UNIVERSITAT JAUME I

Final Project Report

Bachelor's Degree in Video Game Design and Development

# 3D world creation with dark atmosphere Walpurgis Night: The Dark World

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**Abstract**

This project presents an RPG/adventure video game based on Nordic mythology with 3D graphics. With an open world concept, the player will be able to explore and interact with different elements found in it. The game mechanics will be centered around the use of lights in the player's favor and a time trial present in the game. The project is going to be developed using Unity 3D game engine, 3D graphics and motion capture programs.

# Contents

# List of Figures

# List of Tables

# Nomenclature

## Acronyms / Abbreviations

| | | |
|---|---|---|
| 2D | — | Two dimensions. |
| 3D | — | Three dimensions. |
| AI | — | Artificial Intelligence |
| BT | — | Behavior Tree |
| GB | — | Gigabytes |
| Demo | — | Demonstration (as demonstration version) |
| GDD | — | Game Design Document |
| GPU | — | Graphics Processing Unit |
| GUI | — | Graphical User Interface |
| Indie | — | Independent (as Independent video game) |
| Mocap | — | Motion Capture |
| NPC | — | Non-Playable Character |
| PC | — | Personal Computer |
| PS4 | — | PlayStation 4 |
| RPG | — | Role-Playing Game |
| TFG | — | Final thesis |
| TLoZ | — | The Legend of Zelda |
| Toon | — | Cartoon |
| VCS | — | Version Control System |

**Key words**

RPG, 3D, Fantasy, Mythology, Atmosphere, Time

# 1 Technical Proposal

This chapter presents an expansion of the technical proposal, introducing the motivations behind it, goals, tools, basic references and planning.

## 1.1 Introduction

This TFG development is bounded with the wish of developing and completing a project which was started in group with two other classmates last year; with huge narrative work but never completed. Walpurgis Night is a game that blends two video game genres, role-play and adventure. In this game, the Ragnarok[1] has to be stopped and to do that the player will have to complete a series of dungeons, controlling a group of fighters, the Valkyries[2], each one with unique abilities and combat style. The goal is to face the enemies, an organization which plans to destroy the world, and then to rebuild it, becoming then their new deities, and ruling like so. To prevent that, the twelve Valkyries will need to be reunited before midnight on Walpurgis Night[3] and invoke the deity Walburga[4], providing earth her protection. Brunilda's[5] mission, the main character, is to bring together the Valkyries that have been kidnapped and confined in all of nine Yggdarsil[6] worlds.

This project will be based on the Svartalfheim[7] world, the player will find themselves in an underground open scene, controlling the three main Valkyrie (Gemini, Pisces and Aries) in their mission to free one of their sisters-in-arms, discovering what happened in this world and mastering new abilities. Stealth will be an important factor in order to complete the level, as well as puzzle solving based on strategy and environment interaction. Being an underground world, light's existence will be scarce, and therefore the game mechanics will revolve around it. Time is going to be important too, the player will have to race against it, because time passes and the world will change slightly because of it.

### 1.1.1 Shared Content

The complete video game contains the nine worlds, but only these three are going to be developed:

- Jotunheim[8], The homeland of the ice giants, based on strategy and completing puzzles and challenges.
- Niflheim[9], Fog's world, based on stealth and using distraction techniques.
- Svartalfheim[7], Kingdom of the Dark Elves, stealth, strategy and environment interaction level.

Since the three projects are part of the same video game, some content will be the same:

- 3d Models of:
  1. Three main Valkyries.
  2. Basic body structure.
  3. Objects.
  4. Weapons.
- User interface.
- Menus.

- Basic AI.
- Sound effects and music.

In the Annex

## 1.2 Motivation

As stated in the introduction, one of the ideas that motivates mostly working on this project is to keep working on the video game that was born last year, making it evolve and adapted to new tools and skills.

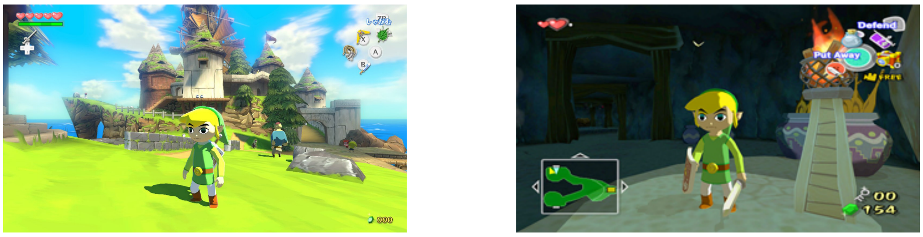
This game will be a mix between role-play[10] and adventure[11] genres. These kind of games are very loved and appreciated by fans, always having a place in the market and evolving non-stop. Every year, games that leave a mark in any way are released, and more people start to enjoy them. An important feature is how the narrative, such as exploration, puzzles, challenges and abilities. In addition, these games, artistically have a complex world, visually well defined, attractive and alive. It's unusual to find scenes where lights are scarce and used as game mechanics. This is typical of horror games, such as survival horror, adding to the lack of light is dark or dull colors and with a closed range variety of colors.

Besides, in this genre a mixed main characters group is common, representing different stereotypes. In this situation, the main group is all female. Hardly ever video game with these features are developed, so the game's history will attract the attention of players that don't identify easily with the genre standards. These genres are characterized by a puzzle solving and combat mechanics, the importance of the story, narrative and setting, exploration and quests, characters with abilities, combats and the presence of items (which can be manipulated) and an inventory. But the most important the relevance of a good narrative and history and all of the related features that give depth to these kind of games.

## 1.3 Influences

### 1.3.1 Art influences

The most remarkable influence for Walpurgis Night is the The Legend Of Zelda saga, specifically The Legend of Zelda: Wind Waker. Originally developed and published for the Nintendo GameCube[12] in 2002/2003, it was the first game in the series to use Cel-Shading[13], giving the game a cartoon-like appearance and used to hide or mask system limitations.

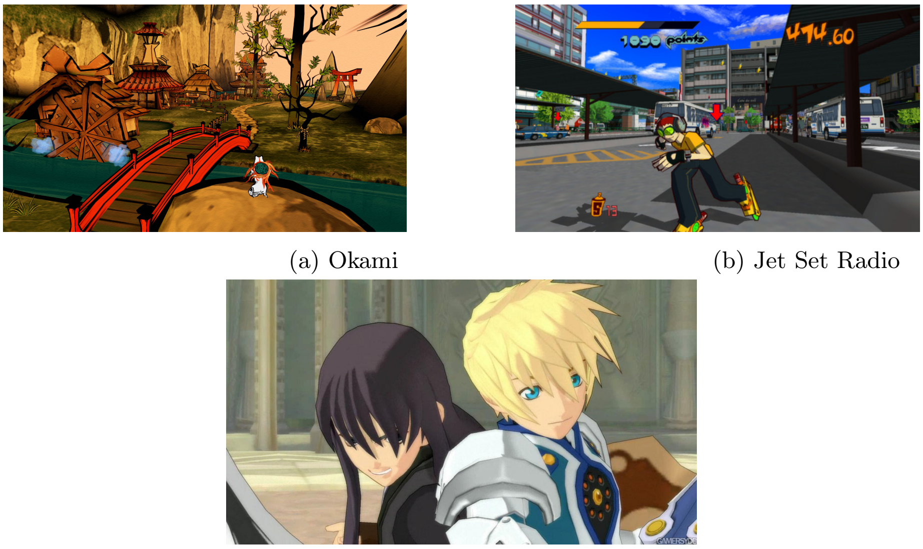


(a) Cel-shading with outdoors lightning

(b) Artificial Light

Figure 1: How cel-shading looks in Wind Waker and the light influence.

Cel-shading, also called toon shading, is a 3D technique that uses a specific shading technique, replacing conventional rendering shading gradients with a simplified version of flat colors and shadows, trying to recreate hand-drawn art and animation, moreover, it also uses outlines to simulate drawing lines. Nowadays, this simplified version of this style evolved, artists started to add special colored textures, giving a different look to the style, more cartoonish but realistic in its way. One of the first games to implement it was Jet Set Radio (2000)[14], this game had real-time Cel-shading, with black thick outlines and flat colors and real-time shadows. After this, toon shading became popular, and many games used and perfected this technique, like Zelda Wind Waker, Okami[15] or Tales Of saga[16]...



(a) Okami

(b) Jet Set Radio

(c) Tales of Vesperia

Figure 2: More games that influenced in the cel-shading styel.

In Wind Waker they added simple textures, enough to give the idea of detail but not too much. Effects such as particles and hits are easily represented with 2D drawings that look like cartoons, they can be found when an enemy dies, a bomb explodes, Link hits an enemy or an object... Elements like the effect of wind use this style too. Clothes, hair, flags, leaves, trees and loose objects are affected by real-time cloth simulation. In cel-shading there's a feature that Wind Waker does not implement and is an outline around the objects, characters and elements in the world. In its HD re-master everything was improved, adding more visual effects like advanced lightning effects and shadows. In addition, and specifically, in Walpurgis Night: The Dark World, an important influence based on this game is the use of bright and vibrant colors, but used correctly and with good color palettes. So this game is easily one of the most important influences for Walpurgis Night.

Other games that influenced this project's art style are games that, like Wind Waker, use a toon shader or lively colors and have a distinct trait that separates them from others, such as:

- Rime (2017)[17], developed by the Spanish company Tequila Works using Unreal Engine 4, this game adds more complex textures to the toon shading. It is a game based on puzzles and world discovery with really detailed scenes, its lights and colors are based on Joaquin Sorolla's work.
- Journey (2012)[18] an indie video game developed by Thatgamecompany with PhyreEngine, uses the simple toon shading but with a very beautiful color palette. It can be a single player or a cooperative on-line multi-player adventure game. This game tried to evoke emotions of smallness and wonder, and the dynamic response of the music to the player's actions helps recreate the atmosphere and give depth to the game.
- Other Zelda games like Skyward Sword or Breath of the Wild, these two are extremely different to Wind Waker with a more serious art style but keeping the base of and evolving the toon shader.

In Walpurgis Night: The Dark World, one influence not related to video games is Art Deco, because some of its ideas and concepts are similar to dwarf details.

Figure 3: Art deco

### 1.3.2 Narrative influences

Walpurgis Night has a huge narrative and history development work, but to achieve this the creators were influenced by a set of games in the early stages of the project to make it complete, with depth and coherence.

Some of those games that influenced the pursuit of a fulfilling history are:

- The Final Fantasy saga[19], always with complete stories, long and appealing, giving the player hour and hours of enjoyment.
- Tales of Symphonia and Tales of Saga, these games have twists that always move further the narrative and catch off guard the player.
- Golden Sun[20], this saga has only three games, unlike the other examples. Its history is complete and rich too.

### 1.3.3 Mechanics influences

There are two kind of influences when talking about mechanics in Walpurgis Night, the ones related to the complete game and the ones related to The Dark World, the complete influences influence The Dark world too of course, but not the other way around.

**Infuences in Walpurgis Night**

The gameplay and mechanics of Walpurgis Night are highly influenced by games such as the Final Fantasy saga, the The Legend Of Zelda saga, Golden Sun or Tales of series.

The Legend Of Zelda is a saga of action/adventure genre developed by Nintendo. It is famous for its mechanics associated to puzzle solving using different objects or tools found in the game, those tools can also be used as weapons or have other uses. The Legend of Zelda games feature a mixture of puzzles, strategic action gameplay, and exploration. These elements have remained constant throughout the series, but with refinements and additions featured in each new game. You are frequently rewarded for solving puzzles or exploring areas. Most Zelda games involve locating and exploring dungeons, in which puzzles are solved and enemies fought, then defeating the dungeon's boss. Each dungeon usually has one major item inside, most of which are required to advance to the boss.

There is a game in this previously mentioned saga that also has a time mechanic like Walpurgis Night, this game being The Legend Of Zelda: Majora's Mask (2000)[21]. Link, the main character of the saga, is not free to wander around a dungeon forever. After three in-game days, he must play the Song of Time to travel back three days to resume his adventure. All progress made through dungeons and side quests will be reset, meaning they can be completed again. Even dungeon bosses can be re-fought. If the three days pass the moon will crash against the city and destroy everything and kill everyone. Because of this, the player has to think about how to manage their time to avoid running out of it.

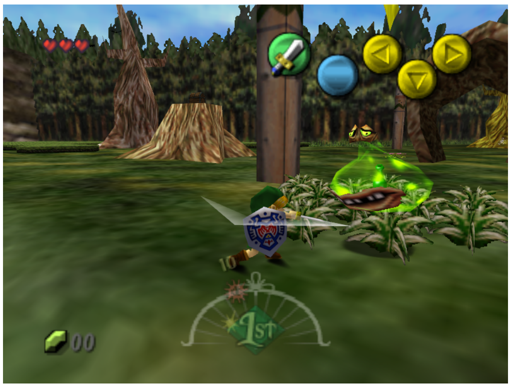


Figure 4: In game image of TLZ: Majora's Mask where the time indicator is visible

Another game that uses the time mechanic is a recent installment of the Final Fantasy saga, and last one of the trilogy of Final Fantasy XIII. That game is Lightning Returns: Final Fantasy XIII (2014)[22]. The player has a maximum of fourteen days to finish the game and certain areas, quests, people, and events are only accessible during specific times of day. Time management is an important element of gameplay. If time runs out before all five main quests are completed, the Apocalypse will occur and the player will be given an option to restart the game from the beginning.

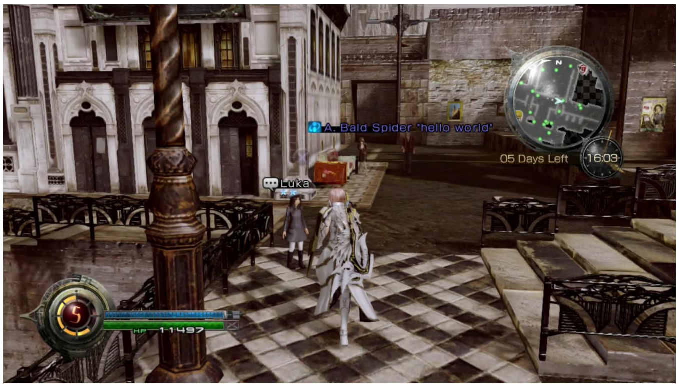


Figure 5: Lightning Returns Final Fantasy XIII in game image

Final Fantasy saga is made up of role-playing games with varying gameplay, settings and stories between each installment, retaining plot and gameplay elements throughout, focusing on fantasy and science fiction settings. Some games changed their genre to other ones like MMORPGs, tactical role-playing games, action role-playing games, and fighting games.

Another games that in one way or another influenced are the Tales of Symphonia saga developed by Bandai Namco and Golden sun by Camelot, both of them RPG games. All these games have influenced the game mechanics.

**Influences in Walpurgis Night: The Dark World**

Firstly as this project uses light and darkness as a mechanic some of the games that influenced it are survival-horror games.

Amnesia: The Dark Descent (2010)[23] developed by Frictional Games is a first person survival-horror video game where the protagonist has to explore a dark castle. In this castle there are monsters and other creatures that the player will have to avoid and puzzles to solve. Being in darkness too long, witnessing unsettling events, or staring at monsters will reduce the protagonist's sanity, causing visual and auditory hallucinations and drawing the attention of monsters. Light sources help restore sanity, the protagonist can light candles and other elements, or use an oil-burning lantern. Elements to light the light sources are limited and using the lantern or standing in a light source makes the player more noticeable to monsters. This means that the player must balance the amount of time spent in light and shadow.

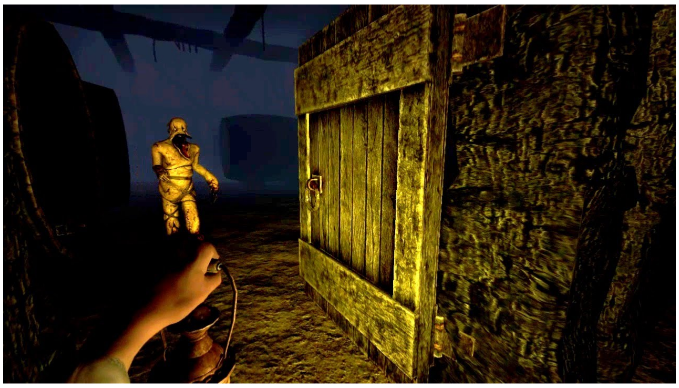


Figure 6: Amnesia and the use of the lantern

With the use of light and darkness comes another type of mechanic, stealth and infiltration, the ability to move without making loud noises and avoid attracting enemies' attention is one of the main mechanics of the Metal Gear saga. Metal Gear[24] is a saga developed and published by the company Konami and created by Hideo Kojima, the first game was released on 1987. Is an action-adventure game and almost the first to introduce stealth. Is a third-person game (first-person in special moments) where the player takes control of a special forces operative assigned to find a superweapon called "Metal Gear". Another traits of these series are cinematic cutscenes, intricate storylines, offbeat and fourth wall humor, and exploration of political and philosophical themes, with references to Hollywood films to add flavor. There are sequels and prequels and this saga is very beloved by the fans and known worldwide.

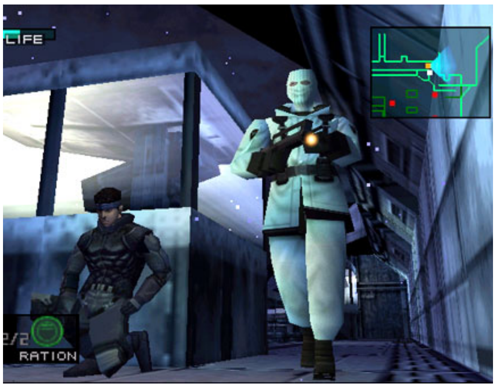


Figure 7: Metal Gear Solid and the use of stealth

## 1.4 Research and Mythology

### 1.4.1 Nordic Mythology and Walpurgis Night

Walpurgis Night is characterized for joining different concepts of mythology that alone have sense in a unique world where a relationship with sense between all of them was created. Here will be explained some of the main concepts.

**Valkyries**

In Norse mythology, valkyrie ("chooser of the slain") are female figures who choose those who may die and those who may live in battle. Selecting among half of those who die in battle, the valkyries bring their chosen ones to the afterlife hall of the slain, Valhalla, ruled over by the god Odin. There are theories that propose a relation between the valkyries, the norns, and the dísir, all of which are supernatural figures associated with fate.

All of the Valkyries that appear in this project are somewhat based on real Valkyries. All of them are shield-maidens, or how they called women that fought like men. Some of those valkyries are famous, is the case of Brunilda.

The names of the Valkyries of the game are: Brunild, Prudr, Gudr, Hilda, Skuld, Mist, Herja, Svipul, Alrune, Svanhuit, Eir and Goll. All of them real names of Valkyries.

### Yggdrasil and the nine worlds

Yggdrasil is an immense mythical tree that connects the nine worlds in Norse cosmology. This tree is holy, and is in the center of the cosmos. The nine worlds are found in its different parts from the roots to the branches, and creatures and animals live in it. These are the nine worlds:

- Asgard, home of the Gods ruled by the Odin.
- Alfheim, home of the light elves.
- Nidavellir/Svartálfaheim, home of the Dwarves and the Dark elves.
- Midgard (Earth), home of humans.
- Jötunheim, home of the giants.
- Vanaheim, home of the nature.
- Niflheim, world of the fog.
- Muspelheim, world of fire and lava.
- Helheim, home of the dead

### Zodiac Signs and Alchemy

Alchemy has a part called Alchemical symbols[25]. These symbols were used to denote some elements and compounds and varied between alchemists. For this game, the real concept was the association of some of those symbols with the Zodiac signs, concretely the alchemical process. These are sometimes expressed as chemical operations, as in some cases there were twelve of these they were assigned to the zodiac signs. The assignation was:

- Calcination - Aries
- Congelation - Taurus
- Fixation - Gemini
- Dissolution - Cancer
- Digestion - Leo
- Distillation - Virgo
- Sublimation - Libra
- Separation - Scorpio
- Incineration - Sagittarius
- Fermentation - Capricorn
- Multiplication - Aquarius
- Projection - Pisces

#### Goddess Walpurga

This goddess is in reality a french saint called Walpurga or Walburga, she was canonized on May 1, so that date became her day. The eve of May 1 is called by the folklore Walpurgis Night.

#### Walpurgis Night

Walpurgis Night is how the night of 30 April is called, it is the eve of the feast day of the Saint Walpurga (in this project, a goddess). The translation of the original name in German means "Witches' Night" and is the night where all the witches will meet and perform satanic rituals. It appears in the folklore throughout Europe, in the Netherlands, Germany, the Czech Republic, Slovenia, Sweden, Lithuania, Latvia, Finland, and Estonia. This is where the term Witches for the project appears and its relationship with the goddess Walpurga.

#### Ragnarök

According to Norse mythology, Ragnarök ("Fate of the Gods" and "Twilight of the Gods") is a series of events including a great battle, foretold to ultimately result in the death of a number of major gods, the occurrence of various natural disasters, and the subsequent submersion of the world in water. Afterward, the world will resurface anew and fertile, the surviving and returning gods will meet, and the world will be repopulated by two human survivors. Ragnarök is an important event in Norse mythology, and has been the subject of scholarly discourse and theory throughout the history of Germanic studies.

For this project Ragnarök is artificially triggered and all the gods die, only one surviving, Walpurga. The two humans that allegedly survive in the original are in this case the rulers of the organization that triggers the artificial Ragnarök.

### 1.4.2 Basic Introduction to this Walpurgis Night: The Dark World mythology

The biggest font of information about Nordic Mythology is the Codex Regius[26], an Icelandic manuscript/codex which contains the called Eddas. These are two, the Prose Edda[27] and the Poetic Edda[28]. It is unclear which one of them was written first, but not that both of them are connected by a common source.

Poetic Edda is a collection of anonymous poems meanwhile the Prose Edda was written by a man called Snorri Sturluson[29]. Both Eddas talk about the world of this project, but is addressed differently. Nidavelir[30] (low fields) is how this world is called in the Poetic Edda, and is where the famous dwarfs[31] live, they are known for their abilities as blacksmiths and living in caves underground. In the Prose Edda, this world is called Svartalfheim (homeland of the Black Elves[32]) and is where the dark elves live. Both of them were thought as a labyrinthine, subterranean complex of mines and forges.

## 1.5 Game Preview

This difference remarked in the previous sub-section makes the existence of two types of enemies in the history and game possible: dwarfs and dark elves. The dwarfs will be basic enemies, always carrying a light because they can't see in the dark. Legends say if the sunlight touches them they will turn into stone, that's why they live underground. Next, the dark elves are an improved version of the dwarfs, with better senses, faster and deadlier. Both enemies can be killed with basic attacks (physical attacks) or using abilities (magic attacks). Moreover, scattered around the level, the player will be able to find NPCs, being able to interact with them.

The character will have a health bar and a mana/magic bar, displaying the amount of life and magic that remains, being able to use objects to fill them when they decrease their level.

The objects that the player will have initially will be the lantern and the different weapons associated to each Valkyrie. The lantern will be extremely important in Svartalfheim, obtained in a previous world in the complete game, will be a normal lantern without special characteristics.

When the character equips it any other action which are neither walking, running or crouching will be blocked, only being able to light up an area around them. In certain history point, the player will learn a new ability related with the lantern: apply magic to it, being this an important asset to complete the level.

Every Valkyrie will have a different weapon and base power, as well as a unique color associated with the zodiac sign that they represent. This means that the color of the lantern will change between the colors of each Valkyrie, having different magic effects.

It's important to repeat that when the lantern is in use the player won't be able to defend themselves, killing the enemy implies unequipping the lantern and being surrounded by almost darkness, relying upon the few lights on the area/dwarfs and hence, fighting will become a difficult task. When magic is used, mana will be consumed, the amount per second will vary depending on its color, thus, its use will be finite. The player will have to coordinate when to employ the lantern to light up the scene or the path and when to apply magic, having to figure out the use correctly.

Along the scene there will be a set of lights strategically distributed. Some of them will be lit from the beginning and others will have to be light up. In addition to those artificial lights there will be crystal seams and rocks that will emit a low intensity light by themselves.

To advance in the game, it is necessary to complete puzzles. One of them will be a labyrinth related to the famous forge of Nidavellir. Nevertheless, the player will have to control the course of time, as time goes by and midnight approaches some mechanics will change. Using time as a mechanic with weight in the narrative of a video game its not common, although a really famous example is The Legend of Zelda: Majora's Mask.

## 1.6 Goals

The big concept of this project is to apply the knowledge acquired during the degree and apply it to create a video game with a defined style and mechanics, these are the main goals of the project:

- Present a functional level and according to the narrative as well as artistically consistent.
- Design and implement a smooth light mechanic
- Create NPC behaviors related with light presence and which kind and passing of time

## 1.7 Related Subjects

This section explains the relation between this project development and some classes of the degree.

### 1.7.1 3D Design - VJ1216

This class's main objective was teaching how to model 3D objects with a computer, focusing on polygon meshes and adding textures and materials to them. Also how to use 3D modeling programs and applying all of it to use it in video games. This project is going to be in a 3D style, this means that this class was of utmost importance because is the basis of all the of art that will be in the project. Learning outcomes:

- E04 - Analyze the technical characteristics of 3D design tools.
- E04 - Use three-dimensional modeling applications for video games.
- E04, IR07, IR13 - Explain the principles that allow the definition of three-dimensional graphic elements.

### 1.7.2 Software Engineering - VJ1224

Software Engineering class was really importante in the develpment of walpurgis night, teaches the fundamental concepts and activities to develop a video game, how to desing it, how to organize the work flow. Tehcniques of planification and team communication and work.

Learning outcomes:

- IR01, IR02, IR04, IR16 - Designing video games.
- IR01, IR02, IR04, IR16, G01 - Properly apply agile methodologies to the development of video games.
- IR01, IR02, IR04, IR16, G01 - Define video game development plans.
- IR01, IR02, IR04, IR16 - Explain the engineering and software management challenges involved in video game development.

### 1.7.3 Conceptual Design - VJ1222

The aim of this class was to seek balance between all the ingredients that make up the video game and find perfect solutions. Moreover, and very important, establish an order to the creative process integrating methods to give sense to projects and the connection with the development of them. This course was one of the three classes where Walpurgis Night was born, in this one, working in the narrative and design documents.

Learning outcomes

- E15 - Define rules that harmonize with technological possibilities and provide fluidity, as well as dynamics of the game as protagonists in the construction of the design.
- E15, G05 - Know and control all the elements and objects involved in the configuration of a game and the ability to establish a harmonic balance between them.
- E15, G10 - Design scenarios and balanced environments for game development.
- E15, G10 - Design systems of balance between the game mechanics, the objectives to be fulfilled and the possible conflicts inside and outside the game.
- E15, G10, G05 - To develop in a precise, orderly and clear way all the information related to the design of a video game project.

### 1.7.4 Video game art - VJ1223

The artist has to be able to capture the ideas from the Game Design Document, giving the concept art the same atmosphere and art style of the project. So, throughout this course, the students work studying the main aspects of the professional functions of the art for video games, going through all the stages of the art creation process for a video game. In this class, all of the graphic and visual aspects of Walpurgis Night were developed, such as color palettes, main art style (although it has changed), basic designs...

Learning outcomes E09, G09 - Control the graphical tools to create representations with high level of detail. E09, G10 - Create environments with definition of lights, shadows, textures and environmental effects. E09, G10 - Create characters characterized and textured.

### 1.7.5 Character design and animation - VJ1226

This class works with two concepts in one: character design and computer animation.

Character design is addressed from a practical and technical point of view. Low poly modeling, rigging and textures creation. Also, technical features of the modeling applications are studied and how are the applied to video games Animation is approached from a theoretical view. The class deals with the most practical and habitual techniques, key concepts and algorithms that animators and developers can use to specify and generate movement of objects in 3d in an interesting way.

This class was one of the three were Walpurgis Night was born, so it has a big influence in the project.

Learning outcomes

- E06 - Explain the basics of computer animation.
- E06 - Explain the principles of character creation.
- E06, IR07, IR13 - Analyze the technical characteristics of the character modeling tools and 3D animation.
- E06, IR07, IR13 - Use character modeling and animation applications in the context of video games.

### 1.7.6 Artificial Intelligence - VJ1231

This class introduces the student to AI techniques to familiarize them with their fundamentals and offering an updated view of the tools that are used today in the design of video games. After the theoretical introduction to AI different concepts and techniques aimed at covering the points of interest in the context of video games are learned, such as the movement of artifacts, the search for ways, decision-making, strategy, tactics and learning, among others. In this project this course takes in important role when working on the enemies AI because they will use behavior trees.

Learning outcomes

- IR06, IR08, IR15 - Know how to solve video game problems using artificial intelligence techniques.
- IR15 - Know how to define particular artificial intelligence techniques for video games.
- IR15 - Know how to explain and differentiate artificial intelligence techniques.

## 1.8 Tools

This section lists all the applications and programs that will be used in the design and development of the project.

