Shadows of a SUNLESS WORLD



1-CONCEPT PRESENTATION

A-Subject

The original idea was to put the sound at the center of a game, and to imagine how would a blind-born person perceives the world. We wanted the sound to be something that rules the universe (at the beginning, the sound was responsible for the correct flowing of time for example), as well as the gameplay. We imagined an action/adventure game, Rime or Journey style, in which you would explore, fight monsters with a musical instrument, and solve puzzles using sound. We wanted to design monsters that feast on sound, but are repelled by music: we thought of it as a cool duality to express, music being not only sound, but "another kind of sound".

Then, when we formed the team, we all discussed what was the main mechanic of the pitch, which was the fact that you unveil your environment by emitting sound waves. We thought it was a good playground for

another kind of game: you guessed it, a horror game, as they tend to like things like uncertainty and low field of view. Plus, as the audio is crucial for the atmosphere in such games, we thought it was a good idea to use the sound as a gameplay, lore and atmosphere feature.

So, we kept the following features of the original pitch, and weaved around them: echolocation, ultrasound-reactive monsters and an exiled character alone in a desolate land fighting for his survival.

B-Relevance to game platforms and means of distribution

For an optimal experience, a horror game is played in a controlled domestic context, it could mean alone, in calm and into darkness.

Thanks to its low-poly design, "Shadows of a Sunless World" will be resource-efficient.

In addition, because it can be played both on the keyboard and the controller, our game can be released on consoles and PCs and that's interesting because those kinds of games almost only exist on Steam. That's why we focus to release our product on digital stores of all sedentary platforms.









2-THE PROJECT AND ITS ORIGINALITY

"Shadows of a Sunless World" is a first-person 3D horror game, in which the player controls Ekko, a member of a species, called Alcars, who can only perceive the world through echolocation. Alcars lived in peace on an undefined planet different from our own, until, one day, they were attacked by monsters called Umbras. To survive, a small group of Alcars was forced to take refuge underground. Fifty years later, Ekko is banished to the desolate surface by his people. If he wants to survive, he will have to find a way to escape from the Umbras notice...

Ekko perceives the world through echolocation. Because of that, the player needs to create sounds to reveal his environement, by walking, running or throwing rocks. But by being noisy, he risks attracting the attention of enemies, the Umbras, on the lookout for any unusual sounds in their vicinity.

The game distinguishes itself by the unusual experience it offers to players. It invites them to see the world through sounds and rethink their perception of how sounds impacts our understanding of the world. The game also takes place in a fantasy setting, which is unusual for a horror game. The story, showcasing a conflict between two species caused by their biological incompatibility and their lack of means of communication, leads players to challenge their preconceived notions of "heroes" and "enemies".



3-GAME DESIGN AND GAMEPLAY

A-3C

CAMERA

The game uses a first-person camera to create a visceral experience for the player. This also allows the player to navigate the environment more easily without having to care about the placement of the camera.

CHARACTER

The player controls Ekko, the main character. Ekko is an Alcar and as such can only perceive the environment through echolocation. He has been exiled from his people and will have to find a way to survive in the land the Umbras took over. Ekko is a simple Alcar, neither strong nor weak, not swift or slow, he is just a simple being thrown out into a dangerous place and tying to survive by all means. His only advantage against the Umbras is his ability to scout materials and feel their

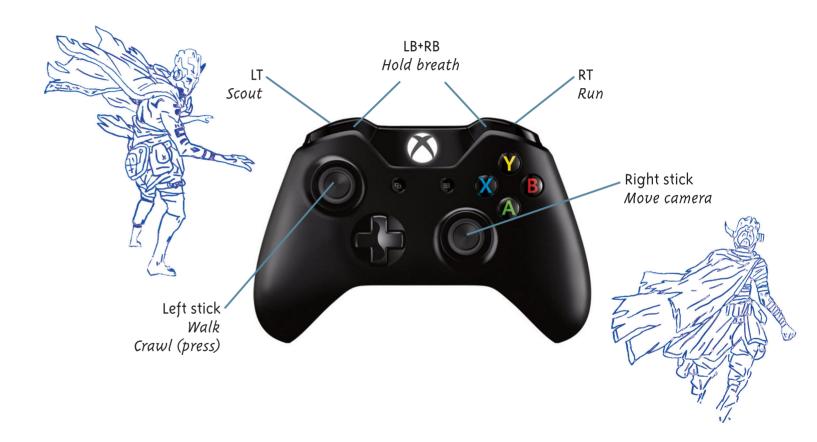
vibrations. Using this capacity and by progressing carefully and silently, he will be able to sneak past the Umbras and survive this living nightmare.

CONTROLLER

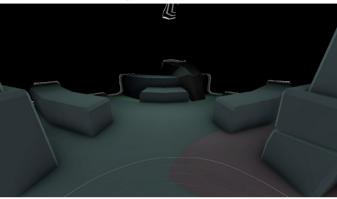
The player can move all around the environment but cannot jump or climb any surface. Each step he makes produces an echo of a strength proportional to the speed of the movement. The faster the movement is, the louder is the noise and the stronger are the echoes, revealing more of the environment by the same.

There are three types of movement:

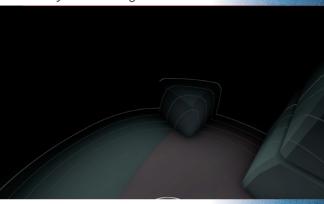
Crawling:
 Ekko ducks and is therefore very slow and fragile but is really quiet when moving. He can enter narrow spaces (pipes, holes) while crawling.

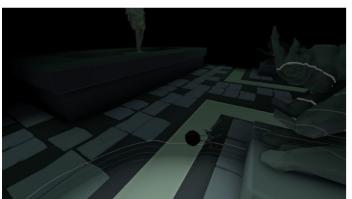


Echoes revealing the environment



Player's breathing





Revealed environment staying visible

Scouting revealing a rat

• Walking:

The normal movemen. The player's speed while walking depends on how little and how much the player pushes the joystick.

• Running:

The fastest way to move, but it is really loud and the enemies can easily detect the player.

