they were artificially placed solely for narrative purposes.

The environmental details in *Gone Home* are thoughtfully placed throughout the game. The recent departure of the family helps to create a cohesive atmosphere, making it understandable why cardboard boxes and clothes are scattered around the house.

In *Bioshock Infinite* all the scenery elements are very well placed and justified within the game world. A good example are all the posters scattered throughout the game, these can be divided into different categories depending on their function.

- Advertising, and within this category we can find
 - o Advertising of the tonics
 - o Advertising of the city
- Propaganda

All of them have the same function, to expand the worldbuilding of the game, besides, as we have seen before, the tonic advertising posters are used to give information of possible advantages that you will find later on. On the other hand, the propaganda posters, which are usually religious, help to understand why the population is so afraid of De Witt since they are in charge of presenting him as a demon. The Voxophones, despite not interrupting the gameflow directly, are elements that normally would camouflage very well with the environment, so to avoid this designers decided to make them larger than normal, which can be a bit weird at times.

Half-Life 2, released in 2004, faced limitations in graphical capabilities and presented science fiction elements that differed from real life. However, these factors did not hinder the player's understanding. The game effectively

explained the operation of its own created weapons and objects, such as the gravity gun.

In *Firewatch*, the signs, posters, notes, and conversations are universally understandable. For instance, posters featuring fauna of the area and sports teams from different cities of the United States can be comprehended through their design, which resembles sports team logos found worldwide. Similarly, signs guiding people through the park, indicating popular destinations like lakes and valleys, can be easily understood, even if their specific details may differ in other regions.

Gone Home tells a straightforward story. Audio tracks of Sam's diary provide situational context, while notes, papers, and posters that initially may seem unrelated gain justification as the game progresses. Despite this, the player doesn't feel excessively guided or overwhelmed with explanations. Similar to *Firewatch*, all the elements in *Gone Home* are easily recognizable and interpretable.

Bioshock Infinite's setting in 1912 with specific technological, architectural, and fashion styles, combined with its incorporation of fantastical elements like a floating city, tonics, and robots, could potentially create visual clashes. However, all the fictional elements function believably and are well-placed within the game world. Environmental storytelling elements effectively convey the context and functioning of these elements without causing comprehension issues.

The *Half-Life* saga effectively introduces players to the expansive and complex world created by Valve. Despite its depth, the game's elements are well-understood, thanks to Valve's correct approach to storytelling.

Firewatch excels in its realistic dialogues between the main characters. Additionally, environmental elements contribute to the narrative progression.

For example, the broken girls' camp and scattered items near the lake provide hints of what the player may encounter next.

Gone Home heavily relies on written paper notes to convey its story. Considering the game's 90s setting, the use of notes as a means of communication is natural. Sam's private diary further enhances understanding of her feelings and experiences. While leaving the electricity on after the family's departure may not be realistic, it serves gameplay purposes and helps create atmosphere.

Unlike indie games that often use notes to expand narratives, Bioshock Infinite takes a different approach. It utilises Voxophones, providing a more elegant solution but introducing other challenges. The game's soundtrack, incorporating real music from the late 1800s and early 1900s, enhances immersion. The inclusion of licensed songs demonstrates the game's larger budget compared to indie titles.

In no case does Half-Life 2 excessively rely on notes as a storytelling resource, unlike Bioshock Infinite. The latter game, having a larger budget compared to Firewatch and Gone Home, could develop more intricate assets to convey its story.

Firewatch effectively allows the player to discover the narrative at their own pace while also nudging them forward when necessary. The well-designed world incorporates story elements that expand the game's worldbuilding, such as stumbling upon an NFS supply box during a hike between two story points.

Gone Home creates a unique sense of isolation within a house that feels unfamiliar yet strangely familiar. The player's freedom to explore and ample time to understand the space contributes to this atmosphere.

Bioshock Infinite's levels are richly decorated, with many assets contributing to the game's narrative. However, the design emphasises a clear

distinction between combat-focused and narrative-focused areas. This differentiation assures players that story moments won't be missed during combat sequences, as the game encourages them to focus on survival and combat. Exploration is made more enjoyable by providing ample time to delve into the game's presented world. However, in the long run, this system can feel artificial to some players.

Half-Life 2 masterfully combines story and gameplay, often employing multiple features mentioned in Smith and Worch's work (Harvey Smith, Matthias Worch, 2010). This ensures a smooth flow of the game, preventing boredom from prolonged story or combat segments.

Firewatch's environmental storytelling elements ignite curiosity and a desire to uncover the unfolding plot. The inclusion of a character who, like the player, is new to the environment enhances the connection, as both discover the story together. This approach effectively avoids the problem of Amnesia, as described by Ernest Adams, ensuring players feel engaged and informed about the main character's values and goals.

Gone Home consistently evokes intrinsic curiosity, compelling players to learn more about the protagonist's family, their absence, and their whereabouts. Each room and narrative thread fuels the desire to uncover what lies ahead. Sam's diary audio recordings provide both companionship and intriguing hints about the story's progression.

Bioshock is an artistically and graphically impressive game, enhancing the enjoyment of exploring and understanding its detailed environments. Reading advertising posters, eavesdropping on conversations, listening to Voxophones containing memories—all these elements entice players to continue their exploration and discover what the world and the game have to offer. This is made possible by Bioshock Infinite's AAA budget and an experienced development team.