### 1.8.1 2D Art

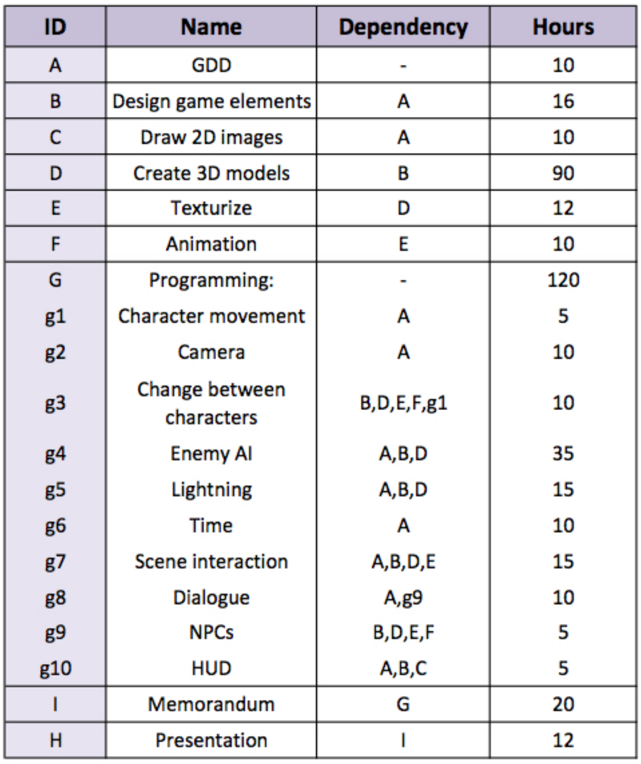
**Adobe Photoshop** [33] : for creating concepts, drawing 2D elements and preparing the textures. This application was used previously in some of the art classes of the degree

### 1.8.2 3D Art

**Blender**[34], **Maya**[35]

These two programs are for the creation of 3D world elements, such as characters, objects, scenery, applying textures to models, materials, lights... Blender is a free 3D program, runs without any problems on Mac and do not overloads the computer. Maya is used as Blender, both of them for supporting each other and complement the work.

Table 2: Tasks chart



| ID | Name | Dependency | Hours |
|---|---|---|---|
| A | GDD | - | 10 |
| B | Design game elements | A | 16 |
| C | Draw 2D images | A | 10 |
| D | Create 3D models | B | 90 |
| E | Texturize | D | 12 |
| F | Animation | E | 10 |
| G | Programming: | - | 120 |
| g1 | Character movement | A | 5 |
| g2 | Camera | A | 10 |
| g3 | Change between characters | B,D,E,F,g1 | 10 |
| g4 | Enemy AI | A,B,D | 35 |
| g5 | Lightning | A,B,D | 15 |
| g6 | Time | A | 10 |
| g7 | Scene interaction | A,B,D,E | 15 |
| g8 | Dialogue | A,g9 | 10 |
| g9 | NPCs | B,D,E,F | 5 |
| g10 | HUD | A,B,C | 5 |
| I | Memorandum | G | 20 |
| H | Presentation | I | 12 |

### 1.8.3 Video game implementation

**Unity 3D**[36], **MonoDevelop**[37]

Programming all the mechanics and structure of the projects, these two programs where previously learned in the degree.

### 1.8.4 Animation

**OptiTrack [38]**, **Maya**, **MotionBuilder**[39]

First, motion capture the animations and after that apply the results to the characters, fix mistakes and prepare them for Unity. OptiTrack is the program that the motion capture uses. Maya and MotionBuilder can support motion capture for applying it to the character and after that editing and fixing it.

### 1.8.5 Documentation and final presentation

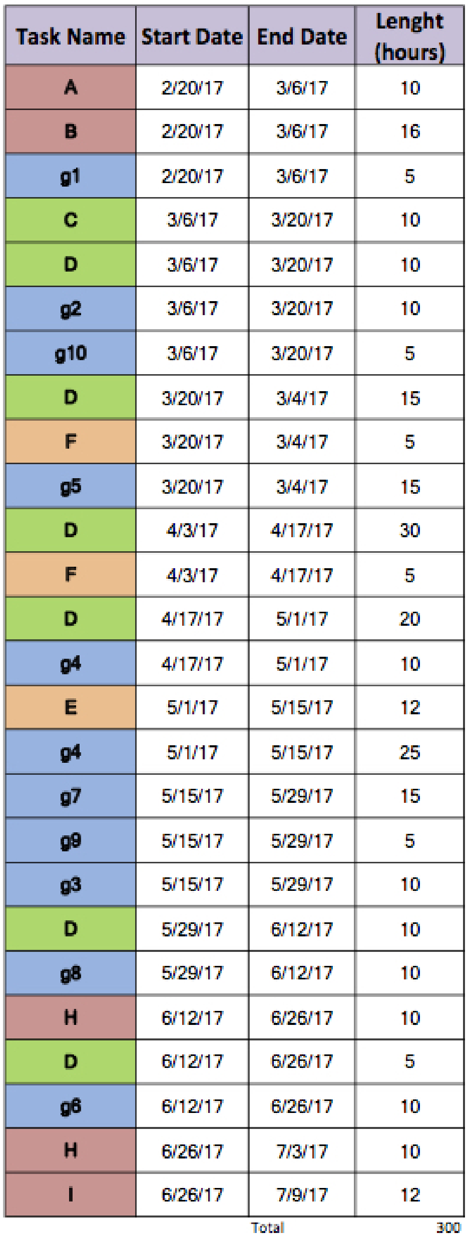
**Overleaf**[?], **Word**[40], **Excel**[41], **Power Point**,[42]

For writing the documents Overleaf is the platform of final choice, but Word ensures working on the project when there is no Internet connection. Excel for table creations and Power Point for the presentation, all of these programs are already known.

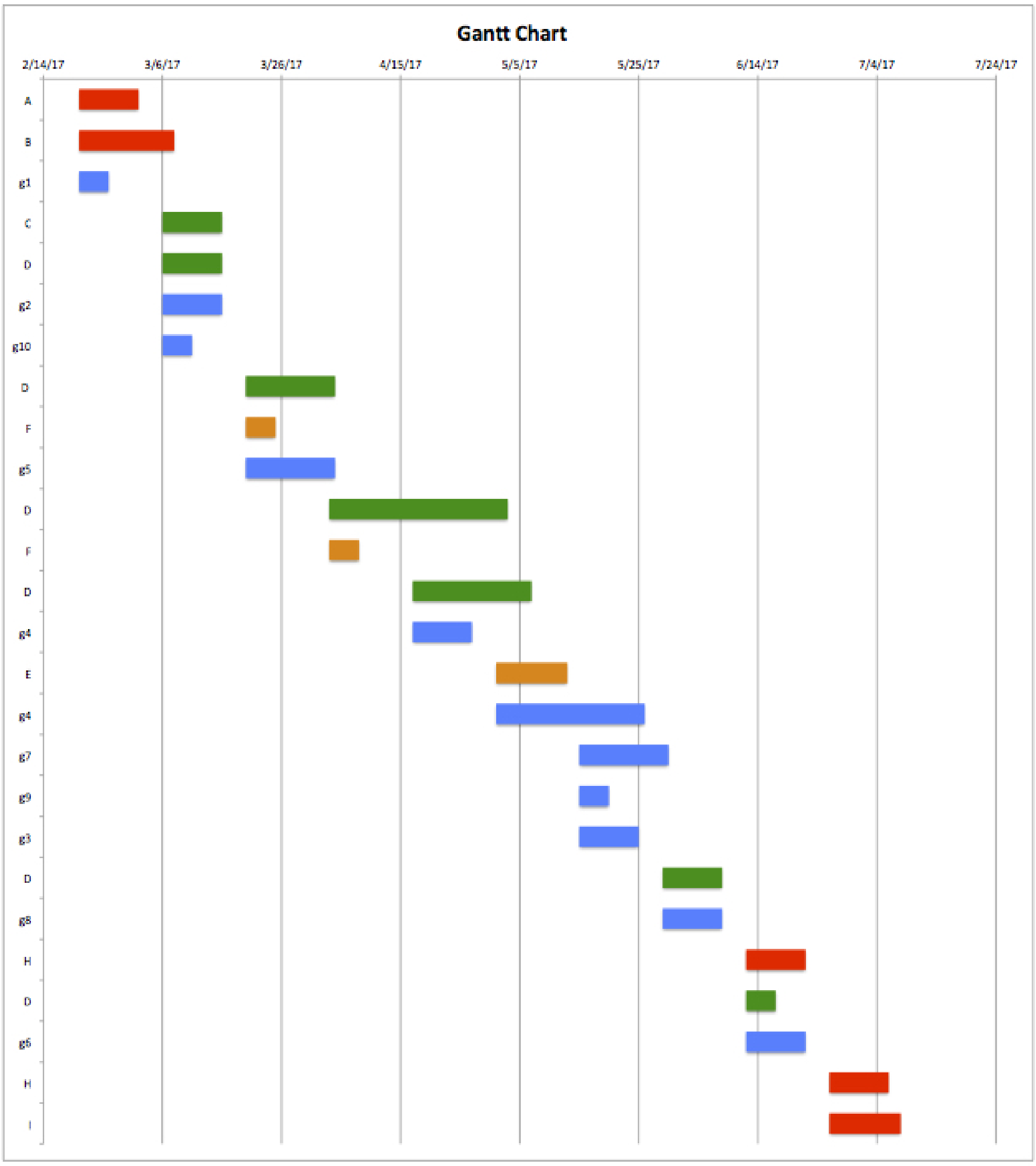
## 1.9 Tasks

Work will start the moment that the proposal is accepted, although, designing scenery elements, enemies and other things has started. Every fifteen days art and programming tasks will be fairly distributed, leaving time for other activities such as testing and researching.

Table 3: Gantt chart

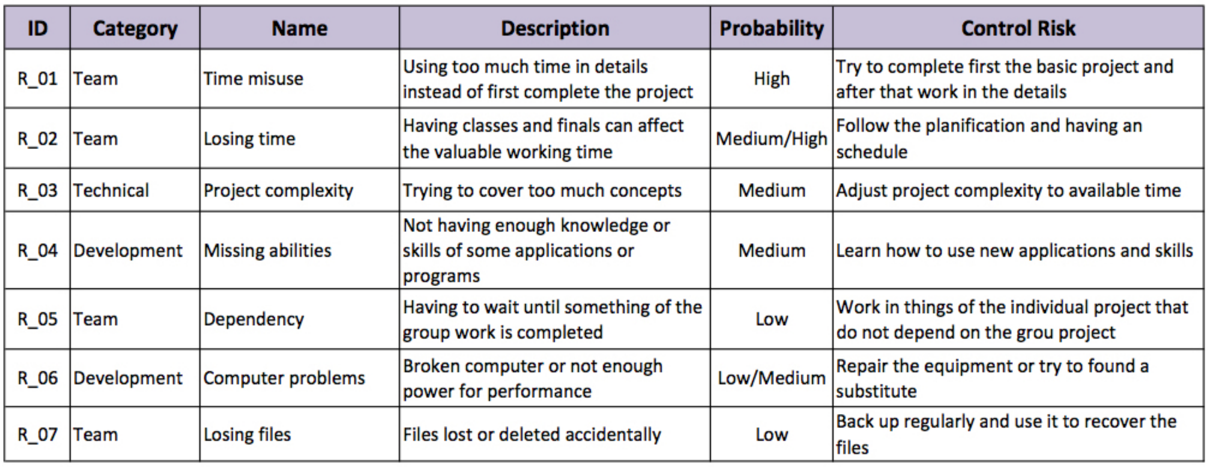


| Task Name | Start Date | End Date | Lenght (hours) |
|---|---|---|---|
| A | 2/20/17 | 3/6/17 | 10 |
| B | 2/20/17 | 3/6/17 | 16 |
| g1 | 2/20/17 | 3/6/17 | 5 |
| C | 3/6/17 | 3/20/17 | 10 |
| D | 3/6/17 | 3/20/17 | 10 |
| g2 | 3/6/17 | 3/20/17 | 10 |
| g10 | 3/6/17 | 3/20/17 | 5 |
| D | 3/20/17 | 3/4/17 | 15 |
| F | 3/20/17 | 3/4/17 | 5 |
| g5 | 3/20/17 | 3/4/17 | 15 |
| D | 4/3/17 | 4/17/17 | 30 |
| F | 4/3/17 | 4/17/17 | 5 |
| D | 4/17/17 | 5/1/17 | 20 |
| g4 | 4/17/17 | 5/1/17 | 10 |
| E | 5/1/17 | 5/15/17 | 12 |
| g4 | 5/1/17 | 5/15/17 | 25 |
| g7 | 5/15/17 | 5/29/17 | 15 |
| g9 | 5/15/17 | 5/29/17 | 5 |
| g3 | 5/15/17 | 5/29/17 | 10 |
| D | 5/29/17 | 6/12/17 | 10 |
| g8 | 5/29/17 | 6/12/17 | 10 |
| H | 6/12/17 | 6/26/17 | 10 |
| D | 6/12/17 | 6/26/17 | 5 |
| g6 | 6/12/17 | 6/26/17 | 10 |
| H | 6/26/17 | 7/3/17 | 10 |
| I | 6/26/17 | 7/9/17 | 12 |
|  |  | Total | 300 |



The chart 2 presents hour distribution and dependency of the tasks and the figure 3 is the Gantt chart.

## 1.10 Risks



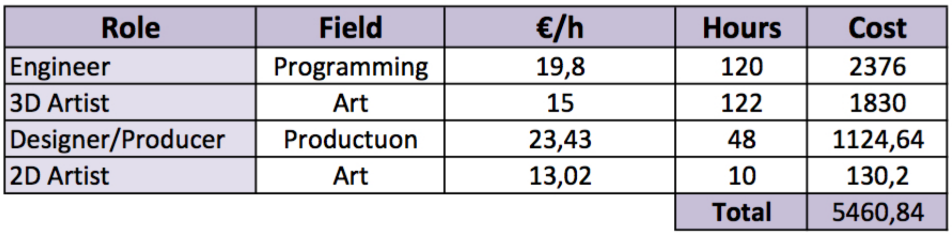
| ID | Category | Name | Description | Probability | Control Risk |
|---|---|---|---|---|---|
| R_01 | Team | Time misuse | Using too much time in details instead of first complete the project | High | Try to complete first the basic project and after that work in the details |
| R_02 | Team | Losing time | Having classes and finals can affect the valuable working time | Medium/High | Follow the planification and having an schedule |
| R_03 | Technical | Project complexity | Trying to cover too much concepts | Medium | Adjust project complexity to available time |
| R_04 | Development | Missing abilities | Not having enough knowledge or skills of some applications or programs | Medium | Learn how to use new applications and skills |
| R_05 | Team | Dependency | Having to wait until something of the group work is completed | Low | Work in things of the individual project that do not depend on the grou project |
| R_06 | Development | Computer problems | Broken computer or not enough power for performance | Low/Medium | Repair the equipment or try to found a substitute |
| R_07 | Team | Losing files | Files lost or deleted accidentally | Low | Back up regularly and use it to recover the files |

Figure 8: Risks Table

The table 8 shows the risks of the project development and how to prevent them.

### 1.10.1 Budget

This sections presents an estimation of the costs associated with developing this project, divided accordingly with every field.



| Role | Field | €/h | Hours | Cost |
|---|---|---|---|---|
| Engineer | Programming | 19,8 | 120 | 2376 |
| 3D Artist | Art | 15 | 122 | 1830 |
| Designer/Producer | Productuon | 23,43 | 48 | 1124,64 |
| 2D Artist | Art | 13,02 | 10 | 130,2 |
| | | | Total | 5460,84 |

Figure 9: Budget Table

The amount of money per hour in 9 is an approximation based on salary in the United States and Europe.

## 1.11 Walpurgis Night

Walpurgis Night was born in the third year of the degree, as a project developed for three classes of that year, those classes are: Software engineering - VJ1224, Video game art - VJ1223 and Video game design - VJ1222. As mentioned above in the chapter of Related Subjects, those courses handled a variety of video game designing and development. There was a playing demo and developing documents (like the Game design document among other ones), so it was a complete work of designing.

Unlike this project, that has been developed with Unity, this was developed using Visual Studio[43] and Cocos 2d-x[44]. Cocos uses C++ and is used to create 2D games, works with sprites and those can be animated, also includes audio libraries, physics systems... but despite all of that, it was not enough to the development of this game being a project with so many details and so big and the work was very slow as every little change involved waiting until the code compiled.

As being limited to make a 2D game, the art style decided was pixel art with classic games influences. And the level developed for the project was the first one of the game called Midgard (world of humans). The design of it consisted of the Valkyrie base, the cathedral, a tavern, the city with a market, the enemy base and a dungeon where another Valkyrie was locked. Regardless, only the cathedral, the market and the tavern were implemented but there were enemies, NPCs and a small challenge.

# 2 Game Design

## 2.1 Introduction

**Disclaimer this introduction is not inside the complete design document**

The Player, in WN:TDW will be immersed in a world which has lost its light over the years, playing as the Valkyries, main characters of this story. This world, one of the nine worlds of Yggdrasil, is called Svartalfheim, kingdom of the Dark Elves. It's a world full of secrets, mysteries and challenges, since the first Ragnarok many things changed. Dwarfs, former habitants, suffer under Ivaldi's[45] cruelty, a dark elf from unknown origin that made disappear the real king and took its place. One of the Valkyrie was captured and handled to him, she's locked somewhere in Svartalfheim, and it is the player who has to save her.

## 2.2 Walpurgis Night History

Eight o'clock of April 30th of an unknown year. This night is known as Walpurgis Night, or Witches Night. These witches will gather and stretch one more year the agony of mankind. That is why Lifthrasir[46], an organization of heroes entrusted with the protection of the world order will do whatever it takes to stop these witches, one of the solutions capture them.

However, that is not completely true, after this organization killed every god with an artificial Raganrök they established their hierarchy, being the new rulers. But, not every god died, Walpurga, goddess of magic and alchemy survived. She knew about the organization plans and tried to prevent them with her twelve fighters, the Valkyries, these warriors knew basic alchemy abilities, but even with that they could not stop it. And now, the organization, as every god was not killed, wants to trigger a second Ragnarök to rule alone the new start of humankind.

These Valkyries thanks to the heroes are regarded as witches, and every year they meet to keep humankind hope until the next year. If at midnight of April 30th they are not together, the organization will complete the second Ragnarök. In those 4 hours Brunilda, Valkyrie of Gemini, will have to free her teammates which were locked by the heroes in the nine worlds of the great tree Yggdrasil. And, time is ticking against Brunilda and her sisters-in-arms.

## 2.3 Walpurgis Night: The Dark World History

Svartalfaheim, formerly known as Nidavelir, was the great kingdom of the dwarves, they where famous by their skill as blacksmiths and living underground. They lived under the reign of Hreidmar[47], a fair and loved king. But after the first Ragnarok, a huge magical energy was released and he disappeared, after that a new ruler appeared, his name was Ivaldi. He was everything that Hreidmar was not, cruel, tyrant and power hungry, and more important he was not a dwarf, he was the first dark elf. He transformed in dark elves those dwarves who accepted his ruling and created his own army, those who rejected him as a king and started an uprising where either frozen in time and space or forced to become work slaves. Moreover, Ivaldi decided to change his world's name from Nidavelir to Svartalfhaeim, as a reminder of his power over his subjects. Now, this dark world is a reign of fear and darkess where things are not where used to be anymore.

## 2.4 Characters

The main characters are a group of Valkyries, these are:

- Brunilda: Gemini. Fixation. Ability to create anything that she thinks with her mind. She creates a replica that sends to help her other sisters-in-arms. Uses a dagger.
- Prudr: Pisces. Projection. She can improve any substance qualities. She can make her spear become the mighty Gungnir[48], Odin's sphere. She is very spiritual.
- Gunr: Aries. Calcination. As her name says, her power burns with a lot of intensity. She loves war and fighting and uses an axe.
- Skuld: Virgo. Distillation. Locked in Svartalfheim. Her power is associated with the ability to subtraction of the magic/soul of different objects or entities. Uses a scepter.

## 2.5 Enemies

There are two main enemies in this game, dwarfs and dark elves.

- Dwarfs: The most basic enemies in this world. They always carry a light, because they can not see in the dark. The only wear a simple piece of protection in their chest and a helmet, their clothes are tatty and soiled. Their weapon is a huge two-edged axe. These enemies will see the player if is inside their light zone, or if they are using the lantern. The legends say that they live underground because the sun light can turn them into rock.
- Dark Elves:These enemies are the strong enemies in the level, they are an improved version of the dwarfs, with better senses, faster and deadly. They wear flashy clothes and armor in a polished look, flaunting their power. Their weapon is a lightweight sword. They are able to see in the dark, so they will see the player when uses the lantern and when not.

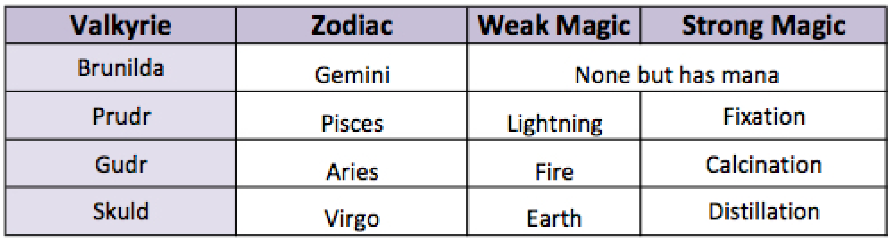
## 2.6 Interaction: NPCs and objects

There are two kind of NPCs in this level, all of them are dwarfs but narrative related some of them are "frozen" in time.

- Normal NPC: dwarfs that are still surviving in Ivaldi's reign of terror, they have organized a small rebellion, waiting until the perfect moment to strike comes and the days of terror can end. Interaction with them will be normal. They will provide information or give the player objects. They dress as the dwarf enemies so it will be difficult to distinguish them.
- Frozen NPC: the player will find something of orange color floating in specific points of the world, those objects when are inside the orange color light will change and a dwarf will appear. Those dwarves have been frozen by Ivaldi, so they do not know the actual situation of their world but they can provide a different type of information that will help the player. As they were frozen at the beginning of everything they are dressed with the untouched version of the enemies clothes, but without armor.

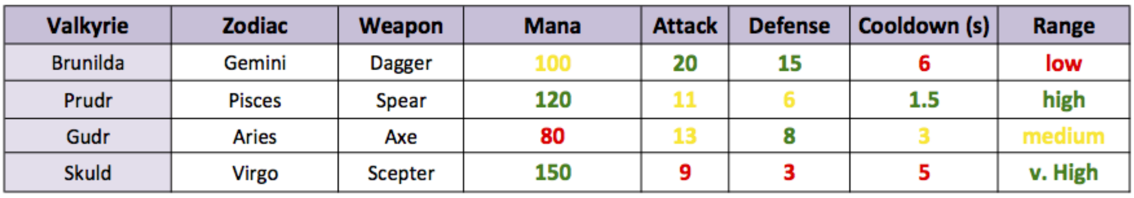
## 2.7 Game mechanics

The specific game mechanics of these project will be basically explained here, for more information see Appendix II - GDD. The basic mechanic only used in this project is the use of the lantern.



| Valkyrie | Zodiac | Weak Magic | Strong Magic |
|---|---|---|---|
| Brunilda | Gemini | None but has mana | |
| Prudr | Pisces | Lightning | Fixation |
| Gudr | Aries | Fire | Calcination |
| Skuld | Virgo | Earth | Distillation |

Figure 10: Characters magics.



| Valkyrie | Zodiac | Weapon | Mana | Attack | Defense | Cooldown (s) | Range |
|---|---|---|---|---|---|---|---|
| Brunilda | Gemini | Dagger | 100 | 20 | 15 | 6 | low |
| Prudr | Pisces | Spear | 120 | 11 | 6 | 1.5 | high |
| Gudr | Aries | Axe | 80 | 13 | 8 | 3 | medium |
| Skuld | Virgo | Scepter | 150 | 9 | 3 | 5 | v. High |

Figure 11: Characters stats.

When the player will not be able to attack if the lantern is in use. It has two modes, normal mode and magic mode. Normal mode lights an area around the Valkyrie. Magic mode varies with the Valkyrie and its color. This is related to their zodiac sign, and the effects are related to mythology and their alchemical process and personality. Any color of the magic mode can make special rocks on the scene absorb energy to light up the area.

- Pisces - light sea green: freezes dark elves, makes special clues appear on walls or surfaces, the dwarfs will see it from a long distance.
- Aries - red: turns the dwarfs into stone, can give false clues to the player. The dark elves will see it from a long distance.
- Gemini - Orange: brings the frozen dwarfs back to this time. Both enemies can see this light from a medium distance.
- Virgo - Blue: removes temporarily the magic protection of something.

Another mechanic is a puzzle that will need to be solved finding the three remaining crystals that are hidden on the scene, those crystals must be put on a pedestal to open the bridge to continue the level. The position of the crystals varies:

- One is in property of a dark elf, the player can kill it or can try to steal the crystal.
- One is found on a box
- One is in property of an NPC, interacting with the NPC will give it to the player.

And the last one, the labyrinth key, found inside the labyrinth in one of the many small vaults, this key opens the door to the central chamber where Virgo is locked. The key can be collected killing all the enemies or using stealth.

## 3 Game Development

In this section of the project, programming task will be explained in depth. It's important to stress that part of the implementations will be used in the complete project, by Irene Pérez and Ángel Torres, as well as, Walpurgis Night: The Dark World will implement scripts by them.

In this section, it will be advisable to take a look at the Appendix I, where the division of the tasks is shown in a table and the organization of the group part is expressed.

For the group part scripts that are relevant to the gameplay and mechanics were programmed, such as the camera, and the player movement, target enemy mode and basic attack, dialogue controller, game intro (moon scene and name project) and menus, making the character turn its head towards the locked enemy or object.

And a task of utmost importance; merging, fixing and adapting all the scripts and prefabs from everyone in the base project.

## 3.1 Input detection

Basically, this task was adapting Unity to work with Dualshock4[49] (play Station 4 controller) and detect its inputs. This controller has 18 buttons and two joysticks. There are two types of inputs, buttons and axis. A button can be pressed and held, and its input can be button, button down and button up. An axis has a value between $-1$ and 1, the neutral position is 0; its input being detected differently than the input of a button.

In addition to the two joysticks, 6 of the 18 buttons that the dualshock4 has are axis too. This means that, for an accurate detection of the axis programming a lock was necessary. Without a lock one input that the player could consider only as one action could be counted by the program as more than one, causing performance problems.

A lock is a mechanism that controls and limits the access to a shared resource. In this case, the problem comes from the buttons that are axis especially using the lantern and inventory interactions. When the correct input is detected and the player lifts their finger from the button a Boolean that controls the lock turns false, and only when that Boolean is false the actions linked to that button will take place and the Boolean becomes true. This happens like a loop every time that the function or the update are called, so the input is detected correctly and accuracy problems are avoided.

## 3.2 Character movement

It is important to remark that the members of the complete project decided to use Unity's Third Person Controller as a base script for the movement. That said, the script was edited and adapted completely to how it ended being used in the project

The player using the left joystick of the controller can run around the world, this means that the default action when moving is running. If the player wants to walk, they need to press the same joystick and hold it while moving. The character can also crouch and walk while crouching, this kind of movement works with the stealth mechanic. All of these movements have sounds associated to them, and the volume changes with the movement.

Also, the player can defend themselves of the enemy attacks, and only half the damage will be subtracted.

In essence, character movement is divided into two scripts, ThirdPersonUserControl and ThirdPersonCharacter.

ThirdPersonUserControl controls the player's input and camera movement relative to the character while they move. Update and FixedUpdate in this script control inputs detection to two different actions, crouch and basic movement. The basic difference between time detection of both is that, basic movement is detected as axis, and need a more precise input, moreover, it's important to use FixedUpdate when dealing with a rigidbody. For the crouch action, being only a one call animation and movement that keeps active as the boolean is true, using the Update function is enough and works properly.

Third Person Character works with the rigidbody, initializing all of its components, also, controls the input of the action defense. This action can be performed two ways, if the button is only pressed once it will be a fast defense, but if the button is held down the defense will be up until the player lifts their finger.

As the rigidbody is in this script, the actions like walking and crouching that were detected in the other script are performed. Scaling the capsule collider when crouching and avoid standing in lower rooms are in this script and finally and most important the update of the animator on the basic animations (walking, turning and coruching).

## 3.3 Camera

The camera in this game takes an important role, in an rpg/adventure genre being able to use the camera, as a mechanic of the game is important. That why, this camera is third person based and interactive, which means that follows the player's movements but allows to change its rotation so the player can control it. The camera position is behind the character and slightly above. This position allows the player to see the 3D avatar of the character.

It is possible to rotate the camera 360 degrees around the character, and even up and down. This gives the player the change to observe and analyze the scenery and situation in the game. That said, one of the most problems with this kind of cameras is collision with scene elements like walls, this camera script implements a function that avoids going trough walls and tall objects. It can also, be centered behind the character if the player wants, repositioning and also when in Target Enemy Mode turns the character to be facing the enemies.

