

# HYPODGEUM



**GAME DESIGN DOCUMENT**

LAMA | ONLINE GAME DESIGN 2018 - 2019



## Team Lama



**Andrea De Cosmo**

Game designer  
Game programmer

andrea.decosmo@studenti.unimi.it



**Andrea Carrarini**

Game designer  
Game programmer

andrea.carrarini@studenti.unimi.it



**Michele Maione**

Game designer  
Game programmer

michele.maione@studenti.unimi.it



**Loris Cerrato**

2D animator  
Graphic designer  
Service designer

vincenzoloris.cerrato@mail.polimi.it



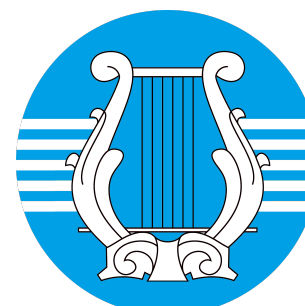
## Artists



**Alessandro Orlandi**

Music composer  
Music designer

alessandroorlandi1993@gmail.com



## Table of contents

<b>1 Changelog</b>	<b>5</b>
<b>2 Vision Statement</b>	<b>7</b>
2.1 Game genre	7
2.2 Look and feel	7
2.3 Game logline	7
2.4 Gameplay Synopsis	7
<b>3 Audience, Platform and Marketing</b>	<b>8</b>
3.1 Target Audience	8
3.1.1 Age and distribution	9
3.1.2 Geographical distribution	9
3.1.3 Personas	10
3.2 Platforms	12
3.3 Minimum system requirements	12
3.4 Recommended system requirements	12
3.5 Top performers	13
3.5.1 Crossout (2017)	13
3.5.2 H1Z1'S Autoroyale (2018)	13
3.5.3 Borderlands 2 (2012)	14
3.5.4 Rocket League (2015)	15
3.5.5 Fortnite (2017)	15
3.6 Feature comparison	16
3.7 Player-base estimation	17
3.8 Business model	19
<b>4 Legal Analysis</b>	<b>20</b>
<b>5 Gameplay</b>	<b>20</b>
5.1 Overview	20
5.2 Gameplay description	20
5.2.1 Gameplay special cases	21
5.2.1.1 Draw when time is up	21
5.2.1.2 Not enough players	21
5.2.1.3 Connection lost	21
5.2.2 Factions characteristics and abilities	21
5.2.2.1 Stats	22
5.2.2.2 Bullets and weapons	22
5.2.2.3 Special abilities	22
5.2.3 Reason vs Instinct	23
5.2.4 Traps	23
5.2.5 Mobs	23

5.2.6 Audience Hype	24
5.3 Controls	25
5.3.1 Driver	25
5.3.2 Shooter	25
5.4 Interfaces	26
5.4.1 Scenes	26
5.4.1.1 Match loop	26
5.4.1.2 Game starts	28
5.4.2 Title screen	29
5.4.3 Character selection	32
5.4.4 Matchmaking	32
5.4.5 Loading	32
5.4.6 Game HUD	32
5.5 Rules	33
5.6 Scoring and winning conditions	34
5.7 Modes and other features	34
<b>6 Game Characters</b>	<b>35</b>
6.1 Characters design	35
6.2 Playable characters	36
6.2.1 Eagles	36
6.2.2 Lions	37
6.2.3 Rhinos	37
6.2.4 Sharks	38
6.3 Non playable characters	39
6.3.1 Spider robot	39
6.3.2 Tank robot	39
6.3.3 Goliath	40
6.4 Size comparison	40
<b>7 Story</b>	<b>41</b>
7.1 Synopsis	41
7.2 Game context	41
7.3 Narrative devices	41
7.4 Storyboard	42
<b>8 The Game World</b>	<b>43</b>
<b>9 Level design</b>	<b>44</b>
9.1 Maps	44
9.1.1 Arena 1 - Coliseum	44
9.2 Prototype	44

10 Media	<b>45</b>
10.1 Music and sounds	45
10.1.1 Musics	45
10.1.2 Sounds	45
10.1.2.1 In game	45
10.1.2.2 In menu	45
10.2 Version control	45
10.2.1 Information	45
10.3 Paths and project structure	46
10.3.1 Project structure	46
10.4 Export formats	47
10.5 Media list	47
10.6 Additional reference images	49
10.6.1 Characters	49
10.6.2 Cars	49
10.6.3 Enemies	50
10.6.4 Traps	50
10.6.5 Instinct and Reason coins / Power-ups	50
10.6.6 Weapons	51
10.6.7 Settings	52
10.6.8 Arena props	52
10.6.9 Other resources	52

## 1 Changelog

User	Date	Description
De Cosmo, Carrarini, Cerrato	22/03/2019	Game Concept
Maione	01/04/2019	Added section Legal analysis
Maione	03/04/2019	Added section Media list
Carrarini	05/04/2019	Added section Gameplay
Maione	06/04/2019	Added section Characters design
De Cosmo	07/04/2019	Added sections: <ul style="list-style-type: none"> <li>- Vision Statement</li> <li>- Game World</li> </ul>
Carrarini	08/04/2019	Updated section Gameplay
Cerrato	09/04/2019	Added sections: <ul style="list-style-type: none"> <li>- Audience</li> <li>- Platform</li> <li>- Marketing</li> </ul>
Maione	09/04/2019	Updated section Characters design
Cerrato	14/04/2019	Added section Interfaces
De Cosmo	06/05/2019	Added section Gameplay special cases Updated sections: <ul style="list-style-type: none"> <li>- Target audience</li> <li>- Top performers</li> <li>- Feature comparison</li> </ul>
Carrarini, Maione, De Cosmo, Cerrato	10/05/2019	Added sections: <ul style="list-style-type: none"> <li>- Level design</li> <li>- Story</li> </ul>
De Cosmo	13/05/2019	Updated sections: <ul style="list-style-type: none"> <li>- Reason vs Instinct</li> <li>- Gameplay description</li> </ul>
Maione	18/05/2019	Added images (screenshots and renderings)
De Cosmo, Maione	03/06/2019	Updated section Feature comparison Added section Size comparison
Maione	04/06/2019	Added section Media
De Cosmo	05/06/2019	Updated section Vision statement

De Cosmo	06/06/2019	Added sections: <ul style="list-style-type: none"> <li>- Player-base estimation</li> <li>- Business model</li> </ul> Updated sections: <ul style="list-style-type: none"> <li>- Legal analysis</li> <li>- Audience, Platform and marketing</li> </ul>
Carrarini	07/06/2019	Updated section Gameplay: <ul style="list-style-type: none"> <li>- Reason vs Instinct</li> <li>- Traps</li> <li>- Mobs</li> <li>- Matchmaking</li> </ul>
Maione	08/06/2019	Added section Level design
Carrarini, Cerrato	08/06/2019	Updated section Gameplay: <ul style="list-style-type: none"> <li>- Audience Hype</li> <li>- Interfaces:             <ul style="list-style-type: none"> <li>- Flowcharts</li> <li>- Wireframes</li> </ul> </li> </ul>
Carrarini, Maione, Cerrato	09/06/2019	Updated section Media: <ul style="list-style-type: none"> <li>- Music</li> <li>- Sounds</li> <li>- Media list</li> </ul>
Cerrato, Carrarini, Maione, De Cosmo	10/06/2019	Added reference images Updated section Story: <ul style="list-style-type: none"> <li>- Storyboard</li> </ul>

## 2 Vision Statement

---

**Hypogeum** is a **shooting and racing game**, where **four teams of two players** face each other in an **enormous arena** (called, in fact, Hypogeum), trying to **defeat** their **enemies** and be the **last standing**. Each team belongs to **one of the four existing factions** and is **composed of two players** from the **same species**, that represent the **champions**. The battles are fought on **cars**, with one player as **driver** and one as **shooter**, each of them **equipped** with a **faction-specific weapon**.

The teams, in addition to the other players, have to pay attention to the **surrounding environment**: different **traps** and **NPCs** could **interfere** with the battle and **increase the difficulty** of the match. However, the heroes are **not alone**: each team has its **supporters in the audience** and, through **thrilling actions**, can **increase their excitement** up to push them to help their favourites with useful **power-ups**.

In order to be the **last species** in the arena, the **cooperation** between the team members is **essential**: when the battle begins, they are alone against the opponents and can **rely only on each other** and on their **nature**. Will their **instinct** prevail? Or will the **reason** command their actions? Only the most **brave** and **sly** players can lead their species to the **victory** and **become the champions**, gaining the **supremacy** on the others.

**Players' statistics** and **battles' results** are tracked through a **seasonal leaderboard**, in order to establish which **species** is the **best** and which **heroes** are the **bravest**.

### 2.1 Game genre

Hypogeum has **two coexisting natures**: it can be played either as a **driving game** or as a **third person shooter game**, based on player's choice. For each match, users have to **select** if they want to **be** the **driver** or the **shooter** of their team. This offers the chance to have **always different battles** and **allows** everyone to **play** the game **as he prefers**.

### 2.2 Look and feel

The game has a **cartoonish graphics** and represents a **futuristic world** where the animals take the control of **human technologies** and start a **war** to gain the **supremacy**. The main characters represent the **champions** of **four species** of **evolved humanoid animals**, **Eagles**, **Lions**, **Rhinos** and **Sharks**, able to drive cars and shoot using different weapons, depending on their faction. Since this evolutionary process is **not complete**, the characters have to face an **inner conflict** between their **instinct** and **reason**.

### 2.3 Game logline

Choose your **species** and face your opponents: are you **brave** and **skilled** enough to gain the **supremacy**? Jump on your **car** and **defeat** your **enemies**! **Show everyone what you are capable of!**

### 2.4 Gameplay Synopsis

The players **choose** one of the four animal species (their **favourite** one, the one embodying their same **ideals** or **way of thinking**, etc.) and battle after battle try to become the **heroes** of the faction, obtaining **special in-game rewards**.

The matches are set in an **arena** with a **300 meters diameter** and an **80 meters height**. There, **four teams of two players** face each other and try to **defeat** their opponents, in order to be the **last team standing**.

Each team represents an **animal species** and is made up of **two players on the same car**, with different **roles** and **tasks**:

- The **driver**:
  - **drives the car**, being aware of the environment (**obstacles**, **enemies** and **traps** in the arena);
  - **avoids** the enemy teams' **shots** and tries to **put** his **teammate** in the best possible conditions to fire;



- **activates** his **ultimate ability**, that depends on the chosen species;
- **uses** the **ramps** and **performs tricks** to **increase** the **audience's hype** for the match.
- The **shooter**:
  - **shoots** the enemies with his **species-specific weapon**;
  - **increases** the **audience's hype** when **damaging** other players;
  - **activates** his **ultimate ability**, that depends on the chosen species;
  - **shoots** to the **traps** to activate their effects, trying to damage the enemies.
- **Both**:
  - try to **collect** the **power-ups** dropped by the audience (driving toward or shooting to them) and **use** them;
  - **decide** if collect the **instinct coin** or the **reason coin**, starting a **challenge** whose **reward** affects the **team statistics** for the whole match;
  - **face** the **NPCs**, trying to **destroy** them shooting or running over, depending on their characteristics.

When the battle begins, each team car spawns in a **different area** of the arena.

Since the **characters are evolving**, they have to **face** an **inner conflict between their instinct and their reason**. In fact, from the very beginning the team has to **take a decision**: **boost** the **instinctive abilities** or the **reasoning** ones? Maybe **none** of them. The choice depends on the faction's **statistics** and on which **playstyle** players decided to adopt. The decision of the **match strategy** has an important role since the first phases and can lead to **very different outcomes!**

To worsen the situation, during the match, several elements can make the **environment hostile**, from **traps** to **NPCs** and **random events** that sometimes may occur, but the **audience** can **help** the teams: thanks to **thrilling actions**, the **supporters' hype can increase**, up to the point that someone on the bleachers will give a **power-up** to the heroes of his species.

For the players, the **cooperation** between the **driver** and the **shooter** becomes a fundamental element: the **only way to survive** in the arena and to reach the objective is **helping each other, joining the forces** against the enemies and the environment.

At the **end of the match**, the game assigns a **score** to **each team member**, depending on the battle's result. This is then **added** to their **personal score** in their **species leaderboard** and to the **species score** in the **overall leaderboard** among the factions.