The relative linearity of the game makes the player feel that all the time is doing things and advancing in the story. In addition, the scripted event systems and environmental storytelling that the game uses to explain its narrative make the player rarely stop playing for a long time, thus generating a continuous curiosity to know what happens next. Not only because of the improvements you will get or what new character you will meet, but also to see the different scenarios of the game and its settings.

In the case of *Firewatch*, there are no puzzles or complex tutorials that require extensive explanations for the player to understand. The tutorials for various actions, such as jumping, climbing, and descending stone walls, are indicated intradiegetically through elements placed in the world. The player is prompted by a UI to push the corresponding key for specific actions.

Gone Home utilises environmental storytelling elements primarily to convey its narrative and evoke emotions in players. The gameplay is intentionally simple, eliminating the need for complex tutorials. Unlike *Firewatch*, the tutorial is presented at the beginning of the game through an image showing the WASD keys and mouse actions. This approach effectively familiarises players with the controls in a concise manner.

In *Bioshock Infinite*, players can often learn how to use the game's salts by reading scattered advertisements in Columbia. Additionally, listening to conversations can provide hints about future encounters and allow players to prepare accordingly. The environmental storytelling elements in the game extend beyond narrative explanations for specific areas.

In *Half-Life 2*, the game does not rely on extradiegetic tutorials to explain the controls. Many of the puzzles are physics-based, requiring players to utilize basic game mechanics to overcome them. However, the first time a player is required to perform a particular action to progress, a small pop-up appears on the screen, specifying the key to press.

Firewatch effectively employs environmental storytelling to enhance the narrative experience. For instance, when the player returns to the cabin after visiting the lake, a suspicious silhouette can be seen stalking them, and the discovery of a vandalized cabin creates a sense of unease during subsequent hikes in the woods. The game also utilizes elements like the sound of flames, a distinct color palette, and the urgency of meeting Delilah amidst a forest fire to evoke anxiety.

In *Gone Home*, the constant sound of rain and occasional lightning and thunder in the distance contribute to the game's unique atmosphere. As previously mentioned, the discovery of Sam's journals when finding certain items further deepens the player's understanding of the story and enhances immersion.

Throughout *Bioshock Infinite*, environmental storytelling elements extend beyond static narratives. Music, heard through radios scattered across the map, helps players immerse themselves in the world and the developers' crafted story. The songs, many from the period depicted in the game, contribute to the overall experience.

Half-Life 2 effectively utilizes environmental storytelling to evoke emotions in players. For instance, in an interrogation room early in the game, the player can witness a guard closing a small window into a cell, creating a sense of discomfort. This feeling intensifies when entering the room and discovering a blood-filled floor. The game features numerous moments where designers skillfully guide players' emotions solely through environmental elements.



F.2.7 - Half-Life 2: Intro

Project Management

The keys to a great project are organisation and methodology. With these two factors in mind, here what methods used to keep this part of the project clear, clean and organised.

Hours	Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
44 h	Memory														
4 h	Introduction														
4 h	Motivation														
40	Gather Information														
40	State of the Art														
32	Development														
10	Project Management														
4	Methodology														
4	Bibliography														
			Design												
			Production												
			Iteration												

T.1.1 Gantt diagram

Tools

- **Github**, in order to have a backup version and the ability to work everywhere I will use Github.
- **Visual Studio Community 2019**, this code editor of choice for most programmers when working in Unity.
- **Unreal Game Engine**: The game engine of choice for this project, first of all, it's free. As mentioned before, the Unity game engine could also be used. The Unreal game engine is the selected one because the documentation is more specific and there are lots of tutorials.
- **Blender**: software that will mainly be used for 3D modelling, it's an open source project with a good and open community around it.
- **Gimp**: image editing software, used to make textures for 3D models. It's an open source project with lots of information and tutorials on how to use it.

Validation

In order to assess the progress and desired quality of the demo, it will be tested with three types of individuals.

User	General video game knowledge	Specific knowledge
New to videogames	None	None
New to videogames theory	Good	None
Not new to video games nor video games theory	Professional	Professional
T.1.2 Validation table		

DAFO

	Positives	Negatives
Internal Origin	<p>Strength</p> <ul style="list-style-type: none"> - Strong Unity and coding knowledge 	<p>Weaknesses</p> <ul style="list-style-type: none"> - Not really experienced in the art part of the project
External Origin	<p>Opportunities</p> <ul style="list-style-type: none"> - Lots of people could take advantage of this work 	<p>Threats</p> <ul style="list-style-type: none"> - Low realistic reach - Maybe the iteration part of the project will be very time consuming
T.1.3 Dafo table		

Risks and contingency plan

Here, possible problems that could arise during the project will be considered and resolved.

Risk	Solution
The design part of the game takes up too much time	Follow the delivery dates perfectly
Art part being very time consuming	Buying the asset in question
The iterating part of the project takes up too much time	Modifying the way the playtesting sessions work in order to work smoother
Not finding proper information on the subject	This subject not only exists in video games, also in cinema and theatre. In the case I'm not able to find information specific to video games I will look for cinema and theatre fonts.
T.1.4 Risk and contingency plan	

Initial cost analysis

Here, the cost of developing this project will be discussed, considering that most of the software used is free or open source. The project is expected to be completed in 4 months, as it is a playable demo rather than a full game.