It is important to remark that the player has the ability to change between a group of Valkyries, the camera object is a child of the active Valkyrie so when changing characters the camera reassigns itself, making the new Valkyrie its parent, so all the Valkyries use the same camera.

The first step to develop the camera was, trying to work with joystick input for a better precision and working with that input in degrees. Working with eulerAngles was the solution. The input to change this values is in LateUpdate. Contrary to what people think, camera should be implemented in it, because LateUpdate is called every frame, and then if a camera is tracking the character movements these are updated in FixedUpdate or Update, so the camera needs to update after these other actions.

The camera can rotate freely around the character in the X axis but is restricted in Y. Using a special function called ClampAngle the camera input in the y axis is limited, so the camera is not allowed to rotate over or underneath the character and be upside-down.

After that, an important feature of the camera is avoid passing trough walls and objects, this camera uses raycast to detect if there is a collision and then applies an offset to avoid that problem, this offset makes the camera approach the character smoothly until the detection of the wall stops and then returns to the original distance.

There are three more properties, the camera can return to its original position behind the character pressing a button, when the character crouches the camera lowers its height to match the new character position in space. Finally when in Target Enemy Mode the character turns its rotation to face the forward of the camera.

## 3.4 Target Enemy Mode

The player when engaging in battle can enter in a battle mode called Target Enemy Mode, this mode allows them to lock an enemy as a target and focus their attacks on the enemy locked. This action is possible while holding L1 button and then when the enemies enter the range of this mode be locked pressing R3.

Every enemy has over his head, its live and a color indicator, this indicator changes its color and is a visual feedback of the status of the enemy in this mode. Its color is blue if the enemy is no inside the range or not in target mode, the color changes to yellow if it is in the range, so is possible to target him; and if the enemy is targeted the color will be red.

This mode is activated from the camera, when the input of button L1 is detected and accordingly a Boolean is changed, this Boolean turns on Target Mode. This is an action that is active while the button is held down.

Target mode basically is a child of the camera that contains a box collider. This collider, works as a range, to determine which enemies are inside it and then make them possible targeting enemies. Every time that an enemy enters the collider, is added to a list of gameobjects of enemiesInRange, and every time that an enemy exits is removed from the list (also when they die).

The character will target the closest enemy, and after that targeting will move from one enemy to another depending on its distance to the character, this because the list of enemies reorders itself. If there are enemies inside the range, a function to start locking will be called, when target enemy button is pressed the first enemy of the list will be selected and be locked. With every change of enemy selected and enemy in range or not in range, the colors of the indicators change automatically.

## 3.5 Dialogue Manager

Being able to interact with an NPC found in the scene is important in this kind of games, the player needs to be able to interact with the world and learn about it, so speaking with an NPCs gives the game a different level of depth. In this game when the character approaches an NPC with dialogue an indicator appears in the screen, telling the player that if the button X is pressed the interaction will start. This function is divided in two scripts, the one that controls the dialogue and dialogue canvas and the one that has the lines of text and that belongs to every NPC and activates the interaction.

When the player interacts with the NPC, sends the Dialogue Manager its dialogue lines and a the bool isSpeaking turns true, this bool works as an action blocker when is true certain inputs won't be detected and enemies won't attack, making the dialogue action the important action in the scene.

Dialogue Manager is in charge of process every sentence that the NPC contains and show it in the dialogue panel text. Every sentence is wrote in screen one by one and separately. A significant feature is that they are written word by word at a prefixed speed, but if the player holds the interaction button (X) pressed, the speed will increase. A visual indicator will appear at the end of every sentence to know if the dialogue continues or is complete.

The script has a function (called from the script of the NPC) where the NPC lines arrive and are added to a List of strings and when addDialogue turns true all the process starts.

In the Update after the dialogue lines are received the animation is forced to be idle and the panel found in the canvas is turned on with the name of the NPC and a blank space for the text, if there is not text being shown then the Coroutine [1] to start is called. If the dialogue with the NPC arrived to its end and one more input of the X button is detected then the script resets the previous changes to their original value, hiding the panel and making possible the interaction again.

The first Coroutine called is StartDialogue. Waits a little bit before starting to show the text and the process of it. The number of lines is counted and an index to know in which line the dialogue is currently is created. The important part begins with a while that will loop while the index is smaller than the number of lines or there is not a string being written. Inside the while, if no string is being revealed then another Coroutine starts and this one with the pertinent line.

The second Coroutine is the one that shows character by character the string on the screen, it is like the first one but RECORRE the string. So while the index is smaller than the length a new word is added to the Text from the screen. When all the string is revealed the while ends and the first Coroutine sends the next line. This process keeps going until all lines of the NPC are shown, after that when is end of dialogue and X is pressed the interaction ends.

[1] A coroutine is the unity method that allows to start a parallel action. When the coroutine is created it runs at the same time as the main code without affecting it, but the coroutine can be paused and can be made to wait until some events take place(like wait until some time has passed or a boolean turned true...), and after that it can keep running

## 3.6 Basic attack

The player can attack an enemy with the Valkyrie and her weapon, this action is when the character is near an enemy and presses button O, the action of attacking will start and subtract life from the enemy. The range of attack and type of weapon vary from one Valkyrie as well as the damage and speed.

Piscis uses a spear and Virgo a scepter, so their basic attacks are similar.

Physical and basic attack has two scripts that make the action of attack an enemy possible. In this case is also important to keep in mind that when the player uses the lantern, the attack action cannot be executed, so the first script is connected to the lantern script, which contains a Boolean to know if the lantern is on or off and attack can be used.

To use the basic attack two conditions must be met, that the cool-down time is completed and that the lantern is off. Cool-down depends on the Valkyrie stats, and it is the time that the player has to wait to attack again. When these two conditions are true, and the input of the button to attack is detected attack is called.

This attack is in a script that varies with the player weapon, but basically triggers the attack animation hurts the enemy and when completed makes it return to the idle or walking animation. To hurt the enemy, the weapon has a collider, this collider is a trigger that when detects that the object inside it is an enemy and the player is attacking it, it will lose the amount of damage that the actual Valkyrie does.

## 3.7 Introduction scenes and Main Menu

There are two scenes before the main menu starts, the first one is an introduction to the project and the second one is the moon changing from its white/yellowish color to blood red, representing the change of the moon in Walpurgis Night. The player can skip this scene if they want, going directly to the main menu. With the left joystick the player can move between options and select them with X button. They can start a new game or load it, change options such as different volumes (master, music and SFX), learn about the project and creators and exit the game.

In the scene of the moon there are four scripts:

- The first one is a script that makes possible to the player to skip the moon scene, if the input of the button O is detected the scene will change to main menu with a fade to black. - Next is a simple script controlling that “Press O to skip” turns on and off, making it blink. - Also, the moon changes colors but in reality changes between two materials, and accessing the renderer of the sphere with the texture of the moon a lerp is applied and the transition between materials starts. Moreover, this script controls when to start the next scene (main menu) after the change is completed. - Finally, in the moon scene and main menu scene there is music playing, and this script controls if the scene is skipped to stop the music, but with a fade avoiding an abrupt silence

Main menu has 4 more scripts that handle different parts: - In the main menu there are twelve spheres with the zodiac signs inside them, these spheres are floating and rotating, the script changes its rotation with the passing of time. At the start of the script with a random is decided if they will rotate to right or left. - In the menu of options, there are a group of sliders, those sliders control the volume of Master Volume, Music and Special Effects, and the value of those sliders is passed to the AudioMixer. - Another script controls that the music starts to play, the volume starts to increase with a lerp to make it gradually and soothing to the ear. - Finally the last script passes to the event system if a button is selected.

## 3.8 Head Look Controller

This part was implemented using an asset from the AssetStore called Head Look Controller. This controller is used when the player enters Target Enemy Mode, and handles the movement of the head when an enemy is locked. The Valkyrie will turn her head and follow the enemy moves like watching him.

The asset works selecting the desired joints which you want to move and for each joint affected applies a rotation to the target of the action. The turning of the head will found the best angle to look at the enemy, from right to left, but inside of an angle limit. This is handled in the LateUpdate with a foreach that calculates the amount of turning of the joints to turn and the desired angle. With Pisces, the bending was wrong the froward sight of the script was edited for the actions of running, standing in idle and crouching, at least to make the character look foorward and not to the floor.

## 3.9 Enemy AI

The base enemy AI was programmed by a teammate using the asset PandaBT, for this project a variation of the basic behavior tree to add the enemy actions linked to the light mechanics. In this subsection the changes applied to the AI will be explained, those changes are for introducing light related behaviors.

The enemy has a basic AI where it will be patrolling the scene, if it sees the player it will start attacking them, and if the enemy hears something then it will take a look at left and right to try and found where that sound came from. If the enemy is following the player and the player is trying to flee, if the player is fast enough to hide behind a wall or something and the enemy can not see them then it will go. When hearing, the enemy can hear sounds from a minimum to a maximum which means that running, walking and crouching can make a difference.

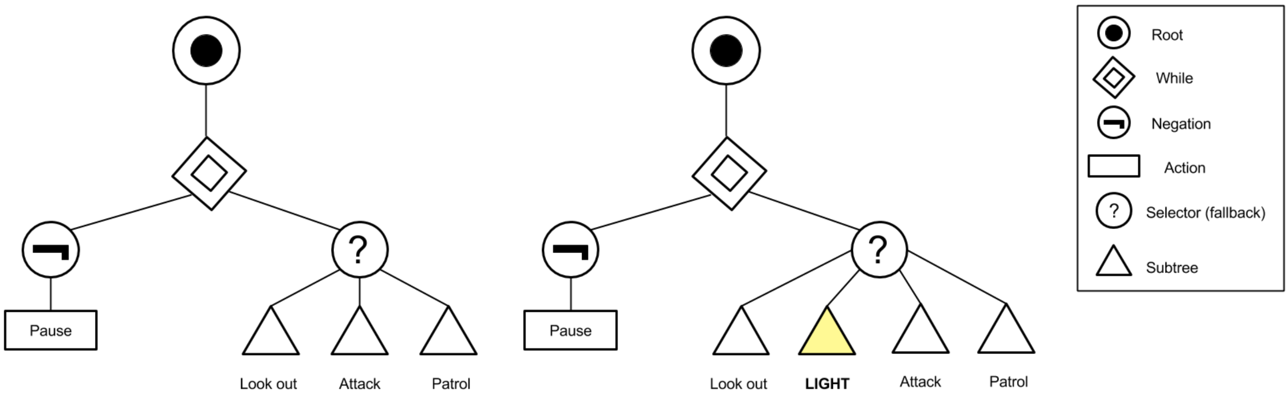


Figure 12: Left: original tree root - Right: edited tree root

The 12 shows two trees that are the same but change slightly, but before explaining the changes the symbols will be described.

- **Root:** The starting point of the behavior tree.
- **While:** will make the actions inside it if its first child is met.
- **Negation:** Not, like it sounds, deny an action.
- **Action:** The task.
- **Selector:** (fallback) runs its child one by one as long as they fail. If succeed with its first successful child, it fails when all fail.
- **Subtree:** An identifier related to another tree.
- **Sequence:** runs its child one by one as long as they succeed. If succeed with all are successful, it fails with the first one that fails.

That said, both trees from 12 do the same things save from the added subtree in the second one. So basically what those trees do: While the game is not on pause, then a selector that starts to going through every subtree of the selector, if a subtree fails goes to the next one, keeps going through every subtree until finds one that succeeds and when that the tree is completed the fallback exits and the root is called again restarting the process.The pause action is a boolean that changes its value when the pause button is pressed in game and the pause menu is opened, this has the purpose of stopping the AI behaviors if the pause menu is activated, avoiding problems with the enemies.

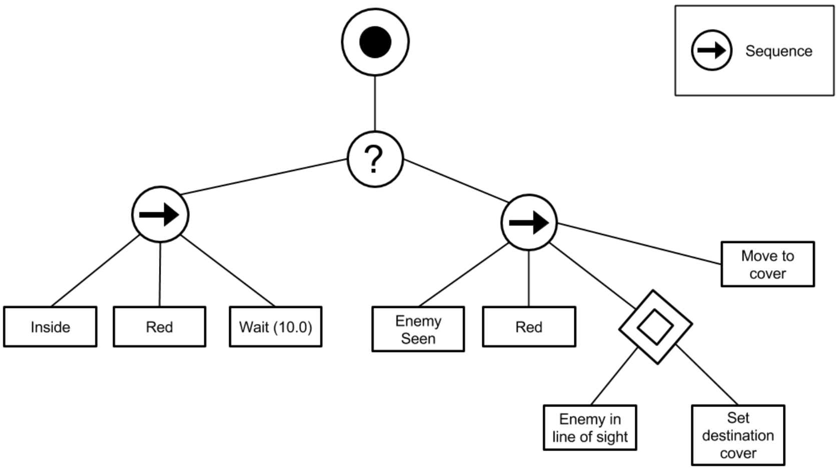


Figure 13: Inside Light tree

The figure 13 finally shows the tree related to light mechanics, this tree starts with a selector, that selector controls if its children fail or not. The first child is a sequence; that sequence will keep doing the actions/task that has like children if they keep being met. The first one is inside, inside returns a boolean that calculates the distance between the enemy and the player, if is less than a given number this returns true, so the next thing that the tree needs to check is if the Valkyrie has her light and if that light is also the color that affects the enemy (in this case is the dwarf so the color that affects him is red). And if this task returns true too, then the last action of this sequence is making the enemy wait 10 seconds (this is the effect that the red light has on this enemies). If any of this tasks return false, then the sequence will fail, and then the selector will move to its second child, the next sequence. Now its time to check if the enemy is seeing the valkyrie, if it is seen, then checks if the Valkyrie has the color light on (red again in this tree). If its on it continues to a while, this while is special, because checks if the Valkyrie has a line of sight to the enemy, if it has one then the enemy has to flee because to avoid being affected by the magic. This calls the action set destination cover, where checks for a place to hide where the Valkyrie can not see him. And then once the destination is set moves to it.

Also, the sight distance and hear distance change with every type of enemy, also, depending on different circumstances those values will change. In both cases it will increase its value when light the normal light of the lantern is on, when the color light is sea green it only will increase the sight distance of the dwarf and when is red of the Dark Elf. When orange or blue both of them will increase. The Dark Elf as a better version of the dwarf can see in the dark so for starters its sigh distances is much bigger than the dwarf. Also hear distance as he can hear in a larger range than the dwarf.

The tasks only commented above will be explained in depth down below.

The tasks of the first sequencer are pretty simple, so moving to the next one, the Enemy Seen was programmed by the teammate that made the basic AI and as move to destination (but in this tree for making it easier to understand its behavior it has been changed to move to cover). The asset helped to develop the next tasks. Enemy is in line of sight takes the valkyrie position, then the enemy and uses another function to see if the valkyrie can see the enemy. This function takes both positions and makes a ray from the valkyrie to the position of the enemy, if the collider hit is the enemy collider this means that the valkyrie has in sight the enemy and the enemy is in danger, so the function returns true, if the collider is not the enemy then returns false. If false is returned then the action of checking if there is a line of sight is not met and the enemy does not need to flee. But, if the return is true, then the next task need to be made, this task will set a cover point for the enemy to hide. The first task is to sample random cover points on an increasing circle. Then, when the process of sampling cover points is complete, the list of potential cover points needs to be traversed and check if those positions can be in sight of the Valkyrie, if they are then those cover points are not suitable and are discarded. If the covers are good then they are added to another list, where the next step is to search the closest cover point, once this is completed the enemy will move to that closes point to hide and wait.

## 3.10 Light Mechanics

### 3.10.1 Lantern

The player can use a lantern to light the scene. This lantern is used pressing the down button on the D-pad. When the lantern is active the weapon will disappear and the player will not be able to attack. Magic abilities can be applied to it, these abilities will change with every Valkyrie. To use this the player has to press L1 (same button as weak magic), the switch will be automatic and the color of the light will change. If the Valkyrie is Pisces the color will be sea green, Aries red, Gemini orange and Virgo blue. When using the color light, mana will be subtracted and the amount varies with each Valkyrie too. If there is no more mana, the magic light will turn off and the effect will stop.

This is controlled with scripts that handle different things, as one of the buttons to use the lantern is a D-pad button, it is necessary to use the lock on the input. So, the first script controls the input of the lantern detecting when to turn it on and when to use the magic and also switching the weapon for the lantern. It also handles the magic subtraction and changes two global variables that identify when it is only normal light or when is colored. Then the other script controls which Valkyrie is using the lantern to determine which color the light should be and with two booleans it indicates to the enemies which one it is.

### 3.10.2 Diamonds

Also called crystals, the player needs to collect all of them to complete the puzzle and continue its way to the labyrinth. To gather them the player has to found them, one is in the scenery in plain sight, other will appear as a gift of one of the NPCs and the last one can be collected when the dark elf that carries it is killed or if the player steals it.

To collect them the player has to approach it and interact with it and automatically will be added to the inventory, this is not a consumable so to know how many of them are in the inventory a visual feedback will appear on the screen (like the revive orb), and they will be automatically used when interacting with the pedestal.

To make the player being able to pick them the respective changes were applied to the scripts of pickup, destroy (the one that is inside the object) and item controller.

### 3.10.3 Pedestal

These is where the player has to bring the collected diamonds. The first time interacting with it, a text will explain what needs to do to open the path. From thereon every time that an interaction is started, the pedestal will tell the player how many diamonds still need to be found. When all of them are found, then the way will be opened.

This uses the dialogue system and the interaction.

### 3.10.4 Special objects

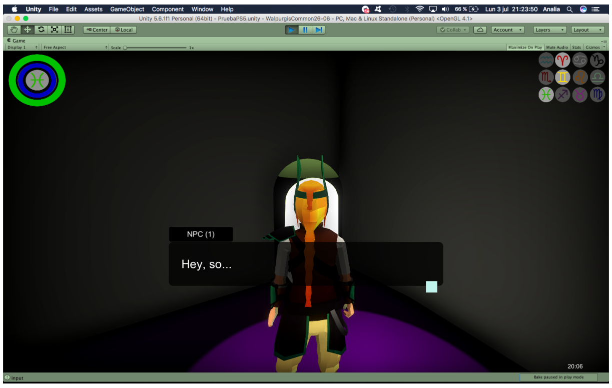
There are some objects in the scene that when are illuminated will react differently. These objects are:

- Orange NPC: When the player uses the orange light over them, the real NPC will appear, this is controlled by a script that detects if the light is orange and if its orange turns on the real NPC gameobject on and turns off the mesh renderer and collider of the orange NPC.
- Blue clues: when the player uses the sea green light, in special places will appear an image which will start to glow and will show clues to the player.
- Rocks: some rocks if magic light touches them will start to glow the color of the light. These two last objects have a script that makes a lerp and changes the material from one without glow to the one with.

## 3.11 NPC interaction

To interact with an NPC a sign will appear on top of them when the player is near it. That sign will display a text telling the player to press the button X. When that button is pressed the interaction will start and the dialogue will appear. Once the interaction starts the player will not be able to move until it ends.

The base script of this action was programmed by another teammate, this script was taken and adapted to fit the established controller and its input. Furthermore, some changes where applied to increase the accuracy of the interaction and the performance.



NPC (1)

Hey, so...

Figure 14: Dialogue

First of all, the script that every NPC has works distance based, if the player is at X distance of the NPC and it's not already interacting or speaking with it a panel with the text "Press X" will appear. When the input of button X is detected that text disappears and a function called Interact is called. This function makes a Boolean from GameController called isSpeaking true and calls dialogueManager to start the dialogue. This happens in the Update, and also this script detects when the character Valkyria is changed to make possible to interact with the NPCs with every character. Once the dialogue starts is impossible to move the character, only the camera and keep reading the dialogue is possible.

## 3.12 Magic

Every Valkyrie is able to use magic, except False Brunilda because she can not use magic. There are two types of magic, weak and strong.

Weak magic is more basic and uses less mana than strong magic. Every Valkirye has a zodiac sign and each one every sign is associated with an element, the elements in the game are water, air, fire and earth, plus lightning. The basic magic attack occurs when the player presses the button R1, and the animation of this action is played. The magic is fired from the Valkyrie's hand and follows a straight line. If the player is in Target Enemy Mode and an enemy is locked, the Valkyrie will turn to face the enemy and shoot in its direction.

Strong magic depends on the zodiac sign and the alchemical process associated with it. Is exclusive of each Valkyrie and uses a large mana amount. This action is activated when the player presses the button R2. When simply pressed R2, the attack will be an area around the Valkyrie using a collider, and all the enemies that are inside it will be affected. However, if the player is in Target Enemy Mode and has an enemy selected the collider will change its position and now the area of the attack will be around the locked enemy, affecting it and all the enemies in the area around it. Only Piscis is different, her strong magic is only in an area around her.

Both magics are controlled by a script called MagicShooting, and in this script while the player is not interacting with an npc and not in the pause menu the inputs of R1 and R2 are detected. If R1 is detected then the animator is called and the animation of shooting magic is triggered, this animation has as an event the magic being shot so only calling the animation is enough. If R2 is detected a new function is called, this function detects which valkyrie is the one using her strong magic and depending on the one using it calls another function with the name of that Valkyrie. This new function depending on the Valkyrie does the strong magic in it or calls another script.

In this project Piscis and Virgo strong magics where developed.

- Piscis uses her ability to enhance her spear invoking the legendary Gungir - Odin's spear. With this spear she strongly hits the ground damaging all the enemies around her.
- Virgo does not hurts the enemy with this, her ability makes an enemy weak against attacks, meaning that after Virgo uses her strong magic all kind of attacks from any Valkyrie will be two times stronger. As before, if there is no enemy locked, the attack will be around her, with an enemy locked the magic will affect him and every enemy around him.

## 3.13 Inventory and Pick up objects

One of the most iconic features of RPG/Adventure games is the existence of an inventory where store consumable objects. In the game when the player pick an item, this is added to the inventory and disappears from the scenery.

To use the object, the player has to use the d-pad of the controller. When pressing the up arrow an 2D panel will appear, this is the inventory, all the objects picked will appear inside it. To select the desired object, the player has to press the left and right d-pad arrows, and the object is triggered when pressing the down arrow. The object will disappear from the inventory and after that the player can close it or use another object.

The inventory panel closes automatically when opening the pause menu and when an interaction with an NPC is started.

The base script of this action was programmed by another teammate, but was adapted to work properly with the inputs and to increase the precision of the detection. At the start this script worked with the click of the mouse but the project does not work with mouse so the adaptation to detect the inputs of the controller as clicks and moving between the objects to select the desired one. To see easily which object is selected, a visual marker was added, this marker moves with the left-right inputs of the d-pad controller. When the selected object is consumed, the marker automatically moves to the next one or if the used object was the last in the inventory, disappears.

For a correct detection of these actions, the input of the controller as previously explained in the subsection 4.1 Input detection has to be controlled with a lock to avoid improper detections.

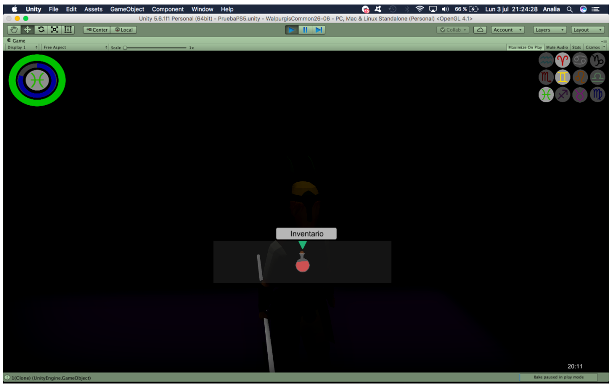


Figure 15: Inventory with marker

To pick up the objects two scripts take action. The script Destroy which every object has and Pickup, for the Valkyries.

Destroy controls the distance with the player, to allow the pick up action, if the player is inside the predefined range of the interaction then the object can be picked. This calls another function which detects with kind of object is the one being picked and returns the icon which represents the picked object. This icon is send to a function in the PickUp scrip, where the icon is added to the inventory canvas and the gameobject to a list of the gameobjects that are in the inventory.

There is an special case, with an specific object, this objects never enters the inventory but a visual feedback that the character picked it is shown on screen.

## 3.14 Change between Valkyries

In the project there are three initial Valkyries and one that is found while playing, as before mentioned, these fighters have different abilities and weapons, so the possibility to change between them to use it when necessary is important.

The player can change pressing the button L2, when this action is triggered, the 3D model of the character will change to the next one in the list. Also to give a visual feedback to the player of which Valkyrie is right now selected, there is an specific interface that shows which one is it and also shows which Valkyries are possible to use.

Interface is a script that controls all of this, the change between the Valkyries and the change of the visual feedback in the canvas, basically with the use of lists and move through them when the action is activated. The change of the Valkyrie happens on the same exact position as the previous one was.

This was programmed by one of the teammates, but as before mentioned, there is only one camera, so to this script was added a new instruction to set the new camera parent as the new active Valkyrie. Also, that means that now, every script that needs to know if the Valkyrie has changed has to be edited from here assigning the selected Valkyrie new variables to them, for example with the mana of the Valkyrie.

## 3.15 Valkyrie class

Every Valkyrie is different and has her own stats and name. So every Valkyrie has this script, and only has five variables the Name, the attack, defense, maximum magic and current magic.

This is used to set different stats and they are associated with their abilities and weapons. This is usually a common concept in RPG games, where every character is different.

### 3.16 Valkyries' life and mana

Life and mana are shown on screen with two sliders that increase or decrease depending of the situation, this works as a feedback to the player. When the character is attacked or uses magic they decrease, If uses a potion or waits (waiting only with mana) they increase. So the script HealthMagic adjusts the slider values and handles the taking damage and using magic of the character.

The colors of the slider change as they decrease their value, life is green when at maximum and mana blue. As they approach the zero value one will turn reddish (life) and the other blackish (mana).

As the live of the character is controlled here, the Game Over associated with losing all of it is here too, but there is an object that can not be used by the player and is used automatically. If the player has one of these and their life is zero the object will activate and the character life will be completely refilled and the Game Over will not happen.

In addition, the functions to increase life and magic that the potions use are here too.

One important detail is that, life is common in every Valkyrie bur magic is individual, so the mana has to be updated with every Valkyrie and not affecting the others, so the script Valkyrie is perfect for this.

### 3.17 Enemy health

Enemies have a slider over their head that shows their life and when the player attacks them with magic or basic attack this slider decreases, with very few exceptions it also increases. When the slider arrives to zero, the enemy dies and disappears.

The color of the slider also changes, with full life its color is green but once the enemy is attacked the color will turn red.

In the script a variation was added, and is that now it controls a multiplier associated to Virgo's magic, if the current enemy is weak the amount of health that will lose with every attack will be the double until the effect fades and stops being weak.

### 3.18 Game Controller

This script basically controls the loop of the game and also the input of the Pause menu and inventory. This was programmed by another teammate but some changes were applied mainly the detection of the input of the controller.

## 4 Game Art

This chapter will show all the artistic decisions behind the project, from color palettes to concept art to 3D models and its creation process.

When someone plays a video game, one of the first things that stand out are the graphics, visual style and art. Video games with amazing graphics tend to attract more players, even when this characteristic has nothing to do with the game mechanics and does not do a bad game a good one.

Sometimes a unique style can make a difference, can help the players to feel different emotions while playing. Small group of video game developers or indies, tend to work towards art that conveys feelings, almost always avoiding realistic art. Because as stated before good art $\neq$ good game, but the same occurs inversely, bad art $\neq$ good game. So finding the balance of the game art is really important when developing it.

## 4.1 Color palettes

In Svartalfheim there is no light, so the basic colors should be darkish to play a part in the atmosphere of the scene. But, as light plays an important role, the colors are going to be brighter so when there is a light source near them they stand out, creating a visual contrast between the atmosphere and game situation.

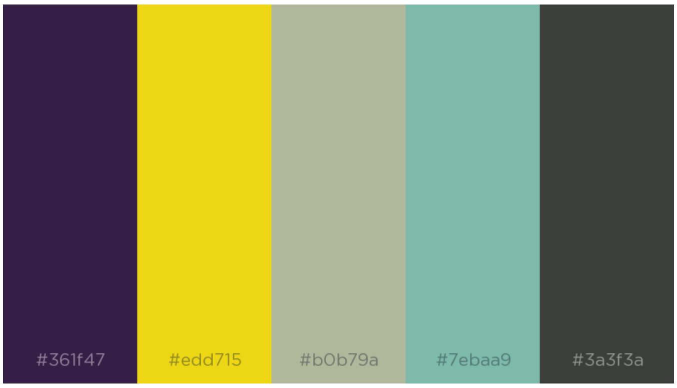


Figure 16: first color palette.

This 16 is a first approach to the color palette of the world, but more colors will be added or changed. Being the kind of world that it is, the existence of more color variety and tones is entirely possible.