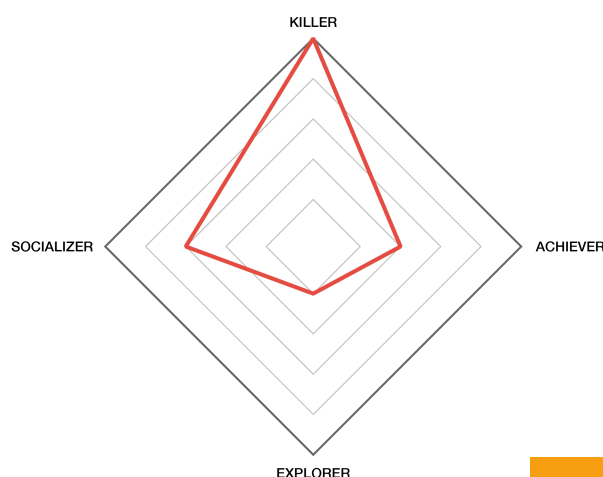
At the **end of each season**, the **best species** is decreed, and the **bravest players** are selected among its members. They will receive **special in-game rewards** to celebrate their **achievements** and **abilities**: they **stood out** from the others for **skills** and **courage** and became the **heroes** of the winning species.

## 3 Audience, Platform and Marketing

### 3.1 Target Audience

The game is designed primarily for **killer gamers**, that are players who enjoy **competition**, want to **demonstrate** their **skill** and **mastery** on the game and **love to win**.

For these reasons, with Hypogeum we are developing a **stimulating competition** on many aspects, not just limited to a single game. Most of the **mechanics** described in the **gameplay** section (**audience participation**, **specie rankings**, **objectives**, **bosses**, etc.) are designed to provide the players **sub-goals** that can give them a sense of **accomplishment** when achieved. We define as a secondary gamer kind the **socializers**. Due to



Hypogeum's **co-op nature**, this type of players can enjoy **playing with friends** or **finding new ones** though **matchmaking**.

According to our estimation, our game should **match** the players types as follows:

- **Killer - 100%**: The whole game is designed around the concept of “**domination**”, from the lore to the gameplay. The battles are set in an **arena** in order to provide the player the feeling of being at **audience's centre of attention**. In this way, they are **motivated** to fight, trying to **survive** and to **show to be the best**, as **ancient gladiators** did in the past. Due to the **co-op nature** and **complexity** of the possible **in-game events**, we foresee Hypogeum as an “**easy to access - hard to master**” game, where the **most skilled** players will **prevail** on the others.
- **Achiever - 40%**: The game is **not** designed around **collectibles** or **similar** features, but we imagine the **species ranking** as an **appealing factor** for this kind of player.
- **Explorer - 20%**: Since the **only environment** developed is the **arena** and there is **not** an **external world**, there is **no** real possibility to **explore**. Even though the setting is pretty big and moving around can make the difference during the battles, we do **not** consider this as a feature that can **satisfy** the **explorers**.
- **Socializer - 75%**: The game **cannot** be played in **single-player** mode. The **matchmaking** is in charge of **setting up** the **teams**, if these have not **already** been **assembled**. This implies that each player **needs** a **partner** to **join** the game. Moreover, the **species** are basically **macro-guilds** and can promote **social aggregation** and **socialization**. These features make the game interesting also for **socializers**.

### 3.1.1 Age and distribution

According to our estimation, we expect a **target audience younger** than the average, but that still covers the main **demographic classifications**.

Analyzing data from different sources, we foresee the following **distribution**:

Age	10-14	15-19	20-23	24-27	28-30	30+
Distribution	19%	31%	26%	14%	7%	3%

By this, we can esteem an **average age of 18 years** for our players.

Despite usually shooting and racing games **audience** is **mainly** made up of **males**, we foresee that Hypogeum can be **appealing also for females**, since it is **non violent** and has a **cartoonish graphics style**.

Fortnite based part of its success on this factor, resulting **attractive** for **girls** and **kids** thanks to its **comics style** and the **funny gags**. The **percentage** of Fortnite's male and female players in 2018 was of **72-28** (based on data provided by [Statista](#)). Even though this represents an **exceptional case** and must be taken with caution, it can be a **good case study**.

Considering what we have said up to now and that the **classical** players **male-female distribution** in **racing** and **shooting** games is approximately **93-7** (according to [QuanticFoundry](#)), we esteem having a **partition** around **80-20** in Hypogeum.

### 3.1.2 Geographical distribution

For what concerns the **geographical distribution**, there is **no reason** to think that we will encounter issues in particular areas or countries.

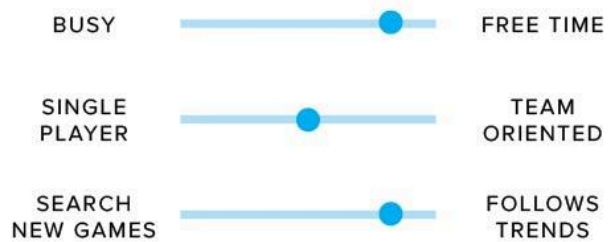
The only **problem** we can foresee is related to **religious motivations** about the **sacrality** of certain **type of animals** in some **cultures**, but up to now we have **no evidence** to face impediments connected to the chosen species for the game. For more information about **animal worshipness** see [Wikipedia](#).

3.1.3 Personas

**THE COMPETITIVE KID**



*“Let’s smash these noobs bro, they don’t stand a single chance against us!”*



**SIMONE**

15 YEARS OLD  
MILAN, ITALY

---

Is quite expert in gaming  
Owns many different consoles  
Plays with his two brothers

---

Spends around 15 hours a week playing on different platforms  
Can spend some money in games

**ABOUT**

Simone is a kid who attends the second year of high school; he is a mid-core gamer, who follows some gaming channels on Youtube and some streamers on Twitch. He has two younger brothers who also play games with him, and they usually play with their friends the games that become the trend of the moment.

**MOTIVATIONS**

- He wants to imitate his favourite streamer, who tried the game and is very good at it.
- He is very competitive and wants a game in which he can constantly show his skills, with low luck involved.

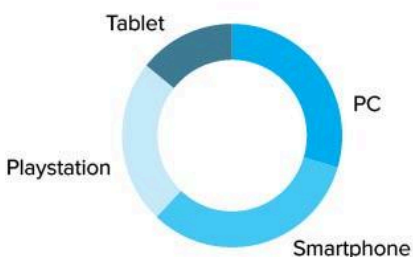
**CHALLENGES**

Achieve tangible results in the game before his friends and brothers.

**NEEDS**

A game which is simple to approach but hard to master.

**DEVICES USED**



**CHANNELS USED**

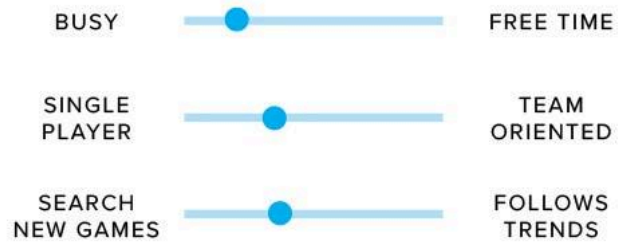


The competitive kid.

**THE NERDY STUDENT**



*“Let’s have some fun, I want to kick some asses before going to bed”*



**SOPHIE**

23 YEARS OLD  
LONDON, ENGLAND

---

Has played many games as a teen  
Owns only a computer  
Enjoys playing with her boyfriend

---

Spends 8 hours a week playing  
Wants exciting experience in short time, usually at night

**ABOUT**

Sophie is a girl who attends her fourth year in university. She has always enjoyed video games and have many friends who play with her. Her boyfriend is also a gamer and sometimes they find new games to play together. She would like to play more but the university commitments don't allow her to.

**MOTIVATIONS**

- Try a new game that was suggested in her favourite review site
- She wants a game that she can play with a partner
- Discuss of the game with friends to improve and tell about fun games

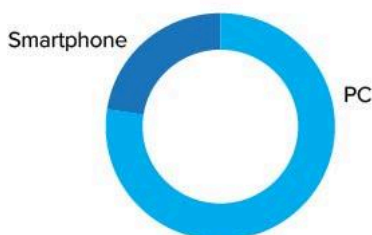
**CHALLENGES**

Find her favourite class and master it soon, to win more games

**NEEDS**

A game with short but exciting matches that she can play at night

**DEVICES USED**



The nerdy student.

**CHANNELS USED**



### 3.2 Platforms

Hypogeum is developed to be played by Microsoft Windows, MacOS and Linux users through the **Steam** client, so it is designed as a **PC video game**.

The first reason of this choice is connected with the **game mechanics**: the nature of input devices such as **mouse** and **keyboard** allows the users to have **greater accuracy** on the **characters movements** while playing the game, therefore granting **better performances** and **game experiences**.

Since the game is designed for **middlecore gamers** and not for hardcore ones, this platform is particularly suitable to expand to a **wider player-base in short time**. If the game turns out to be **successful**, we could consider a possible release of Hypogeum also on **consoles** like **PlayStation**, **Xbox** and **Nintendo Switch**.

We **excluded** the release on **mobile gaming platforms** due to a **weaker Internet connection**, **more difficult control management** on touch screens and the **average duration of the game** (around 10 minutes), that is too much for these devices. All these factors are **critical points** and will make the **experience less enjoyable** and **entertaining**.

### 3.3 Minimum system requirements

To **avoid reducing** our **market share**, we designed the game such that it has **minimum system requirements** in order to make it playable on almost any computer. These requirements are:

Processor	Dual-core @ 2.4 GHz
Memory	2 GB RAM
Graphics	ATI Radeon HD 4850 or NVIDIA GTX 260
Storage	150 MB available space
Sound Card	DirectX-compatible sound card
Connection	Broadband Internet connection
Network	ADSL 10 Mbps
Input Devices	Mouse and keyboard are required

### 3.4 Recommended system requirements

However, we **recommend** the following **system requirements** in order to have an improved game experience:

Processor	Quad-core @ 2.5+ GHz
Memory	4 GB RAM
Graphics	ATI Radeon HD 7950 or NVIDIA GTX 660
Storage	150 MB available space
Sound Card	DirectX-compatible sound card
Connection	Broadband Internet connection
Network	ADSL 20 Mbps

Input Devices

Mouse and keyboard are required

### 3.5 Top performers

We performed an **analysis** of our game's **major competitors** in order to evaluate their **main features**, **selling points** and **statistics**, such as the number of players or their market share.

#### 3.5.1 Crossout (2017)

**Crossout** is a **post-apocalyptic MMO-action game** for **PC** and **consoles** developed by Targem Games and is published by Gaijin Entertainment.

The game allows players to **construct** their own **post-apocalyptic vehicles** to be used in **PvP** engagements with real players and **PvE** missions involving **AI-participants**.

The battles are in **real-time** and involve **two teams** of **players** and **AI agents**. To win, a team must **eliminate** the **enemy team**, **capture base** or perform **other tasks** depending on the game mode.

This game also provides a system of **7 factions**, each with its own gameplay features and story.



#### 3.5.2 H1Z1'S Autoroyale (2018)

**Autoroyale** is an **expansion** of the famous battle royale **H1Z1**, developed by Daybreak Game Company.

The gameplay follows the same **logic** of **other battle royales**, but the players can only **move** and **shoot** through their cars.

When the game starts, the players are inside a **box** placed in an area of the map. When this box opens, players are free to **move** and can try to **get a vehicle**. Each car is controlled by a **team** made of **four players**, **one driver** and **three shooters**. It is possible to **drive over power-ups**, **activate** them and **shooting** to some **special boxes**, acquiring **new weapons** and **equipment**. The players are forced to **get closer** since they have to stay **inside** a circle that becomes **smaller** time after time, otherwise they **get damaged up to die**. The **last team standing** is the **winner** of the match.



### 3.5.3 Borderlands 2 (2012)

**Borderlands 2** is an **action role-playing first-person shooter** game developed by Gearbox Software and published by 2K Games. The gameplay is based on the achievement of **several missions** and the **collection of randomly generated loot**, such as **weapons, shields, skins**, and other **items**, with various **rarities, statistics**, and **elemental effects**. **Four playable character classes** are available in the base game, each with its own **unique abilities and skill trees**.

Borderlands 2 was **one of the best-selling** games of 2012 and has become the best-selling game in 2K Games history, with **8.5 million** copies sold in February 2014.

We consider Borderlands as a competitor, due to its later added **cooperative mode**, where players can **drive vehicles and shoot**, even if it is not based on matches and is an **open world**.



### 3.5.4 Rocket League (2015)

**Rocket League** is a **vehicular soccer** video game developed and published by Psyonix. The game is based on controlling a **rocket-powered car** and use it to **hit a ball** towards the other team's **goal area** to score, resembling a **soccer game**.

Players' cars have the ability to **jump** to **hit** the ball while in **mid-air**. The players can also pick up a **speed boost** by **passing** over **marked spaces** on the field, enabling them to **quickly cross the field**, use the **added momentum** to hit the ball, or run into another player's car to **destroy** it. Matches can be played from between **one-on-one up to four-on-four** players, as well as **casual** and **ranked**.