Expense class	Payment Type	Amount	Total Amount
Salary	Monthly	650.00€	3.250,00 €
Unreal	One time payment	Free	0,00€
Blender	One time payment	Free	0,00€
Gimp	One time payment	Free	0,00€
Visual Studio Community	One time payment	Free	0,00€
Github	One time payment	Free	0,00€
Computer	One time payment	900.00 €	900,00 €
Mouse	One time payment	15.00 €	15,00€
Keyboard	One time payment	20.00 €	20,00€
Monitor	One time payment	100.00 €	100,00€
Assets	One time payment	100.00€	100,00€

			4.385,00 €
T.1.5 Cost table			

Methodology

To produce the game demo, a linear structure will be followed to ensure clarity and understanding of all points before proceeding to the next step of the process. However, the final part deviates from this structure as the demo design will be iterated upon. User feedback will be obtained to assess what aspects are effective and what areas require improvement, allowing for iteration on the initial idea.

Development phases

This work will be based over five clear phases.



T.1.6 - Scheme Source: Personal

- **Planning:** at the outset of the project, the work will be structured to establish the flow of tasks and determine release dates, ensuring the project remains on schedule.
- **Research:** during this phase, information will be sought from various sources to gather relevant data.
 - Papers.
 - Books.
 - Videos.
 - Podcasts.

This phase will be dedicated to gaining a comprehensive understanding of the subject matter and establishing a solid foundation for building the demo.

- **Design:** will be the phase of applying the concepts learned in the research phase and use them in order to build the concept and design of the demo.

- **Production:** will be the phase of moving the Design decisions to reality using the Unreal Game Engine, this phase will also involve learning about code, art production.
- **Iteration:** will be the phase of receiving feedback from the users that test the demo, analyse this feedback and study how to apply it to the demo.

Development

Introduction

In this part, we will discuss and explain the procedure followed during the development of the game, as well as the methodology used to develop the different parts of the project. The technical specifications of the equipment used for this project are as follows:

- Processor: Intel Core i7 8700k @3.70GHz.
- RAM: 16.00 GB Dual-Channel DDR4.
- Motherboard: TUF Z360-PRO.
- Graphics card: Nvidia RTX 3070.
- Storage: 250 GB SSD (970 EVO).

This equipment has been selected to ensure smooth performance in Unreal Engine, considering its demanding nature. We will now delve into the decisions made during the development process and the underlying philosophy that guided those decisions.

Unreal Engine version

For the development of the game, the 5.1 version of the program has been chosen. During the initial stages of development, Epic Games introduced the preview release of version 5.2 of their engine. However, the decision was made to stick with version 5.1. This choice was driven by the fact that new versions of game engines often come with minor errors and bugs that may not be present in older versions. Additionally, version 5.1 offers several features that enhance the efficiency of game creation. Notably, the inclusion of Soundscape simplifies the programming, implementation, and design of the game's audio elements.

F.2.8 - Unreal Engine logo⁷

Game features

The game is designed as a first-person exploration experience, placing players in the role of an employee from a prominent real estate company. The objective is to investigate the enigmatic vanishing of a colleague who went missing while attempting to purchase a plot of land from a family residing on an island in the north-western region of the United States.

While the game will feature various puzzles to solve, the primary emphasis lies in the player's observations and deductions based on the surrounding environment. To aid in their investigation, players will possess an analog camera, which they must utilize to capture photographs of potential evidence encountered throughout their journey on the island.

Game mechanics development

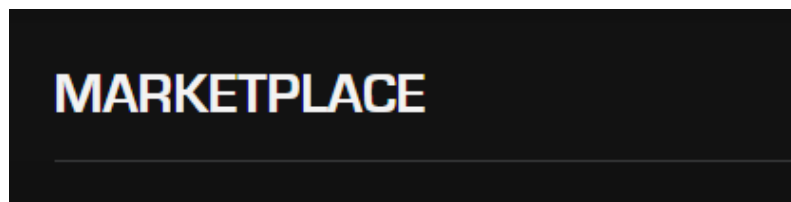
The photo camera utilised in the game was sourced from the Unreal Engine asset store under the name "Instant Photo Camera." This particular asset proved to be instrumental in expediting the testing phase of the in-game photography mechanic.

⁷ From: Unreal Engine:

<https://www.unrealengine.com/en-US/blog/unreal-engine-5-1-is-now-available>

To facilitate the player's movement and interactions with various in-game objects, we employed an asset named "First Person Story Adventure," which was generously provided by Epic Games as a complimentary offering. This asset significantly streamlined the development process by providing an interaction system with the game world and objects, along with the inclusion of diverse menus.

It is worth noting that both assets, "Instant Photo Camera" and "First Person Story Adventure," were developed by Palinoia Interactive.



F.2.9 - Unreal Engine marketplace logo

World creation

The island itself plays a pivotal role in the game, and to achieve a realistic atmosphere, I incorporated the "Northern Island Pack 4x4 km" asset developed by Freshcan 3d. This asset proved to be indispensable in bringing a lifelike quality to the game world.

As for the house featured in the game, I utilised the "Atmospheric House (Modular)" asset provided by Finward Studios. It's worth noting that this asset was available for free during the development period.

The remaining assets used in the game were either created manually or sourced from Sketchfab, a platform offering free assets under licences that permit unrestricted usage without the need for attribution.

To bring the seagull characters to life, I integrated the "Animal Variety Pack" asset developed by PROTOFACTOR INC, which provided the necessary animations for the seagull behaviour within the game.

Audio

To acquire the necessary audio files, I utilized the free content page freesound.org, which provided a wide selection of sound files that were downloaded for use in the game. In cases where modifications were required, I relied on the built-in editing capabilities of the Unreal Engine.

However, I must mention an exception regarding the player's footsteps. To achieve more realistic and immersive footstep sounds, the "Footstep Sound Effects [PRO]" asset was employed.