## 4.2 Old Walpurgis Night art

### 4.2.1 Old concept arts

The old Walpurgis Night had a total different art concept and style. Looking for an old school video games style using 2D art, like in classic games such as final fantasy, the first The Legend of Zeldas... So this decision, clearly affected all the work related to concept art and art.

When talking about characters, concepts were more simple, with less detail and trying to find a balance between real Nordic armor/clothes, detail amount and pixel art, because the pixel art style decided for the project could not have too much detail.

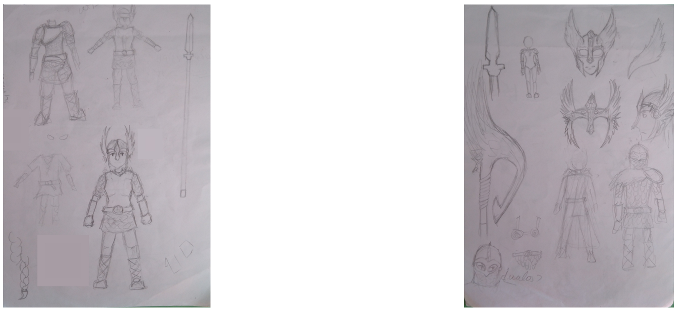


Figure 17: Old valkyries concept arts.

On the other hand, world concepts, last year concepts for the first world of the game where developed. As well as with character concept development, when working with the world concept a study of the architecture, drawings and history of the Nordic mythology was made.

One of the most important buildings of this world and the game was the Cathedral, this building, was developed keeping in mind the Gothic architecture, even taking real references on real Nordic cathedrals, and after drawing the Gothic base, viking details where added.

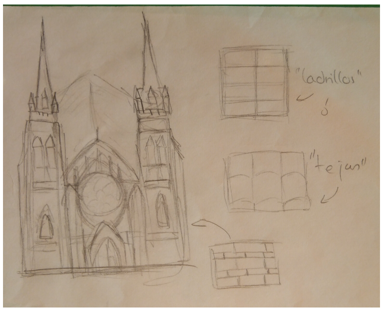


Figure 18: Cathedral concept art.

When drawing concepts of the other buildings, like houses and the tavern, the same actions and developing process were applied.

### 4.2.2 Old art in game

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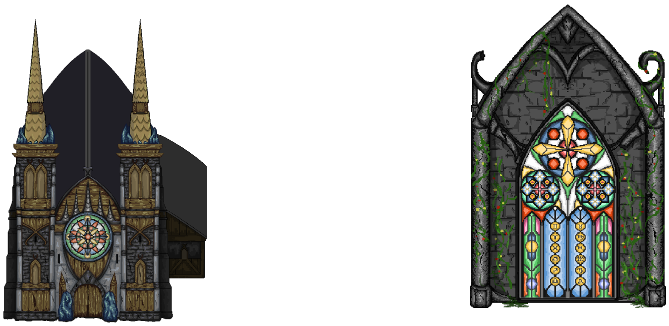
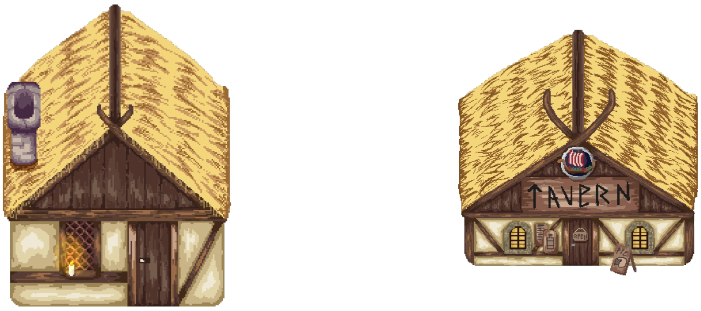
The art style of the first version of Walpurgis Night was inspired, as before commented, by the pixel art classics. A style with detail but not in excess and with a variety of colors related to nordic culture.



(a) Cathedral

(b) Stained glass from inside of the cathedral

Figure 19: The Cathedral



(a) House

(b) Tavern

Figure 20: Some buildings

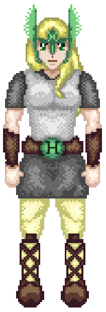


Figure 21: The old Valkyrie.

## 4.3 New Walpurgis Night

### 4.3.1 Concept Art

#### Valkyries

As the art style from one version to the another changed, the concept art changed as well. Especially those changes were applied to main characters. The Valkyries went through a total makeover and concept change, but this new concepts and armor/clothings have been designed keeping the historical and mythological reference. Their clothes are fantastic and adapted versions of what a truly viking wore. Each Valkyrie has her own concept, those concepts suffered some changes in the final in-game version.

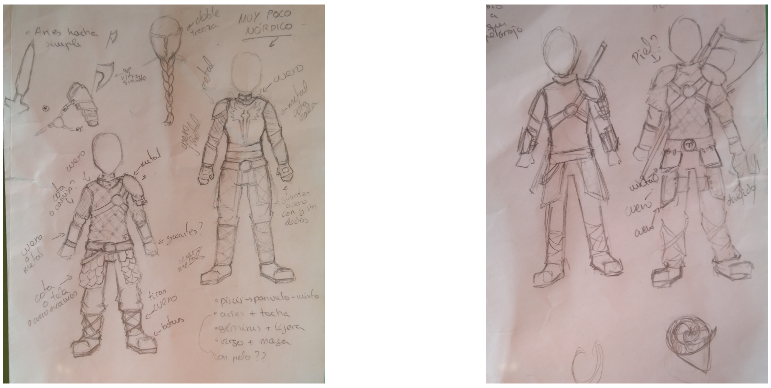


Figure 22: Concept art of the new Valkyries

#### Enemies and NPCs

In this project, the world developed is Svartalfheim, the dwarfs and dark elves world. Both of them considered the same in mythology but not at the same time, as explained in subsection 1.4 - Research and Mythology. In this case, both of them have a different style and aesthetic. Dwarfs have a more realistic and accurate design, and the typical beard. The dark elves have a more fantasy influenced style, and their clothing is not something influenced by the vikings; they are more flashy, they like to show their power and superiority.

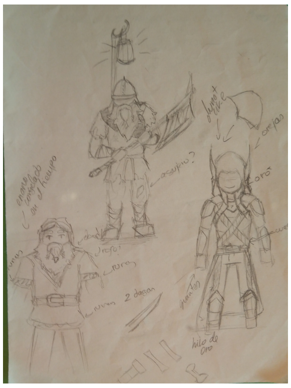


Figure 23: Enemies concept

### World

As for the world, it is an underground level, with huge caverns and constructions. The first concept is that in one mythologycal representation they are dwarfs and in the other dark elves, so, dwarfs live underground and elves tend to live on huge trees; from this two ideas, the final desing was born, they would live in houses on colossal columns and in the higher levels, bridges will connect the houses and columns; creating a net of paths. But the level, is played on the lower level, and as the columns are massive, the houses and bridges can not be seen.

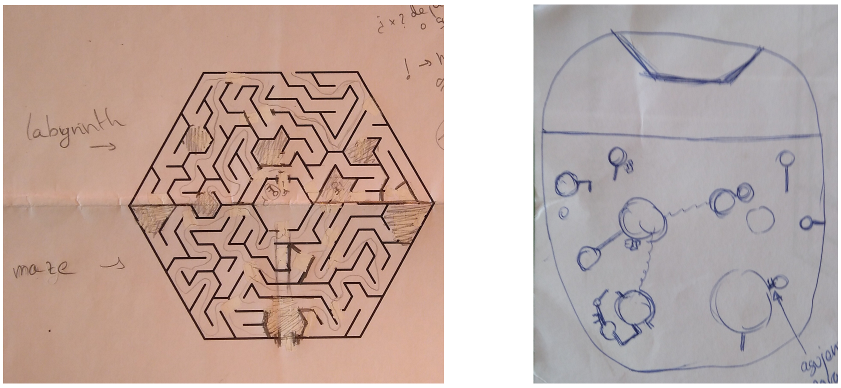


Figure 24: Concept art of world

### Interface

In this project the interface aimed for a simple and functional style. All the required information on screen and on the corners of it, leaving the center free. The UI objects that must be visible for the player are: life, mana, selected Valkyrie, time, and the active Valkyries.

### Main menu

Main menu design was a total adaptation of the 2D old menu to 3D.

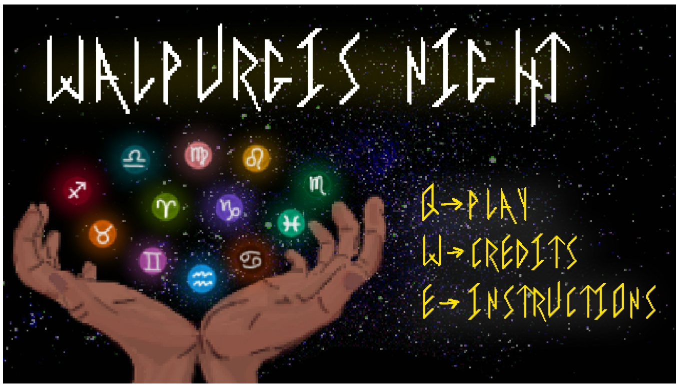


Figure 25: Old main menu

The two hands which appear in the menu represent the hands of the goddess, embracing the twelve spheres of the zodiac signs of her fighters the Valkyries.

**Title**

Game Title usually is something that has to be appealing for the players, needs to be intelligible, with personality and related to the style and concept of the game. For the old Walpurgis Night a font liked by the team was used and adapted to pixel art but for the new game this changed.

Inspiration to designing the new title came from the existence of the old Norse runes and adapting them to modern day words.

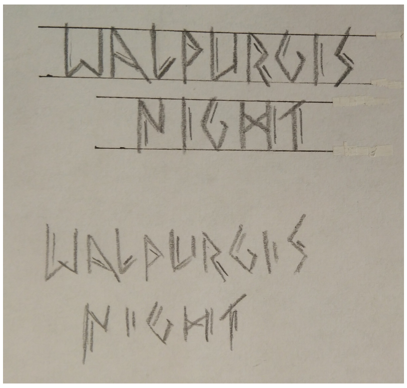


Figure 26: Title concept art

In the first photo, the style that was tried to PLASMAR was of runes carved in stone, being irregular and with different sizes and parts, but keeping a mirror symmetry.

The second one was inspired by the runes wrote on paper, more regular and symmetrical, without longer parts and with two FINAS lines in UP and DOWN.

## 4.4 2D Art

### 4.4.1 Game Title and Main menu

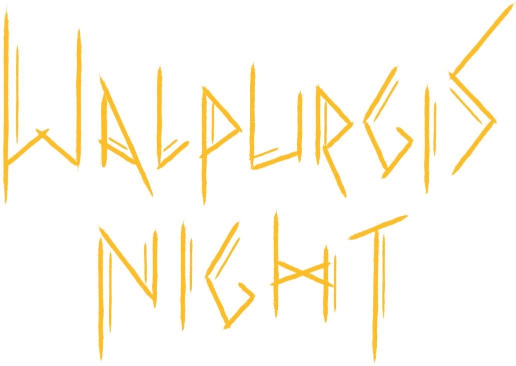


Figure 27: Final title art

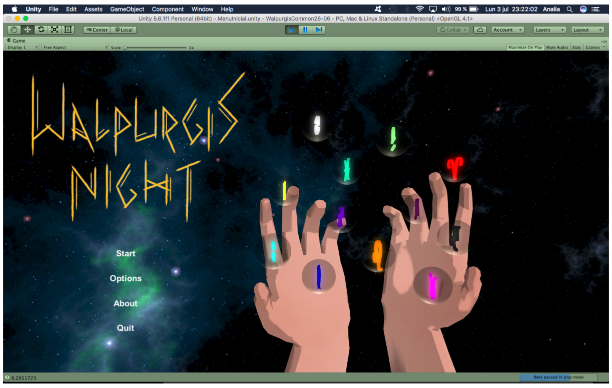


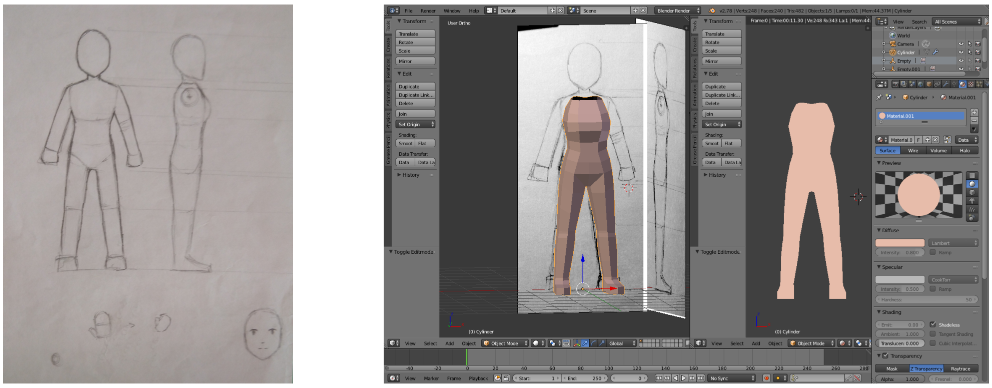
Figure 28: Final main menu

## 4.5 3D Art

### 4.5.1 Character

The 3D of the follows the low poly style. A low poly mesh has a small number of polygons, usually to improve the game performance or simply as an aesthetic feature; in this project both of those reasons were why this style was selected.

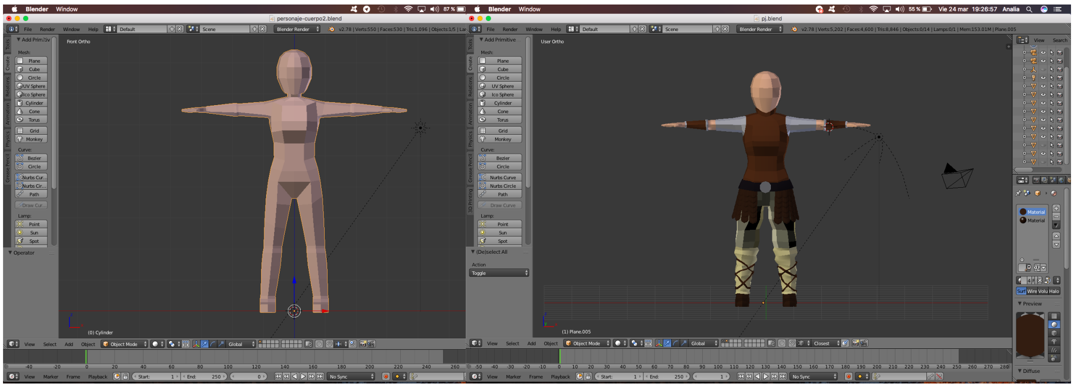
For creating the 3D models of the project two programs were used, Blender and Maya. The first step was make the base model of the 3D body for everyone to use in this project, this was created with Blender. With a concept on paper and used as a blueprint with the desired proportions of the body structure the basic shape was made using a cylinder and extruding adding vertex and shaping the form until the desired shape was achieved.



(a) Body blueprint

(b) Process of making the base

After that the blueprint reference was discarded and the work using the concept art of the valkyrie started, this Valkyrie is Pisces. In this step, the concept was not used as a blueprint, it was more a work of external reference and somewhat improvisation based on the concept.



(a) Body base completed

(b) Adding details

Some things changed from the concept, first the character hands where like real hands, with five fingers, but when working on the animation some problems appeared and so, the hands where simplified to mitten hands. The hair process was tricky since extruding and moving correctly the polygons, edges and vertices to form the braid was tedious, as well as the hair bangs.

After completing the base Valkyrie, details were added to it modeling new objects until the fitted correctly, those details are the shoulder pad, with the chest belt, the two forearms protections, the headband with wings, the rope on the lower parts of the legs and the belt of the waist with the two thick leather protection that hang from it protecting the thighs. Some of them suffered variations and changes after the animation step, creating a back and forth process.

At one point, when the model was almost completed colored materials were added to it to see try color palettes and define this Valkyrie color traits. In this point, the modeling was still in Blender, but after this point Maya was required.

Maya is a 3D art program completely different, and the change from one to another can be kind of tricky. But, after importing properly the 3D model the first task was clean the mesh fixing non-planar faces [2]. Following this task, and after the final color palette for Pisces was decided, was time to texturize it.

[2] A polygon face is non-planar when it has more than three vertices, and one or more of those vertices do not lie in the same plane. When a polygon mesh is comprised of quads or n-gons it is possible to have non-planar polygon faces.

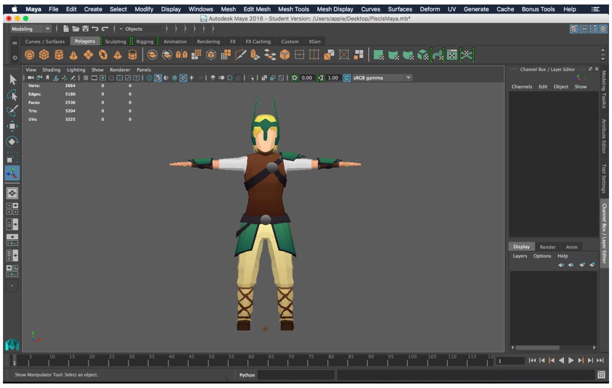
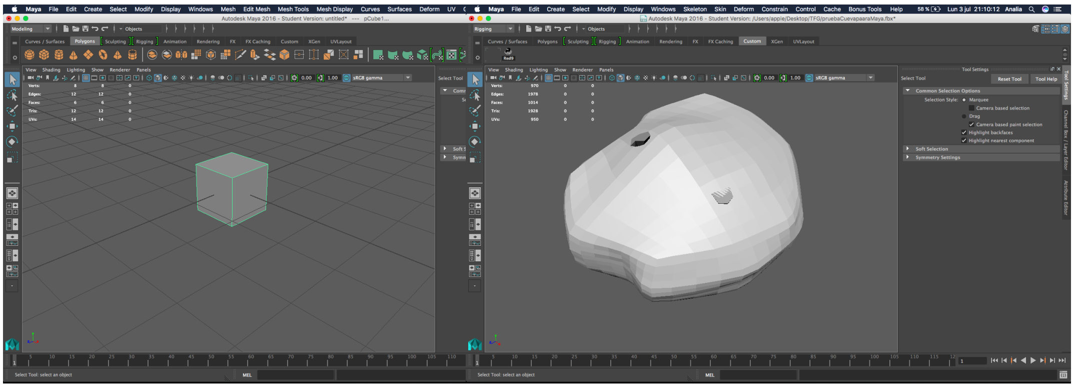


Figure 31: Valkyrie with textures

### 4.5.2 Scenery

For the scenery creation, the same process was followed, the vast majority of them starting from basic cubes. And these are some of the elements found in-game:

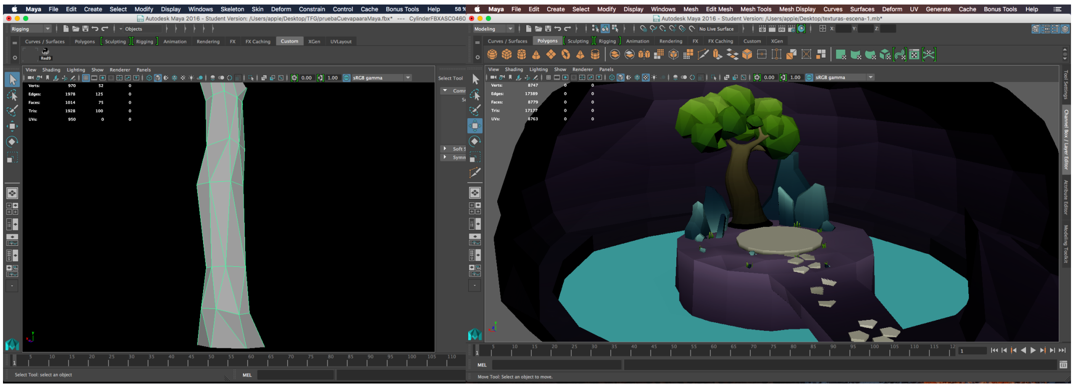
The caves are cubes edited and deformed until the shape of a cave was achieved and then flipping the normals to make the inside visible. Same as rocks, tiles and grass. The columns are cylinders edited.



(a) basic cube

(b) Basic shape of the cave

The tree was one of the most tricky elements of the scenery, this one created first with a cube, collapsing all of its vertices in one and then extruding it following the basic shape of a tree. Then, giving it volume and editing its size to look like a tree trunk. The leaves are ico spheres, edited and sized until the group looked like a tree.



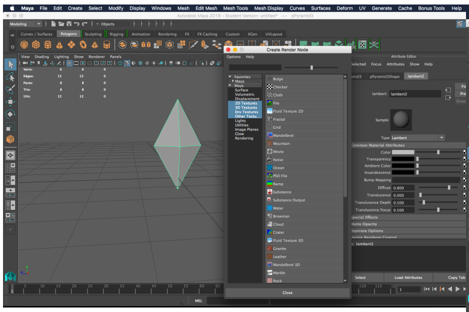
(a) Final column

(b) Final first scenery

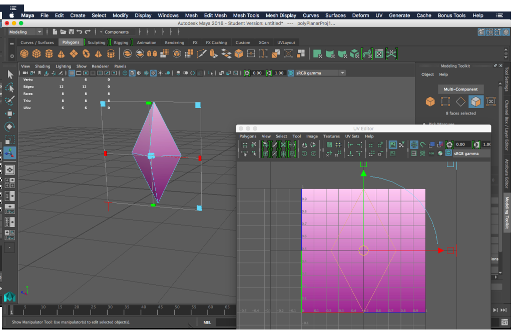
## 4.6 Texturize

For texturizing a 2D texture image is needed, in this case created with Photoshop. After that texturizing was made in Maya, following a really easy and simple method for the unwrap and texture application. Selecting the object to texturize and applying a base material, the texture is added to that material, after that, the desired faces were selected and the unwrap applied to them, opening the UV editor those selected faces were situated in their matching color. Repeating the steps the model was texturized.

The scene elements are more easy to texturize than the character, because selection of polygon faces is not necessary.



(a) Applying the material to add the texture



(b) UV set editor

## 4.7 3D models in game

These are the final results of the games in unity, after applying the shader material. This shader is an asset downloaded from the asset store called MK Toon[50], and has multitude of options to edit and change the toon shader until the desired look is achieved.

# 5 Animation

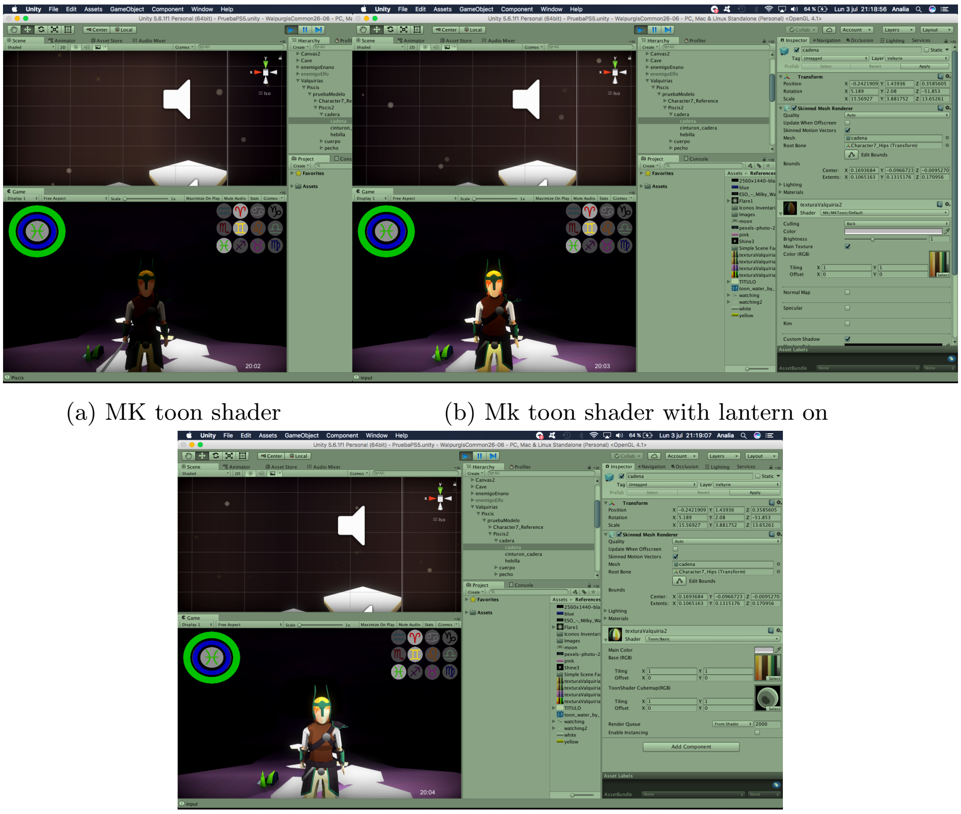
One of the main characteristics of this project is the use of motion capture to create the animations, giving them more dynamism and realism and learning the techniques that real video game developers use. The idea to use this system comes from Character Design and Animation - VJ1226, this was the first contact with this technique.

Animation in this project involved a great time of learning new skills and knowledge about programs and concepts, those programs are Autodesk Maya and Autodesk MotionBuilder.

## 5.1 Motion Capture

**Disclaimer: The following content is included on the three projects due to its common development.**

Motion Capture technology, also known as Mocap, is a set of tools and techniques whose aim is recording accurate animations. Famous companies use this technology, achieving realistic results and a huge variety of different poses and movements. Companies such as Naughty Dog, developers of the recognized The Last of Us or the Uncharted, series, Quantic Dream, who developed Beyond Two Souls with facial Mocap, Crystal Dynamics who worked with motion capture for the Tomb Raider (2013) and Rise of the Tomb Raider, or Ubisoft company with Watch Dogs and the Assassin's Creed series by using real parkour athletes. Even in 2001, one of the most known video game series, Metal Gear Solid introduced Mocap techniques in MGS2 but it was not until 2004 Metal Gear Solid 3: Snake Eater when the use of Mocap was fairly relevant.

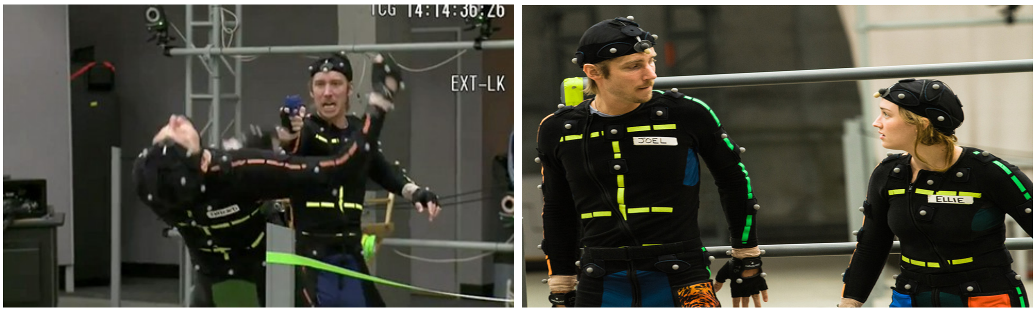


(a) MK toon shader

(b) Mk toon shader with lantern on

(c) Unity toon shader

Figure 35: Difference in-game between shaders.



(a) Recording a fight.

(b) Protagonists interaction.

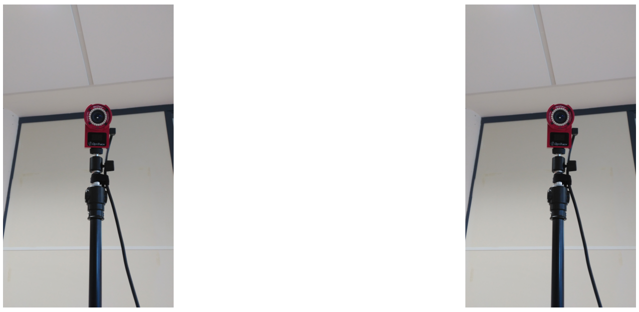
Figure 36: Mocap recording for The Last of Us.

For Mocap recording, there are some necessary elements and some specific situations that must be prepared. It is needed a large enough void room, several cameras surrounding the room, and a special suit with several markers, calibration tools and a software that controls the cameras, record the poses and be able to export them. The room can be added some different elements to help the actors such as chairs, stairs or boxes, as long as there are no light-reflecting elements that would hinder the camera detection. There must be at least 6 infrared cameras for a proper animation recording. These cameras have from 100fps to 300fps frame rate and their resolution is from 0.3MP to 4.1MP. The Mocap suit has got Velcro to attach the markers. The more markers the suit has attached, the more accuracy the animation will get.