Rocket league is a **competitor** due to the **elements** it has **in common** with our game: it is played in an **arena** with cars, requires **good coordination** in **driving** and **among** the **team members** and periodically provides **in-match power-ups**.



### 3.5.5 Fortnite (2017)

Fortnite is an **online video game** developed by Epic Games. The game has **three distinct game modes** that shares the **same general gameplay** and **game engine**.

**Fortnite Save the World** is a **cooperative shooter-survival** game for **up to four players** that have to **fight zombie-like creatures**, while **defending objects** through the **fortifications** they can build.

**Fortnite Battle Royale** is a **free-to-play player-vs-player battle royale** where **up to 100 players** fight until **one** of them is the **last one standing**. Weaponless players airdrop from a **Battle Bus** that crosses the map and, when land, they try to **survive** and **kill other players**, while the **map shrinks** down, time after time.

In **Fortnite Creative**, that is a **sandbox game** mode, the players are free to **create** their own **worlds**, **battle arenas**, **race courses**, **challenges** and so on. In the **first two modes**, players use a **pickaxe** to knock down existing structures on the map and **collect** basic **resources** that they use **to build fortifications** such as walls, floors or stairs, that can also be edited adding doors or windows, etc. Depending on the material used, these items can have **different durability properties** that can change if they are updated with stronger variants using more materials.

**Fortnite Battle Royale** is a resounding success, involving more than **125 million player** in less than a year and earning **hundreds of millions of dollars per month**, up to become a cultural phenomenon. The monetization is



done through **V-Bucks**, that are the **in-game currency** buyable with real-world funds or earnable completing missions or achievements, used to buy pinatas containing random items.

We consider Fortnite as a competitor since recently Epic Games started a **timed event** (in April) called **Air Royale** during which **teams** of players face each other to gain **exclusive rewards**. One member of the team plays as **plane pilot** so **drives** the aircraft and uses the **on-board weapons**, whereas the other is the **passenger** and uses his **personal weapons** to hit the enemies.



### 3.6 Feature comparison

	Crossout	H1Z1 Autoroyale	Borderlands 2	Rocket league	Fortnite	Hypogeum
Co-Op (on same vehicle)	No	Yes	Yes	No	Yes (limited to an event)	Yes
Real time coordination	No	No	Yes	No	Yes (limited to an event)	Yes
Arena	No	No	No	Yes	No	Yes
Different classes	Yes	No	No	No	Yes	Yes
Instinct vs Reason (affects statistics)	No	No	No	No	No	Yes
In-match objectives	No	Yes	No	No	No (they are in-game or connected to events)	Yes
Neutral enemies	No	No	Yes	No	No	Yes
Factions	Yes	No	No	No	No	Yes

Audience hype	No	No	No	No	No	Yes
Off-match car customization	Yes	No	No	Yes	No	No
More game modes	Last-standing	Last-standing	PvE	Scoring goals	Last-standing, Sandbox, Cooperative Survival Shooter	Last-standing
Graphic style	War	Post apocalyptic	Semi realistic 2.5D	Cartoonish	Cartoonish	Cartoonish
Platforms	PC, Xbox, PS4	PC, PS4	PS3, Xbox, PC, macOS, Linux, PS Vita, PS4	PS4, Nintendo Switch, Xbox, PC, macOS, Linux	PC, PS4, Nintendo Switch, Xbox One, macOS, iOS, Android	PC

As can be seen, there are **several features** that differentiate our game from the competitors. The first one is a game core mechanic: the **cooperative mode**. Hypogeum relies on **players' collaboration** more than other games do: the **whole match**, the **actions performed** and their **results** are strictly depending on the **team's synergy**.

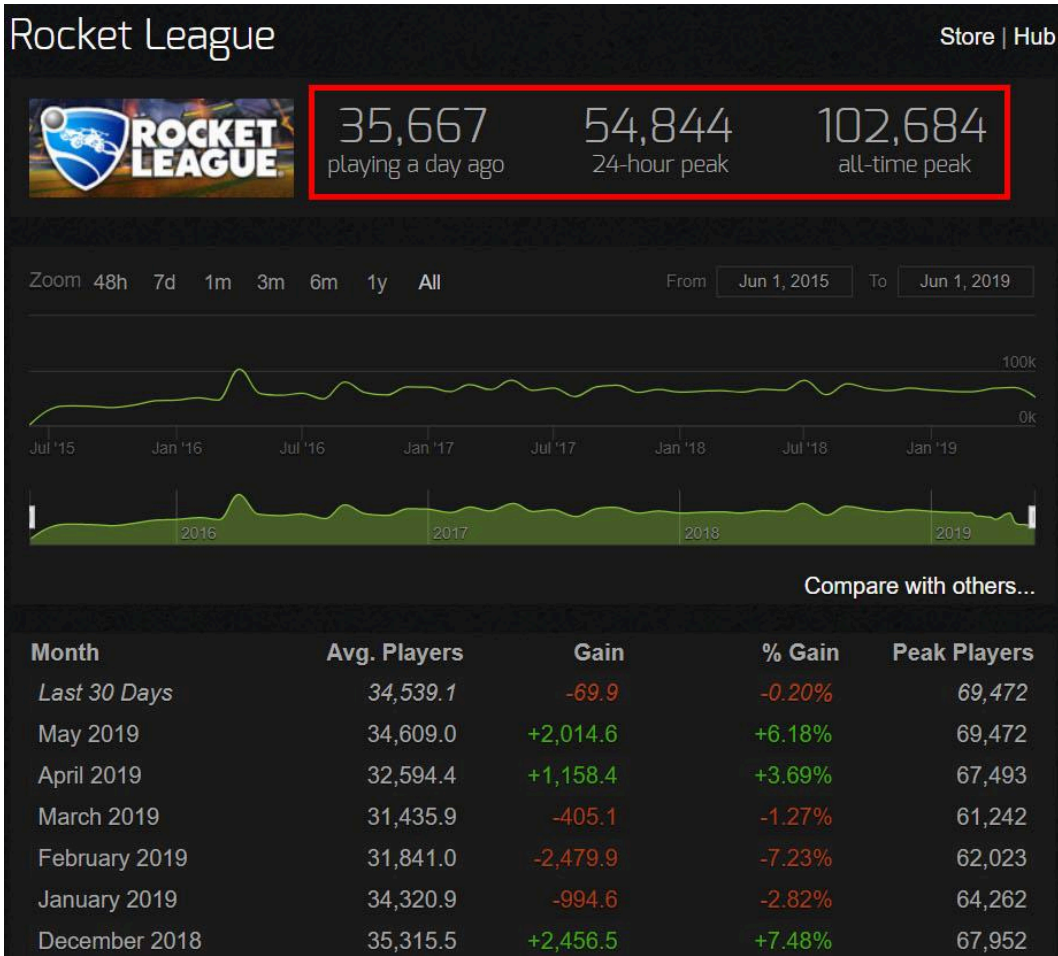
A **fundamental characteristic** of the game is the **inner conflict** of the characters between their **instinct** and their **reason**. This duality gives birth to the possibility of favouring **one side** of the spectre **or another**, through the **team choices** reflected in specific **in-game objectives**. If players so desire, they can **incline** their **behaviour** towards a more **aggressive**, a more **strategic** or a **neutral** playstyle. [5.2.3 Reason vs Instinct](#) better describes this feature.

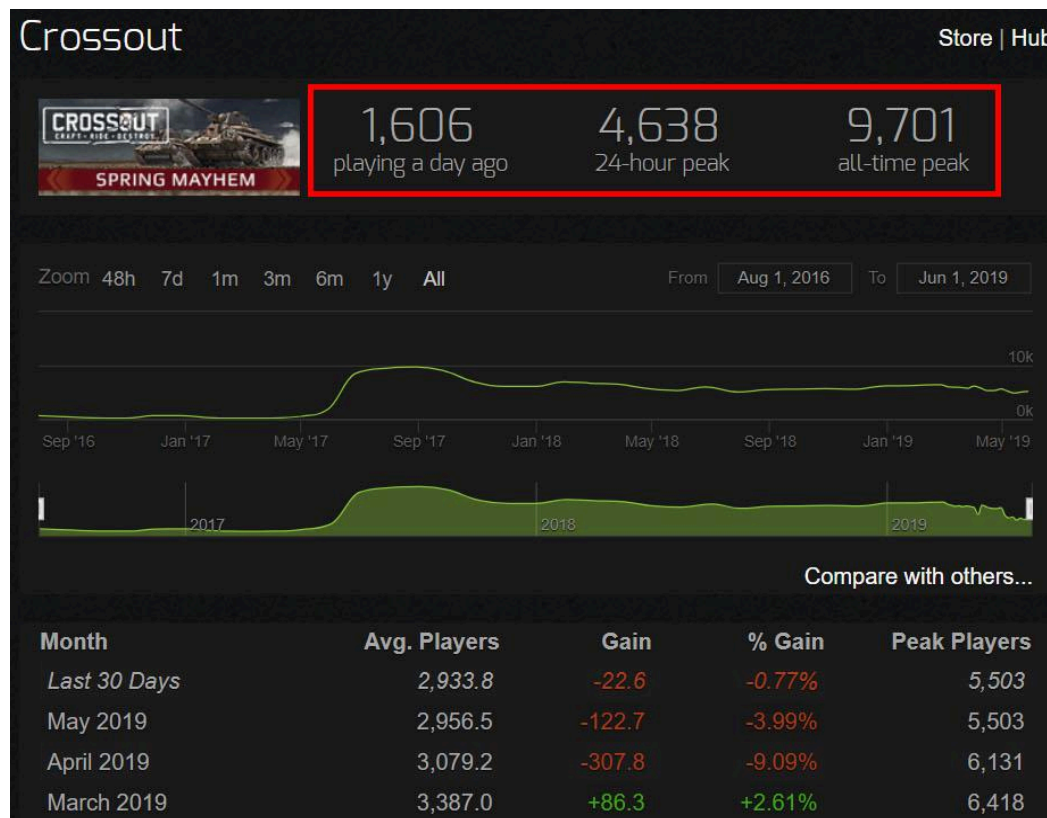
Differently from our competitors, we **emphasize** a lot the **species factions system**, up to the point that it **characterizes** some of the **game mechanics**. See [6 Game Characters](#) for more detailed information.

Another important feature is the **audience hype mechanic**, that does not exist in none of the analyzed competitors. Performing **stylish actions**, teams can increase the audience hype and, once it reaches the apex, get **special power-ups**. For more information, see [5.2.6 Audience Hype](#).

### 3.7 Player-base estimation

Analyzing the **data** provided by **SteamChart** about **3** of our **available on Steam main competitors** (Rocket League, Borderlands 2 and Crossout), it has been possible to make some **estimations** about our **player-base dimensions**. It is clear that it is **not possible** to have the same number of players of **Rocket League**, since it is one of the **most successful** games in the recent years, or of **Borderlands 2**, another pretty **popular game**, but we expect to have **at least** the **same** number of users of the competitor with the **lower player-base dimension**, Crossout. Starting from these data, we foresee to have on **average 130,000 players per month**, that means around **4,000 players per day on average**.





### 3.8 Business model

We decided for a **freemium business model**: the game will be released as a **free-to-play** game on **Steam** and will have an **in-game store** where users can **purchase season passes** and **customize** their characters with **new skins, weapons and cars**, through a **microtransactions system**.

In the **free-to-play model**, the most important factors are the number of players **continuously engaged** and how many **spending opportunities** the game offers. We chose this business model because it has two strong advantages:

- **more people** will try the game since it is **free**;
- **revenues** will likely be **more** than a traditional game, since **different players** can spend **different amounts of money**, depending on their **engagement** and **preferences**.

According to several researches (see [VentureBeat](#) and [Vox](#) for more details), the **majority** of players plays for **free** and **few pay** money, so a very tiny **minority**, called **whales**, **pays the majority of the income**. It has been esteemed that **up to 50%** of revenue comes from **0.15%** of the players, called **white whales**.

Hypogeum is designed with **season-based mechanics**, so all the game **events** are **time-constrained** to specific periods, such as the corresponding **rewards**. We will also release **four major updates** to improve players' **game experience** and **involvement**. These will **add more in-game elements, new features** and **personalization items**. In this way, we can **keep our players' interest** in the game, **reducing the abandonment rate**, and **lure newer ones**.

## 4 Legal Analysis

---

The **Hypogeum** name is free from copyright.

The **prototype** is implemented in **Unity**, with the **Personal Edition** license.

Most of the **resources** and **assets** used in the **game prototype** are available with a **free license**, whereas some assets might be **purchased** from the **Unity Asset Store**.

All the **digital contents** included in the **final game** will be **designed** and **created** by the **development team**, in **collaboration** with **graphic and music artists**.