Additionally, for the sound of the waves, I recorded them using a mobile phone, ensuring an authentic and captivating auditory experience.

Decision-making

Throughout the project's development, several significant decisions were made that greatly influenced the final outcome.

The initial and foremost decision involved removing the player's mesh to avoid potential issues with animations and collisions. Initially, the character possessed a basic mesh with various animations for actions, but it became evident that these animations could cause visual and mechanical conflicts in the future. Thus, the decision was made to eliminate the mesh altogether.

Another crucial decision focused on determining which variables should be saved in the game's save game system to ensure smooth loading and saving. To optimise the overall experience and minimise loading times, it was decided to save only the essential variables.

Lastly, an important decision was made to incorporate an interaction menu for actions such as opening doors. While initially opting against such menus, it was realised that players might not grasp the intended actions without clear visual cues. Consequently, the decision was made to implement interaction menus to enhance player control over the game world.

With these decisions in mind, let's delve into specific aspects of the game to explore the theoretical principles applied in practical implementation.



F.2.10 - Screenshot of the first part of the game showing the office where the protagonist works

This scene is dimly lit to help the player notice the parts that are clearly lit.

Of these there are two that are clearly differentiated:

- The first is the desk lamp that illuminates a box and a cassette player.
- The second is the exit sign that tells the player where to leave the level.

On the table can be found a note, a cassette and a box. If the cassette is played a voice will be heard explaining what our goal is and why we must fulfil it. The same can be found written in the note on the table but, as mentioned above, it is much more interactive to listen to an audio than to read a whole letter.



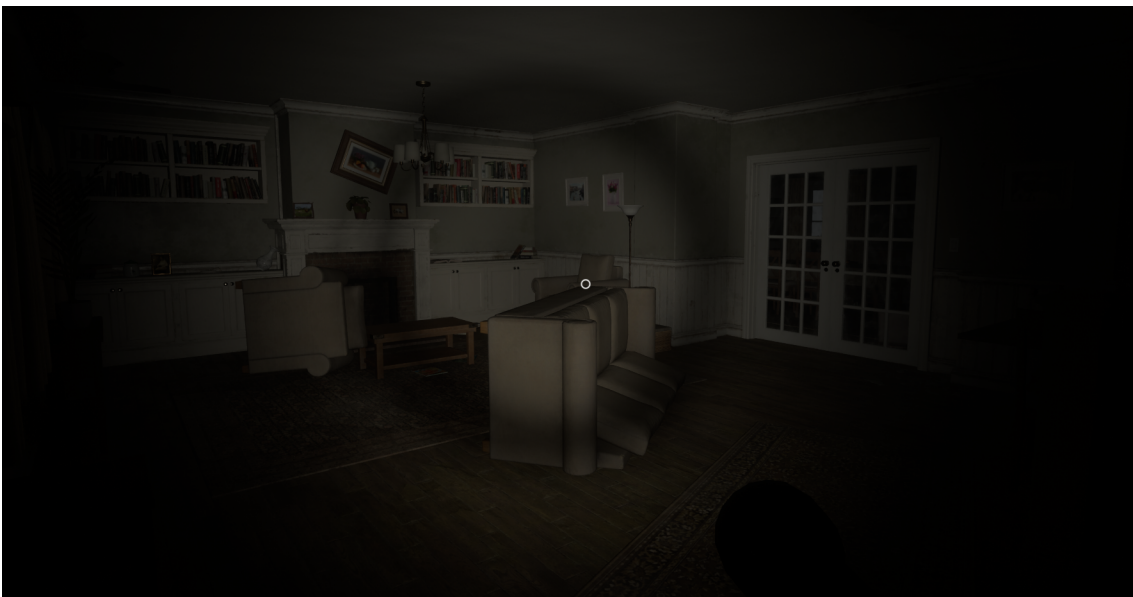
F.2.11 - Closer look at the table

The following image is from the main level of the game.



F.2.12 - Night scene with the board lit.

Once the player arrives at the family's property it is already dark and the player must use a flashlight to be able to see where he is going. The first thing that stands out is a board with papers pasted on it. If you get closer and read some of them you can understand that they are papers describing the different offers the family received for their property.



F.2.13 - Image of the first room of the house

When the player enters the house he can quickly observe that everything is in disarray and with clear marks of violence. On the other hand, there are open cupboards and food, clothes and furniture lying on the floor. These objects are placed this way to imply that there was some kind of fight and then the family had to leave quickly.



F.2.14 - First view of the kitchen clock with blood stains next to it

To provide guidance and convey a sense of something ominous, blood marks were strategically placed near the wall clock in the kitchen. Furthermore, the key required to access the basement was cleverly attached to the clock's bell.



F.2.15 - Door leading to the basement with blood stains on the floor

Finally, the next part of the house to visit is the basement, which is the area where you will find more clues about what has happened in the house.



F.2.16 - Basement area with two tables, one is full of televisions repeating the same image all the time and the other one is full of blood.

In the basement area there are several boards with photographs showing that the father of the family was very paranoid and under constant stress. In them you can find photographs of important people of the time as well as "proofs" that try to disprove different historical facts.

On the other hand, we have six televisions that reproduce looped images of things like UFOs, or President Kennedy.

Next to it a table with a knife can be found, both of them are full of blood.

Playtesting

To ensure the effectiveness of the elements implemented throughout the game's different levels, a user test was conducted. Prior to conducting the test, valuable insights were gathered from the book "Games User Research" (Drachen, Mirza-Babei, Nacke, 2018), which aided in creating an optimised testing approach to gather user feedback.