### 5.1.1 Configuration

OptiTrack Mocap is a passive motion capture system, that means that markers do not cast light but reflect it. The Mocap tools that have been used to record animations for these projects are eight OptiTrack cameras, two camera connectors, a calibration T-bar, a calibration L-bar, the OptiTrack suit, 37 markers (some of them are included in a plate for each hand) and a PC with the Motive application. The configuration process is the following:

First of all, the cameras must be located around the capture area, this area could be square or circle. Is important that they are approximately aiming to the center of it. In this case, the cameras where situated in a round area in the room TC 1215 AA of the University, with enough space to capture the animations. The cameras have to be connected in two balanced groups with two camera connectors, and those connectors connected to the computer.

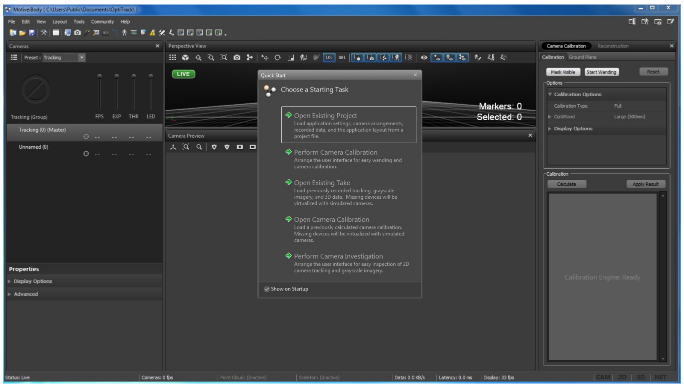


(a) Non-detected camera.

(b) Detected camera.

Figure 37: OptiTrack cameras.

Secondly, the computer and the Motive application must be opened so that the cameras are detected by the software. To verify whether the camera is connected it is just simple as seeing if the camera displays a number. Its number identifies the camera for the program. Cameras may detect some reflections that will be represented with white spots in the cameras' views. Then, it is necessary to mask the reflections, in this way the cameras will not consider those reflections as the actor's markers. After masking, those spots will turn red.



Motive:Body ( C:\Users\Public\Documents\OptiTrack\ )

Quick Start

Choose a Starting Task

Open Existing Project
Load application settings, camera arrangements, recorded data, and the application layout from a project file.

Perform Camera Calibration
Arrange the user interface for easy wanding and camera calibration.

Open Existing Take
Load previously recorded tracking, grayscale imagery, and 3D data. Missing devices will be virtualized with simulated cameras.

Open Camera Calibration
Load a previously calculated camera calibration. Missing devices will be virtualized with simulated cameras.

Perform Camera Investigation
Arrange the user interface for easy inspection of 2D camera tracking and grayscale imagery.

☑ Show on Startup

Preset : Tracking

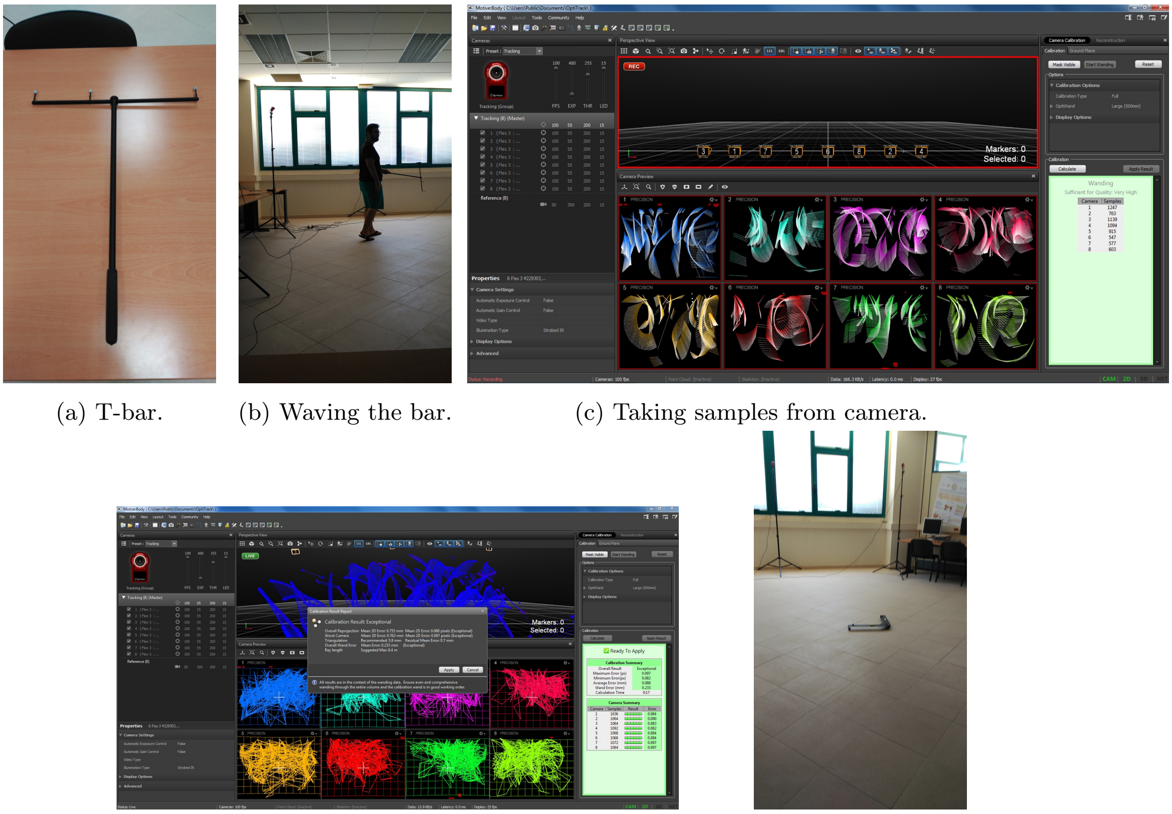
Calibration Type: Full

OptiWand: Large (500mm)

Markers: 0
Selected: 0

Figure 38: Motive interface.

Then, cameras location must be learned by the software, it is necessary to calibrate the space by using the calibration T-bar, a T-form bar with three markers that is slowly waved through the area. Those markers are separated with a specific distance that the application knows so it can be used to a proper calibration. From the application, it must be indicated that calibration process is starting. Then, a person will wave the T-bar through the capture area, by drawing "eights". This process must continue until there are a proper amount of samples. After calibrating the location of the cameras, the floor detection must be done. The L-bar must be approximately left in the center of the detection space, so that the floor will be detected. The ground calibration must be saved in the computer, otherwise the animation recording will not be possible. It is noticeable that the whole calibration step must be done as soon as a camera is moved or displaced.



(a) T-bar.

(b) Waving the bar.

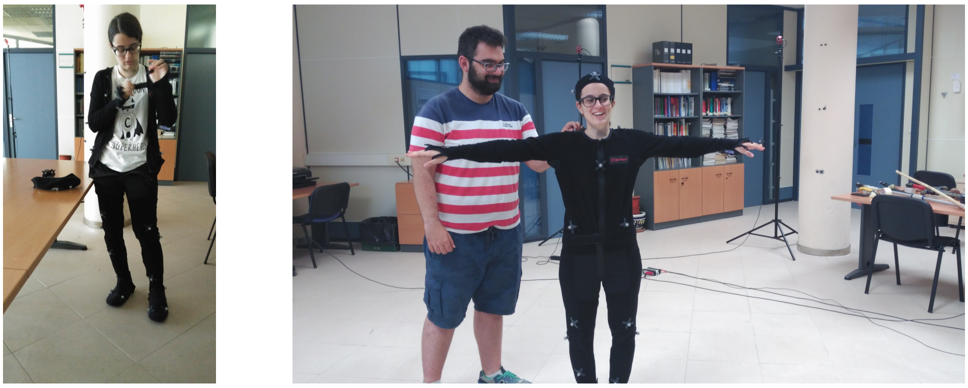
(c) Taking samples from camera.

(d) Successful sampling.

(e) L-bar.

Figure 39: Camera calibration.

Before stating the recording, the actor has to dress up with the special suit, composed by a jacket, pants, shoe and a hat. Then, another person will put the markers on the suit, according to the places where the application suggests to get a correct animation. In the application, the skeleton has to be created by using a 37-marker skeleton model (called Baseline). After that, the skeleton is created by pressing "Create" (a preview of the skeleton can be created by selecting On in the "Skeleton Preview" section).

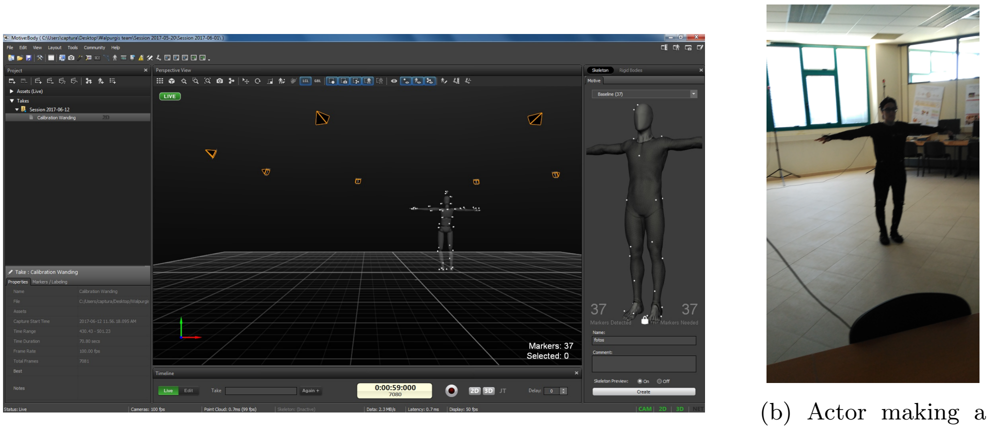


(a) Actor dressing up.

(b) Putting markers on the actor.

Figure 40: Dressing the actor.

Finally, the actor will be able to be tracked by pressing the Rec button in the program. The cameras will track whatever the actor does while the Rec button is pressed. Once the recording is



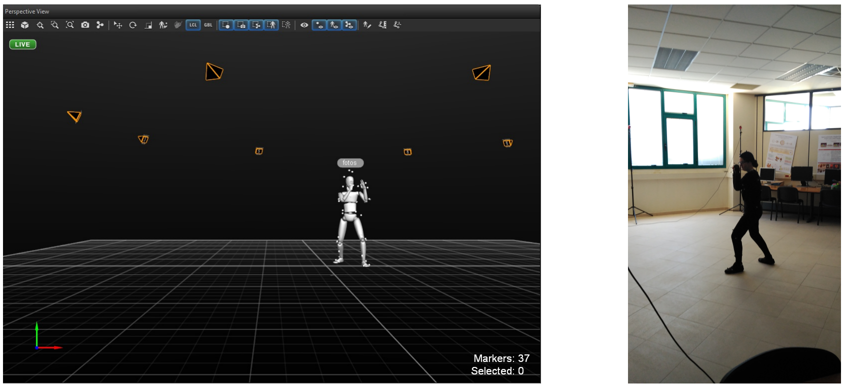
(a) How to create a skeleton.

(b) Actor making a T-pose.

Figure 41: Skeleton creation while t-posing.

finished, a take will be saved into the application. In this case, several takes have been recorded with different items like fake swords, axes or spears that would help the actor to make the pose. Sometimes, tracking may present swapping problems, that means that the software swaps the markers tags and distorts the skeleton.

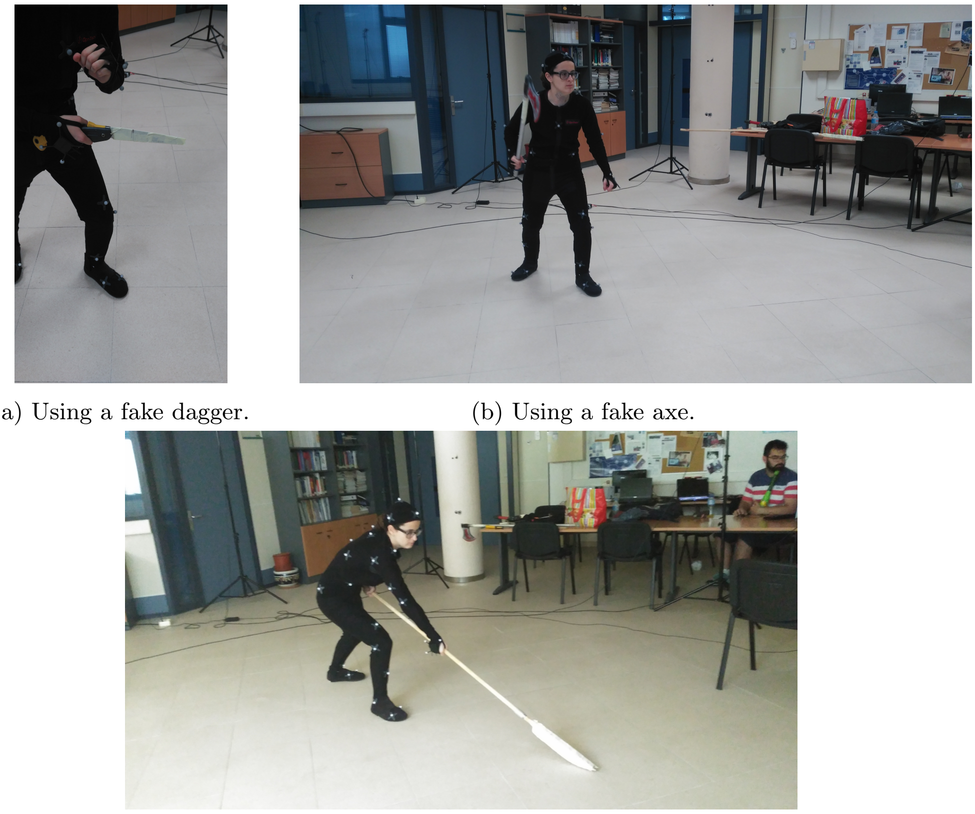
At the time to export, there are many options but the one used for these projects es .fbx binary, since Autodesk software presents problems at reading and importing these skeletons.



(a) Posing in Motive.

(b) Real posing.

Figure 42: A real pose and how it looks in Motive.



(a) Using a fake dagger.

(b) Using a fake axe.

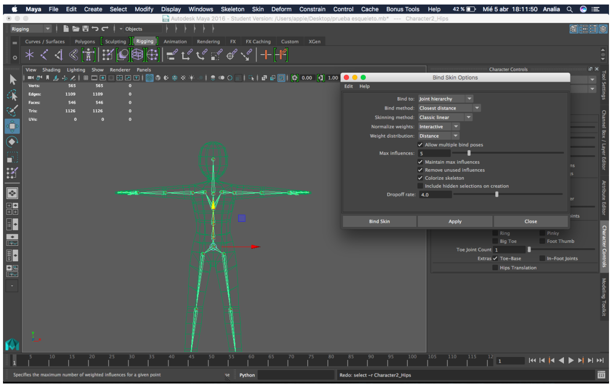
(c) Using a fake spear.

Figure 43: A real pose and how it looks in Motive.

## 5.2 After Motion Capture

Animation in 3D models require adding a skeleton to the character, and after that to an easy animation process in Maya transform the skeleton to a control rig.

First of all, the skeleton was added to the 3D space, if the 3D model is too big in comparison with the skeleton both can be scaled. Once they are the same size, the skeleton has to be edited to fit properly the body shape. Also, is necessary to decide between a group of characteristics of the final skeleton structure, like number of fingers or spine bones. It is important to position correctly the joints to avoid bad bending once the process is completed. When everything was in its place, to prevent unwanted skeleton changes it has to be locked.



Bind Skin Options

Bind to: Joint hierarchy

Bind method: Closest distance

Skinning method: Classic linear

Normalize weights: Interactive

Weight distribution: Distance

☑ Allow multiple bind poses

Max influences: 5

☑ Maintain max influences

☑ Remove unused influences

☑ Colorize skeleton

□ Include hidden selections on creation

Dropoff rate: 4.0

Figure 44: Skeleton testing

When all of the previous preparations were completed was time to combine the skeleton with the 3D model, this is made with the Bind skin instruction, for a more customized skin some of the default options were changed. To try and see if the skin was made correctly, some poses and changes were tried with the control rig edition (created automatically when completed the process), with this, it was visible that the skin was not properly attached to the correct bones. And then, the difficult part started, this was really tedious because it was trial and error until the final and good definition was reached.

In the first runs with the model, some problems that required model editions and alternative solutions were detected, such as shoulder pad rotation. If this protection was added with the complete skin the rotation of the arm affected its rotation and the position was unnatural, even when edited so that only the rotation of the shoulder affected it the result was still wrong. This required a new approach, detach the shoulder pad and use an alternative joint structure, making possible the edition the position and rotation of the shoulder pad manually to make it look correct in the animation. This decision involved some changes and trials and errors until the good combination of the new shoulder pad, body mesh and joints was achieved. The process of skinning the shoulder-pad to the new joints was made. The first join of the new joints have a parent that is

h

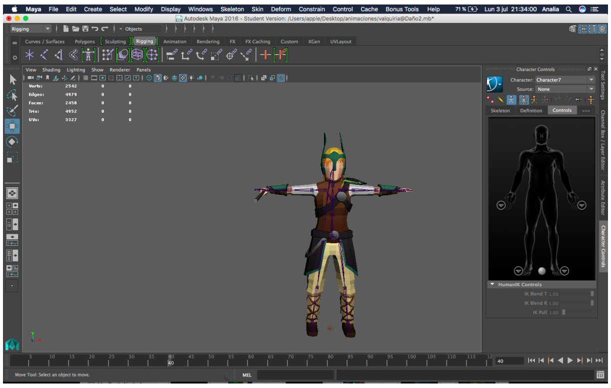


Figure 45: Final Valkyrie with skeleton

h

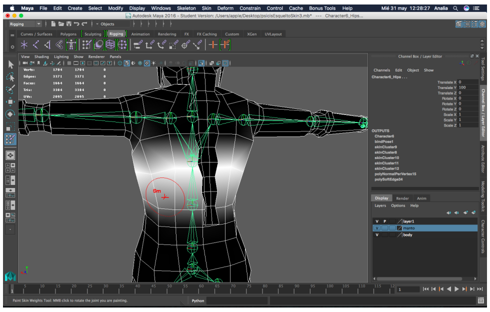


Figure 47: Weight of the back

in the skeleton of the body mesh, so their position changes with it, but still is possible to move it and rotate it.

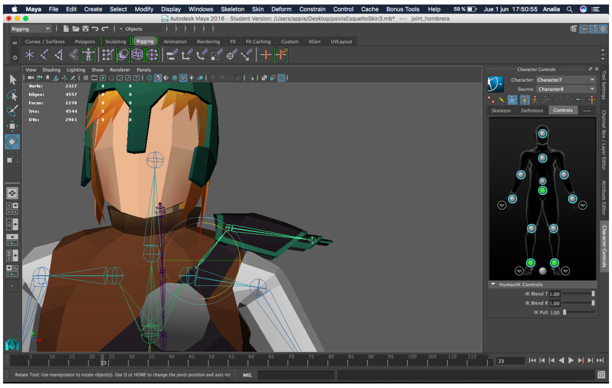


Figure 46: Shoulder pad bones

Something like with the shoulder pad happened with Pisces's braid. But this one was more complicated because her braid was problematic to detach from the rest of the body, as they are the same object. So in this case, the alternative was to as in the shoulder pad, add joints to it and then add them to the skin via Add influences. The first joint has as parent the head bone for the same reasons as the shoulder pad.

The process is called Paint skin weights. When skinning, the different bones of the skeleton have an influence over the mesh making it deform when the bones move, this influence is called weight, and in Maya the user can modify it with the previous named process and using the paint weights brush. In the model the joints were a correct weight is required are shoulders, neck and pelvis; with this one the pelvis was very troublesome because the leather protections. Painting weights in low poly can be challenging, because changing the weight of one of the vertex can alter dramatically the ones near it, and cause an unwanted effect. Every time that something went wrong and the was mandatory re-start the process all the skin weight needed to be repainted, Maya has a tool to avoid this problem but by some reason in this case did not work so restart was the only option, trial and error. After all of those tries, when the final skin weights definitions was achieved was time to work with the motion capture animation.

The second step once the animation FBX is imported in the scene is change its position to the center of the scene and all the bones rotations to 0, 0, 0 so the skeleton of the mocap animation is in a perfect T position. After that, in the Character Controls a new skeleton has to be defined, this is done selecting in the given body structure by Maya one by one every part that matches its counterpart in the mocap skeleton. Just after this step, again the definition was locked.

Going back to the character and her skeleton to make this skeleton follow the mocap one Maya ease an option to do it, so after selecting it Pisces's skeleton follows the mocap skeleton. The next step was bake the animation to the control rig of Pisces for future edits and fixes. After the animation was baked on Pisces, the mocap animation was not needed anymore and the work with the final animation started.

h

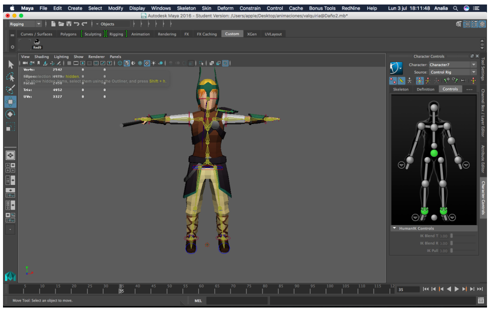


Figure 48: Control rig of the valkyrie

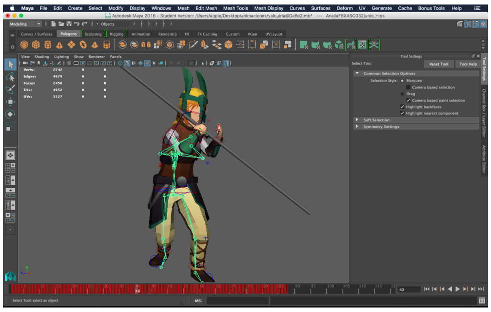


Figure 49: Model following motion capture animation.

The mocap animations tend to have more frames than necessary for this kind of project (some of them over 500), so after searching solutions and options Red9 was found. This plug-in for Maya has a large set of tools and options, but the one that was used was the Interactive Curve Filter, that allows to resample the curve to simplify it and discard redundant frames. in addition to Red9 Curve Filter, Maya's native Graph Editor was used too, for editing particular frames. Afterwards, for making changes easily to the animation without changing the base one use layers was the solution. This allows to create key frames in the time slider and those changes adapted to the base animation without overriding it. For Pisces this solutions was really important, she uses a spear as a weapon and one of the hands is always wielding it but the other needed to follow the movement correctly to look like she is using both hands for the attack. So with the animation layer, the rotation and position of the hands and arms was possible and the complete animation of the attack played without any problem. Then, the simple animation of the shoulder pad was made, following it the braid one, enough to give it movement and an illusion of action.

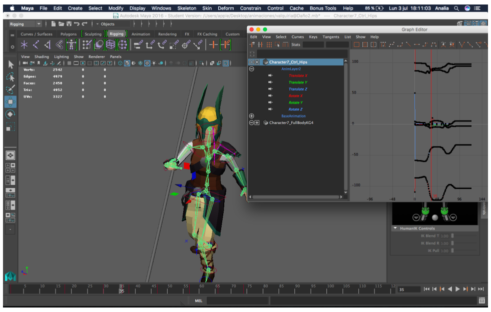


Figure 50: Graph editor

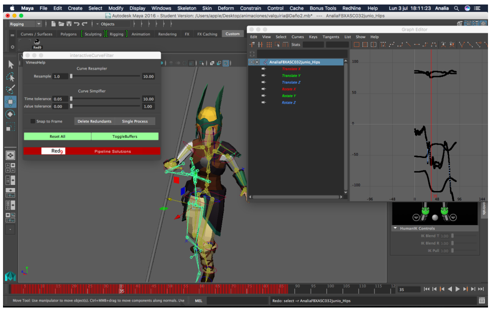


Figure 51: Red9 on screen

The animation was ready. but in the control rig not in the skeleton, so after the animation was baked correctly on the skeleton the process was completed and the animation exported to unity.

But, here appeared a big problem that required many tries until the solution was found. This is a problem that pops up sometimes when exporting complex animations from Maya to Unity, and is a problem in plain sight. There is some problems between Maya and Unity angles, and the animation ends totally wrong, with Pisces was especially troubling because all the work trying to make the hands and spear match and keep the animation smooth was lost.

Even on the Internet and after years no one knew how to fix it. Talking with Irene Pérez, one of the teammates, a possible solution was commented, using an in-between program, and MotionBuilder was the solution.

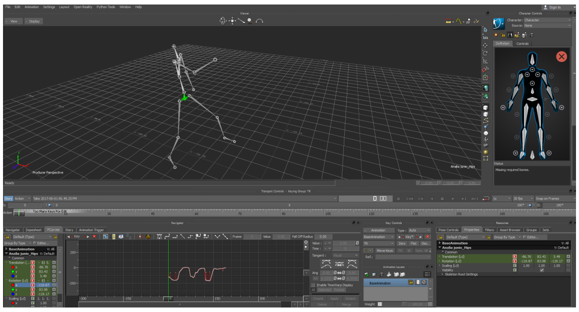


Figure 52: Animation in motion builder

MotionBuilder [3] is, as Maya, and Autodesk program. This means that when the problematic animation was imported, cleaned and exported to Unity again and it worked correctly.

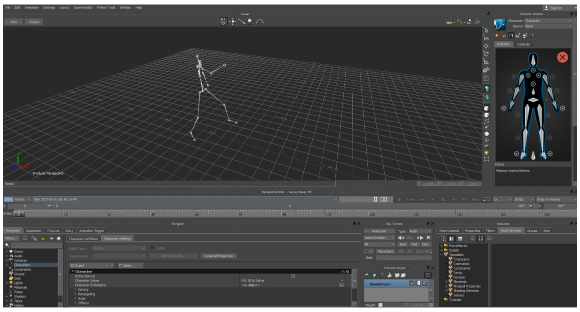


Figure 53: FCurves of the animation

After all of the problems were corrected, the animation process was faster because not all animations need to be fixed or cleaned.

[3] MotionBuilder 3D character animation software for virtual production helps the user to more efficiently manipulate and refine data with greater reliability. Capture, edit, and play back complex character animation in a highly responsive, interactive environment, and work with a display optimized for both animators and directors.

MotionBuilder was used too to make cyclic animations, importing the mocap data to the program and setting up the skeleton like in Maya, the process involves selecting the start and end frames desired for the loop and afterwards the program has an own cycle generator that interpolates the start and end and creates the loop as a new animation.

This program as Maya can be used to clean specific frames of the mocap animations, in those frames usually problems of the capture are visible, so deleting them is the perfect solution and do not affect the result.

# 6 Results

The next set of images shows some of the results achieved in the project.

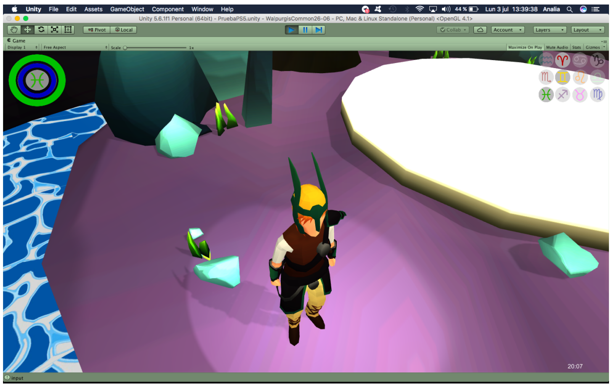


Figure 54: Light details

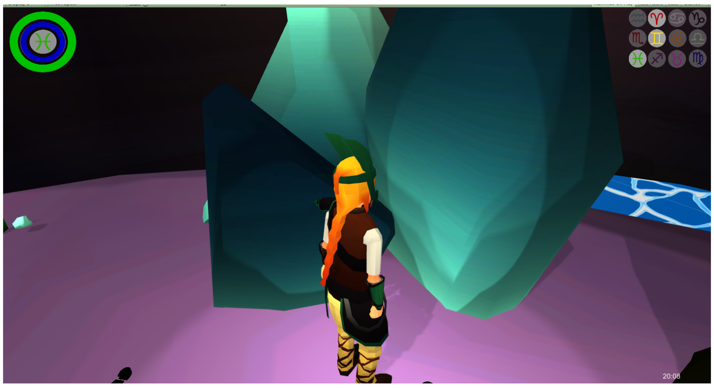


Figure 55: Light lightning scenery objects

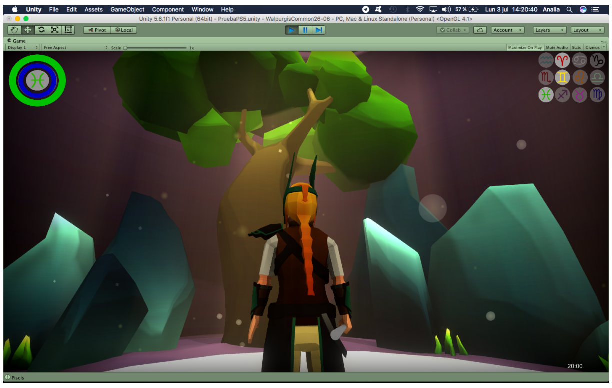


Figure 56: Overview of the tree and the particles

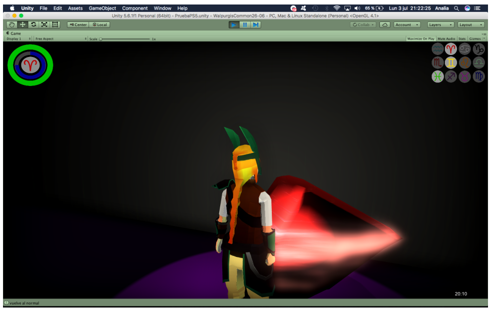


Figure 57: Rock emitting light after interaction with lantern

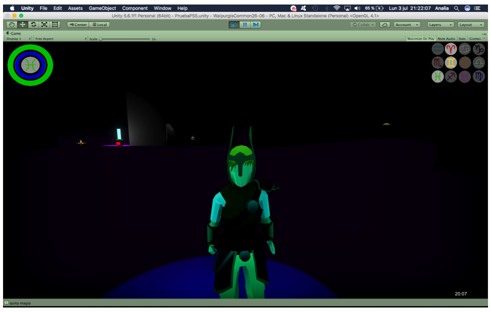


Figure 58: Blue light

## 6.1 Gameplay demo

Here is a link to the basic gameplay of the project.