**External services** will be purchased from **third party companies**.

**PEGI 7**: no bad language, violence in a not realistic context, online gameplay.

## 5 Gameplay

---

### 5.1 Overview

Each player can choose **his species** among the **four** available ones: **Eagles, Lions, Rhinos** and **Sharks**.

In each match, a **battle** among **four teams** made of **two players** of the **same species** takes place. The members of the couple have **two different roles**: one is the **driver**, whereas the other is the **shooter**. The two players have to **collaborate** to **win** the match and **gain points** for **themselves** and their **faction**.

The objective of the battle is **defeat** all the **enemy teams**, destroying their cars, and be the **last standing**.

In the arena it is also possible to **face mobs**, **run into traps**, **perform jumps** and **increase audience hype**... **avoid hazards** and **dangers**, **defeat** the **enemies** and **win** the battle for the **glory** of the species!

### 5.2 Gameplay description

When the **matchmaking** ends and the **four teams** are formed (for more details see section [5.4.4 Matchmaking](#)) the match begins with the teams' **cars** in different **spawn points** of the arena.

From that moment on, the **driver** is **free** to move in the map: he can **perform jumps**, **collect power-ups**, **try to hit** other teams with his car, **choose** the **Instinct** or the **Reason coin** and **run over AI mobs**. The **driving ability** is the key to **avoid** all the **hazards** and **dangers** in the arena (see section [5.2.4 Traps](#) and [5.2.5 Mobs](#)) and put the shooter in the **best possible conditions** to **hit enemy teams** and knock them out of the game, getting rid of them. Moreover, the driver has to pay attention to **bumps**: hit a **mob** will **damage** only **this last one**, whereas a crash with **other players** will **damage both** but depending on their **resistance statistics**. Bumping into **walls** does **not damage** the car.

The shooter's main aim is to use his **species-specific weapon** to **fire** both **enemy teams** and **AI mobs** but can also shoot to **Instinct** and **Reason coins** or to the **power-ups** to collect them and **activate the traps**. Shooter's **aiming skill** is then fundamental to **defeat** the enemies, follow the chosen **strategy** and lead the team to **victory**.

For each team, both the **driver** and the **shooter** can also activate their **species-specific special ability** (for more information see Section [5.2.2.3 Special abilities](#)) in order to deal with difficult and dangerous situations, get out of trouble or cause more damage and defeat the opponents. During the game these abilities **recharge with time** or when the team **destroys mobs** or **other players**. Moreover, different species have **different car** and **weapon statistics**, each with its strengths and weaknesses (see Sections [5.2.2.1 Stats](#) and [5.2.2.2 Weapon and bullet types](#)).

The **audience's entertainment level** is represented by the **hype**: **spectacular jumps**, **tricks** and **shots** will increase the engagement up to push the team supporters to throw **power-ups** in the arena to **help** their species' champions in the battle (for more information see Section [5.2.6 Audience Hype](#)).

At the beginning of the match, each team can see **two different coins**: the **Instinct** one and the **Reason** one. These coins represent the characters' **inner conflict** between their **evolved** and **animal nature**. The couple has then to take a **choice**: let the **instinct** prevail, follow the new **rational** side or stay **neutral**. When the team picks up a coin (driving through or shooting to it), the other one disappears and a **task** begins: if it will be **completed**, the species gets a **boost** to the statistics of the correspondingly nature (see Section [5.2.3 Reason vs Instinct](#) for more details).

The game **lasts 15 minutes** and ends when only **one team remains**.

What happens when **time is up** and there are **two or more teams alive** is discussed in Section [5.2.1.1 Draw when time is up](#). Other problems that may occur are the case in which the **minimum number** of players is **not reached** or when one or more **players lose the connection**, described respectively in Section [5.2.1.2 Not enough players](#) and [5.2.1.3 Connection lost](#).

## 5.2.1 Gameplay special cases

In the gameplay, three main special cases may occur and therefore need to be discussed:

- **draw when time is up**;
- **not enough players**;
- **connection lost**.

### 5.2.1.1 Draw when time is up

Since each match lasts 15 minutes, when the time is up the remaining team with **more health** is the winner. In case of a tie, we add **2 extra minutes** to the match time during which the squads continue their battle, trying to defeat their opponents or inflict the most possible damage. At the end of the extra time, we check again the **winning conditions**: if only one team **survived it is the winner**, otherwise the one with **more health wins** the match; if these conditions are **not satisfied**, the match **ends with a draw** and the **players tie**.

### 5.2.1.2 Not enough players

Sometimes, the matchmaking may not be able to find the 8 players required to start a match. In these cases, **after 2 minutes** the player can choose if join a **smaller lobby** of **4 or 6 players** and therefore play a match with respectively two or three teams, instead of four.

### 5.2.1.3 Connection lost

The connection lost case can be divided in **two sub-cases**: the **first** one concerns the **player that loses the connection**, whereas the **second** one concerns **his teammate**.

The player that has a connection lost is **kicked out** from the match and **cannot rejoin it**. Depending on the **number of disconnections** in the last **two hours**, the player can **get or not a penalty** to his score: the **first time** he does **not receive any penalty**, whereas for **the following** ones he gets an **incrementally-increasing penalty**, starting from **30 points**.

The **teammate** left alone can instead choose if play in "**single-player**" mode, managing both the **driver** and the **shooter** for the remaining time, or return to the **main menu**, **without** getting any **penalty** to his score.

Dealing these cases we aim to **prevent** as much as possible **unfair behaviours** (for example **rage quitting**, **cheating**, etc.) and possible **collateral damages** to other players, with resulting disruptions.

## 5.2.2 Factions characteristics and abilities

All the species have **their own statistics**, different from faction to faction, and **two special abilities** (one for the **attack** and one for the **defense**), each one activated by one of the two team members. The **driver's special ability** is **recharged with time**, whereas the **shooter's** one is recharged when he **damages or destroys** both **players and mobs**.

The team statistics are:

- **attack** = affects the amount of **damage** inflicted by the **shooter** with his weapon;
- **resistance** = affects the amount of **damage inflicted and received** in case of **collision**;

- **health** = represents the **health pool** of the car; when it is zero, the team is defeated;
- **speed** = represents the **maximum speed** of the car;
- **agility** = affects **how fast** the car **reaches maximum speed** and its **steering behaviour**;
- **fire rate** = affects **how fast** the shooter can **fire** with his weapon (the value is **hidden** to the players).

### 5.2.2.1 Stats

In the following, we describe the statistics of each species:

Property	Lions	Sharks	Eagles	Rhinos
Health	1200	1000	800	1500
Attack	9	7	5	7
Fire rate	6	7	9	5
Resistance	6	7	5	9
Speed	6	7	9	5
Agility	7	6	9	4

### 5.2.2.2 Bullets and weapons

	Lions	Sharks	Eagles	Rhinos
Bullet	Spear	Harpoon	Arrow	Cannon ball
Weapon	Spear gun	Harpoon cannon	Ballista	Cannon

### 5.2.2.3 Special abilities

Here we present the two special abilities of each species:

#### Lions

Ability	Name	Player	Description
Attack	Grenade	Shooter	Throws a grenade that causes 200 damage to players within 15 meters range
Defense	Roar	Driver	All the cars within a 20 meters range rotate on their position for 4 seconds

#### Sharks

Ability	Name	Player	Description
Attack	Bite	Driver	The car jerks forward and bites the enemy, causing a doubled collision damage and increasing by 10% the damage dealt in the following 5 seconds
Defense	Shark skin	Shooter	For 20 seconds, the received collision damage becomes zero and the bullets damage is reduced by 40%

#### Eagles

Ability	Name	Player	Description
Attack	Net	Shooter	Throws a net that blocks all the captured enemies for 10 seconds
Defense	Tornado	Driver	Summons a small tornado around the car that deflects all the incoming bullets for 20 seconds

#### Rhinos

Ability	Name	Player	Description
Attack	Charge	Driver	Furiously charges the enemies doubling the speed and the inflicted collision damage

Defense	Shield	Shooter	Creates a 200 health points shield around the car with no time limit
---------	--------	---------	--

### 5.2.3 Reason vs Instinct

The game animals belong to species facing an **evolutionary process** that, time after time, has given them **humanoid appearance** and **behaviours**. Since this evolution is **not complete**, sometimes one between their old **instinctive** or new **rational nature** may **prevail** over the other and affect their **actions, decisions** and **thoughts**.

For this reason, at the beginning of each battle players in Hypogeum have the chance to **choose** between their instinctive or rational side: the team has to decide if collect the **Instinct coin**, the **Reason coin** or **none** of them (staying neutral), modifying its **statistics** (or not) for the **whole match**.

The Instinct coin has **claws** drawn on it, whereas the Reason coin has a **brain**. In order to collect the coins, the team can **drive toward** or **shoot at** them. Once the team has chosen its nature and has picked up the corresponding coin, the game assigns it an **objective**: when it is **completed**, the changes are applied and the team's **statistics** are **modified**.

The objectives are divided into **two classes**, depending on the nature the affect:

- **Reason objectives:**
  - Do not receive damage by enemy bullets for 1 minute;
  - Avoid 3 collisions;
  - Run over and kill 5 small spider robots;
- **Instinct objectives:**
  - Kill 5 mobs with your weapon or special ability (shooter);
  - Cause a total of 300 damage to other players;
  - Trigger 3 mines by shooting them.

As it can be noticed, the **instinctive nature** is more related with **shooting skills**, since they represent the wildest and most ferocious behaviour and aim to the survival. The achievement of the corresponding objectives gives a **+2** to **attack** and **resistance** statistics. On the other side, the **rational nature** is more related with **driving skills**, an ability that exclusively belongs to human beings. The achievement of the corresponding objectives gives a **+2** to **speed** and **agility** statistics.

### 5.2.4 Traps

Inside the arena there are different **traps** and **hazards** that can increase the **difficulty** but also the **spectacularity** of the battles. The teams have to try to **avoid the dangers**, but can also **activate** some **traps** to damage their enemies, human and mobs.

The **in-game traps** and **hazards** are:

- **spin trap**: when a car passes over the trap, it **rotates** on itself for **3 seconds**. The trap is **always active**;
- **mud**: when a car enters in the mud puddle, it **moves two times slower**. The trap is **always active**;
- **mine**: the mine **explodes** on touch, but can also be activated if shooted (it could be useful to damage enemies' cars), causing **100 damage**. It **respawns** after **30 seconds**;
- **geyser**: a strong water jet **lifts the car** for **10 seconds**, causing **5 damage per second** and making it vulnerable and exposed to other teams' bullets. The trap is **activated every minute**;
- **meteor shower**: **5 and 10 minutes** after the **beginning** of the battle, a meteor shower crashes on the arena. Teams have to pay attention to avoid the meteors, since if they are hit will receive **300 damages**.

To be precise, the arena will contain **4 spin trap**, **4 mud puddles**, **4 mines** and **2 geysers**. Except for the **geysers**, that will be always in the **same position**, in each match the other **traps** and **hazards** will spawn in **different locations** of the map.

### 5.2.5 Mobs

During the match, in addition to other players, each team has to face and fight against **mobs** spawned in the arena that make the battle and the environment more **dynamic** and **changeable**.



We can distinguish **three classes** of **AI enemies**, different for **skills, dimensions** and **behaviours**:

- **spider robots**: organized in groups of **four units**, **cannot damage** teams' cars and can be easily **destroyed running over** them;
- **tank robot**: is the **leader** of the spider robots' group. It **does not directly damage** the players but **cannot be destroyed if run over**: in case of collision, the cars are **bounced away**. This enemy can be **destroyed by the shooter**, through his **weapon** or **special ability**, or by the **driver**, if he has an **offensive special ability** (such as with Rhinos and Sharks). When a team destroys the **last spider robot** of the group controlled by the tank, the leader starts to **hunt** it until its target is **not defeated** or the robot is **destroyed**. In hunting mode, the robot will try to hinder the team, **getting on its way** and **trying to have collisions**, in order to make it bounce away.
- **goliath**: this enemy spawns at the **center** of the map in the **middle of the game**, aiming at the teams who enter in its attack range (of **30 meters radius**). The players of the species that destroys the goliath will receive a **special in-game medal**. There will also be a **special leaderboard** that will keep track of players' medals, in order to give to the ones in the first positions a **special in-game reward** at the end of each season.

**Every three minutes**, the game checks that there are **at least 3 groups of spider robots**, with the corresponding tank robot. If this condition is not verified, the game will **spawn** the **necessary number** of mobs to match it. There are **four spawn points** inside the arena, placed at the same distance the one from the other along the boundaries of the map.

### 5.2.6 Audience Hype

The audience of the matches is made up of the **supporters** of the four factions, there to sustain their species champions, and will **react** to players **actions** such as **acrobatic jumps** on ramps, **spectacular tricks** or **exciting shootings**.