The echoes produced by the player while moving reveal the environment around the player. A stronger echo will reveal a bigger area around him. A memory of the echoes is kept, so the parts of the environment revealed stay visible for a short time before slowly fading out. As Ekko can only see the state of his surroundings on the moment his echoes reflected on them, this creates a stroboscopic effect where moving objects and creatures appear in a jittery fashion that increases the uncertainty of the state of the environment of the player.

The player breathes and this breathing also produces a constant though small echo. As a result, the enemies can hear the player if they are close enough, even though they stand still. The player can hold their breath for a short time, in tense situations, but if they hold it too

long, they will produce a huge echo, so they have to be careful with their breath too.

The only special ability of the player is to scout some materials. By using the scouting ability on scoutable objects, the player can reveal them in their entirety, and even perceive them through walls. If a living being comes into contact with it while it is being scouted, they will also become visible to the player.

Later in the game, the player can collect special stones that produce large echoes when hitting a wall or an object. These stones are scattered around the level but the player can only carry a limited number of these stones. If an enemy is hit by a stone, it will chase the player immediately so the player must throw these with caution. But by being noisy, he risks attracting the attention of enemies, the Umbras, on the lookout for any unusual sounds in their vicinity.

B-GAME RULES

GOALS

The goal of the player is to destroy the ever-expanding dark domes that have sprawled around the remains of his civilisation. Only by doing this will he be certain that he isn't in danger of being killed by an Umbra. But doing this means that he will be casting out the Umbras the same way they did before and act as monstrously as they did. So an alternative objective for the player is to find a way to understand and communicate with the monsters and find a way to agree on a truce so that the Alcars and the Umbras can cohabit together.

To destroy each dark dome, the player must find his way inside each dome. Once inside, he must find and reach the corrupted blazing beacon that created the dark dome and reactivate it to destroy the dome.

On his way to the corrupted blazing beacon, he will have to avoid the monsters roaming the place and survive the dangers of each area. He will be able to find messages that helps him understanding the world and the ways of the Umbras.

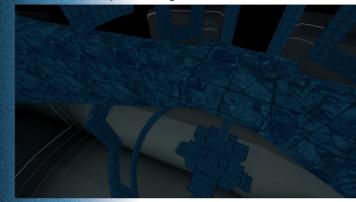
THE ENEMIES

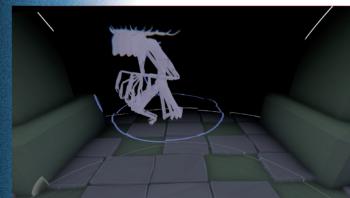
The enemies have the particularity to absorb environmental sounds and reproduce. As a result, these reproduced sounds serve as a decoy for the player that never knows if a sound is one from an enemy or not. The enemies roam around the levels of the game. They react to the sound of the echoes produced by the player.

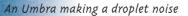
If an enemy hears an echo, they will investigate the origin of this echo a search around it. If an enemy hears too many echoes or if it hears an echo that is too strong, it will start chasing the player until the player eventually escapes the enemy by hiding is shallow spaces. If the enemy enters in contact with the player, the player loses and respawns.

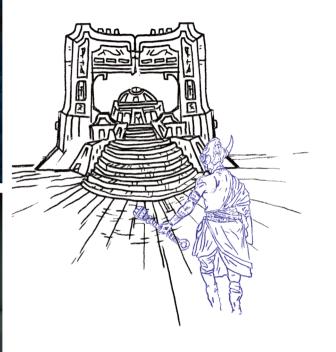
The enemies can also scream while investigating, producing an echo similar to the player's but not revealing the environment. If the player is touched by this echo, the monster will start chasing the player as well.

The corrupted blazing beacon





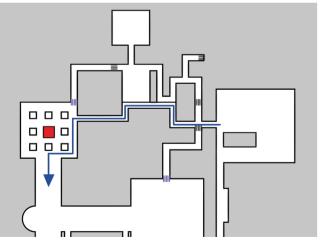


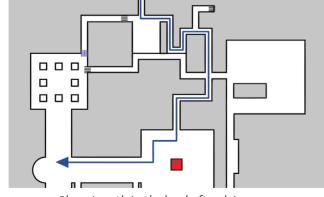


DEATH

When the enemy catches the player, the player wakes up elsewhere in the level as if he has been knocked out by the enemy. The level design is then changed and the critical path towards his objective as well.

This allows to create new situations even when the player loses and has to restart again. This prevents the player from being able to anticipate everything that will happen and maintain the feeling of uncertainty and dread even in these cases





Player's path in the level

Player's path in the level after dying

C-LEVEL DESIGN

To progress in the game, the player has to reach the end of each level while avoiding enemies. On his way, he will encounter several gameplay elements that will help or hinder him from reaching his goal.

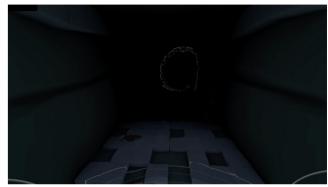
ENVIRONMENTAL SOUNDS

Environmental sounds are all the sounds that are not produced by the player. For example, a drop of water hitting the ground, a rat passing by or a monster lurking in the darkness. Unlike echoes, these sounds do not reveal the environment, but are identified through their visual feedback. The player can see there is a sound, where it is coming from, he can hear the sound, but he does not know for sure what is causing it. This reinforces the uncertainty and the dread the player might feel.

MUCUS

Mucus is a substance produced by Umbras that can be found in their habitats. It slows down the player if he walks on it, reducing his field of vision. It can be an obstacle to avoid if the player has to escape from an enemy chasing him down.

Environmental sound...

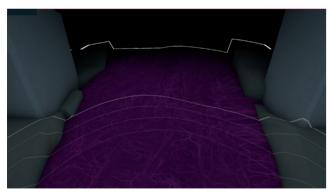




...made by flies on a dead Alcar

Mucus left by an Umbra





Mucus slowing down the player

MEMORY RECONSTITUTION

Having lived on the surface before the war, Ekko kept a vivid mental image and memories of certain places important to him. From the start of a level, these places appear in the field of view of the player, without needing to be revealed. They appear as Ekko remembers them from the past. They can serve as landmarks that he will try to reach or use to orient himself if he feels lost. Once he reaches one of them, the place is revealed as it is in present time. This is the occasion to introduce narration and stage what happened to the world because of war and time.