Two separate tests were conducted, with user selection following consistent guidelines. The first test, conducted during the game's development phase, aimed to validate the project's adherence to proper level design

principles and narrative structure. This test served as a means to assess whether any revisions were necessary in these foundational aspects.

The second one was carried out once the prototype development was finished, to see if it was necessary to correct or modify any component of the game as well as to find bugs and errors.

The users who tested the prototype can be divided into three groups. The factors used to determine which group a user should be in are:

- The amount of knowledge about video games.
- The diversity of video game genres played.

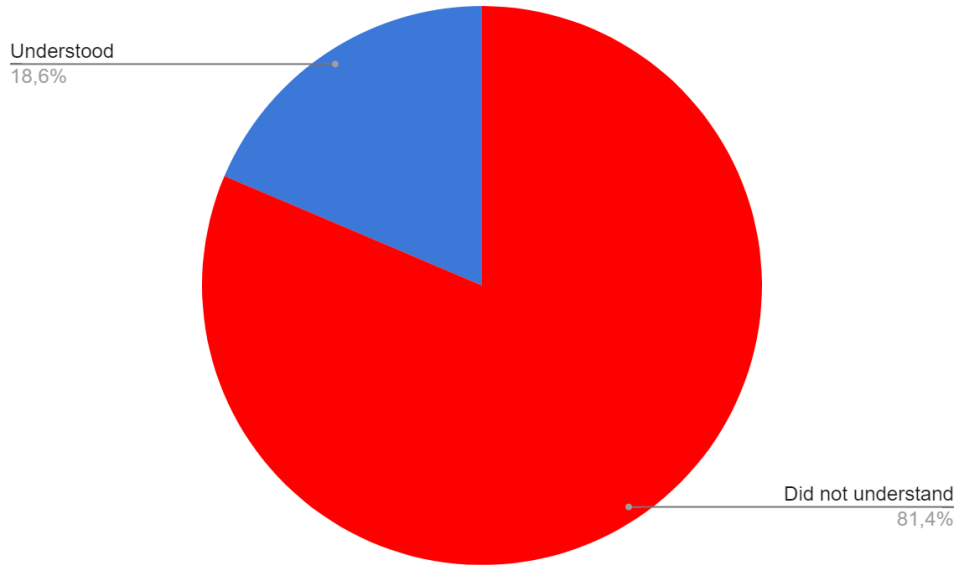
Taking these factors into account, the following three groups were created:

- They do not have much knowledge and do not play many video games.
- They have an average knowledge of video games and play a variety of different video game genres.
- They have a wide knowledge of video games and play many different types of video games.

For the tests the users first tried the game with an external person who would only help them if they did not know how to progress. After finishing the prototype they answered a questionnaire.

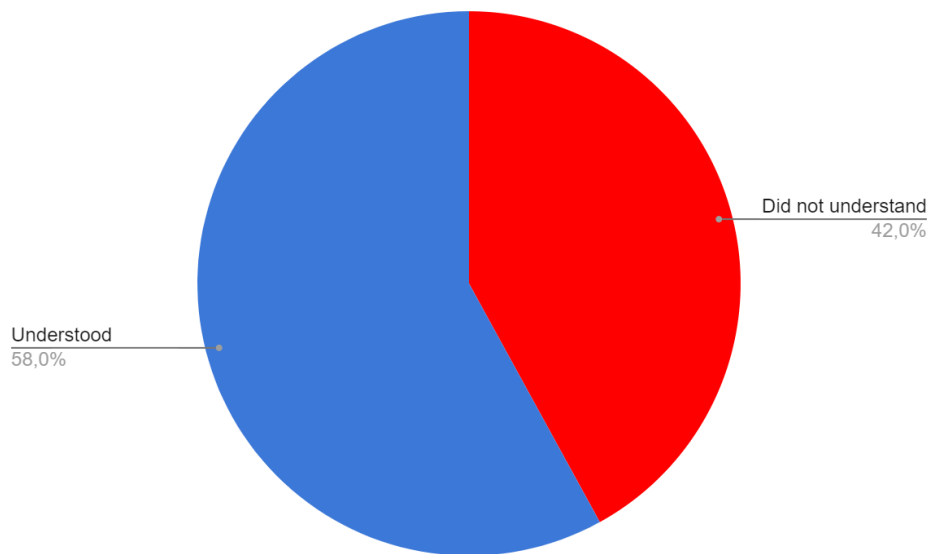
Most of the questions focused on the feeling of the game and their experience playing it. This was a preparation for the important question, whether they felt they understood the story the game wanted to tell. This was followed by a space for them to write a short summary of the story.