There exist **two types of ramps**:

- **single**: the jump can be performed only in **one direction**;
- **double**: the jump can be performed in **both directions**, but players have to pay attention to not fall into the **traps in between** and to **aerial collisions** with other teams.

Each team has **its own hype-o-meter** and **hype bar**, which can be filled only by its actions and behaviours. The **four factors** that affect the hype bar are:

- **max height reached** during the jump (rounded);
- **flight time** (rounded);
- **shots scored while flying** (**30 points** for each shot on target);
- how car **lands** on the ground after the jump (**20 points** if the car lands on all four wheels).

For the **last 2 minutes** of the match the **hype progression** is **doubled**, since the battle becomes more hectic.

When the hype bar is completely **full**, it will automatically **reset** to zero and the team supporters will throw a **power-up** in the arena that can be activated by passing over or shooting at it only by the corresponding species players.

The **available power-ups** are:

- **traps and hazards immunity** for **30 seconds**;
- **partial invisibility** for **30 seconds** (the edges are visible);
- **medikit** to restore **20%** of team's **health** (it is not possible to have more health points than the starting ones);
- **+20%** of **bonus charge** to driver and shooter **special ability** bar.

Teams' supporters on the bleachers are **not NPCs** and for this reason are **directly related** to **game mechanics**. The audience hype may offer us an important chance to make Hypogeum also an **e-sport game** or to organize **tournaments**, since we may evaluate the **replacement** (or the **integration**) of **in-game supporters** with **real people** that will attend the matches and will sustain the teams' champions during their battles.

## 5.3 Controls

### 5.3.1 Driver

KEYS	ACTION
W	Go ahead
S	Go back
A	Turn left
D	Turn right
M	Brake
K	Handbrake
L	Use driver special ability

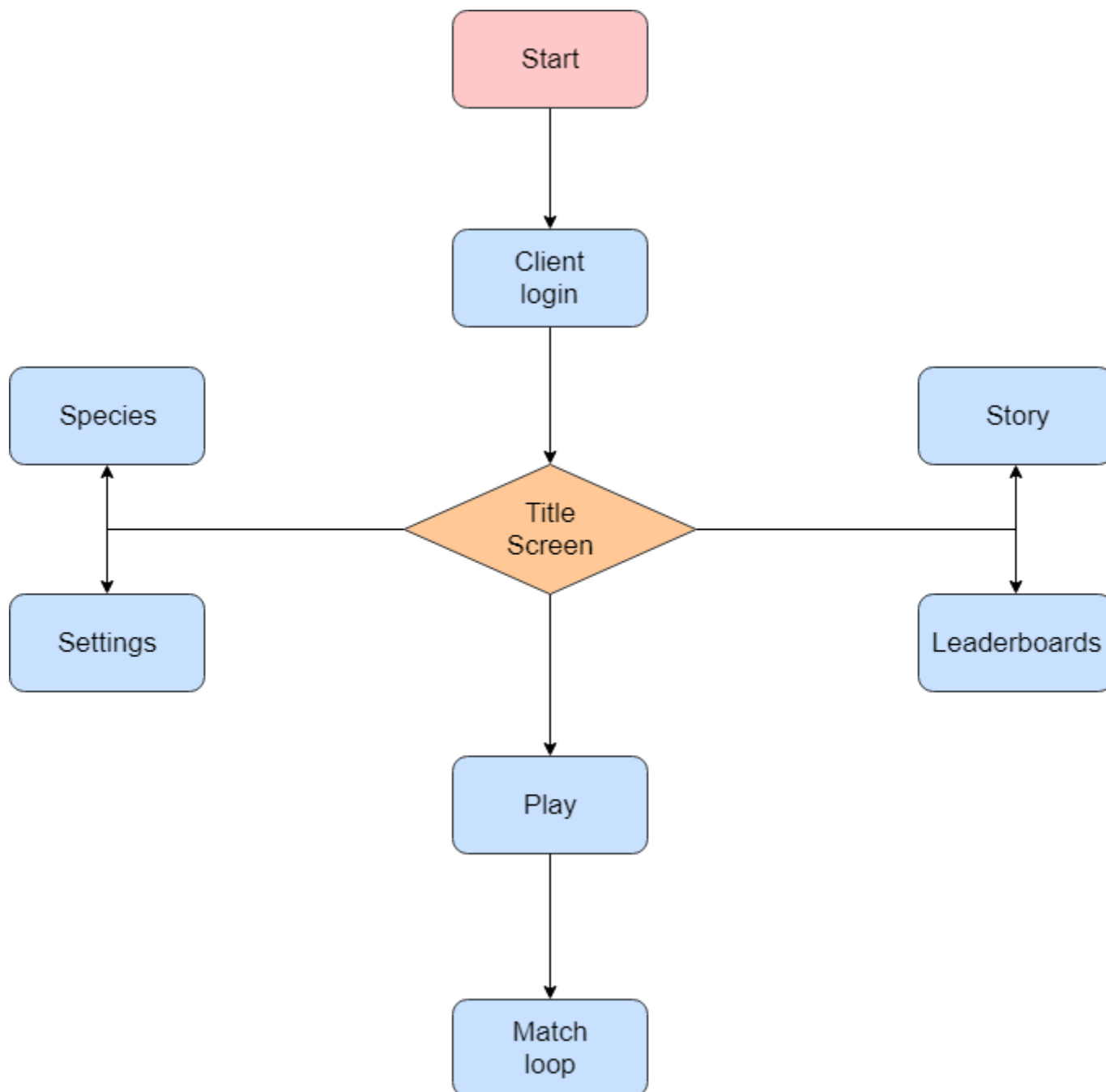
### 5.3.2 Shooter

KEYS	ACTION
Mouse L	Fire
Mouse R	Use shooter special ability
Mouse	Move camera

## 5.4 Interfaces

### 5.4.1 Scenes

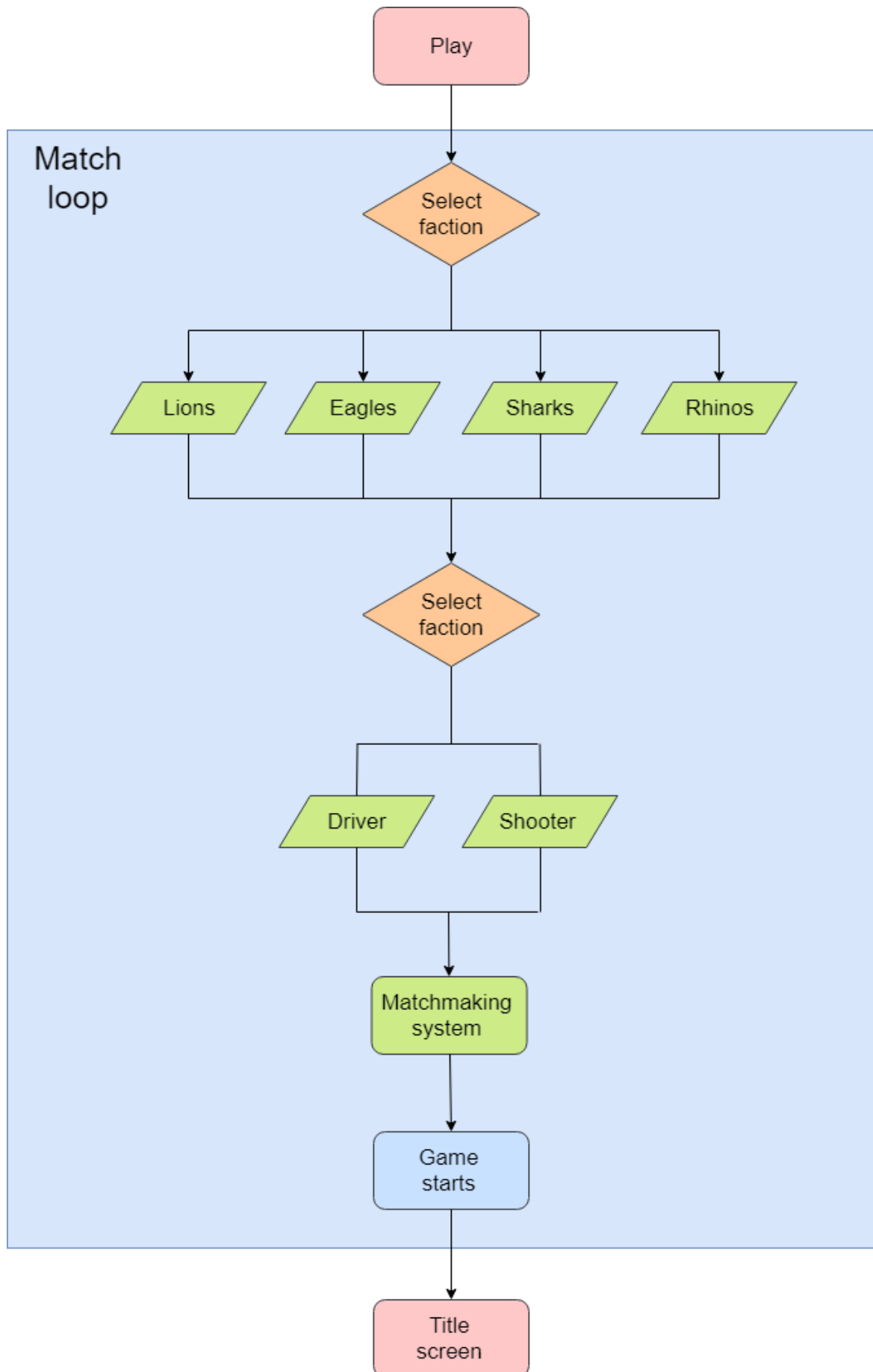
In the following **flowchart** we present the **choices** the player can do and the **resulting sequence of scenes**. For more detailed information about the Title screen, see Section [5.4.2 Title screen](#).



Game scenes sequence.

#### 5.4.1.1 Match loop

When the player clicks **Play** he is brought to the **character selection scene**, where he has to select his **species** (among the four available ones) and his **role** for the match. At this point, the **matchmaking** phase begins: when the required number of players is reached, the **teams are formed** and then the **match can start**.

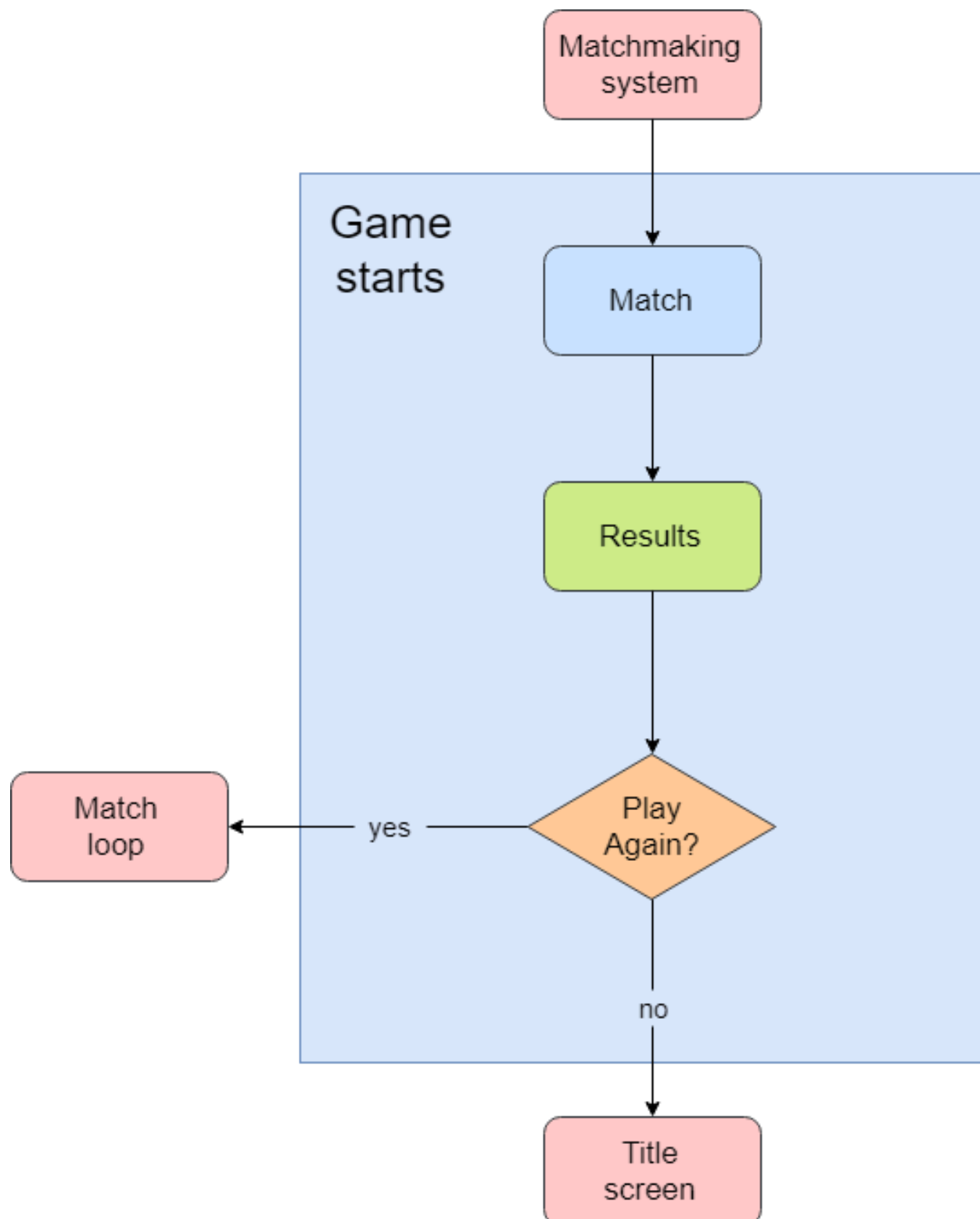


Match loop in detail.