COLLECTIBLES

Throughout each level, the player can find messages left behind by other Alcars. They can be used to give hints and help the player understand how to avoid enemies and reward players who take to time to explore the level. They can also be used for narrative purposes and give information about places, characters, backstories, ultimately allowing the player to discover what originally caused the conflict between Alcars and Umbras.

D-PROGRESSION

LEVEL PHASES

Each level is divided into two distinct phases. The first one takes place outside the dark dome. The player explores the surface and has to find his way towards the dome. He can also reveal memory landmarks and find collectible messages. He may have to solve some environmental puzzles to progress. Once the player goes inside the dark dome, he reaches the second phase of the level. He has to navigate inside a set of corridors and claustrophobic tight spaces, avoid enemies and reach the machine that will allow him to destroy the dome. This is the phase in which he will really feel dread and horror.

LEVEL PROGRESSION

The game is comprised of seven levels in total. The player goes through them in a set order, but does not have a feeling of linearity: the player goes back to some levels after an event triggered by him, giving the impression that the world is evolving because of his actions in the world. As the player progresses through levels, he gets closer and closer to the heart of the Umbras civilisation and encounters more enemies.

TWO DIFFERENT ENDINGS

To finish the last level, the player has to destroy the heart of the Umbras civilisation, their last and most populated dome. If he manages it, he gains access to the standard ending showing Alcars coming to the surface and inhabiting it once more. Ekko reunites with his close friends, and helps rebuild a new civilisation.

However, an alternate ending exists. The player can access it if he collected enough messages left by other Alcars and revealed enough memory landmarks, thus discovering the root of the conflict between Alcars and Umbras, and inventing a way to communicate with Umbras. This ending shows Alcars and Umbras learning to coexist and compromise, overcoming difficulties together even if their relationship will stay strained for years to come.

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4-ART DESIGN

A-Artistic direction

HORROR GAME

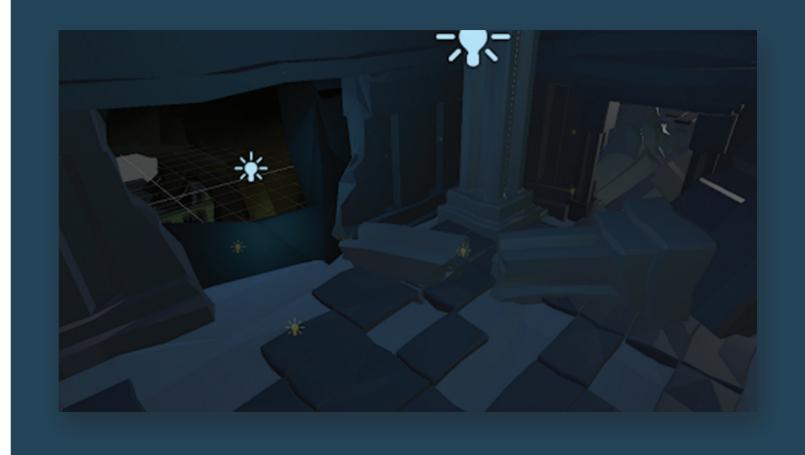
"Shadows of a Sunless World" is a horror game, therefore all our artistic direction must, above all, be consistent with the subject, and focus on the player's immersion. It must be based on his feelings, emotions, and states of mind. There are many types of fear in humans and multiple ways to trigger them. We therefore chose to focus on those that we thought were the most interesting to use for our game principle:

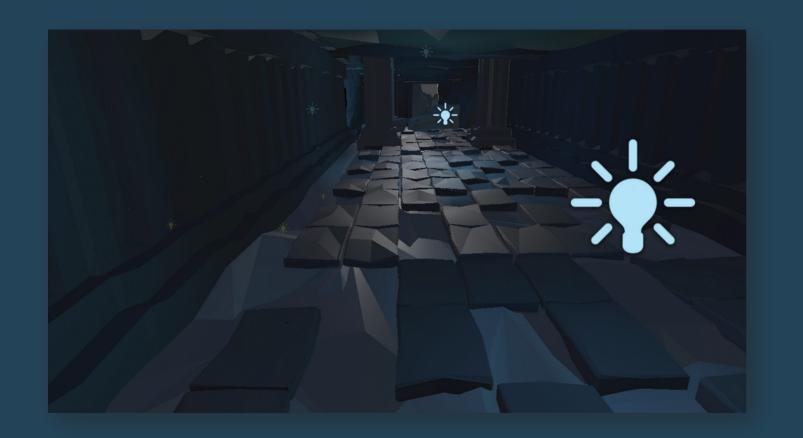
- Fear of the dark
- Fear of the unknown
- Fear of loss of identity

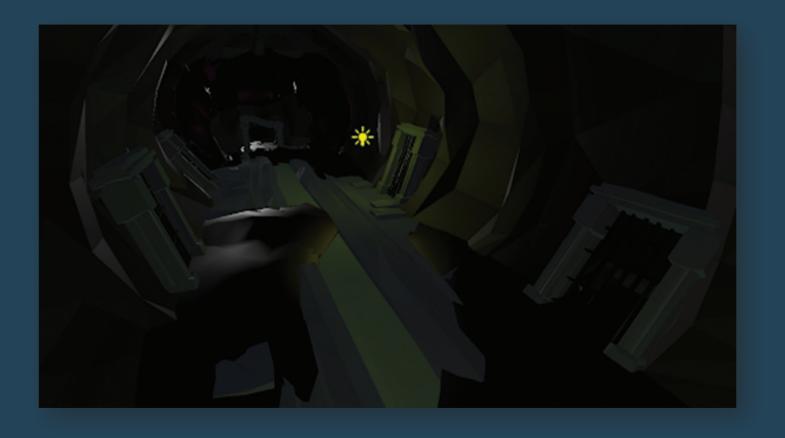
Based on these choices, we determined different sensations that we wanted the player to feel in order to reinforce his feelings: stress, oppression, disgust, uncertainty, disorientation, and rejection.