Little knowledge and few genres played:

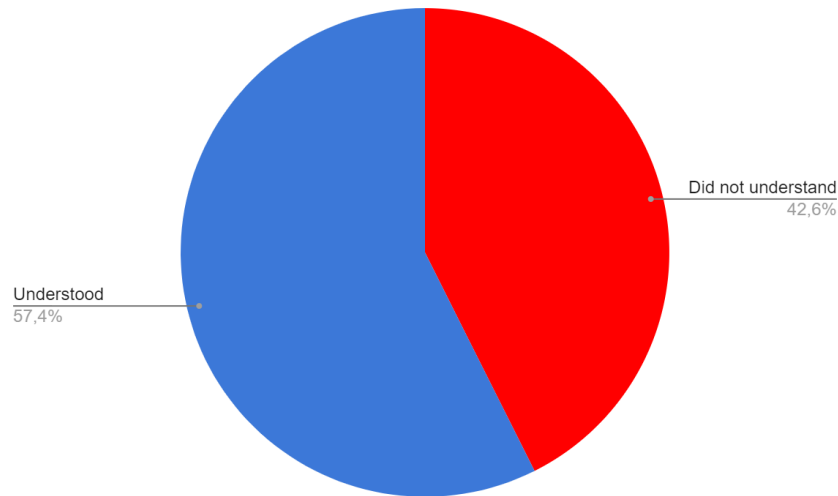


F.2.17 - Graphic displaying the results of the test

Average knowledge and different genres played:



F.2.18 - Graphic displaying the results of the test

Great knowledge and a lot of genres played:

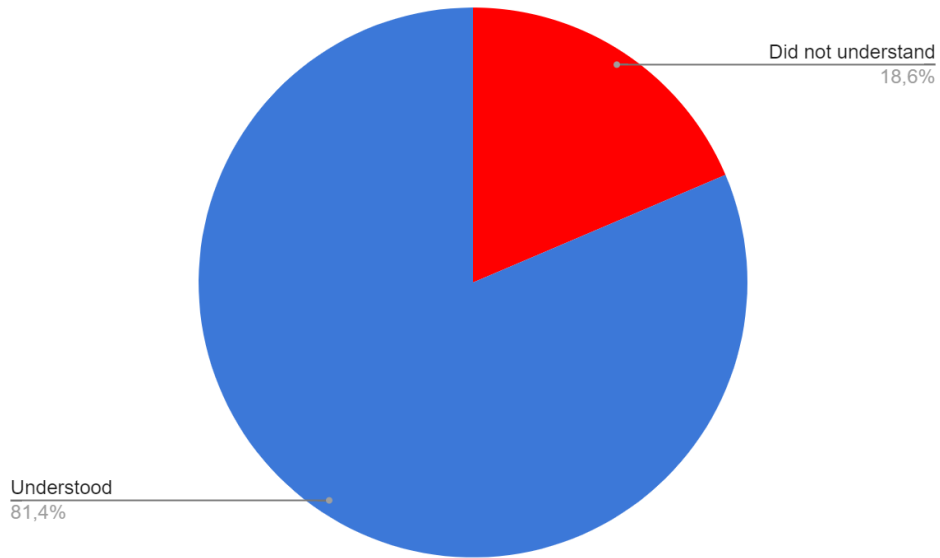
F.2.19 - Graphic displaying the results of the test

Upon reviewing and analysing the results, it was observed that a significant number of individuals in the non-gamer group had difficulty understanding the game's story. This outcome was anticipated since the development phase primarily relied on text-based assets to convey the narrative, as they are relatively easier to produce. It was observed that non-gamer participants tended to bypass these assets and proceeded directly to the end of the level. Furthermore, when they did engage with the assets, they often left them unfinished due to the excessive amount of text, which made them tedious to read.

To address these issues, modifications were implemented to enhance the visibility of the assets and make them more concise and focused. Additionally, certain assets were completely transformed, replacing paper notes with blood decals on the walls and interactive cassettes, resulting in a more engaging and appealing prototype. The basement area, which portrays the transformation of the father character after returning from war, underwent significant changes to make it more visually impactful.

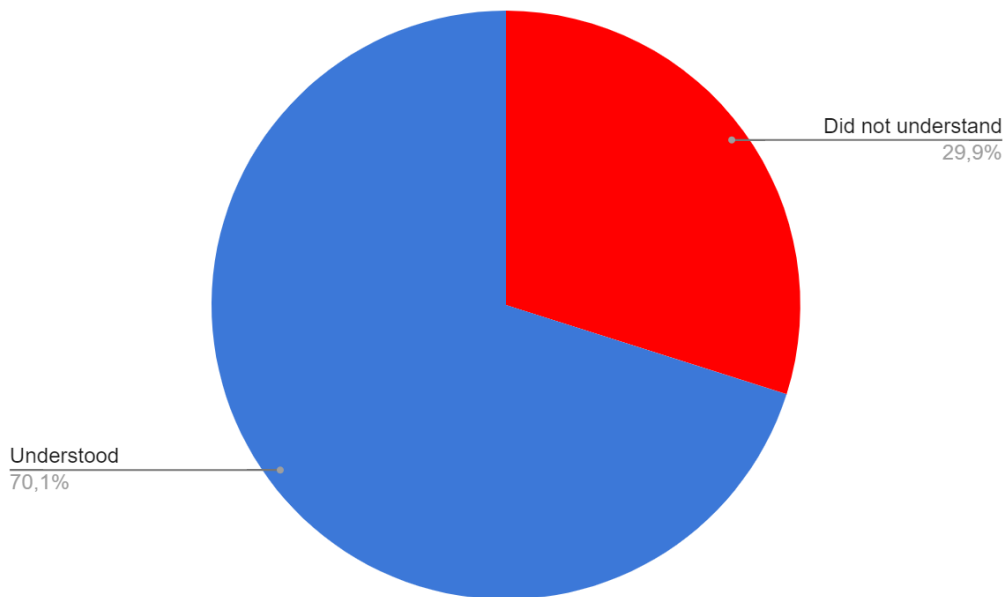
In the remaining two sectors, the results aligned with expectations, thus confirming the decision to proceed with the project's development. Subsequently, a follow-up test was conducted, involving a mix of new users and those who had previously tested the earlier prototype. The following section presents the outcomes of this subsequent test.