5.4.1.2 Game starts

At the end of the matchmaking phase, the players **start the battle** in the arena and face each other. When the **match is over**, each player can see **his statistics** and **score** and the **leaderboards, updated** with the result achieved in the last game.

At this point, it is possible to **choose** if **play again**, that will bring the player back to the **character selection scene**, or **not**, returning then to the **title screen**.



Game starts detail.

### 5.4.2 Title screen

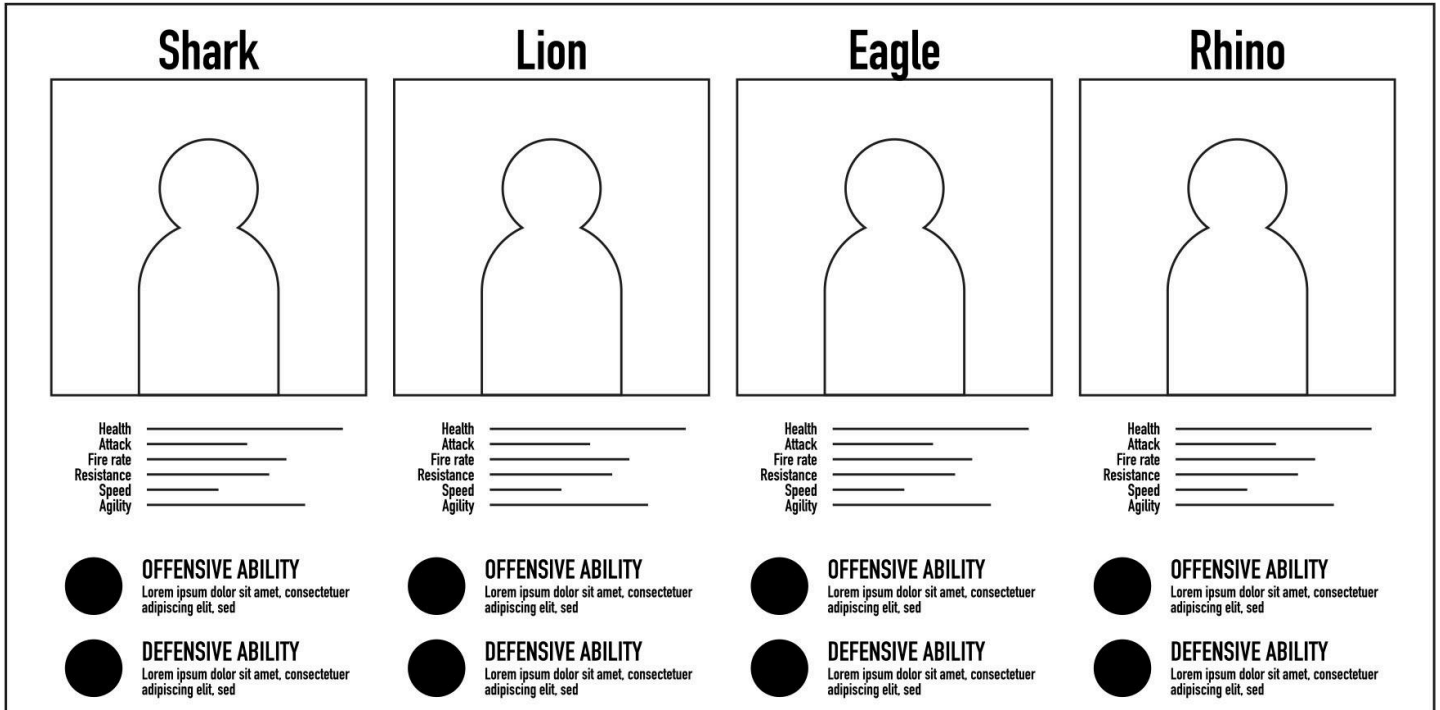
The interface of the **start menu**, as can be seen in the following image (it is a sketch, could be changed in future), contains several **items**:

- **play** - from here, the player goes to **character and role selection** and then to **matchmaking and game**;
- **species** - the player can find the **descriptions** of the **species** and of the corresponding **abilities and statistics**;
- **story** - players can find **information** and **learn** about the **game world and context**, in order to find out the **events** occurred and the **story** of each species;
- **leaderboards** - here the player can see the **leaderboards** and the **rankings** of **players** (can be filtered in drivers and shooters), **species** (to know who is winning the season) and **medals** (to see the ranking based on trophies);
- **settings** - used to **modify** and **adjust** the **game settings**.



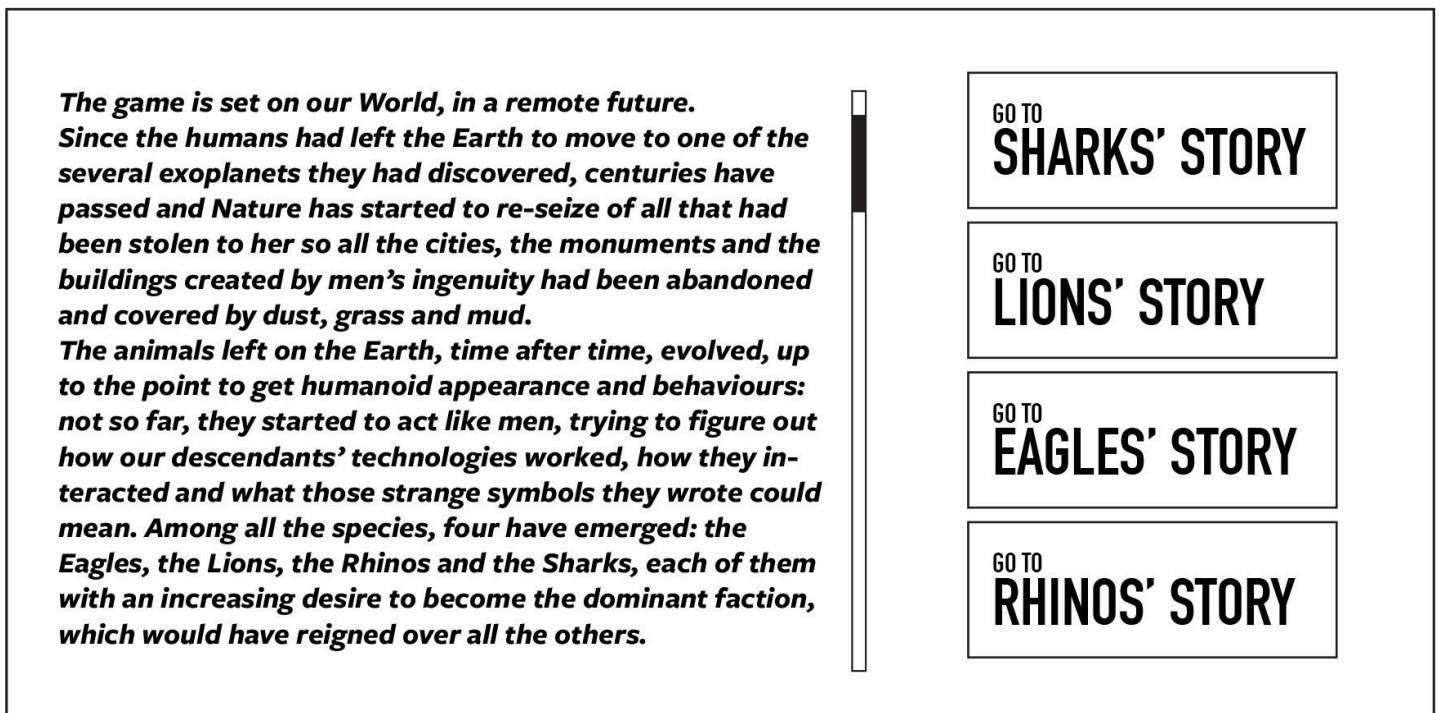
Start menu interface sketch.

## SPECIES



Species interface sketch.

## STORY



Story interface sketch.

## LEADERBOARDS

General		Sharks	Lions	Eagles	Rhinos
1	Michele	200			
2	Loris	190			
3	Andrea	180			
4	Giovanni	170			
5	Matteo	160			
6	Giulia	150			
7	Luca	140			
8	Stefano	130			
9	Martina	120			
10	Federico	110			

**YOU 88**

Position: 19

Leaderboards interface sketch.

## SETTINGS

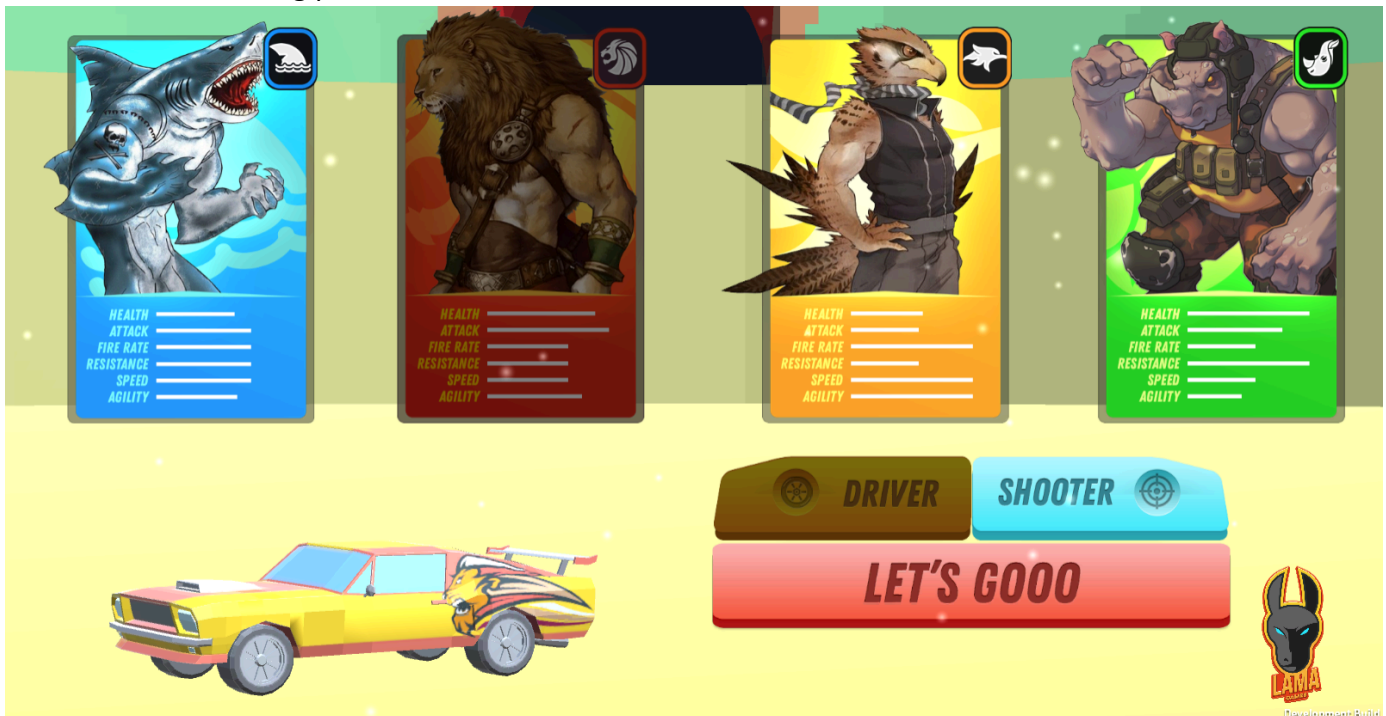
<b>Map resolution</b>	<input type="range"/>	<b>Controls</b>	Front	W
<b>Graphic quality</b>	<input type="range"/>		Right	D
<b>Audio volume</b>	<input type="range"/>		Left	A
<b>Map resolution</b>	<input type="range"/>		Back	S
<b>Mouse sensibility</b>	<input type="range"/>		Brake	M

Settings interface sketch.