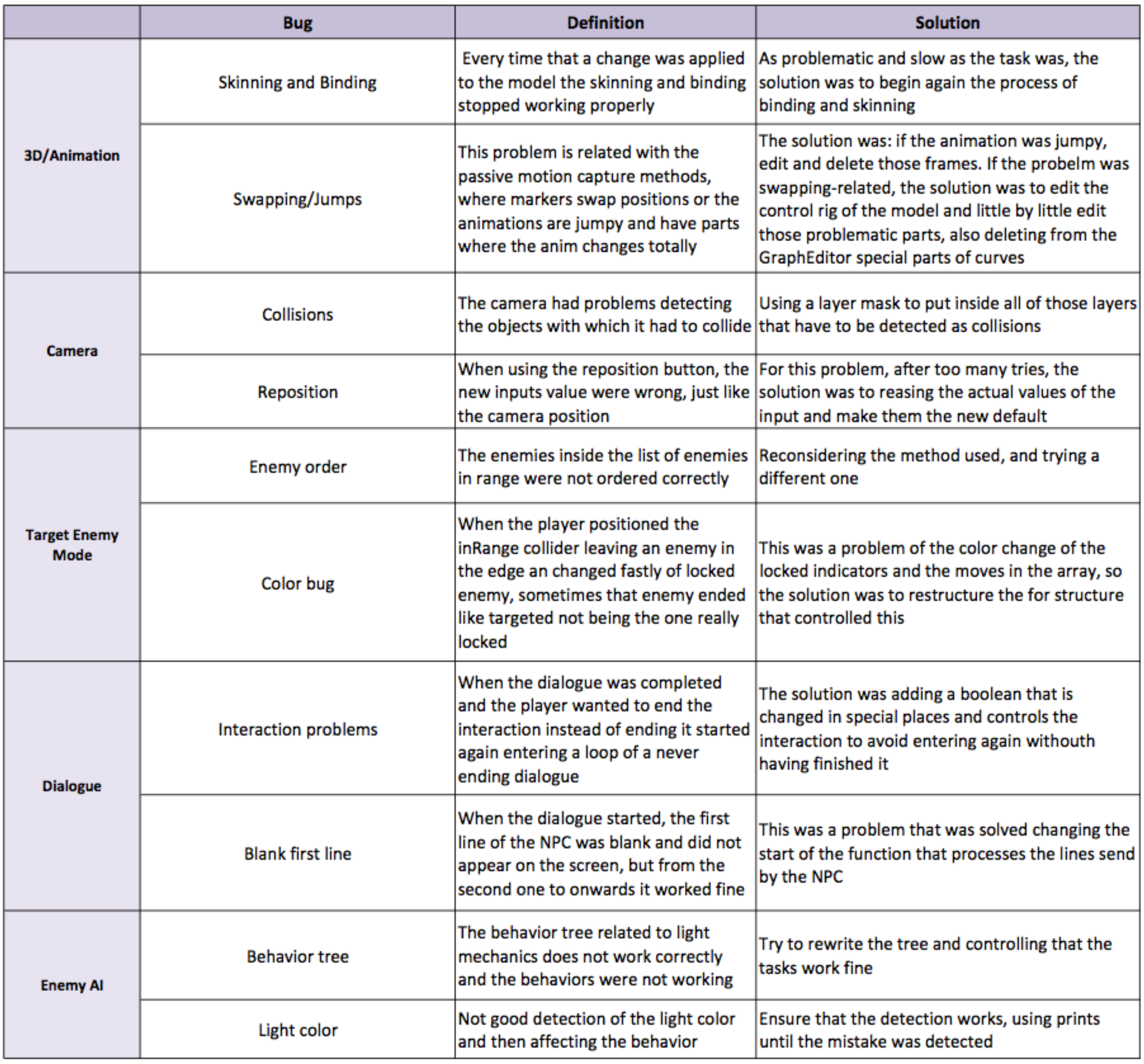
https://drive.google.com/file/d/0ByfnVgwUXn16LXZMSU8yUmpkeEk/view?usp=sharing

# 7 Testing and evaluation

This section will express which method was followed when testing programmed scripts.

The process of developing and testing varied slightly with every task. But basically, first came working on the algorithm and the characteristics and goals of the task, after that was clear we wrote the code down in Monodevelop. Next was trying to see if it worked or not; if it worked and the goals of the task were achieved then no more testing was needed, but if some problems appeared then a simple tactic was followed. Check the script to see if in the place where the error

Table 4: Bugs table



| | Bug | Definition | Solution |
|---|---|---|---|
| 3D/Animation | Skinning and Binding | Every time that a change was applied to the model the skinning and binding stopped working properly | As problematic and slow as the task was, the solution was to begin again the process of binding and skinning |
| | Swapping/Jumps | This problem is related with the passive motion capture methods, where markers swap positions or the animations are jumpy and have parts where the anim changes totally | The solution was: if the animation was jumpy, edit and delete those frames. If the probelm was swapping-related, the solution was to edit the control rig of the model and little by little edit those problematic parts, also deleting from the GraphEditor special parts of curves |
| Camera | Collisions | The camera had problems detecting the objects with which it had to collide | Using a layer mask to put inside all of those layers that have to be detected as collisions |
| | Reposition | When using the reposition button, the new inputs value were wrong, just like the camera position | For this problem, after too many tries, the solution was to reasing the actual values of the input and make them the new default |
| Target Enemy Mode | Enemy order | The enemies inside the list of enemies in range were not ordered correctly | Reconsidering the method used, and trying a different one |
| | Color bug | When the player positioned the inRange collider leaving an enemy in the edge an changed fastly of locked enemy, sometimes that enemy ended like targeted not being the one really locked | This was a problem of the color change of the locked indicators and the moves in the array, so the solution was to restructure the for structure that controlled this |
| Dialogue | Interaction problems | When the dialogue was completed and the player wanted to end the interaction instead of ending it started again entering a loop of a never ending dialogue | The solution was adding a boolean that is changed in special places and controls the interaction to avoid entering again withouth having finished it |
| | Blank first line | When the dialogue started, the first line of the NPC was blank and did not appear on the screen, but from the second one to onwards it worked fine | This was a problem that was solved changing the start of the function that processes the lines send by the NPC |
| Enemy AI | Behavior tree | The behavior tree related to light mechanics does not work correctly and the behaviors were not working | Try to rewrite the tree and controlling that the tasks work fine |
| | Light color | Not good detection of the light color and then affecting the behavior | Ensure that the detection works, using prints until the mistake was detected |

jumps the problem is in plain sight; if it is not, or if the error log does not say anything useful, check the code or use prints and little variations on the it to find where the problem is.

The table 4 explains some of the bugs that were more problematic or more time was dedicated to them. And a brief summary of the solution.

# 8 Conclusions

This document presents a video game level where every aspect of it has been worked on, from design, art, and animation to programming. All of this setting up a schedule, an hours division and tasks previously planned.

The final project is not as complex as firstly thought and planned, a great number of problems and complications arose but that did not hamper the workflow and achieve the goals of this project.

Knowledge acquired in the degree has been used in the development, but especially gaining new knowledge and skills and adapting them to a different model of work. The highlight of this project is learning how to use and work with two programs that the professionals use in art, video games and movies, those programs are Maya and MotionBuilder. Also Blender is a free tool which eases the work flow in a easy and simple way with a big number of options.

Furthermore, learning how to capture motion capture animations and work with them, fixing errors of the capture process and adapting them to a variety of models. Making cyclic animations like walking and also make isolated animations like attacks.

In terms of programming, this project has served to prove to ourselves how far we can go, where knowledge lacks and where improvement is needed and to pay attention. A lot of new concepts have been learned that help to keep improving ourselves; how to take an idea and enhance and adapt it to new skills and changes, as well as giving it depth and features to approach it more to the players.

Also how much we can achieve and know how much can be completed in a defined number of hours, try to cover the correct amount of work and how to organize it and consider that there are external factors that can affect the work flow.

Team work has been important too, learning to be careful at the early stages to break down correctly the tasks and assign it depending on everyone skills to keep a constant work flow.

So in the end this project helped to learn your own limitations, where there will be problems, also to discover how much work costs to complete things and where to watch out to future problems. How to create a planning and try to follow it and finally make a documentation work.

In relation with the goals proposed in the technical proposal and the end of this project, basically they have been achieved. Not in the detail that was thought at the beginning of everything, but they have been achieved. The level and sceneries show the idea of a dark world but in the presence of light a great number of lively colors appear, and it goes with the narrative and history keeping an artistic consistency. And the presence of light and mechanic associated with it have been achieved too.

- Present a functional level and according to the narrative as well as artistically consistent.
- Design and implement a smooth light mechanic
- Create NPC behaviors related with light presence and which kind and passing of time

## 8.1 Future work

There are two concepts inside future work, near future in WN:The Dark World and future related with Walpurgis Night.

### 8.1.1 Near future

The first thing that will be done is, continue working on the 3D models, add the enemies and add details to the environment. These will be done for the final thesis fair and defense.

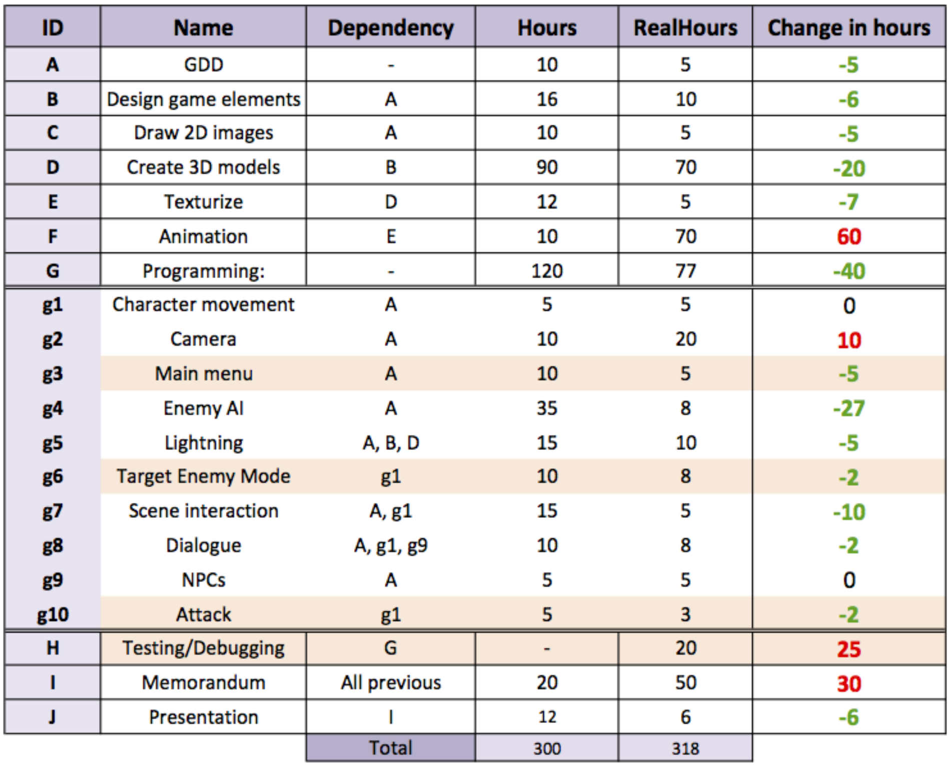
As the final result of the level is not as complex and detailed as initially thought this means that it would be nice to add more details, add new 3D models and animations, developing more the sceneries in the level. Also improve the light mechanics, meaning that right now they work smoothly but it would be nice to add more mechanics and variety in the gameplay like an improvement in the battle system as combo attacks.

### 8.1.2 Walpurgis Night

Walpurgis Night: The Dark World is a level inside the complete project Walpurgis Night. This is a world complex and complete, and when developing the narrative and history the world came to life itself little by little, this project brings illusion and the desire to keep working on it. So there are intentions to keep working on it, develop the other worlds and keep adding details to it. Working on good mechanics and ways to keep the player hooked.

There are still so many things to develop inside this project, every world has its own history with its own mechanics and peculiarities. Also keep working in the animations, and the concepts and the 3D models.

Table 5: Hour deviation table



| ID | Name | Dependency | Hours | RealHours | Change in hours |
|---|---|---|---|---|---|
| A | GDD | - | 10 | 5 | -5 |
| B | Design game elements | A | 16 | 10 | -6 |
| C | Draw 2D images | A | 10 | 5 | -5 |
| D | Create 3D models | B | 90 | 70 | -20 |
| E | Texturize | D | 12 | 5 | -7 |
| F | Animation | E | 10 | 70 | 60 |
| G | Programming: | - | 120 | 77 | -40 |
| g1 | Character movement | A | 5 | 5 | 0 |
| g2 | Camera | A | 10 | 20 | 10 |
| g3 | Main menu | A | 10 | 5 | -5 |
| g4 | Enemy AI | A | 35 | 8 | -27 |
| g5 | Lightning | A, B, D | 15 | 10 | -5 |
| g6 | Target Enemy Mode | g1 | 10 | 8 | -2 |
| g7 | Scene interaction | A, g1 | 15 | 5 | -10 |
| g8 | Dialogue | A, g1, g9 | 10 | 8 | -2 |
| g9 | NPCs | A | 5 | 5 | 0 |
| g10 | Attack | g1 | 5 | 3 | -2 |
| H | Testing/Debugging | G | - | 20 | 25 |
| I | Memorandum | All previous | 20 | 50 | 30 |
| J | Presentation | I | 12 | 6 | -6 |
|  |  | Total | 300 | 318 |  |

# 9 Deviations

This section will explain the difference between the initial task and hours planning and the final result. There is a big variation between the initial and ideal planning and which resulted to be the real time and tasks distribution. For starters there are tasks that in the end were not developed in this project, but there were others that replaced them. Also, there was a week where no work was advanced, the week of Easter, where the grad trip was. Also 3 days a week there were classes and near the end of the semester were the tests and second-chance tests.

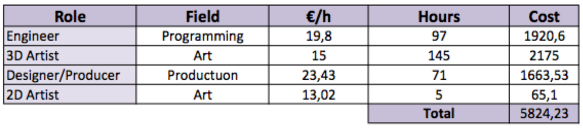
One of the risks was computer problems and were associated with the situation that the computer used to develop this project is a 5 years old MacBook Air with 4gb of ram and 125gb of memory, this risk came true more than once. It has been a hinder during all the project development.

The table 5, shows how many hours were worked in the end in this project, the total rises to 318 hours, eighteen hours over the maximum. The column "Hours" is the hours that were estimated at the begging of the development of the project, "Real Hours" is as the name says how many hours were truly spent in each task, and finally the last column or "Change in hours" is the difference between the initial estimation and the reality. If there is a minus symbol before the hours means that the task was finished the number of hours before expected.

Seeing the table, there are a few tasks that need to be discussed, those tasks are:

- Texturize: The process is faster than expected, the only part that can make it more slow is when selecting specific faces that are problematic to select and deciding color palettes.
- 3D Art and Animation: These two were the most problematic tasks, for starters, it was necessary to learn how to work with Maya, Blender and MotionBuilder from scratch. Maya is a very complex program when there is no previous knowledge or someone to teach how to work with it, modeling was tricky but working with animations and motion captures was another completely different thing. Lots of complications appeared, from modeling problems to skinning, even with the skeleton and the mocap animation. Like when adding the new

Table 6: Final budget table



| Role | Field | €/h | Hours | Cost |
|---|---|---|---|---|
| Engineer | Programming | 19,8 | 97 | 1920,6 |
| 3D Artist | Art | 15 | 145 | 2175 |
| Designer/Producer | Productuon | 23,43 | 71 | 1663,53 |
| 2D Artist | Art | 13,02 | 5 | 65,1 |
|  |  |  | Total | 5824,23 |

joints for the shoulder pad or the braid, the skinning had to be painted again, so every time that some change had to be applied the skin process needed to be done again. So many problems arose in this part of the development that a lot of hours were spent. Another problem is the previous mentioned in the section of animation, with the animation exported from maya to unity or the correct format and characteristics to import the animation in Maya.

VER DE AÑADIR MASSSS

- Programming: in this general task visually less hours than originally thought were used, but, the this does not mean that the goals were not achieved. SO

  1. The camera had more work than expected, because some problems with the wall detection and avoidance appeared, also when repositioning it and re-detecting correctly the input of the joysticks. So some unexpected complications showed up. In the end programming and preparing the camera was longer than expected.
  2. Enemy AI: This has been faster to develop for one reason, because the basic AI of the enemies was developed by a teammate, meaning that the final hours spent on the AI were hours purely spent on the Light presence AI of the enemies.
  3. Scene interaction: there was a part programmed by a teammate and the real hours were spent adapting the script and changing a pair of details.

- Testing/Debugging: this task was forgotten when the planning was thought, but after working on the project it was mandatory that it appeared in the end.

- Memorandum: the first estimation was a foolishness, of course more hours than expected have been spent in this document.

This table 6 shows how the budget changed in reference to the new hours and tasks.

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# Anexo I: Repartición de tareas

Debido a que estos tres proyectos pertenecen al desarrollo del mismo juego, se han tenido que aplicar metodologías de organización del trabajo en conceptos grupales. El conocimiento de dichas metodologías se han adquirido a lo largo del grado, muy específicamente la asignatura de Ingeniería del Software (código VJ1224). En dicha asignatura se aprendieron metodologías de desarrollo del software, la existencia de ciertos patrones de diseño y se aplicaron técnicas de organización de grupos de trabajo, con la intención de poder trabajar de forma paralela y uniendo el trabajo de cada uno de los proyectos. Posteriormente, se explicarán las diferentes características que se han utilizado para desarrollar el videojuego.

- **Herramientas utilizadas:** Aquí se especifican todos los dispositivos y herramientas que han sido utilizados para el desarrollo del juego:
    - **Google Drive:** herramienta online para poner en común el proyecto, herramientas o archivos relacionados con el proyecto.
    - **Trello:** herramienta online utilizada para realizar el seguimiento y asignación de las tareas del proyecto
    - **Pen drives:** hardware útil para poner en común los archivos relacionados con el proyecto.
    - **Mandos PS4:** dispositivo I/O para probar la interactividad entre el jugador y el juego.
    - **Sistema de captura de movimiento:** método utilizado para la realización de las animaciones, consta de 8 cámaras, un traje con marcadores para el actor, una torre de mac y una pantalla de ordenador, junto al programa Motive.

- **Reuniones:** Para coordinar el trabajo, se han hecho reuniones semanalmente en el edificio TI de la Universidad, aprovechando las conversaciones con Víctor Ávila, compositor del proyecto en persona. Además, a partir de mayo se han empezado a desarrollar grupos intensivos de trabajo para unificar y corregir cada parte desarrollada de forma individual en un proyecto base común, desde el que cada uno es capaz de desarrollar su nivel. Finalmente, se han hecho llamadas por skype con la intención de justificar el trabajo hecho hasta ese momento y definir las nuevas tareas.

- **Métodos empleados:** El método empleado es el sistema de Scrum, basado en una o dos reuniones semanales para explicar cómo va el desarrollo de las tareas y la definición de tareas completadas o en curso. Para indicar las tareas que cada uno tenía que hacer, se ha usado la herramienta Trello, que sirve como pizarra de tareas y que cualquiera de los tres puede editar con la intención de definir el estado de cada tarea. Finalmente, se han hecho cada tres o cuatro semanas reuniones a modo de Sprint, para justificar el estado de las tareas previas y la definición de nuevas tareas para el próximo ciclo.

- **Reparticiones de tareas:** La asignación y seguimiento de las tareas se ha realizado mediante la aplicación Trello. Las tareas se asignaron siguiendo este criterio:
  - Analía Boix se encarga del desarrollo del jugador.
  - Irene Pérez se encarga del desarrollo del Interfaz de Usuario.
  - Ángel Torres se encarga del desarrollo de la Inteligencia Artificial.

- **Comunicación:** Se han utilizado varias vías de comunicación, tanto presenciales como no presenciales. Se han hecho varias reuniones todas las semanas de varios tipos. A modo de Scrum, se han hecho reuniones los miércoles y los jueves por la tarde, tanto presenciales como por Skype. Los sábados, por la mañana, ha habido reuniones presenciales con Víctor Ávila, compositor del juego. Además, a cada cierre de Sprint, ha habido reuniones cada tres o cuatro semanas de tipo Sprint en alguna de los horarios indicados anteriormente. En caso de urgencia, se ha hablado por Whatsapp para intentar solucionar problemas muy concretos.

Distribución de partes del código:

| Nombre | Tarea | Módulo |
|---|---|---|
| Analía Boix Scabbiolo | Cámara | Programación |
| | Sistema de fijado de enemigos | Programación |
| | Movimiento del personaje | Programación |
| | Dialogo | Programación + Arte |
| | Ataque físico Base | Programación |
| | Detección input mando | Programación |
| | Ataque físico Piscis y Virgo | Programación |
| | Alquimia de Piscis y Virgo | Programación |
| | Introducción y menú inicial | Programación + Arte |
| | Modelo base de cuerpo | Arte |
| | Modelado Piscis y Virgo | Arte |
| | Investigación adaptación captura de movimiento al modelado<br>+<br>Limpieza y depuración de animaciones | Arte |
| | Unión de partes del proyecto y adaptación de los inputs | Programación |
| | Apéndices | Diseño |

| | | |
|---|---|---|
| Irene Pérez Collado | Interfaz | Programación + Diseño |
| | Cambio Valquiria | Programación |
| | Salud y Magia de las Valquirias | Programación + Diseño |
| | Salud de los Enemigos | Programación + Diseño |
| | Base Interacción | Programación |
| | Menú de Pausa | Programación |
| | Time Controller | Programación |
| | Base del Ataque Mágico | Programación + Adaptación de Partículas |
| | Alquimia Fuerte de Aries y Tauro | Programación |
| | Ataque Físico de Aries y Tauro | Programación |
| | Inventario | Programación |
| | Objetos del Inventario | Programación + Arte + Modelado |
| | Pisadas | Programación |
| | Limpieza de Animaciones y Depuración | Arte |
| | Base Game Controller | Programación |
| | Apéndices | Diseño |
| Ángel Torres Parada | Guardado | Programación |
| | Comportamiento básico del enemigo | Programación |
| | Gestión de datos entre escenas | Programación |
| | Ataque físico de Géminis y Libra | Programación |
| | Alquimia de Géminis y Libra | Programación |
| | Modelado de Aries y Libra | Arte |
| | Apéndices | Diseño |
| | Limpieza de Animaciones y Depuración (individuales) | Arte |

Debugging

| Tarea | Personas implicadas | Tipo de debug |
|---|---|---|
| Fijado enemigos | Analía Boix<br>Ángel Torres | Arreglo de bugs |
| Alquimias de personajes | Analía Boix<br>Irene Pérez<br>Ángel Torres | Ampliación |
| Modelados | Analía Boix<br>Irene Pérez<br>Ángel Torres | Decisión de diseño |
| Interfaz | Analía Boix<br>Irene Pérez<br>Ángel Torres | Integración de otros scripts<br>Arreglo de bugs |
| Magia | Analía Boix<br>Ángel Torres | Adaptación a las stats de las Valquirias |
| Interacción Objetos | Analia Boix<br>Irene Pérez<br>Ángel Torres | Mejora de precisión |
| Interacción dentro del Inventario | Analía Boix<br>Irene Pérez<br>Ángel Torres | Arreglo de errores |
| Interacción con NPC | Analia Boix<br>Irene Pérez | Mejora de precisión |
| Menú de pausa | Ángel Torres | Adición de guardado |
| Time Controller | Irene Pérez<br>Ángel Torres | Reconstrucción de la idea |
| Game Controller | Ángel Torres | Adición del flujo de datos |
|  | Analía Boix<br>Ángel Torres | Adición escena Game Over |
| Guardado | Analía Boix<br>Ángel Torres | Adaptación |
| Comportamiento básico del | Analía Boix | Adaptación |

| | | |
|---|---|---|
| enemigo | Ángel Torres | |
| | Analía Boix<br>Irene Pérez<br>Ángel Torres | Bloqueo del movimiento en pausa |
| Bloqueo de control en pausa e interacción | Analía Boix<br>Irene Pérez<br>Ángel Torres | Mejora |

# Anexo II: Diseño Conceptual del Juego

# Walpurgis Night

Diseñado por Irene Pérez, Analia Boix y Ángel Torres

Para: PC
Edades: A partir de 10 años
Fecha de lanzamiento: Julio 2017 (beta)

Walpurgis Night se trata de un proyecto principalmente desarrollado en grupo durante el tercer curso para las asignaturas: Ingeniería del Software, Diseño Conceptual y Arte del videojuego. Se trata de un proyecto conceptualmente muy desarrollado al que se cogió cariño y se vió una oportunidad perfecta para reinventarlo durante el TFG.

Walpurgis Night es un juego RPG con toques clásicos y de Aventuras, basado en la mitología nórdica, gráficos 3D y en tercera persona. Será un proyecto orientado a PC y consolas de sobremesa. El jugador se verá transportado a diferentes mundos, encarnando el papel de las valquirias, las protagonistas de esta historia. Su misión, salvar a sus compañeras capturadas y estar así un paso más cerca de evitar el fin del universo tal y como se le conoce.

El jugador se sumergirá en un mundo lleno de secretos, misterios y traiciones mientras intenta cumplir su objetivo a contra-reloj. Con grandes influencias de juegos como el Zelda Majora's Mask con el contrarreloj, el Zelda Wind Waker y el uso del toon shading y elementos más simples.

Debido a que es un TFG grupal se desarrollarán tres mundos distintos de este universo. en la tabla siguiente se hará una división de dichos mundos y elementos desarrollados por cada alumno con una asignación de colores que identificarán a cada uno de los componentes del grupo y sus partes en el documento. Todo aquello indicado de color negro corresponde a trabajo común.

| | |
|---|---|
| Irene Pérez Collado | **Jötunheim: mundo de hielo** |
| Analia Boix Scabbiolo | **Svartalfheim: mundo de los elfos oscuros** |
| Ángel Torres Parada | **Niflheim: mundo de la niebla** |

*Tabla A: División de trabajos dependiendo de su color*

A lo largo del documento se mantendrá una explicación de la parte del juego completo para mantener el contexto de la história y el juego en sí, pero, se hará hincapié en las diferentes partes de cada uno.

# Historia y Sumario del juego

Son las ocho de la tarde de 30 de abril de un año desconocido. La cultura popular conoce esa noche como Noche de Walpurgis, o Noche de las Brujas. Se considera que ellas se reunirán esa noche para alargar un año más la agonía de la humanidad. Es por eso que la organización Lifthrasir, encargada de mantener el orden mundial, está interesada en capturar a las doce brujas. La realidad es completamente distinta.

Yggdrasil, el árbol de la vida, y en el que entre sus ramas y raíces se encuentran los nueve mundos, era gobernado por un conjunto de dioses y sus normas. Pero un grupo de héroes de Midgard, el mundo de los hombres, decidieron, cansados de vivir bajo la sombra de los caprichosos dioses, crear una organización para cambiar el orden establecido y poder dictar ellos mismos el destino de la humanidad.

El primer Ragnarök, así se llamó al suceso que dejó a los mundos tal y como se conocían sin dioses, fue activado artificialmente por dicha organización. Sin embargo, no todos los dioses perecieron: la Diosa Walburga, diosa de la magia y alquimia, sobrevivió debido a que era conocedora de los planes de los héroes e intentó evitar, poniendo en combate a doce valquirias conocedoras de las artes alquímicas más básicas, que se completasen, pero no lo consiguió.