Little knowledge and few genres played:



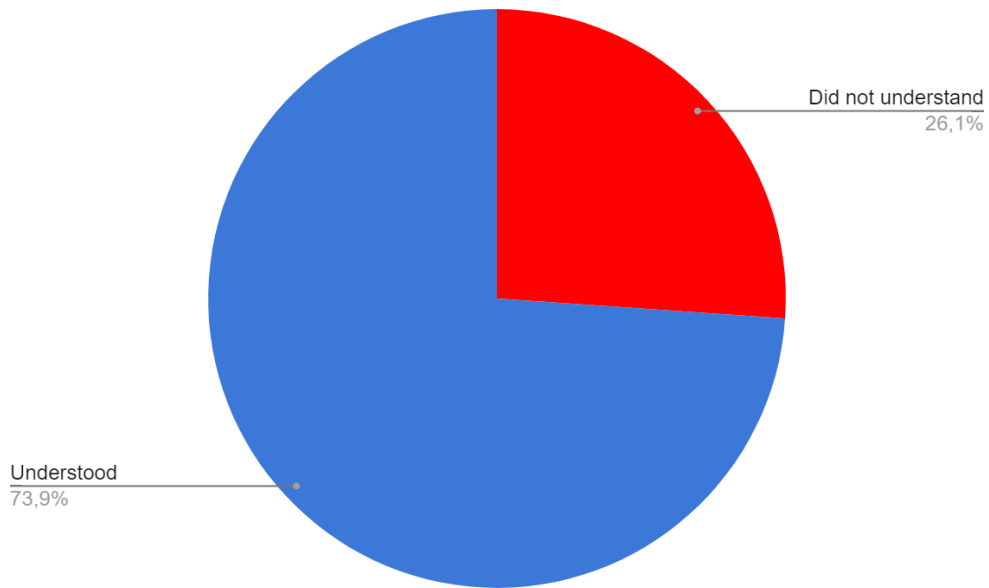
F.2.20 - Graphic displaying the results of the test

Average knowledge and different genres played:



F.2.21 - Graphic displaying the results of the test

Great knowledge and a lot of genres played:



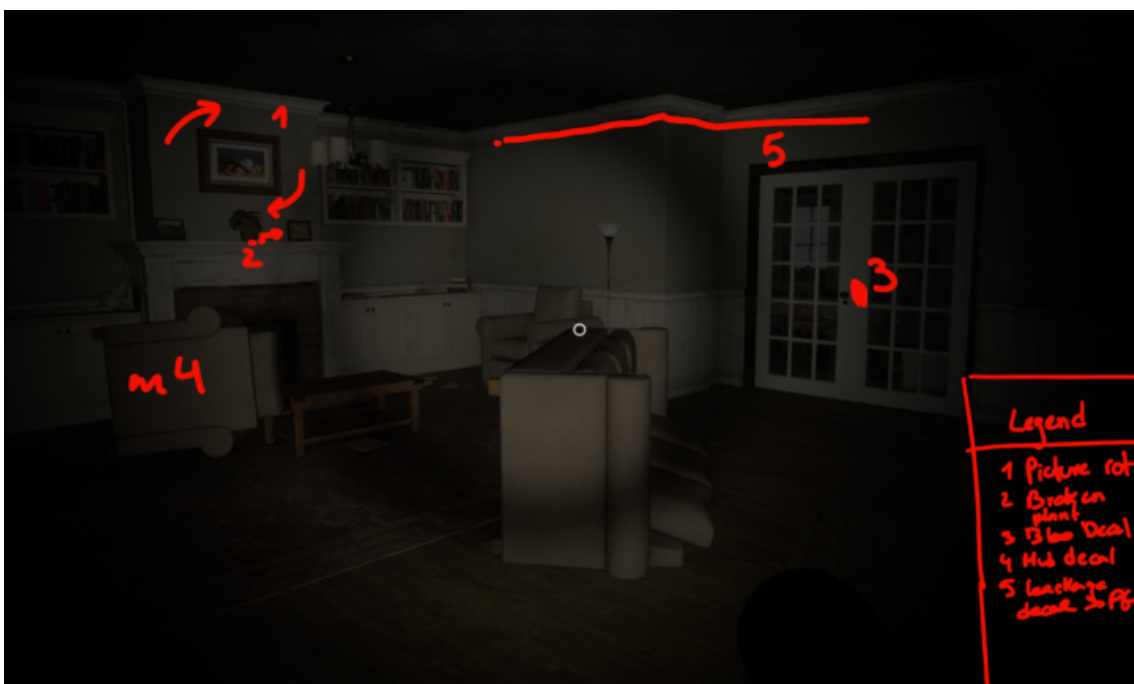
F.2.22 - Graphic displaying the results of the test

Based on the latest results, it is evident that the modifications implemented in response to the previous findings have led to an improved understanding of the game's story among users.

Conclusions

Accomplishing this work has given me a much broader perspective not only of the subject of the work itself, but of the different disciplines that are needed to make good games with an interesting narrative.

I have come to understand that the environmental storytelling narrative system is not applicable to all video games as a main method as it does not work well in games with a focus on action and dynamism where you have to be thinking about enemies or where to go to avoid being killed. But it always enriches the experience to find elements of environmental narrative in the game world.