### 5.4.3 Character selection

In the **character selection menu**, the player **chooses** his **species** and **role** for the following match and then starts the matchmaking phase:



Characters selection menu.

### 5.4.4 Matchmaking

The **matchmaking** scene image is the same as the start menu, with the addition of a **timer** showing the **estimated time** to create or find a match, the **elapsed time** and the **current number of players** in the match lobby.

Since Hypogeum is designed as an **online multiplayer competitive game**, we aim to provide to the players **balanced matches**. For this reason, the matchmaking is **based on** the evaluation of **players' Elo score**, updated according the **Elo ranking mechanics** (increased when the player wins the match, decreased when he loses, but proportionally to the opponents' scores).

### 5.4.5 Loading

The **loading screen** shows in loop **several wallpapers**, with a **loading bar** at the top and some **in-game tips** at the bottom.

### 5.4.6 Game HUD

The **in-game HUD** provides important information to the players:

- **team health points;**
- **speed;**
- **special ability loading (driver and shooter);**
- **time left;**
- **chosen nature (Instinct or Reason);**
- **audience's hype-o-meter;**
- **objective completion level;**
- **minimap** of the arena (shows enemies, traps and hazards position).



In-game HUD sketch.

## 5.5 Rules

The game has the following rules:

- the **standard match** is a battle among **four teams** of **two players** (for a **total of eight players**);
- if the matchmaking **cannot find the required number** of players, the match can be played by **two or three** teams, instead of the standard four;
- when the team's **health points** become **zero**, the players are **defeated** and have to choose if play again or return to the start menu;
- the **last surviving team** is the **winner** of the battle;
- in order to prevent **stalemates**, each battle has a **15 minutes time limit**: when the **time is up**, if there are more teams alive in the arena, the one with **more left health points** is the winner; if there is a **tie**, **2 extra minutes** are added: when the **time is up**, the **winning condition** is checked again and if it is **not met** the game ends in a **draw**;
- each player has his **own role** in the team for the whole battle;
- the player's **role cannot be changed** during the match and **a player cannot be both** the driver and the shooter (except in case of teammate's connection lost, as described in Section [5.2.1.3 Connection lost](#));
- when the **shooter hits** an enemy with his weapons, the target's health is decreased depending on the **attack statistics** of the **shooter's team** (higher the attack, higher the damage inflicted);
- **friendly fire is not allowed** (shooters' bullets cannot damage his team);
- **driver and shooter special abilities** can only be **used** when they are **completely charged**;
- the team's **power-ups** are thrown in the arena by the corresponding supporters only when the **team's hype bar** is **full**;
- each **team can only collect the power-ups** thrown by **its supporters**;
- when the team's car **bumps into an enemy car**, the collision will **damage both** the vehicles, depending on the **resistance** statistics of the two teams;
- when the team's car **bumps into mobs**, the **collision** will affect only these **last ones**;

- when the team's car **bumps into walls**, the car does **not** receive **damage**;
- players **cannot get out of their car**;
- teams' cars **cannot leave the arena**.

### ***5.6 Scoring and winning conditions***

The **last surviving team** in the arena is the one who **wins** the match. In the case of **two or more** remaining teams when the time is up (each battle lasts at most **15 minutes**), the match is **won** by the team **with more health points**. If a **tie** occurs, the game adds **two minutes** of **extra time** and the match continues. When also the extra time is up, the **winning conditions are checked** again: if they are **not satisfied**, the game ends with a **draw**.

### ***5.7 Modes and other features***

Since Hypogeum is designed as an **online multiplayer competitive game**, it only has a **multiplayer mode**: four (in standard matches), three or two teams of two players face each other in a free-for-all battle, aiming for defeat all their opponents, both controlled by other players or by the game.

The game has also an **in-game store**, where players can buy **season passes** and **customize their characters** with **skins, weapons** and **cars**.

In order to make **players' cooperation** possible, since it is a key element of the game, we will develop and integrate an **in-game team chat** (both **textual** and **vocal**), available only **during the matches**, including also the chance to switch to a **in-match general chat**, where every player of the battle can talk, if he wishes.

## 6 Game Characters

### 6.1 Characters design

The players can choose their **in-game species** among the **four** existing ones: **Eagles, Lions, Rhinos** and **Sharks**. Each faction has its **own car, weapon** and **two special abilities**, one for the **attack** and one for the **defense**. Since the **animals' evolutionary process is not complete**, the characters face an **inner conflict** among their **instinctive and ferocious** side and the **rational and evolved** one. Players can then decide to **embrace** one of the two natures, **improving** in this way the corresponding **statistics**, or stay **neutral**, having a more **balanced playstyle**.

In order to have balanced matches, each team has **different statistics (health, attack, fire rate, resistance, speed and agility)**, whose values are set through **playtesting phases**, necessary to prevent that a species may prevail over the others.



Banners and emblems of the four factions, each placed on one of the four entrance arches, in correspondence with the team's spawn point and therefore also with its supporters.

## 6.2 Playable characters

In the following, we present a more detailed description of each of the **four species**, describing both **their statistics** and the **car's physical properties**. In order to balance the characters, we computed:

- how many **hits** are **needed** for each **team's shooter** to defeat each of the other species, multiplied by the **weapon recharge time**, thus obtaining an estimate of the **minimum survival time** with the factions standing facing each other;
- how many **collisions** are **needed** for each **team's driver** to defeat each of the other species, obtaining an estimate of the **minimum survival time** for each character.

### 6.2.1 Eagles



The **Eagles** are the undisputed **masters of the skies**, **feared** but also **respected** for their **courage**, their **speed** and their **elusive attack** and **defense techniques**. Now this species is no longer satisfied with dominating the air and aims to **control** other **habitats and animals**. Eagles have the **highest** values of **speed and agility** and thus are the fastest and most elusive characters.

#### Statistics

Health	Attack	Fire rate	Resistance	Speed	Agility
800	5	9	5	9	9

#### Physical dimensions

Weight (kg)	Width (cm)	Depth (cm)	Height (cm)
1165	366	163	149

### 6.2.2 Lions



Lions are known to be the **kings of the forests and wastelands**. Since they are the **most ferocious and aggressive** species and are driven by the desire to **dominate all** the other animals, Lions are the species with the **highest attack** value and thus inflict the highest fire damage.

#### Statistics

Health	Attack	Fire rate	Resistance	Speed	Agility
1200	9	6	6	6	7

#### Physical dimensions

Weight (kg)	Width (cm)	Depth (cm)	Height (cm)
1165	456	180	145

### 6.2.3 Rhinos



Tired of being **hunted for centuries** by human beings, the **Rhinos** took advantage of their departure in order to **regain** what was taken from them and **avenge** the injustices suffered. Due to their physical characteristics, Rhinos are the species with the **highest resistance** value and thus inflict the highest collision damage.

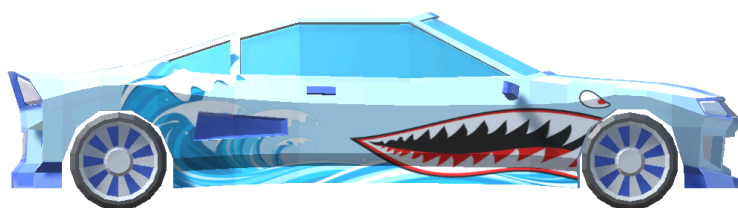
**Statistics**

Health	Attack	Fire rate	Resistance	Speed	Agility
1500	7	5	9	5	4

**Physical dimensions**

Weight (kg)	Width (cm)	Depth (cm)	Height (cm)
2600	516	206	200

**6.2.4 Sharks**



Since their origins (more than 400 million years ago), **Sharks** proved to be among the most **ruthless predators**, but also **essential** and **effective**. Initially driven by their survival instinct and aware of having no opponents in the water, now they want to **prove** to do **not** have **rivals** even on dry land. The Sharks are the **most balanced species**: **versatility** is their ace in the hole.

**Statistics**

Health	Attack	Fire rate	Resistance	Speed	Agility
1000	7	7	7	7	6

**Physical dimensions**

Weight (kg)	Width (cm)	Depth (cm)	Height (cm)
1425	406	178	144

### 6.3 Non playable characters

The four species, as mutually agreed, decided to recover **three different types of robots**, among those left on the Earth by humans, and use them as **shared** and **neutral enemies**, in order to avoid possible interferences (linked to preferences or aversions) by other animals. All these robots are **in-game NPCs**.

Each non playable character is managed by **its own artificial intelligence**, that is in charge of its **behaviours** and **actions**. In the following we present the **statistics** and the **physical dimensions** of the NPCs (for more detailed information about their behaviors and actions, see Section [5.2.5 Mobs](#)).

#### 6.3.1 Spider robot



Spider robots come out of **hidden pits** in the arena. They are **rather weak enemies**, but can be very **annoying** for the players. These robots walk in formations of **four units** and surround a **tank robot** that leads the group.

##### Statistics

Health	Attack	Fire rate	Speed
200	0	0	4

##### Physical dimensions

Weight (kg)	Width (cm)	Depth (cm)	Height (cm)
200	100	100	100

#### 6.3.2 Tank robot



The tank robot is the **leader** of the spider robots' group and **cannot be damaged by collisions**.

This enemy **does not directly damage** the player but can represent a particularly **insidious** threat: when his team of spider robots is destroyed, the tank turns into a **hunter**. In that case, this NPC becomes a **walking obstacle** and tries to **have collisions** with the enemy team, in order to make it bounce away.

##### Statistics

Health	Attack	Fire rate	Speed
500	0	0	4

##### Physical dimensions

Weight (kg)	Width (cm)	Depth (cm)	Height (cm)
1000	170	170	170



### 6.3.3 Goliath



The **goliath** spawns at the **center** of the map in the **middle** of the game.

Even though it is **very slow**, its **attacking power** is **devastating** and **unmatchable**. This, in addition to its **extraordinary** value of **health points**, makes the goliath a truly **fearsome** and **dangerous** enemy. Its **goal** is simple: **defeat** and **destroy** anyone it encounters on its path.

#### Statistics

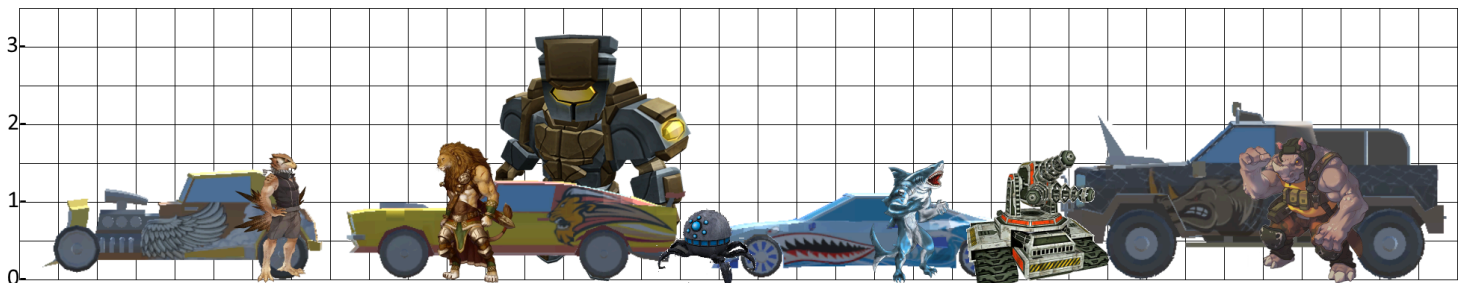
Health	Attack	Fire rate	Speed
10000	10	2	2

#### Physical dimensions

Weight (kg)	Width (cm)	Depth (cm)	Height (cm)
6000	250	130	300

### 6.4 Size comparison

All the game characters, vehicles and NPCs are designed with different statistics and physical characteristics, in order to create a rather **variegated** and **believable world**. In the following, we present the **size comparison** of all elements of the game world. For more detailed information, refer to Sections [6.2 Playable characters](#) and [6.3 Non playable characters](#).



Grid size: 0.5m x 0.5m

Characters, vehicles and NPCs size comparison.

## 7 Story

---

### 7.1 Synopsis

Centuries have passed since **humans left the planet** in search of a new place to call home. Since then, the Earth is inhabited only by **animals** that, over time, **evolved** up to the point of learning how to use the **technology** abandoned by men and creating their own.

Some of them started a **long war**, driven by their desire for **power** and aiming at gain the **supremacy** over all the other species. Inspired by the ancient books on Roman and Greek **mythology**, the animal factions decided to set their battles in an **arena**, to which they gave the name of **Hypogeum**.

Now, only **four teams** remain (Eagles, Lions, Rhinos and Sharks) and the outcome is more uncertain than ever: **who will defeat all his opponents** and become the **king** of the whole animal world?