The entire artistic direction therefore followed these bases meticulously to create the proposed universe. We have created a desolate, dark and hostile world towards the player through the principles of dark domes, and the creatures that inhabit it (Umbras). We cut off his field of vision, by hiding much of the spatial information surrounding it through echolocation.

We have established a choice of colors quite varied according to the different biomes that the player will be able to survey. This richness of colour allows us to go from the dark-blue tints of the Alcars ruins, to the orange of the desert sand, or the dark green of an old sewer, for example.









The design of the Umbras was created to make them terrifying, dangerous, like the predators they represent for the Alcars. Their silhouette graphic design with stroboscopic effect allows to maintain the player's imagination, much more powerful to create apprehension. The presence of scripted visual or sound elements allows us to keep the player in stress and uncertainty (landslide, cracking branches, broken pipes, etc.)

The atmosphere of Shadows of a sunless world is divided into two parts:

- Calm and desolate outside the dome.
- Horrific and confusing inside the dome.

These two parts allow the player time to breathe during the game. We did not want to leave him in permanent anguish, because otherwise he would constantly be on alert and would never let his guard down. That is why, even in the sequences inside the domes, we have sparingly measured the amount of frightening events that can arise and scare the player, in order to give him essential moments of downtime.

A NON-TERRESTRIAL AND-NON HUMAN LORE

To create these different fears we have created a lore to place the player in an appropriate context. We have created two biologically opposed species:

 Alcars, a humanoid species that rejects ultrasound by breathing and speaking. She only sees and lives through sounds.



• Umbras, an insectoid species for which ultrasound is deadly. They hunts and feed on all sound emitters.



Umbras suddenly declared war, leading to the near extermination of the Alcars. Alcars have lost all their lands and their cities. The survivors had to hide under the surface to survive. The game and our story begins fifty years after this war. We are one of the surviving Alcars, Ekko. Who, after a serious fault, finds himself exiled by his peers to the surface of his native planet. Alone, at the mercy of this desolate and hostile world. To make amends, he has to rid his world of the Monsters.

We wanted to create a complex world that partly looks like ours so that the player would not lose too much and

could easily identify with the characters.

While keeping an important science fiction side to reinforce the uncertainty because of what he could find in this world.

A DESOLATE LAND

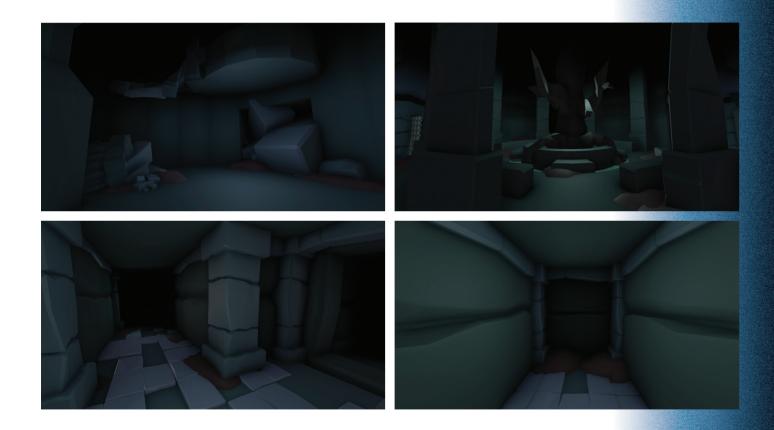
This context has allowed us to build a post-apocalyptic world, in line with our initial vision. We wanted to show the stigmas of this war, the destruction of the Alcar civilization, and their culture through the landscape. To initiate the player's immersion, we include known landmarks like terrestrial elements to compare (mountains, forest, desert, ruins), while creating novelty through fauna and flora.

That is why the world of "Shadow of a Sunless World" is divided into two distinct types:

 Dark domes, which represent the natural habitat of the Umbras. There are seven of them and they are scattered all over the world. Often grafted on to old cities taken from the Alcars, they will be composed of abandoned Alcar ruins and cultural elements, covered by nature and mucus (organic waste produced by the Umbras, in order to recreate their natural habitat).



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 Outside, is a place of exploration composed of several biomes (forest, desert, mountain,...).
 Allowing the player to explore the world around him more freely, to introduce narration, and giving him elements to understand the history of this world.

REFERENCES

To create this universe and made his graphics we have immersed ourselves in an in-depth research, from which we have established our main artistic references, in order to create our different mood boards. They come from cinema as well as video games, literature and architecture:

- A quiet place (film 2018)
- Alien (film 1979)
- Annihilation (film 2018)
- Dark scanner (game 2017)
- Perception (game 2017)
- Ashen (game 2018)
- Alien isolation (game 2014)

- Rime (game 2017)
- Death Stranding (game unannounced)
- Blind (gale 2018)
- H.P Lovecraft (books)
- Petra's ruin (architecture)
- Notes on blindness (audio VR experience)

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B-Graphic style

ECHOES

Echoes made by the avatar's footsteps, because they are the visualization of a sound propagation, are identified with a circular wave around the avatar. This gives more accuracy and more readability for the player. They are light to avoid a visual overload for the player. Indeed, this effect is omnipresent in the game because it is triggered at every footstep and while the avatar is breathing, except when he is holding his breath which is quite rare in a regular game session.



Like other sounds, the echo is white. We chose this uniformity to reduce the confusion experienced by the player. We didn't put any formal difference in the sounds the player makes with what his environment produces.

ENVIRONMENTAL SOUNDS

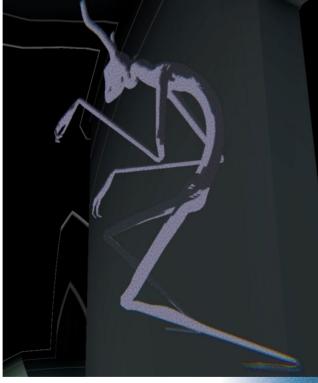
Environmental sounds include wildlife noises and classical environmental sounds (teardrops, wind, etc.) but also include sounds made by enemies (footsteps and screams). We include them because enemies reemit environmental sounds to confuse the player. Like said before, environmental sounds have the same color as the echo does to avoid any sound differentiation based on colors. We can't visually differenciate an enemy's sound from a bird sound for instance.