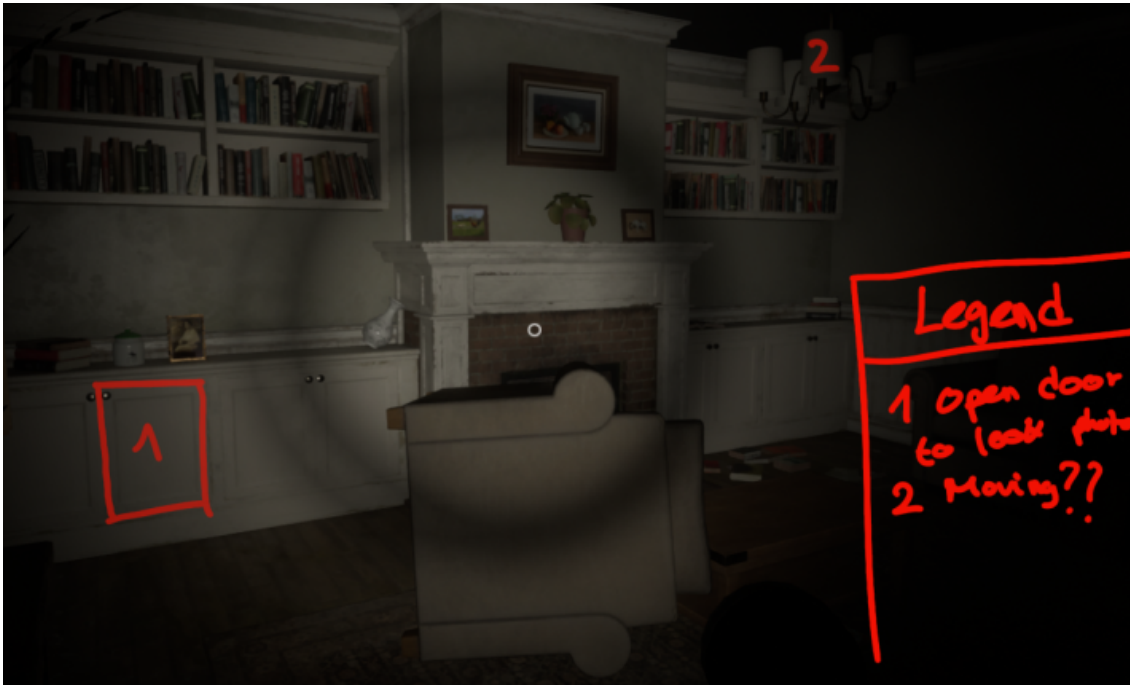


F.2.23 - Example of design sketch of the main house

On the other hand, I have proven that, to limit the player within the spaces of the videogame, using as "walls" diegetic and logical elements of the world in which the player is is the best option. If it is not done in this way the player can start to see that the world in which he is is something artificial and created by another human being, which completely breaks the immersion in the game.

While doing this work I have discovered that another key factor when designing and developing the different assets that will be used for the environmental narrative is to take into account the different cultural realities of the player base that will play your game. Under no circumstances should you give global theories or ideas without first checking it, because if you don't do it, it can cause that some of the people who try your game don't understand

some aspect of it or that they consider that it doesn't make any kind of sense. To avoid this mistake you should always use references that you know with certainty that everyone will understand, and also test them with real users.



F.2.24 - Example of design sketch of the main house

One of the main problems I have encountered when developing the prototype, and which has been one of the points that the testers have remarked, is to know how to manage the player's attention well when he/she is playing. The main mistake I made in this aspect is to assume that all players would stop to cautiously inspect all the clues I placed around the world, but, as I said before, when testing with users I saw that this was not the case. The method I used to fix this problem was to modify or redo all the assets that were getting heavy to make them more interactive and quicker to read and assimilate.

Another problem I encountered when developing the game was that users did not know which objects they could interact with and which they could not. This problem is somewhat increased by the realistic aesthetics of my game. I think I should have been able to recognize this error in the design phase since, unlike the previous one, it is much more obvious, but I think my solution has been elegant and functional.

The main problem that I have had, and that I saw in my research that many people noticed, is not being able to properly organise the time and effort to produce artistic assets, such as models, textures, etc... This problem is given by two main factors:

- I am not an artist.
- At first I considered that with the free assets that Epic Games gives away and some free assets from the internet will be enough. In the end, luckily, I had enough time to make all the assets I needed.

Another factor that I am proud of is how the two levels in the prototype are mixed in a coherent way. When doing the theoretical part of this work I realised that many of the video games that base their narrative on environmental storytelling do not have levels that are very different from the artistic point of view. I remember that when I played the different games I analysed I did not notice this detail, and, now, I have understood that if those same games had dozens of different worlds it would be impossible to explain a story using always coherent elements between the worlds. Despite this difficulty, for my game I considered that it was essential to have the level of the office for the introduction, both narrative and mechanical, of the game and I consider that it fulfils its function perfectly.



F.2.25 - Example of design sketch of the main house

On the other hand, I have understood how necessary it is to test with different groups of users to modify possible errors or reiterate aspects that were thought to be finished. After all, if the elements designed for the player to understand the story do not work, the game will be empty of meaning, a fact that worsens if the game remains in basic gameplay mechanics.

In conclusion, I would like to say that this work has made me investigate a world that interested me but of which I did not know the depth. I am more

than satisfied with the work I have done and that I am proud of both this paper and the prototype I have made.

Future Plans

The future plans for this project are clear: to finish the prototype itself and make it a proper game:

- Optimise the game to run much more smoothly on all types of computers.
- Fix bugs and errors.
- Add accessibility options.

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