Éstas valquirias, que debido a la influencia de los héroes son ahora consideradas las brujas mencionadas anteriormente, y se reúnen cada año para mantener hasta el siguiente la esperanza de la humanidad. Si a medianoche no consiguen reunirse, la organización se saldrá con la suya. En esas cuatro horas, Brunilda, valquiria con la alquimia Géminis infiltrada en la organización, debe liberar a sus compañeras. Para conseguirlo, debe recorrer los nueve reinos en busca de las otras, en una carrera contrarreloj.

Al considerar la organización a Walburga un obstáculo para el nuevo mundo, se disponen a llevar a cabo un segundo Ragnarok, eliminando así a la diosa. Para evitar la intromisión de la diosa, los héroes deciden evitar la reunión de las seguidoras de Walburga, las valquirias, aprisionándolas en los nueve mundos del Yggdrasil, para así evitar que su reunión invoque la protección de Walburga sobre la Tierra.

El jugador va a tener que convertirse en una valiente guerrera experta en armas, una poderosa maga que controle las artes alquímicas y una brillante estratega que sepa mover a sus compañeras a la victoria.

## Historia de Jöttunheim y su nivel relacionado *(desarrollado por Irene Pérez)*

Jöttunheim es el mundo de los gigantes, en él conviven los gigantes y los golems de hielo y piedra, estos últimos, creaciones del Rey de este mundo, Thrym.

En la mitología nórdica, los gigantes vivían constantemente amenazando a los humanos de Midgard y a los dioses de Asgard, de los cuales estaban separados por el río Iving. Esta constante amenaza es debido a que los poderes de los gigantes rivalizaba con el de los dioses y querían derrotarles, además, los dioses y los humanos, por aquel entonces, eran aliados. Por ello, los gigantes eran considerados los 'devoradores' que trataban de crear el caos sobre el orden creado por los dioses.

Los héroes, conocedores de esta rivalidad, usaron esto como ventaja para negociar con ellos en el primer Ragnarok. Los gigantes no estaban interesados en gobernar el mundo, solo demostrar que su poder era superior al de los dioses, por lo tanto aceptaron la propuesta y colaboraron con la destrucción de los dioses.

Ahora que los héroes planean un segundo Ragnarok para acabar con la diosa que logró huir del primero, Walpurga, los gigantes han colaborado en el secuestro de las valquírias, en este caso, secuestrando a Tauro y manteniéndola como prisionera en sus mazmorras.

Aquí es donde empieza el nivel, el jugador deberá controlar a las tres valquirias disponibles, Géminis, Aries y Piscis, para rescatar a Tauro y seguir con el plan de detener el segundo Ragnarok. Cada una de estas valquirias posee unos poderes diferentes que facilitará al jugador el avance en el nivel.

El primer escenario es un bosque montañoso tranquilo, donde el jugador tomará el primer contacto con algún golem para aprender a manejar los controles y familiarizarse con el entorno. Además, encontrará alguna poción y algún reloj por si este enfrentamiento ha sido más largo de lo que era necesario.

En el segundo escenario (Utgard, la fortaleza de los gigantes) el jugador podrá interaccionar con los NPCs que allí se encuentran para aprender algo más de la historia del juego y de ese mundo, además, deberá enfrentarse al guardián de la puerta para poder entrar a la mazmorra y encontrar a su compañera Tauro. En esta escena estará granizando, lo que dañará al personaje, pero no al enemigo al que hay que enfrentarse, suponiendo esto una desventaja para el jugador.

En el tercer escenario, nos encontramos ya dentro de la mazmorra. Esta mazmorra es una combinación de hielo y nieve por lo que el jugador se verá afectado por el deslizamiento y las fuerzas que el hielo aplicará sobre las valquirias. Deberá superar un puente de hielo, al que le afectará el movimiento que la valquiria realice, una inclinación de hielo y la habitación donde está Tauro atrapada. Todo esto mientras se enfrenta a los golems que le impedirán seguir hacia adelante y al Rey Thrym, que hará todo lo posible para evitar que Tauro sea rescatada.

## Historia de Niflheim *(desarrollado por Ángel Torres)*

Niflheim es el mundo de la niebla, un mundo inhóspito en el que todo aquel que entra muere, o al menos es lo que se cuenta…

El mundo de la niebla se encuentra en las raíces del Yggdrasil y fue de los primeros territorios que fueron creados alrededor del Yggdrasil. Dichas raíces están siendo continuamente devoradas por Nidhogg, el dragón que regenta Niflheim.

Previamente, Lifthrasir estaba preocupado por el descontrol que podría causar Nidhogg en el Yggdrasil, por lo que decidieron destruir al dragón antes de comenzar el Primer Ragnarök. No obstante, Nidhogg llegó a enterarse de los planes de la organización y decide buscar un pacto con ellos. Nidhogg sobreviviría, pero su poder se vería reducido al salir de la niebla, controlando así el crecimiento de las raíces del árbol. Además, para ganarse la clemencia de la organización, Nidhogg pacta trabajar para Lifthrasir si es necesario. Después del primer Ragnarök, Nidhogg controla Niflheim para Lifthrasir y evitaría la posible intromisión de posibles enemigos en Niflheim.

Mist, la valquiria con la alquimia de Libra, controla los niveles de niebla que circula en Niflheim, nieblas que circulan descontroladas por el mundo. El control de la niebla perjudica a Nidhogg, ya que al reducir la niebla, su poder disminuye; además el pacto con Lifthrasir obligaba a tomar cartas en el asunto sobre Mist. Y consigue secuestrarla con el poder de la niebla en el mundo de la niebla.

Es este el momento en el que comienza el nivel, el jugador controla a Brunilda, Gudr y Prudr para rescatar a Mist y evitar así la ejecución del Segundo Ragnarök. Con sus diferentes poderes, podrán atravesar los mundos, salvando así al resto de valquirias.

Sin embargo, cuando llegan a Niflheim, se dan cuenta de que la niebla es extremadamente densa y que es imposible atravesar Niflheim sin poder ver a causa de la espesa niebla. Esto se debe a que Nidhogg hace uso de la alquimia de Libra para poder sublimar la tierra de Niflheim y crear una densa niebla. Afortunadamente, la voz de Brunilda dicta que Lifthrasir usa Lámparas de Vacío, un mecanismo mágico que les permite viajar a través del mundo de la niebla, disipándola. Resulta que una de esas lámparas debe encontrarse en las instalaciones de la organización.

Brunilda entonces intenta buscarla, aunque sin ningún permiso para acceder a las salas especiales de las instalaciones. Tendrá que luchar contra soldados que no le dejarán continuar su búsqueda o distraerlos, así que debe tener cuidado y evitar recibir daño. La alquimia de Géminis le presta cierta ayuda, permitiéndole crear clones de aquello en lo que esté pensando, incluso Sigfried, uno de los héroes que pertenecen a la organización y con quien tiene una relación más profunda con ella. La fijación de Géminis le permitirá crear copias de Sigfried que le permitirán interactuar con otros soldados o incluso atacar, usando una gran cantidad de maná. Mientras Brunilda sea cuidadosa, encontrará fácilmente la lámpara.

Una vez se encuentra la lámpara, la fijación de géminis permitirá enviar una réplica de la lámpara, funcional como la original. La niebla casi desaparecerá y Niflheim será explorable una vez más. Cuando las valquirias llegan al puente de Niflheim, encontrarán a Mist desmayada. Cuando se levanta, una magia desconocida bloquea el puente. Se asume que esto se debe a la magia que regenta Niflheim, aquella que controla Nidhogg. Si quieren salir del mundo de la niebla, deben derrotar a Nidhogg, consiguiendo así eliminar la magia.

## Historia de Svartálfaheim *(Desarrollado por Analía Boix)*

Svartálfaheim, antiguamente conocido como Nidavelir el gran reino de los enanos. Estos últimos eran conocidos por sus habilidades como herreros y por vivir bajo tierra. Vivían bajo el reinado del gran Hreidmar, un rey justo y muy querido por la gente del mundo. Hreidmar trabajaba como uno más de sus súbditos, preocupado por el estado del reino y de sus habitantes. Todos los enanos trabajaban como hermanos en las forjas y minas, manteniendo viva la leyenda de sus grandes capacidades de trabajar con metales y crear verdaderas maravillas... Hasta que sucedió el primer Ragnarok, donde una gran cantidad de energía mágica fue liberada, y una parte afectó a Hreidmar. Su alma, al no poder contener ni procesar tanta magia acabó corrompiéndose, pero convirtiéndose en una versión mejorada de un enano, y siendo así el primer elfo oscuro de la historia. Bajo el nombre de Ivaldi, se volvió más poderoso y al sentirse superior decidió que los enanos merecedores de su confianza y los más fuertes, serían merecedores de poder, y así creó su ejército de elfos oscuros. Los enanos que no fueron aceptados, se vieron esclavizados y obligados a trabajar sin pausa y los que decidieron rebelarse fueron congelados en el tiempo, y de esta manera logró instaurar un reinado de miedo.

Por decisión de Ivaldi el nombre del mundo dejó de ser Nidavelir para convertirse en Svartálfaheim, el rey ya no se preocupa por su gente, ni por el estado de su reino, simplemente en crear armas y armaduras cada vez más poderosas con la ayuda de la magia. El mundo antes brillante y conocido por sus grandes pasillos de oro, luces reflejadas en piedras preciosas y construcciones impresionantes dejó de ser lo que era, la oscuridad predomina en este momento, y todo ha sido destruido y/o ha ido deteriorándose con el paso del tiempo. Brunilda, Prudr y Gudr tendrán que buscar a su compañera Skuld que se encuentra capturada en el mundo, en el interior de la gran forja, intentando no perder una gran parte del valioso tiempo que les queda, y liberar también al mundo de la oscuridad que lo consume.

El jugador tendrá que moverse por las diferentes zonas del mundo haciendo uso del sigilo y interaccionando con los NPCs, buscando aquellos objetos que le permitan continuar su camino hasta encontrar a Virgo. El jugador tendrá que hacer uso de la luz a su favor y de las habilidades mágicas de cada valquiria, por ejemplo en una parte del escenario tendrá que localizar 3 cristales para poder abrirse camino.

# Personajes y controles

**PERSONAJES:**

- **Brunilda - Géminis:** Valquiria capaz de crear cualquier cosa según le venga en mente. Es así como crea un réplica de ella misma mientras se encuentra dentro de la organización Lifthrasir. La falsa Brunilda no tiene dicha habilidad ni ataques mágicos, su única opción de defensa es una daga que porta. Tendrá que rescatar al resto de valquirias sin levantar sospechas. Para utilizar la magia y así poder eliminar a los enemigos que se presenten recibirá la ayuda de Gudr y Prudr.

- **Gudr - Aries:** valquiria con el poder de calcinación. Conoce los planes de Brunilda y se unirá a ella para rescatar a las 9 valquirias restantes. Le encanta la guerra, lo que le hace extremadamente peligrosa. Su arma de elección es un hacha.

- **Prudr - Piscis:** Valquiria con el poder de la proyección, lo cual mejora las cualidades de cualquier sustancia. Gracias a ello, y por haber sido sierva directa de Odín en el pasado, conoce cómo convertir una simple rama en la legendaria lanza Gungnir, por ello su arma es una lanza. Muy espiritual, puede ver o sentir cosas que las demás no.

- Skuld - Virgo ***(Desarrollado por Analía Boix)***: Valquiria con el poder de la destilación, asociado a la habilidad de sustracción de magia/alma de diferentes objetos y/o entidades. Es una de las valquirias con más poder mágico, y para una correcta canalización de este porta un cetro. Está encerrada en las profundidades de la gran forja de Svartálfaheim.

- Herja - Tauro ***(Desarrollado por Irene Pérez)***: Valquiria con el poder de la congelación, asociado a la modificación de la materia. Es un personaje que destaca más en el ataque físico y en su velocidad, pero a causa de eso, su defensa y su poder mágico es bastante inferior al de sus compañeras. Se encuentra atrapada en Jöttunheim.

- Mist - Libra ***(diseñada por Ángel Torres)*:** Valquiria con la alquimia basada en la sublimación de sustancias, asociado a la habilidad de convertir gas en sólido o sólido en gas. Suele viajar a Niflheim para controlar la cantidad de niebla del mundo y así entrenar sus poderes. Suele defenderse gracias a sus escudos convirtiéndola en alguien difícil de vencer aunque de carácter poco ofensivo. Tras uno de sus viajes a Niflheim, es raptada por un poder desconocido.

# Mundos

Existen nueve mazmorras, coincidiendo con los reinos que existen en la mitología nórdica entorno al Yggdrasil:

- **Midgard:** El reino de los humanos, se caracteriza por ser un lugar apacible en el que los hombres viven con indiferencia los caprichos de los dioses.

- ***Jöttunheim* *(Desarrollado por Irene Pérez)*:** El reino de los gigantes de hielo, un lugar gélido en el que sólo los seres más resistentes pueden sobrevivir.

- **Helheim:** El reino de los muertos, un lugar tabú para cualquier ser vivo. Puede ser comparable con el infierno que todos conocen.

- *Niflheim* ***(Desarrollada por Ángel Torres)***: El reino de la niebla, un reino vacío, indómito. Allí no ha llegado a pisar ningún ser vivo, salvo Mist, quien controla los niveles de niebla del mundo.

- *Svartálfaheim* ***(Desarrollado por Analía Boix)*:** El reino de los elfos oscuros, una raza de elfos bastante cerrada, pero que cuidan de los hombres, aunque ahora se sienten corrompidos.

- **Muspelheim:** El reino del fuego, gobernado por los gigantes de fuego. Al igual que Jöttunheim, resulta imposible para un ser humano sobrevivir allí.

- **Vanaheim:** El reino de la naturaleza y hogar de los Vanir, deidades relacionadas con la fertilidad y la sabiduría; desde el Ragnarok, corrupto.

- **Alfheim:** El reino de los elfos de luz, un reino pulcro lleno de seres orgullosos y poderosos. Es lo más parecido al paraíso.

- **Asgard:** El reino de los Dioses, una área aurea llena de lujo en la que los dioses disfrutaban de sus vidas eternas… hasta que sucedió aquel trágico evento.

# Gameplay

El jugador irá reclutando valquirias con poderes especiales que deberán ser utilizados en las mazmorras para poder avanzar. Se comenzará manejando a Brunilda, valquiria con el poder Géminis (crear cualquier cosa que haya memorizado), en Midgard, la tierra de los humanos y la primera mazmorra. Su objetivo es ir recorriendo los nueve reinos para rescatar a sus compañeras. Deberá ir luchando con los enemigos e ir ordenando al resto de valquirias para eliminar al jefe que corrompe cada reino.

Tras liberar a las nueve brujas, el jugador debe volver a Midgard para reencontrarse con el resto de valquirias. Esto debe suceder justo antes de medianoche ya que si el jugador tarda más de la cuenta, todas las brujas no se podrán reunir y la organización llevará a cabo el Ragnarok.

En cuanto al tiempo, es un elemento muy importante del juego. Brunilda tiene cuatro horas para rescatar a sus compañeras. Esto llevará al jugador a elegir sabiamente qué hacer para no perder demasiado tiempo en las mazmorras. El tiempo pasará a velocidades diferentes en los mundos, los más cercanos a Midgard, tienen un tiempo más similar al tiempo real, cuanto más alejado se esté más rápido pasará. Siendo un recurso importante a la hora de la creación de estrategias sobre cómo se afrontará el reto del juego.

Todas las valquirias podrán interactuar con elementos específicos del escenario y con los personajes no controlables, entrar en combate con los enemigos y utilizar/almacenar objetos. El jugador será capaz de intercambiar entre las valquirias para poder utilizar convenientemente sus habilidades, que variarán dependiendo de la valquiria que sea.
Las habilidades se activan con R2 y/o triángulo, dependiendo del momento del uso y utilidad y son:

- **Calcinación:** habilidad ofensiva en su totalidad, proyecta gran cantidad de energía a una temperatura extremadamente alta. Hace daño a los enemigos y con determinados objetos los hace arder.

- **Fijación:** alquimia dedicada a crear objetos a partir del pensamiento. Se pueden invocar objetos y seres que han quedado recordados por Brunilda como pueden ser héroes que fueron afines a ella en el pasado, como por ejemplo Sigfried, con la intención de negociar con otros enemigos.

- **Proyección:** habilidad encargada de mejorar las substancias. Un ejemplo conocido es mejorar el metal en oro. Por tanto puede mejorar objetos. La utilidad más característica en este caso es mejorar la lanza que lleva como arma básica y convertirla en la famosa Gungnir, lanza del dios Odín.

- ***Destilación* *(Desarrollado por Analía Boix):*** esta habilidad, tienen una función especial con objetos que han sido imbuidos mágicamente, siendo capaz de sacar la magia de su interior y dejar el objeto en su estado básico hasta que se vuelva a recargar o se recargue solo. Frente a enemigos es capaz de sacar su alma y dejarlos indefensos durante unos segundos, durante este tiempo recibirán un bonus de daño si se les ataca.

- ***Sublimación*** *(desarrollado por Ángel Torres):* capacidad de convertir en sólido un gas y viceversa. Puede ser muy útil para convertir la niebla en hielo o el hielo en vapor. El estado de sublimación de un material es temporal y a vuelve a su estado original.

- *Congelación* ***(Desarrollado por Irene Pérez)*****:** como su nombre indica, congela, se puede gastar tanto para atacar como para superar obstáculos. Si este ataque es realizado sobre algún enemigo, éste se congela durante unos segundos, impidiéndole así realizar cualquier acción hasta que se pase este efecto.

Estas habilidades como se ha comentado anteriormente son exclusivas de cada valquiria y tendrán que utilizarse tanto para la resolución de puzles como combate. Además de las armas.

# Modos y mecánicas

**ARMAS:**

- Brunilda - Géminis: daga. Cadencia baja, rango corto y daño muy alto.
- Gudr - Aries: hacha. Cadencia media-alta, rango medio, daño medio/alto.
- Prudr - Piscis: lanza. Cadencia alta, rango alto, daño medio.
- Skuld - Virgo: cetro. Cadencia baja, rango largo alcance, daño medio/bajo.
- Mist - Libra: dos escudos. Cadencia alta, rango bajo, daño bajo/medio.
- Herja - Tauro: puños. Cadencia alta, rango muy bajo, daño alto.

Hay dos tipos de habilidades mágicas y/o alquímicas que las valquirias pueden utilizar, estos dos tipos son la magia básica o débil y la magia especial o fuerte.

**MAGIA BÁSICA:**

Esta magia está asociada al elemento del signo del zodíaco de cada valquiria (fuego, tierra, aire y agua), menos en el caso de Piscis que al ser la hija de Thor su magia cambia para favorecer al daño elemental de rayo.

- Brunilda Falsa - Géminis: tiene maná pero no habilidades mágicas.
- Brunilda Verdadera - Géminis: ataque con bola de aire.
- Gudr - Aries: ataque con llama de fuego.
- Prudr - Piscis: ataque con rayo.
- Skuld - Virgo: ataque con proyectil de tierra.
- Mist - Libra: ataque con bola de aire.
- Herja - Tauro: ataque con proyectil de tierra..

**MAGIA ESPECIAL:**

Esta magia depende del proceso alquímico asociado a cada signo del zodíaco,

- Brunilda Falsa - Géminis: tiene maná pero no habilidades mágicas.
- Brunilda Verdadera - Géminis: Fijación. Invocar a Sigfried.
- Gudr - Aries: Calcinación. De largo alcance, mucho más potente que el básico. Gasta 20 puntos de maná.
- Prudr - Piscis: Proyección. Invocar a Gugnir. Se necesita el 51% del maná para activarla. Daño de área, golpea fuertemente el suelo delante de ella y afecta a todos los enemigos cercanos. Cadencia baja, rango muy alto, daño muy alto.
- Skuld - Virgo: Destilación. Doble de daño sobre el enemigo afectado durante 10 segundos. Utiliza 45 puntos de maná.
- Mist - Libra: Sublimación. Convierte la niebla en hielo y el hielo en vapor. Ataca con granizo generado por la sublimación del propio aire. Gasta 50 puntos de maná.
- Herja - Tauro: Congelación. Congelar al enemigo durante 15 segundos. Gasta 20 de mana

**ORBES DE ALQUIMIA:** Son cristales con poderes especiales que pueden ser utilizados para mejorar la defensa, crear escudos, no morir en caso de que se pierda toda la vida o incluso recuperarla cuando sea necesaria.

- **Orbe Gules:** Aumenta la fortaleza de la bruja, reduciendo a la mitad el daño que pueda recibir.
- **Orbe Azur:** Recupera vida, +25 puntos de vida por cada orbe.
- **Orbe Sinople:** Crea un campo de protección alrededor de la valquiria. Sin recibir golpes puede durar hasta 2 minutos.
- **Orbe Sable:** Revive a la valquiria si pierde toda la vida.

**RELOJ:** cuando se utiliza retrasa una hora el tiempo del reloj del juego. Dando más tiempo al jugador. Uno por nivel.

**POCIÓN DE MANÁ:** Recupera 10 de maná una vez se consume.

**POCIÓN DE SALUD:** Recupera 15 puntos de salud una vez se consume.

**FAROLILLO MÁGICO** ***(Desarrollado por Analía Boix)*****:** Función simple, iluminar un área de la escena. Función mágica, el uso variará dependiendo de la valquiria:

- Verde mar claro: congela elfos oscuros, puede hacer aparecer pistas en puntos concretos del escenario
- Rojo: convierte en piedra a los enanos enemigos, da pistas falsas en el laberinto
- Naranja: Devuelve al tiempo actual a los enanos congelados en el tiempo
- Azul: quita la protección mágica

**LÁMPARA DE VACÍO** ***(desarrollado por Ángel Torres)*****:** Elimina el maleficio de la Niebla Eterna. La niebla de Niflheim deja de tener efecto de desorientación que hace volver a la plataforma de inicio.

**CAMPANA** ***(desarrollado por Ángel Torres):*** Al lanzarse, causa mucho ruido que puede despistar a los enemigos.

**MALEFICIOS** ***(desarrollado por Ángel Torres):*** El jugador puede sufrir diferentes tipos de maleficios si no resuelve correctamente la mazmorra. Estos pueden variar desde ver la pantalla en blanco hasta tener los controles cambiados hasta que no se resuelva el conflicto infligido (en un futuro se explicarán cómo resolver cada uno de ellos.

- **Niebla Eterna:** Una espesa niebla inunda el terreno. Brunilda necesita encontrar una Lámpara de Vacío.

# Normas

- No se puede usar más de una valquiria a la vez.

- No se puede usar más de un objeto a la vez.

- No se puede saltar.

- Solo puedes usar la magia mientras se tenga suficiente maná para ejecutar un movimiento mágico en la barra de magia.

- Solo puedes interactuar con el entorno con magias o con objetos específicamente preparados para la interactividad.

- Se puede usar magia con cualquier valquiria excepto con la réplica de Brunilda.

- Hay dos formas de conseguir maná, esperando que se reponga a lo largo de la partida o usando Orbes de Maná.

- El jugador morirá cuando caiga al agua o al vacío.

- El jugador no perderá los objetos obtenidos hasta que se usen o muera.

- Los enemigos pierden vida al ser atacados por el jugador salvo que estén defendiéndose.

- Los enemigos morirán cuando su vida llegue a 0.

- El jugador perderá vida al ser atacado por un enemigo salvo que esté defendiéndose.

- El jugador morirá cuando su vida llegue a 0 excepto si tiene un Orbe de Resurrección en su inventario.

- El jugador solo puede atacar con armas o con magia.

- El jugador debe completar los puzles presentes en el nivel para poder avanzar.

- Los enemigos te persiguen si estás en su rango de visión.

- Los enemigos mirarán alrededor si escuchan algún ruido.

- Los enemigos dejarán de perseguirte si te alejas lo suficiente de ellos.

- Puedes cambiar de valquiria cuando quieras.

- Solo se puede seleccionar una valquiria de las que el juego dispone en principio o se ha conseguido reclutar.

- El arma y habilidad correspondiente a cada valquiria tienen estadísticas de ataque y rangos diferentes.

- Solo se puede interactuar con ciertos elementos del entorno si se usa el tipo de magia adecuada.

- Reclutar a la nueva valquiria cuando la encuentras es obligatorio para poder continuar el nivel.

- Si el reloj llega a las 00:00 se acaba el juego.

- El jugador puede alterar el paso del tiempo mediante objetos.

- El jugador no podrá volver a una hora anterior a las 20:00.

- ***(Desarrollado por Ángel Torres)*** En Niflheim, el jugador no podrá continuar el nivel hasta que se consiga la Lámpara de Vacío.

- ***(Desarrollado por Ángel Torres)*** El jugador no podrá volver al terreno inicial de Niflheim si no es reiniciando desde el último punto de guardado o venciendo a Nidhogg, una vez se rescate a Mist.

- ***(Desarrollado por Ángel Torres)*** Sin llaves, el jugador no podrá entrar en las áreas cerradas con llave.

- ***(Desarrollado por Analía Boix)*** Sí a la valquiria no le queda maná la habilidad especial del farolillo no podrá activarse.

- ***(Desarrollado por Analía Boix)*** El jugador no podrá atacar ni defenderse mientras esté activo el farolillo.

- ***(Desarrollado por Analía Boix)*** Los enemigos se verán atraídos por la luz

- ***(Desarrollado por Irene Pérez)*** Si el personaje ha sido congelado, no podrá moverse hasta que se pase este efecto.

- ***(Desarrollado por Irene Pérez)*** Si el personaje está sobre hielo, su movimiento se verá un poco restringido.

# Enemigos y bosses

**Enemigos:** Enemigos débiles y no muy complicados de eliminar que aparecerán a lo largo de la aventura repetidamente. Son soldados de Lifthrasir, con la misión de evitar que el jugador cumpla su misión de reunir a todas las valquirias.

**Bosses:** al final de cada mundo/mazmorra, las valquirias deberán enfrentarse a un jefe de sala para poder salvar a sus compañeras.

- **Jörmundgander:** conocida también como la serpiente de Midgard, será el primero boss del juego. Puede rodear la tierra con su escamosos cuerpo debido a lo gigantesca que puede llegar a ser.

- **Hel:** encargada de custodiar Helheim, ya que es la reina. Es un caso especial del primer ragnarok. Su apariencia representa el cómo ve la gente a la muerte.

- **Ivaldi** ***(Desarrollado por Analía Boix)*****:** El primer elfo oscuro, era anteriormente el rey enano Hreidmar hasta que fue corrompido por la energía liberada por el primer Ragnarok. Cruel y ávido de poder reina con mano dura lo que ahora considera que es su mundo. La luz verde marl le congela temporalmente y la azul permite que sea atacado tanto física como mágicamente. Es el boss de la mazmorra de Svartalfaheim.

- **Thrym** ***(Desarrollado por Irene Pérez)*****:** rey de Jöttunheim, se le concedió este título al ayudar en el primer ragnarök. Siempre odió a los dioses y es un gigante muy ambicioso. Controla a los golems de piedra y hielo ya que son creaciones suyas, es un enemigo con un gran ataque físico que puede realizar un gran daño, sin embargo es poco resistente al fuego debido a su naturaleza. Su odio hacia los dioses y hacia aquellos que trabajan para ellos viene desde que le arrebató a Thor su martillo, extorsionando con ello a los dioses para que le entregasen a la diosa Freyja como esposa, pero Thor le engañó y le derrotó.

- **Nidhogg** *(Diseñado por Ángel Torres)***:** dragón que vive en Niflheim, después del primer ragnarök se ha dedicado a atormentar a las almas humanas presentes en Niflheim y a la vez mantener segura la mazmorra. Pactó con Lifthrasir antes del primer Ragnarök sumisión a la organización a cambio de permitirle sobrevivir. Tras el primer Ragnarök, empezó a controlar la niebla de Niflheim, aunque siempre encontró a alguien que contrarrestaba su poder gracias a la alquimia de sublimación, la valquiria Mist.

- **Hafgufa:** monstruo marino de gran tamaño, que recuerda a una isla por las rocas que cubren su espalda.

- **Njördr:** en su día fue un dios vanir, habitante de Vanaheim, pero durante una guerra del pasado entre dioses fue tratado injustamente y se le quitó su poder.

Después del primer ragnarök se le devolvieron estos a cambio de trabajar para Lifthrasir y ahora es el protector de la mazmorra que se encuentra en Vanaheim.

- **Dullahan:** después del primer ragnarök corrompió el mundo de los elfos de la luz conocido como Alfheim, se dedica a recorrer el territorio en la noche eterna con su cabeza como linterna en la mano.

- **Fenrir:** lobo de grandes dimensiones y brutal fuerza. Es el protector de Asgard desde el primer ragnarok. Será el boss final en esta localización, siendo uno de los enemigos más duros del juego.

- **Surtr:** gigante habitante de Muspelheim, es un jötunn portador de una inmensa espada de fuego y es el encargado de defender la mazmorra de dicho lugar. Con un papel importante también durante el primer Ragnarok, ya que no teme a los dioses y sus poderes.

- **Völundr:** maestro herrero y artesano, que a causa de sus malas acciones se ve corrompido por esta razón pierde las piernas, se construye sus propias alas. Es uno de los capitanes de la organización. Y será el enemigo al llegar a las 24:00.