BIG INSECTOID ENEMIES

Umbras are hunters and sound eaters. They are predators, accurate, discreet, and fast. We worked on their design in game to make the player feel its different characteristics and the danger they represented for him. They are very thin, longish, and agile and can reach 4m high. All these characteristics not only make them frightening but also reinforce the fragility of the avatar

(Ekko) in the face of these entities. Their behaviour is similar to that of insects, they do not destroy existing habitat when they create a dome. They only superimpose their own on top of the existing one, that they end up completely encompassing to create something new, a kind of symbiosis. They have a social class system similar to humans. That is why there are types of Umbras, warriors, civilians, young people, old people.

Most of the players they met would be warriors, but we also wanted them to be able to see that not all of them were killers who were freezing with efficiency. That he discovered parts of weakness in them, and especially that his action of destroying the domes and habitat of the Umbras also amounted to eradicating them.



Umbra revealed by echoes

C-Technical elements

3D DIGITAL SCULPTING AND MODELISATION

To allows efficiency in the workflow, which means allows rapidity coupled with quality in the assets creation, we create modular environmental elements. Taking our first level as an example, 95% of the level consists in corridors and stairs so to be able to create variety for more richness in the environment and for the landmark placement, we must create changeable pieces. The modular workflow consists in the creation of walls and stairs in different pieces that can be switched and/or removed.

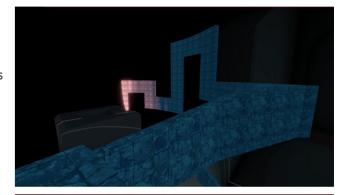
In this game we decided to use different shaders to create stylized visual effects. It is the case for the player's echo which put him in the dark and reveals the environment at every footstep with the circular wave at his feet.

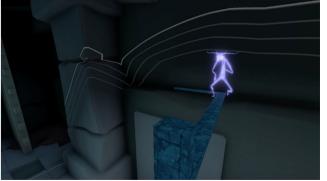
USE OF SHADERS

There is also a shader to recreate water, it allows the water mesh to slowly move to mimic tiny waves and create some circular waves and droplets to indicate more clearly that the avatar is walking in water.

The scouting mechanic is introduced with a visual effect

that uses a shader allowing the player to gradually and quickly discover a material by revealing its texture with a coloured glowing effect.





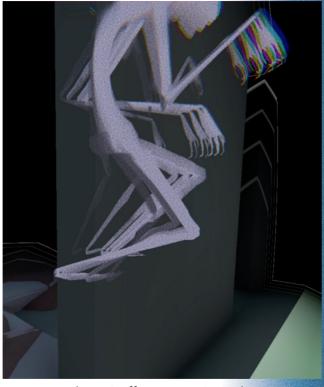
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Because we wanted the enemies to have a ghostly aspect while being clearly distinguishable and well integrated with the environment, we used a shader that creates two different visual effects.

First, it creates a stroboscopic effect when enemies are moving that recalls different ghost movies with dangerous spirits approaching the camera under flashing lights but also making these enemies appear more disarticulated through their animations. Then this shader put some grey, some noises and some chromatic aberration to enhance their shape making them more readable and stylized.

MID POLY GRAPHISMS

Environmental assets are low poly. It creates a distinct visual, minimalist and stylized which has the advantage of making light assets. There are also created quicker which is great when there is a lot of variation to make Characters (Umbras, Alcars, living beings) are mid poly to fit well with the environment, to put forward the life and point of interest in the game and to facilitate the animation work that needs to have a certain number of polygons to create great deformations on the model.



Stroboscopic effect on a moving Umbra

LANDSCAPES AND LEVELS TO CREATE

Because there are seven levels in the complete game it means that there will have seven dark domes to deactivate and so to create (every dome having its own unique level design to model).

Landscapes outside these domes must be created too, it includes meadows, forests and mountains that will contain a unique non-terrestrial wildlife to model and animate.

WORKLOAD TRANSMITTED TO PRODUCER

To work with our producer we use Hack'n'plan to evaluate the time needed to each task, check this time after having done it and to set priorities.

The principal tasks to mark are:

- Creation of domes (elements to build each level)
- Creation of the outside (mountains, meadow, forest, trees, etc.)
- Creation of props
- Creation of models (enemies, Alcars and animated assets): sculpting/modelisation + retopology

 Creation of animations (enemies, animals, environmental elements)

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- Texturing
- Integration

5-SOUND DESIGN

A-Sounds

In horror games, immersion is crucial. Without being immersed, you can't be tense, nervous, and frightened. The main sound design goal was to make the character feel alive, so the player could self-identify and feel more intense sensations. This was achieved with a "living character system", including a dynamic breathing system, heartbeats and grunts.

As our character only perceives his world through echolocation, we wanted the "echoes" to be very meaningful. But, as we create echoes with each step we take, it was more of a disturbance to hear them every time. So we settled with a system that plays the echo SFXs only once when the character starts to move. This allowed us to have a very distinct and massive echo sound when the movement starts, to add a real feeling of sound propagating, without being too

inconvenient for the player to hear, and avoiding it to become monotonous.

Footsteps are a huge part of the sound design. We designed walking, running and crawling SFXs, on different materials (stone, wet stone, water, mucus). It is very important that the player has a distinct feedback regarding which material he's stepping on, as some materials have different effects on gameplay (mucus dramatically slows the player down).

A lot of work went into the monster's sounds, as they have this singularity consisting of them being able to reemit sounds they have heard in the environment (water droplets, wind, creaking wood, metal bending...). We wanted their screams and grunts to be really terrifying, organic, consisting of a mix of "natural" sounds. Screams are composed of metal bending and screeching, grunts are mainly wood creaking.