# Retos en el Juego

Nuestro objetivo a la hora de desarrollar el gameplay del juego era conseguir que el jugador tuviera que emplear tanto sus habilidades físicas como mentales para ir superando los retos a los que se enfrentaría durante el juego; por ejemplo resolviendo los puzzles de las distintas mazmorras que se iría encontrando a lo largo del juego.

En cuanto a la jerarquía de los retos: el juego está organizado en un objetivo principal, el cual se subdividirá en 10 niveles o mazmorras para liberar a las 9 valquirias restantes y así evitar el Ragnarok. Cada nivel tendrá un jefe de mazmorra. Para llegar a él será necesario eliminar a ciertos enemigos y superar una serie de puzzles que llevarán al jugador a la sala final donde este se encuentra. El objetivo principal de cada nivel es rescatar a la valquiria capturada, el enfrentamiento final no es obligatorio si el jugador descubre cómo evitarlo.

Como misión adicional en cada mazmorra dependiendo del mundo podrá haber NPCs que ayuden al jugador a comprender los secretos e historias de estos.

Uno de los puntos que se quiere tocar es dar al jugador la opción de superar el final del juego de diferentes maneras, ya que tendrá que plantearse una estrategia eligiendo tres valquirias entre las que tenga disponibles. A pesar de que podrá cambiarlas en determinados puntos llamados tótems rúnicos.

El jugador, además, podrá elegir completar algunos retos o no siendo estos tanto implícitos como explícitos. Por ejemplo, conocer todos los secretos de los mundos, superar los maleficios…

# Recursos y Entidades en el Juego

Los recursos que aparecen en el juego son los siguientes:

- **Tiempo:** Recurso intangible que puede ir en beneficio o detrimento del jugador. Este va avanzando continuamente durante la partida. Al principio del juego, serán las 20:00 horas. Si el juego alcanza medianoche, el jugador perderá el juego. El jugador puede encontrar elementos que lo alteren. Dependiendo de la mazmorra, el tiempo avanzará con una velocidad u otra.

- **Maná:** Recurso intangible que las valquirias utilizan para poder usar la magia limitadamente. Los ataques mágicos necesitan maná para poder ser ejecutados. La cantidad será visible para el jugador en cualquier momento.

- **Vida:** Recurso intangible. Las valquirias poseen un porcentaje de vida que podrá ir disminuyendo conforme se enfrente a enemigos o aumentando si se curan los daños.

Las entidades son las siguientes:

- **Valquirias:** Son entidades del juego que el jugador puede controlar. A medida que avanza el juego se irán desbloqueando más valquirias, cada una tiene unas características propias.

- **Ataques Mágicos:** Entidades de combate. Cada valquiria tiene un poder mágico diferente al resto dependiendo de su símbolo del zodíaco y su habilidad alquímica. Se pueden usar para hacer daño a un enemigo, o para activar una mecánica sobre un objeto.

- **Orbes de Alquimia:** Entidades potenciadoras. Son cristales con poderes especiales que pueden ser utilizados para mejorar la defensa, crear escudos, no morir en caso de que se pierda toda la vida o incluso recuperarla cuando sea necesaria.

- **Pociones:** Entidades regeneradoras, recuperan un porcentaje de maná o vida al ser utilizadas.

- **Relojes:** Son entidades encargadas de beneficiar al jugador, una vez activado se restará tiempo del reloj del juego.

- **Lámparas de vacío:** Entidad única, se utiliza para disolver el maleficio de la niebla eterna.

- **Farolillo mágico:** Entidad única, emite luz a la cual se le pueden aplicar poderes mágicos que le dan diferentes efectos.

- **Maleficios:** Entidad que utilizan los diferentes jefes de mazmorra como castigo tras llegar a una conclusión errónea tras la conversación crítica al vencerlo. Puede dificultar gravemente el avance del jugador.

- **Enemigos:** Entidad, son los enemigos dentro del juego, tanto jefes finales como enemigos normales. Hay de varios tipos y dependiendo del tipo de enemigo, tendrán patrones de combate distintos y fuerza de ataque y defensa que varían.

- **NPCs:** Entidad, personajes no jugables dentro del juego. Aportan información sobre el nivel.

De estas entidades aquí descritas, hay cinco entidades de las que sus elementos son únicos. Estos son las valquirias, los jefes (que son enemigos), lámpara, farolillo y los maleficios.

Como recursos y entidades tangibles, es decir, que se pueden tocar y que son visibles en pantalla son las valquirias, que son las únicas que pueden ser controladas, todos los objetos, los enemigos que se pueden vencer y los NPCs.

Los recursos y entidades intangibles, que no se pueden tocar. Estos son el tiempo, el maná y la vida, que tienen límites, los ataques mágicos que son productos de la mecánica de ataque y los maleficios, que son productos de la mecánica de castigo.

De las entidades que hemos definido, estas tienen atributos que las describen. Las valquirias se ven definidas por diversos atributos como la vida, el maná, el ataque, y la defensa (todas ellas cuantificables) la dirección que sigue y la magia que se ve definida por el signo que representa y es característica de cada una. Los enemigos se ven definidos por la vida, el daño que efectúa y la defensa, que son atributos cuantificables y el estado en el que se encuentra el enemigo.

# Acciones de las mecánicas

Las mecánicas que rigen las relaciones entre las entidades son:

**- Atacar con armas:** es la mecánica para eliminar a los enemigos cuerpo a cuerpo desde el punto de vista del jugador o al jugador desde el punto de vista de los enemigos. Con cada ataque, la víctima del ataque, en caso que no esté defendiéndose pierde puntos de vida. Para decidir cuánta vida pierde la víctima y si el atacante puede hacer daño, se tienen en cuenta la cadencia del arma, el rango de alcance y el valor de ataque de la unidad.

**Usar magia:** con esta mecánica se puede interactuar con el escenario y con los objetos que hay en él o atacar a los enemigos. Para usar la magia es necesario tener una cantidad mínima de maná, que variará según la magia que utiliza cada valquiria o si la magia es básica o especial. El uso de la magia implica la pérdida de maná. La réplica de Brunilda es la única valquiria incapaz de usar magia.

**Defenderse:** es una mecánica disponible tanto para ciertos enemigos como para el jugador. Gracias a la defensa, se pueden bloquear los ataques y evitar recibir daño.

**Moverse:** esta mecánica implica el desplazamiento de la valquiria a través del escenario. Es una parte fundamental del desarrollo del juego, ya que sin movimiento el jugador no puede completar los puzles ni salvar a las otras valquirias ni vencer a los jefes.

**Recoger objetos:** esta mecánica añade al inventario objetos consumibles que se encontrarán dispersos por el nivel. No es necesaria para completarlo, pretenden favorecer y ayudar al jugador en el camino.

**Usar objetos:** mecánica asociada a la anterior, permite al jugador utilizar los objetos recogidos y recibir sus efectos. Pueden ser instantáneos o actuar durante un rango de tiempo. Algunos de estos tienen un uso automático, no dependen de que el jugador los active.

Activar farolillo ***(Desarrollado por Analía Boix)*****:** mecánica que permite al jugador en su uso básico iluminar una pequeña parte de la escena, una vez se le aplica energía mágica su funcionamiento y características cambia dependiendo de quien la utilice.

**Cambiar de valquiria:** la mecánica de cambio de valquiria permite cambiar entre las diferentes valquirias disponibles, es imprescindible para completar el juego. Esto es porque los muchos puzles del juego han de resolverse mediante el uso en concreto de alguna de las habilidades de estas, por tanto cambiar entre ellas es de gran importancia para poder acceder a estas habilidades rápidamente.

**Hablar con los personajes no controlables:** los personajes no enemigos pueden ser consultados por el jugador al encontrarse cerca de ellos. Gracias a esto, el jugador puede recibir información relevante sobre la historia o sobre la continuidad en el juego.

**Interacción con elementos del escenario:** una mecánica básica y de gran importancia para completar los diferentes niveles. Permite al jugador aplicar las habilidades mágicas asociadas a las valquirias para poder completar puzles. También puede ser una interacción básica por ejemplo activar palancas.

**Modo sigilo:** mecánica que permite al jugador poder moverse por el escenario llamando mínimamente la atención de los enemigos ya que hace muy poco ruido. Le permitirá si quiere poder superar diferentes niveles sin necesidad de entrar en combate.

**Mover cámara:** esta mecánica permite al jugador observar el escenario a su alrededor, para poder así planear las mejores estrategias para afrontar los niveles de la mejor manera posible.

**Fijar enemigo:** gracias a esta mecánica, el jugador puede mantener como blanco fijo a un enemigo para poder lanzar ataques físicos y mágicos automáticamente en la dirección del enemigo.

**Lanzar objeto** (diseñado por Ángel Torres): algunos objetos como el cencerro se pueden lanzar, causando un gran ruido al golpear el suelo.

| **ACCIONES DE USUARIO** | |
|---|---|
| **Mecánica** | **Características** |
| Moverse | Dirección = ($\mathcal{V}_x$, $\mathcal{V}_y$, $\mathcal{V}_z$)<br>$\mathcal{V}_y$ constreñido al plano del suelo. |
| Atacar con arma | Al contacto con el enemigo.<br>Causa $\mathscr{x}$ daño.<br>Dependiente de la cadencia del arma.<br>Dependiente del rango de cada arma. |
| Usar magia | Sobre elemento interactivo del escenario:<br>Activa efecto del elemento.<br>Sobre enemigo:<br>Causa $\mathcal{Y}$ daño.<br>En ambos casos elimina $\mathscr{z}$ puntos de maná.<br>$\mathcal{Y}$ y $\mathscr{z}$ son dependientes de cada valquiria. |
| Defenderse | Bloquea daño del enemigo (daño enemigo = 0). |
| Recoger objeto | El objeto desaparece del escenario.<br>El objeto se añade al inventario. |
| Usar objeto | En pociones, orbes (salvo Orbe Sable) y relojes:<br>El objeto desaparece del inventario.<br>Realiza el efecto que se espera del objeto.<br>En Orbes Sable:<br>Se usa automáticamente cuando vida = 0.<br>El objeto desaparece del inventario.<br>Recupera toda la vida de la valquiria.<br>En objetos equipables (lámparas): |

| | |
|---|---|
| | El objeto aparece como equipado.<br>Realiza el efecto siempre que esté equipado. |
| Cambiar de valquiria | Cambia todas las estadísticas de la valquiria y su arma. |
| Hablar con NPCs | Ejecuta flujo de conversación.<br>Recibe información del NPC. |
| Interacción con el escenario | Activa objetos del escenario. |
| Modo sigilo | Volumen de sonido muy reducido.<br>Velocidad de valquiria muy reducida. |
| Mover cámara | Desplazar orientación de la vista. |
| Fijar cámara | Cámara centrada en un enemigo concreto.<br>Dirección de ataque (físico o mágico) = dirección enemigo. |

*Tabla B: Explicación de las distintas acciones que el usuario puede realizar.*

De las entidades y recursos que hemos descrito anteriormente, prácticamente ninguna aparecerá mediante una fuente. Sólo podremos considerar la vida y el maná como unos recursos que se irán recuperando a medida que pase el tiempo.

Además, Los enemigos finales y los orbes serán los únicos elementos que pueden ser drenados del sistema del juego. Los enemigos pueden ser drenados cuando el jugador lo elimina venciendolo y los orbes se drenan al utilizarlo sobre una valquiria.

En el juego, habrán mecánicas que plantearán retos, como los maleficios. Sin embargo, como los maleficios son mecánicas en sí mismas, se considerará superado el reto que estos plantean el reto será superado.

Como hemos dicho anteriormente, los enemigos y los NPCs tienen mecánicas de interacción, sin embargo son elementos no jugables. Para solucionar esto se implementarán algoritmos que regulen sus movimientos y que activará una secuencia de acciones que irán haciendo avanzar las conversaciones cuando interactúe con las valquirias.

En el apartado de exploración, el personaje avanzará por el escenario, encontrándose enemigos o NPCs con los que interactuar, se encontrará orbes y pociones que se almacenarán en el escenario al ser recogidos por el jugador, será afectado por maleficios o se encontrará runas que le aportarán información para el juego.

En cuanto al combate, será un 1 contra 1, donde el jugador deberá golpear un número de veces X al enemigo para derrotarlo. Para combatir podrá usar tanto armas como magia, permitiéndole de esta forma más combinaciones de ataque.

Las mecánicas en su conjunto y en un entorno compartido funcionan de esta manera:

| **ACCIONES DE LOS RECURSOS GLOBALES** | | |
|---|---|---|
| Mecánica | **Características** | **Acciones** |
| Poción de maná | Aumenta maná al usarse.<br>Se puede encontrar en todos los niveles. | Ocupar espacio en inventario.<br>Desaparecer de escenario.<br>Fortalece magia. |
| Poción de vida | Aumenta vida al usarse.<br>Se puede encontrar en todos los niveles. | Ocupar espacio en inventario.<br>Desaparecer de escenario.<br>Recupera vida. |
| Orbe Sable | Recupera toda la vida si vida = 0.<br>Se puede encontrar en todos los niveles. | Desaparecer de escenario.<br>Recupera toda la vida. |
| Reloj | Retrasa el tiempo una hora.<br>Se puede encontrar en todos los niveles. | Ocupar espacio en inventario.<br>Desaparecer de escenario.<br>Retrasa el tiempo una hora. |
| Orbe Escudo | Crea un escudo alrededor del personaje por un tiempo limitado.<br>Se puede encontrar en todos los niveles. | Ocupar espacio en inventario.<br>Desaparecer de escenario.<br>Crear un escudo protector. |
| Orbe Magia | Permite usar magia sin gastar maná por un tiempo limitado.<br>Se puede encontrar en todos los niveles. | Ocupar espacio en inventario.<br>Desaparecer de escenario.<br>Permite no gastar maná |

*Tabla C: Explicación de las acciones de los recursos del juego.*

| ACCIONES DE LOS RECURSOS DE NIFLHEIM (***desarrollado por Ángel Torres)*** | | |
|---|---|---|
| Mecánica | Características | Acciones |
| Soldados | Patrullar.<br>Ataques débiles.<br>Se pueden encontrar en Base Enemiga. | Moverse<br>Conversar (si es con Sigfried)<br>Ataque con arma<br>Perder vida<br>Matar<br>Morir |
| Comandantes | Ataques cargados.<br>Se pueden encontrar en Base Enemiga. | Moverse<br>Conversar (si es con Sigfried)<br>Ataque con arma<br>Defenderse<br>Perder vida<br>Matar<br>Morir |
| Sigfried | Conversar.<br>Se puede encontrar en Base Enemiga. | Conversar<br>Moverse |
| Nidhogg | Ataques muy fuertes como dragón..<br>Se puede encontrar en Coliseo de Niflheim. | Moverse (en tres dimensiones)<br>Atacar con las garras<br>Perder vida<br>Matar<br>Morir |
| Mist | Conversar.<br>Se encuentra en puente de Niflheim. | Conversar<br>Añadirse al equipo. |

| | | |
|---|---|---|
| Poción de maná | Aumenta maná al usarse.<br>Se pueden encontrar en Niflheim y Base Enemiga. | Ocupar espacio en inventario.<br>Desaparecer de escenario.<br>Fortalece magia. |
| Poción de vida | Aumenta vida al usarse.<br>Se pueden encontrar en Niflheim y Base Enemiga. | Ocupar espacio en inventario.<br>Desaparecer de escenario.<br>Recupera vida. |
| Orbe Sable | Recupera toda la vida si vida = 0.<br>Se puede encontrar en Niflheim. | Desaparecer de escenario.<br>Recupera toda la vida. |
| Reloj | Retrasa el tiempo una hora.<br>Se pueden encontrar en Base Enemiga. | Ocupar espacio en inventario.<br>Desaparecer de escenario.<br>Retrasa el tiempo una hora. |
| Lámpara de vacío | Deshace automáticamente la Niebla Eterna.<br>Se pueden encontrar en Base Enemiga. | Desaparecer de escenario.<br>Deshace la Niebla Eterna (maleficio). |
| Cencerro | Emite sonido al colisionar con algo.<br>Se pueden encontrar en Base Enemiga. | Ocupar espacio en inventario.<br>Desaparecer de escenario.<br>Emitir sonido al ser lanzado. |
| Campana extractora | Absorbe olor de la comida.<br>Se encuentra en Base Enemiga. | Activar/desactivar.<br>Absorber olor. |
| Cocina | Produce olor.<br>Se encuentra en Base Enemiga. | Activar/desactivar.<br>Crear olor. |
| Termostato | Aumenta o disminuye.<br>Se encuentran en Bases Enemigas. | Aumentar/disminuir temperatura. |

*Tabla D: Explicación de las acciones de los recursos de Niflheim.*

| **ACCIONES DE LOS RECURSOS DE JÖTTUNHEIM** ***(desarrollado por Irene Pérez)*** | | |
|---|---|---|
| **Mecánica** | **Características** | **Acciones** |
| Golem de Piedra | Patrullar.<br>Ataques débiles.<br>Resistencia alta<br>Se pueden encontrar en la Mazmorra Congelada | Moverse<br>Ataque<br>Perder vida<br>Matar<br>Morir |
| Golem de Hielo | Patrullar<br>Ataques que congelan.<br>Resistencia baja.<br>Se pueden encontrar en la Mazmorra Congelada. | Moverse<br>Ataque<br>Defenderse<br>Perder vida<br>Matar<br>Morir |
| Udgard | Gran poder de ataque<br>Gran resistencia, excepto a ataques de fuego<br>Se puede encontrar en la Mazmorra Congelada | Moverse<br>Atacar<br>Perder vida<br>Matar<br>Morir |
| Gigantes | Son NPC básicos que viven en Jöttunheim<br>Conversar.<br>Se encuentra en el poblado antes de la Mazmorra Congelada | Conversar |
| Herja / Tauro | Valquiria atrapada en este mundo. | Conservar |

| | | |
|---|---|---|
| | Conservar.<br>Se encuentra en la Mazmorra Congelada. | Añadir al grupo<br>Una vez en el grupo, usar sus habilidades |
| Poción de maná | Aumenta maná al usarse.<br>Se pueden encontrar en Jöttunheim. Y en la Mazmorra Congelada. | Ocupar espacio en inventario.<br>Desaparecer de escenario.<br>Fortalece magia. |
| Poción de vida | Aumenta vida al usarse.<br>Se pueden encontrar en Jöttunheim. Y en la Mazmorra Congelada. | Ocupar espacio en inventario.<br>Desaparecer de escenario.<br>Recupera vida. |
| Orbe Sable | Recupera toda la vida si vida = 0.<br>Se puede encontrar en Jöttunheim. Y en la Mazmorra Congelada. | Desaparecer de escenario.<br>Recupera toda la vida. |
| Reloj | Retrasa el tiempo una hora.<br>Se pueden encontrar en Jöttunheim. Y en la Mazmorra Congelada. | Ocupar espacio en inventario.<br>Desaparecer de escenario.<br>Retrasa el tiempo una hora. |
| Orbe Escudo | Crea un escudo alrededor del personaje por un tiempo limitado.<br>Se puede encontrar en todos los niveles. | Ocupar espacio en inventario.<br>Desaparecer de escenario.<br>Crear un escudo protector. |
| Orbe Magia | Permite usar magia sin gastar maná por un tiempo limitado.<br>Se puede encontrar en todos los niveles. | Ocupar espacio en inventario.<br>Desaparecer de escenario.<br>Permite no gastar maná |
| Llave de Hielo | Abre la puerta de la Mazmorra Congelada<br>Se consigue derrotando al guardián de la puerta | Ocupar espacio en el inventario.<br>Desaparecer del escenario.<br>Permitir el paso a la mazmorra. |

*Tabla E: Explicación de las acciones de los recursos de Jotunheim.*

| ACCIONES DE LOS RECURSOS DE SVARTALFHEIM *(Desarrollado por Analía Boix)* | | |
|---|---|---|
| **Mecánica** | **Características** | **Acciones** |
| Enanos Esclavos | Patrullar<br>Ataques lentos pero fuertes<br>No ven en la oscuridad<br>Llevan un farol<br>Les atrae la luz que no sea roja<br>Les afecta la luz roja<br>Se pueden encontrar en el mundo | Moverse<br>Ataque<br>Perder vida<br>Matar<br>Morir |
| Elfos Oscuros | Patrullar<br>Ataques rápidos y medio fuertes<br>Ven en la oscuridad<br>Les atrae la luz que no sea azul<br>Les afecta la luz azul<br>Se pueden encontrar en el mundo | Moverse<br>Ataque<br>Defenderse<br>Perder vida<br>Matar<br>Morir |
| Enanos | NPC básicos<br>Conversar<br>Se encuentran en determinadas zonas del escenario de la Gran Caverna | Conversar |
| Enanos Congelados en el | NPC básicos<br>Vuelven al tiempo actual mediante luz naranja | Conversar |

| | | |
|---|---|---|
| tiempo | Se encuentran en determinadas zonas del escenario de la Gran Caverna | |
| Farolillo | Efecto normal: ilumina dentro de un rango<br>Efecto mágico: depende de la valquiria<br>- Verde mar claro: congela elfos oscuros, puede hacer aparecer pistas en puntos concretos del escenario<br>- Rojo: convierte en piedra a los enanos enemigos, da pistas falsas en el laberinto<br>- Naranja: Devuelve al tiempo actual a los enanos congelados en el tiempo<br>- Azul: quita la protección mágica | Iluminar<br>Usar habilidades<br>Gastar maná<br>Conseguir pistas<br>Conseguir información |
| Skuld | Valquiria encerrada en el laberinto de la forja del mundo | Conservar<br>Añadir al grupo<br>Una vez en el grupo, usar sus habilidades |
| Poción de maná | Aumenta maná al usarse.<br>Se pueden encontrar en todos los niveles | Ocupar espacio en inventario.<br>Desaparecer de escenario.<br>Fortalece magia. |
| Poción de vida | Aumenta vida al usarse.<br>Se pueden encontrar en todos los niveles | Ocupar espacio en inventario.<br>Desaparecer de escenario.<br>Recupera vida. |
| Orbe Sable | Recupera toda la vida si vida = 0.<br>Se pueden encontrar en todos los niveles | Desaparecer de escenario.<br>Recupera toda la vida. |
| Reloj | Retrasa el tiempo una hora.<br>Se pueden encontrar en todos los niveles | Ocupar espacio en inventario.<br>Desaparecer de escenario.<br>Retrasa el tiempo una hora. |
| Cristales mágicos | 3 Cristales localizados en la Gran Caverna<br>1 lo lleva un elfo oscuro<br>1 lo encuentras sobre una caja<br>1 lo tiene un NPC | Desaparecer del escenario.<br>Permitir el paso a el laberinto |
| Llave del laberinto | Poder acceder a la sala central donde se encuentra Skuld<br>Se obtiene en una sala del laberinto derrotando a los enemigos | Desaparecer del escenario<br>Permitir entrada en la sala central |

*Tabla F: Explicación de las acciones de los recursos de Svartalfalheim.*

Las mecánicas para el resto de niveles serán similares, ya que se mantendrán constantes durante todo el juego y aunque la historia o los objetivos varíen, la forma de realizarlos será la misma.

# Controles

Serán iguales para todas las valquirias, sin contar la diferencia de habilidades. Los controles están pensados para que el jugador tenga un fácil acceso a todas las características del juego. Se jugará con un mando de consola, concretamente un mando de playstation 4:

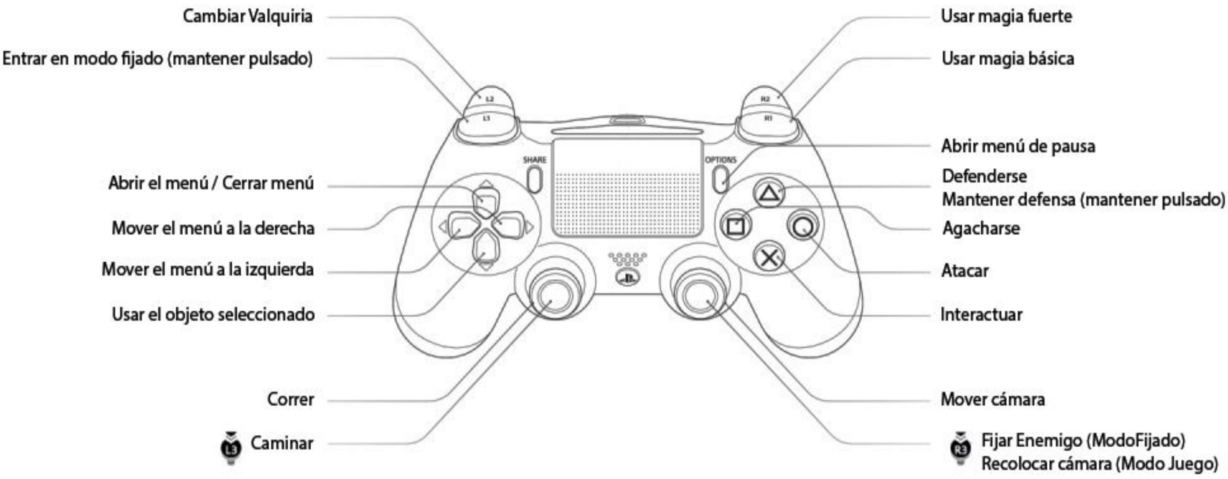
Cambiar Valquiria
Entrar en modo fijado (mantener pulsado)
Abrir el menú / Cerrar menú
Mover el menú a la derecha
Mover el menú a la izquierda
Usar el objeto seleccionado
Correr
L3
Caminar
Usar magia fuerte
Usar magia básica
Abrir menú de pausa
Defenderse
Mantener defensa (mantener pulsado)
Agacharse
Atacar
Interactuar
Mover cámara
R3
Fijar Enemigo (ModoFijado)
Recolocar cámara (Modo Juego)
L2
L1
R2
R1
SHARE
OPTIONS

*Figura 1: Explicación visual de los controles del juego.*

- **Joystick izquierdo**: mover al personaje controlable por el escenario, caminando. Moverse por los diferentes menús.
- **Joystick derecho:** controlar el movimiento de la cámara.
- **R1**: activación de la habilidad mágica básica de la valquiria, asociada al signo del zodiaco correspondiente. Ataque mágico débil.
- **R2:** activación de la habilidad mágica fuerte de la valquiria, única de cada una, asociada al poder alquímico.
- **L2:** sirve para cambiar de valquiria entre las disponibles.
- **Círculo:** ataque físico, dependerá del arma de elección de cada valquiria.
- **Cuadrado:** agacharse, modo sigilo.
- **X:** interacción con NPCs, objetos y/o elementos del escenario.
- **Triángulo:** defenderse.
- **Cruceta:** cruceta superior abre el inventario, las crucetas izquierda y derecha te permite moverte por él y la cruceta inferior te permite usar el objeto seleccionado.
- **Cruceta inferior:** activar desactivar farolillo
- **L1:** con farolillo activado activar la luz mágica

- **Options:** menú de pausa.
- **L3:** correr.
- **R3:** recolocar la cámara detrás del personaje.
- **L1**: entrar en el modo fijar enemigos.
- **R3 dentro de modo fijar:** fijar a un enemigo para dirigir los ataques a este.

# Sonido

El trabajo de sonido se está llevando a cabo conjuntamente con un compositor externo a la carrera estudiante del conservatorio. A continuación Víctor Ávila añadirá su punto de vista sobre el proceso de la creación y componentes del sonido:

La base musical y sonora de Walpurgis Night, ha sido diseñada para reflejar, el mundo en el que transcurre el juego, utilizando como base musical el elemento de mitología y magia y sobre todo la presencia de la protagonista, también en la banda sonora.

Por una parte, quería darle importancia al hecho de utilizar mitología nórdica como motor de la historia y que, auditivamente sea claramente definible. Es por ello que se han utilizado referencias armónicas y rítmicas de temas y danzas populares noruegas.

Se quería que la banda sonora, igual que la experiencia sonora, fuera dentro de las posibilidades, un elemento más de la historia y funcionará como un potenciador de las sensaciones que el juego transmitiese. Es por ese motivo que se utilizan elementos técnicos como la espacialización, o diferentes tipos de reverberación, dependiendo del escenario en el que transcurre la acción. Consiguiendo así mayor inmersión del jugador.

Se decidió trabajar como elemento de unión los diferentes temas la voz femenina, representando el canto de la protagonista, y hacer esta extensible en la mayor parte de los temas, dando una altura y timbre de voz específico a cada una de las valkirias.

En todo momento se da un ambiente de misterio o tensión, inclusive en las pantallas de guardado, consiguiendo que el jugador esté a la expectativa en todo momento y siempre quiera avanzar.

Se niega cualquier temporalidad o elemento que pueda mantener un pulso, haciendo una música incidental de lugar más que de acción.

En resumen, se ha compuesto una banda sonora, que cuente la historia a la par que el juego o las imágenes y que complemente a estas, ofreciendo una experiencia al jugador lo más inmersiva posible.