As the player will perceive many sounds in the environment, we had to work on occlusion so all the sounds in the scene are not heard simultaneously, to avoid the audio scene to become a cacophony. Alice (one of our programmers) designed scripts involving raycasting, allowing me to filter certain sounds when a wall is blocking the view, for example. This allows for a clearer mix.

B-MUSIC

The music, ambiances and soundscapes are here to convey emotions and put pressure on the player. They alternate between stress, tension, adrenaline and fear. We designed a dynamic music system based on the monster states: the monsters switch between idle/patrolling, alerted, investigating and chasing. A musical track is assigned to each state, and when the player confronts the monster, the music adapts itself to the situation.

There are "scripted" ambiances and musical parts too, to allow an ambiance build-up, or a distinct music track playing at a certain moment to put emphasis on the situation.

We also used "room tones", which are low-volume monotonous ambiance tracks, to prevent "digital silences" when we wanted to play with silence. Those room tones are unique, and allow the player to feel a difference when switching between rooms without being distinctly heard.



6-USER EXPERIENCE

Developing a horror game was a big challenge for the User Experience design. Scaring people is very delicate, and our first mission was to educate ourselves on how to design fear, different types of fear, its effects on the player's body, etc. Those researches allowed us to adapt our game design in adequation with what we wanted to achieve.

We worked as a team, and bounded the game design with the user experience, as it is very important for the game to be cohesive to be able to succeed (frighten the player). But not only we paired the user experience with the game design, we also paired it with the sound ϵ environmental design, as those domains are particularly interconnected within a horror game.

UX design was also integrated in programming, as we designed menu interfaces and accessibility options for the game to be playable by a vast majority of players

(switch between controllers made easy, keys remap, one-handed playing mode...).



7-COMMERCIAL POTENTIAL

A-Target market

We studied the potential buyers of our game and identified three targets. We adapt our product to those personas skills and habits.



B-Competitive analysis

"Shadows of a Sunless World" is intended for the horror game market. The purchase of this type of game is often driven by the atmosphere perceived through the advertising campaign. We selected games that would compete with ours if it came out today.

Aiming at a price of \$19.99/€, we think we have a place on this market for players who don't want to pay a significant price for an immersive experience of a few hours.



8-FINANCIAL BENEFITS ESTIMATE

As competition is strong in this sector, our goal is to generate profits with reduced sales.

To do this, we have developed a game that is low in content, resulting in a low production cost, but effective in the proposed experience.

| Sales turnover | | | | | | |
|-----------------------------|--------------|--|--|--|--|--|
| Number of units sold (est.) | 40 000 units | | | | | |
| Full selling price | 30 € | | | | | |
| Gross income | 1 200 000 € | | | | | |
| Expenses | | | | | | |
| Development time | 11 month | | | | | |
| Development budget | 510 000 € | | | | | |
| Results | | | | | | |
| R.O.I. reach point | 34 000 units | | | | | |
| Benefits | 690 000 € | | | | | |

9-INNOVATIONS

The main innovation of our project is the work that makes it possible to immerse ourselves in the service of mechanics at the heart of the game. In fact, the sound produced by the player reveals the surroundings. If this mechanism is not new, the way we treat and use it is. Indeed, we have created a particular audiovisual rendering for the echo and the way it interacts with environments by encoding a particular shader and a synthetic audio processing.



This modified shader is used by enemies to spot us and is also used to visualize sound sources in play.



In the same way, scouting makes it possible to reveal a metallic structure and thus inform the player about the architecture of the level in which he must progress.

10-TOOLS AND **METHODS**

As it is a horror game, the main challenge of our project on User Stories.

Each User story is dedicated to one feature include into the game. We allow a Sprint of two weeks to each ending by a Playtest.

Each sprint begins with a Sprint Meeting where we define what we want to evaluate through our playtest.

From this we deduce game design, and so the functions which have to be coded, and level design and then the corresponding asset list, including visual and audio elements.

Following this sprint meeting, each member of the team creates his own tasks and complete Hack'n'Plan with it.

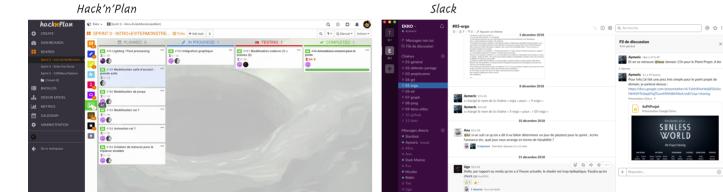
Our team is working mainly in presential, nevertheless is the immersive aspect. That's why we focused our work we must keep a record of our work and sometimes agree at a distance.

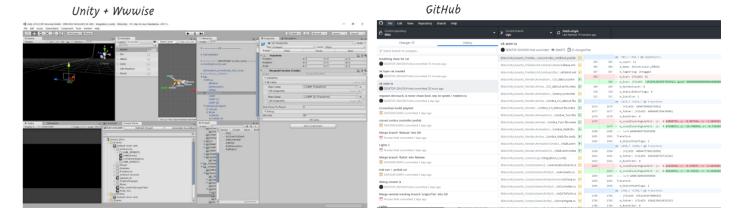
> That's why we use Slack to consolidate our intern communication with several channels, depending on the topics we are discussing.

> To develop our game we work with a combo of Unity as game engine and Wwise as audio engine because those tools fit to our needs and we know it well.

> Finally, the team uses the GitHub software, which allows us to work together on the project without risk of losing

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Présentation CDocs *

Morroofi 13 février

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SUNLESS

WORLD

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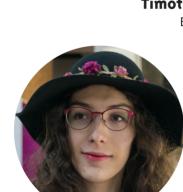
4ePtProjet Présentation Google Drive

11-THE TEAM

Our team is composed of nine people, all students finishing our Master's Degree in the ENJMIN school, each in their own field of expertise.



Timothée Degli Innocenti **Environment Artist**



Ugo Belfiore Gameplay Programmer



Alice Pinto Technical Artist and Programmer



Marine Furlan Character and texture Artist



Nicolas Noël Game and level Designer



Robin Richard Sound Designer



Aymeric Manceau Producer



Eva Abollivier Game and narrative Designer



Anaïtis De France **UX** Designer

12-PRODUCTION PLANNING

We consider that our Pre-production has been done part-time and that each level requires three weeks of development in Production.

| Total | Prop. Art | Env. Art | Tech Art | GPP | SD | LD | GD | UX | Producer | | |
|-------|-----------|----------|----------|-----|-----|-----|-----|-----|----------|---------|-----------------|
| 4,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | Nov. 18 | |
| 4,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | Déc. 18 | Pré-Production |
| 4,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | Jan. 18 | |
| 4,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | Fév. 18 | |
| 9 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Mars | |
| 9 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Avril | |
| 9 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Mai | Production |
| 9 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Juin | riodaction |
| 9 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Juillet | |
| 9 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Août | |
| 8 | 1 | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | Sept. | Post-Production |
| 3 | | | | 1 | | | | 1 | 1 | Oct. | rost-rioudction |

13-TECHNICAL POST-MORTEM

A-Technical challenges

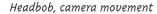
3C: Camera Character Controller, we had a first person camera to polish with the challenge of immersion in a horror game.

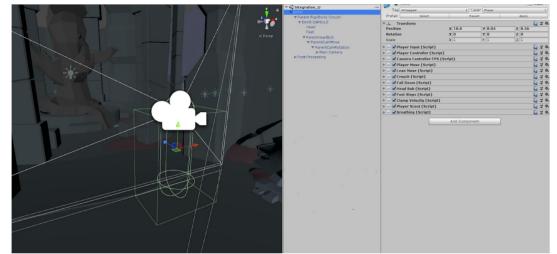
- Headbob, camera movement top/bottom with a swing
- Lateral rotations (lean move) when moving
- Camera rotations with easings
- Acceleration effects when running
- · Landing effect after falling
- Realistic crouch

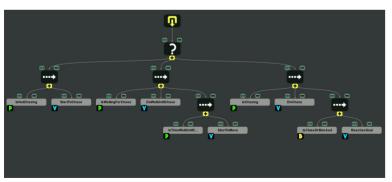
Umbra AI and Rat AI, using state-machines and behaviour trees. The challenge was to have AIs that are partly systemic and self-functioning, partly with scripted events to fit in the level design.

Core loop management with scene transitions, accessibility options saves.

Umbra's animations management (Animator, blendings and transitions)



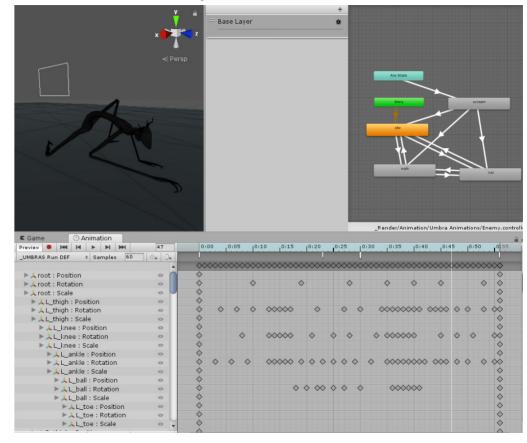




| Enable Vibration | $\overline{\checkmark}$ |
|-------------------|-------------------------|
| Enable Head Bob | $\overline{\checkmark}$ |
| Enable Lean Move | $\overline{\checkmark}$ |
| Enable FOV Change | $\overline{\checkmark}$ |
| Invert Cam Axis | |
| Display Cursor | |
| Gamma | 1 |
| Music | 1 |
| Sfx | 1 |

Umbra AI and Rat AI Accessibility options

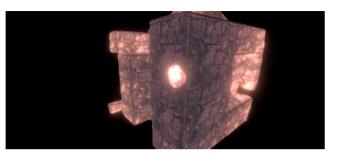
Umbra's animations management

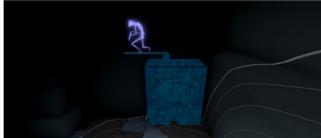


Echoes mechanic and visual rendering of the game:

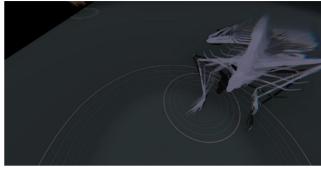
- Scripts for echoes management, each echo can have different logics (Ekko's echoes, Umbra's echoes, Rat's echoes, environmental echoes...)
- Scriptable objects to store rendering parameters of various echoes types (colors, noises...)
- Echoes rendering with one main shader that serve as a post-processing effect included in the Unity's Post-Processing Stack v2
- Creation of a compositing shader with multiple cameras rendering in render textures to allow different Post-Processing to be used on different cameras. This allows the echoes to not affect the scouting effect, and specific visuals for the umbras.







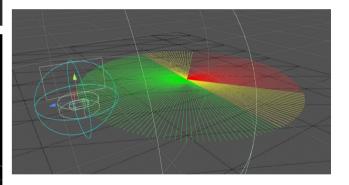
Scouting mechanic, shader effect to show you can interact with the object with a preview, then when you touch it, a wave courses the object, showing the scouted structure in front of everything with a glowing effect, and revealing all entites walking on it (Umbras, rats).





Umbra visual rendering: mix of scripts and shaders and a specific camera with post-processing effects. Intention to make the umbra look spectral, insectoïd, organic, and deadly.

Various tools for level design, and notably for audio integration, as the audio is a crucial part of the success of a horror game. Orientation filter that changes the audio emitted by objects if you're looking at them or turning back, Occlusion filter that can change the way the sound is perceived when behind parts of the environment, utilities with triggers and ranges to facilitate sound integration.



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B-Most complex challenge

We choose the echoes mechanic and its rendering as our more complex problematic in our project.

Our reasons justifying this choice are that it is the main mechanic of the projet, a major point of originality in the gameplay, but also in the visual rendering of the game.

In addition, the echoes mechanic is technically blocking if it cannot be achieved, the rest of the game depends of it.

This mechanic also raises questions about its realization, ask to learn new skills and to experiment.

For theses reasons, we also decided to develop it as soon as possible to reduce the risks of the project.

C-Details

Our character doesn't see and apprehends the world through sounds instead of with his eyes, so we need to find a visual rendering that showcases this particular perception of his environment.

We opted for an echoes system representing the sounds and their propagation with waves. We wanted a total dark screen in which the environment will only be revealed in small portions: the ranges of propagation of the differents echoes the player do. Echoes made by environmental elements or other entities are just waves, hinting at the shape of the environment but not revealing it really. When an echo reveals the environment, the area stays memorized for a short time, in a darker tone, before being forgotten and fading out to black again. Also, different echoes can have different visuals, the color and the shape of the waves can change.

The echoes are not just visual and need logical impacts on the world and its entities. Umbras need to "hear" Ekko's sounds in order to investigate or chase him, rats to be scared and run away, etc.

D-Objectives

- Display echoes that progress and reveal the environment (or only the shapes).
- Continue to show the space revealed by echoes during a small period of time before returning to obscurity (memorization).
- Manage differents visual impacts for echoes: waves revealing the environment and memorizing it, or only display waves that courses the shapes of the environment without revealing and memorizing it.
- Manage echoes logic: they must detect certain things they touch to react accordingly, in function of what creates them.
- Create parameters for echoes that permit to assign them different shapes and colors of wave.

E-Envisaged and tested solutions

FIRST ITERATION

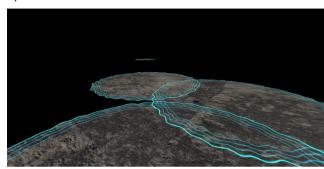
Echo + EchoManager for logic, shader for objects + list of materials using it for rendering.

In the first version of the echoes system, we created three scripts: Echo, EchoManager and EchoParameters, the first one to manage individual echoes logic and data, the second one to update them and send data to modify the visual rendering accordingly, and the third one is a ScriptableObject required to create Echo instances and decide the shape and colors of the echoes waves when rendered.t

Individual echoes at this stage manage only a wave progression that we could describe as spheres that grow, and store different variables: the origin of the echo, the maximum range to reach, the time it takes to reach this range. When an echo is created, the EchoManager stores it and calls its logic every frame. The EchoManager also stores a list of Materials (using our custom Echoes shader), and sends to each one the needed information about the different echoes.

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Then, the shader renders the environment in the range of echoes' waves.



In the Echoes shader, a noise in polar coordinates is used to deform the circular waves of the echoes.

An improvement we made was that the Shader was given to the EchoManager, so it could automatically search all the materials using it in the scene. So we do not need to manually manage a list of materials.

DEFAULTS

The main problem with this version was that it was computing-heavy and reduced FPS a lot when we had too many simultaneous echoes. Also it was more complex to change how an object affected by the

echoes looked because every object needed to have a material that had the Echoes shader. We wanted to reduce these calculations to optimize performances and have a more elegant architecture, so we tried another method for rendering.

SECOND ITERATION

Same logic as the first iteration, but with an image effect shader for rendering.

We developed an Image Effect shader to reproduce echoes effects in order to reduce drastically the calculations: it's now only done for the screen instead of for each object affected by echoes. It also facilitates the integration in the scene. With the Echoes Image Effect shader comes a new script on the camera to activate depth and get data from the EchoManager and send it to the shader.

In the shader we use camera depth and matrices to find the world position of the pixels of the screen, then we can calculate our echoes again.

We also added a second progression value representing the memorization duration, and all the effects that go with it (darker tone, no more waves, still a noise on the borders, and the final fadeout to black).

For the logic side, we add new informations on the echoes (like the source: player footsteps, player breathing, Umbras, rats, environment...) so we could add new behaviours on them. For example: echoes created by Ekko's footsteps augment the aggressivity level of Umbras touched by it.



We also created a tool with buttons in the Unity scene inspector in order to activate/deactivate the shader, in order to facilitate integration/level design. We introduced a special echo which is permanent and

constantly moving instead of completing a range: it is the breathing echo, and it requires different behaviours (in order to not trigger certain things every frame for example).

DEFAULTS

This version was way better to deal with integration and way more optimized. But it was still not the ideal because we couldn't really render certain objects differently, everything will be affected by the image effect at this end, and we couldn't use Unity's post-processing effects as we wished.

THIRD ITERATION

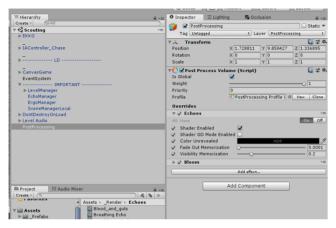
Post-Processing Stack v2 encapsulation + Compositing.

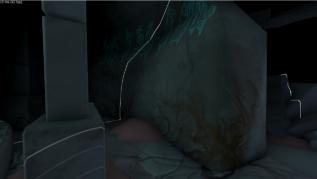
This is the solution we chose and kept.

We have reworked the Echoes shader image effect in order to encapsulate it as a post-processing effect integrated in the Unity's Post-Processing Stack v2. With the addition of a post-processing parameters script and a post-processing effect script that gets the echoes data in EchoManager and sends them into the shader. We also fixed a bug in the world position calculation of the pixel in the screen, that caused echoes to have a

displacement from their origin point depending on the orientation of the camera.

In addition to this, we created a compositing shader that merges different render textures. So we changed the cameras' architecture, with multiple cameras, each one rendering in a specific render texture: the main one for most layers, doing mostly the echoes as post-processing effect, another one for the scouting, that has more bloom to sublime the scouting effect and because the scouting can be visible even out of the echoes range, and finally the last one for entities, doing specific post-processing to alter even more their perception (as they already have scripts and shaders showing them with a kind of stroboscopic spectral effect). The final camera, the compositing camera merges them all and gives the final rendering of the game.





F-Defect and improvements

We have thought about optimizations for the echoes, like having more echoes stored in the script part (the list of echoes in EchoManager) and less calculated in the shader, like sending only those who are visible in the camera field of view, with certain distance and taking into account the range and positions of the different echoes. But it would not greatly impact game performances so we have not done that in the vertical slice, privileging other polish elements.

Another improvement possible that would be more effective for performances could be to use a texture for the noise instead of fully calculating it in code.