### 7.2 Game context

The in-game events are set **during the war** among the species. The evolution of the game history **depends both on players' actions and the results they achieved**, so the **storyline is not predefined** but changes under the **influence** of the **game community**.

For a detailed description of the **game backstory**, see Section [8 The Game World](#).

### 7.3 Narrative devices

The game begins in the middle of the war among the species. For this reason, players can **learn** about the backstory through the **Story** menu item that allows them to **discover**, or **read again**, the **story** of the **game world** and of the **four factions**. Moreover, they receive **periodic news** in order to learn how the storyline **evolves**, what **events** occur and the **current state** of the war. These information become **progressively available** in the **Story** section of the main menu, so that they can be **consulted** by the players whenever they want.

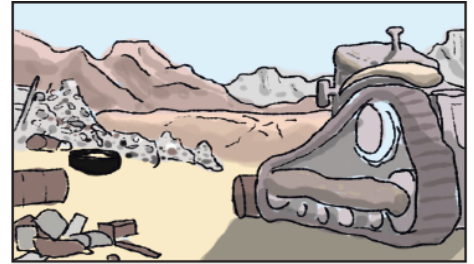
**7.4 Storyboard**



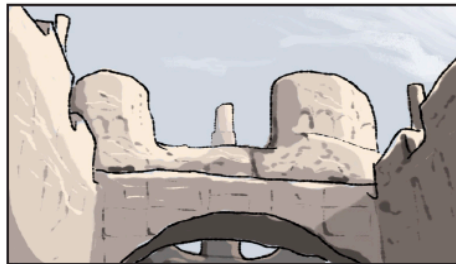
It's been centuries since humans definitely abandoned Earth...



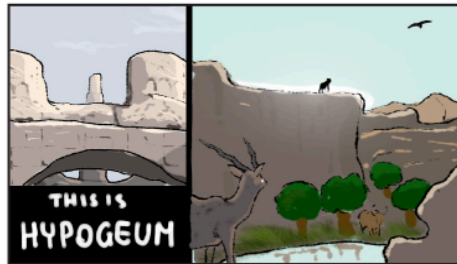
Cities are now abandoned



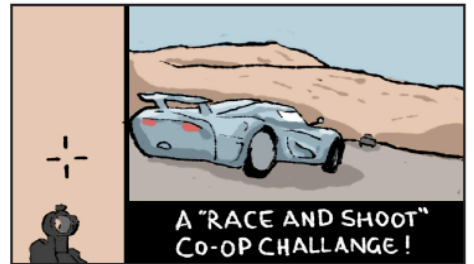
and animals have learnt to control human technology



and now four factions fight a revolutionary war in an arena, to establish the new dominant species.



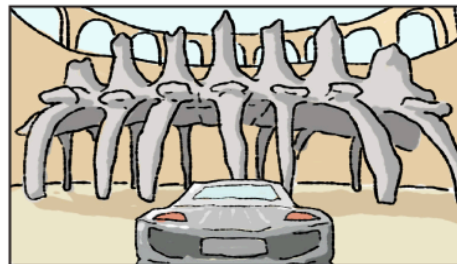
This is Hypogeum!



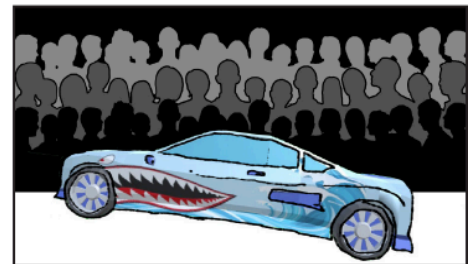
A "race-and-shoot" co-op challenge!



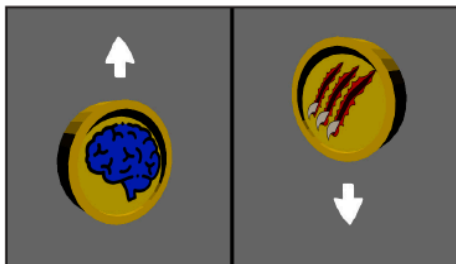
Play for Sharks! Lions! Eagles! And Rhinos!



Run together! Fight together!



Hype your audience with stylish moves!



And choose your nature! Are you rational and evolved or a feral beast?



It's co-op only, so find your best mate!



Lama games presents HYPOGEUM

The storyboard.

## 8 The Game World

---

In a remote future, the planet **Earth** was not able to meet the **needs** of a **constantly growing** human population. This, in addition to the **high levels of pollution** caused by men, ended up **endangering** the survival of the species. For these reasons, **humans** had to **leave the planet** and set off in search of a **new** place to call home where they could settle. This was the **only way** to save themselves and maybe the Earth as well.

Centuries have passed since that day. Without the men continuous exploitation, the Earth **slowly** began to **recovered** and Nature started to **reclaim** what was taken away from her. Buildings, monuments and entire cities, once a symbol of human **ingenuity** and **intelligence**, were abandoned and covered with dust, sand and grass.

When humans left, they took with them some animals, but almost all of them **remained** on the planet. In the following years, the abandoned examples began to **evolve**, up to the point of acquiring **human-like behaviour** and **appearance**: they learned to **walk upright**, to **communicate** and **act** like men. Moreover, they tried to understand what the **strange symbols** written by humans meant and in a short time learned to **read** and began to **know** how the abandoned **technology** worked.

As a result of the disappearance of the dominant species, animals could proliferate and spread out. As happened **innumerable times** over human history, these **expansionist aims**, combined with the **absence** of a well **defined social hierarchy**, pushed the different species to **face** each other and **clash**, driven by the ambition of obtaining the **supremacy** and **reign** over the enemies. Among all the animals, **four factions** emerged: **Eagles, Lions, Rhinos** and **Sharks**.

Thus started a **long war** among these species which, leaded by their thirst for power, began to battle in order to become the **new sovereign** of the animal kingdom. Unfortunately, the clashes ended up causing **death** and **destruction** in a world that had already suffered enough when the wars involved men.

Since the species were **close to extinction** due to the war, the leaders of the four factions decided to stop and **change the way the battles took place**. The wise elders of each species gathered in order to find alternative fighting styles. Reading ancient books about **human mythology**, they discovered that men used to set their **battles in large arenas**, with an **audience** on the edge of its seats attending the clashes.

Excited from what they learned, the leaders decided to do the same, even though with **some changes** to increase the spectacularity: **pairs of heroes** for each faction would faced each other to demonstrate which was the **strongest** and the **bravest** one; the struggles would not be held in a traditional way, but each team would be on a **car**, with one of the champions **driving** the vehicle and the other **firing** through the **on-board weapon**, and would try to **defeat** all the opponents; the **last team** left in the arena would then be the **match winner**; by mutual agreement, the leaders decided to let **robots** fight in the arena, as **common** and **impartial** enemies.

The arena was called **Hypogeum**, in order to represent that being defeated in the battle was the same of being buried under the strength, the courage and the glory of the winner and being therefore destined for the oblivion. The arena was built in the **desert**, so it was covered by sand, and surrounded by **stands**, so that the audience could **incite** the teams to give all of themselves in the match. Moreover, the clashes were held **during the day**, so anyone could admire the heroes' **deeds**.

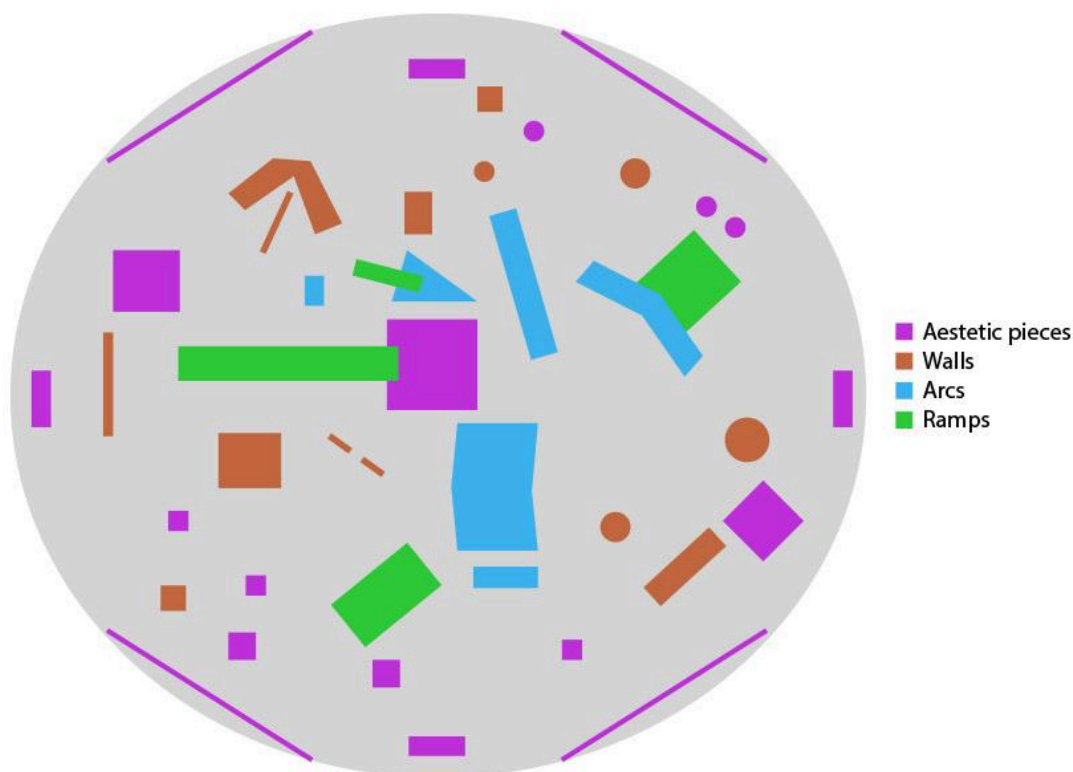
Periodically, the species with the **highest score**, evaluated on its heroes' **abilities** and **results**, is declared to be the **dominant** one for the **following season**; the **other** ones will instead try to **put an end to its supremacy**. The **bravest** and **most skilled heroes** of the winning faction, are awarded personally by their **leader**, as a **reward** for having fought for their species' **glory**.

## 9 Level design

### 9.1 Maps

In the **first game release** all the battles will be set in **one arena**, but we expect to add **more** in the **following seasons and game updates**.

#### 9.1.1 Arena 1 - Coliseum



Game arena.

### 9.2 Prototype

The game **prototype** will contain the following **features**:

- **Species selection;**
- **Player role selection;**
- The **first arena** with some **in-game elements** (such as arcs, ramps, walls, etc.)
- **Four playable characters** with **different statistics;**
- **Driver and shooter game mode** implementation;
- A **shared type of weapon and bullet;**
- **Health and speed bar;**
- **Hype increase (power-ups not included);**
- **Instinct and Reason coins (no statistics improvement and no objectives management);**
- **Lobby;**
- **Online multiplayer;**
- **Match winning conditions;**

## 10 Media

---

### 10.1 Music and sounds

#### 10.1.1 Musics

- No soundtrack in game;
- In the menu, reference **Swing Doors - Allan Gray** ([https://www.youtube.com/watch?v=VeD8USz\\_jVg](https://www.youtube.com/watch?v=VeD8USz_jVg)).

#### 10.1.2 Sounds

Here there is a list of **necessary sounds** both in-game and in-menu.

##### 10.1.2.1 In game

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Car engine;</li> <li>• Drift sounds;</li> <li>• Car collision;</li> <li>• Mob collision;</li> <li>• Wall collision;</li> <li>• Fired shot (different for each car);</li> <li>• Hit shot;</li> <li>• Cheering audience;</li> <li>• Astonished audience;</li> <li>• Disappointed audience;</li> <li>• Drums;</li> <li>• Ability activation;</li> </ul> | <ul style="list-style-type: none"> <li>• Air sound at high speed;</li> <li>• Traps (different for each trap);</li> <li>• Mobs spawned;</li> <li>• Spiders movement;</li> <li>• Tank movement;</li> <li>• Goliath movement;</li> <li>• Goliath attack;</li> <li>• Mobs defeated (explosion);</li> <li>• Collect reason/instinct coins;</li> <li>• Death sound;</li> <li>• Victory sound;</li> <li>• Defeat sound.</li> </ul> |
|---|---|

##### 10.1.2.2 In menu

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Match found sound;</li> <li>• Game queue starting;</li> </ul> | <ul style="list-style-type: none"> <li>• Animals sounds (in character selection);</li> <li>• Clicked buttons sound.</li> </ul> |
|--|--|

### 10.2 Version control

We are using [Git](#) as a **version-control system** and [GitHub](#) as a **web-based hosting service** for Git. For changes or access requests contact the **repository administrator**.

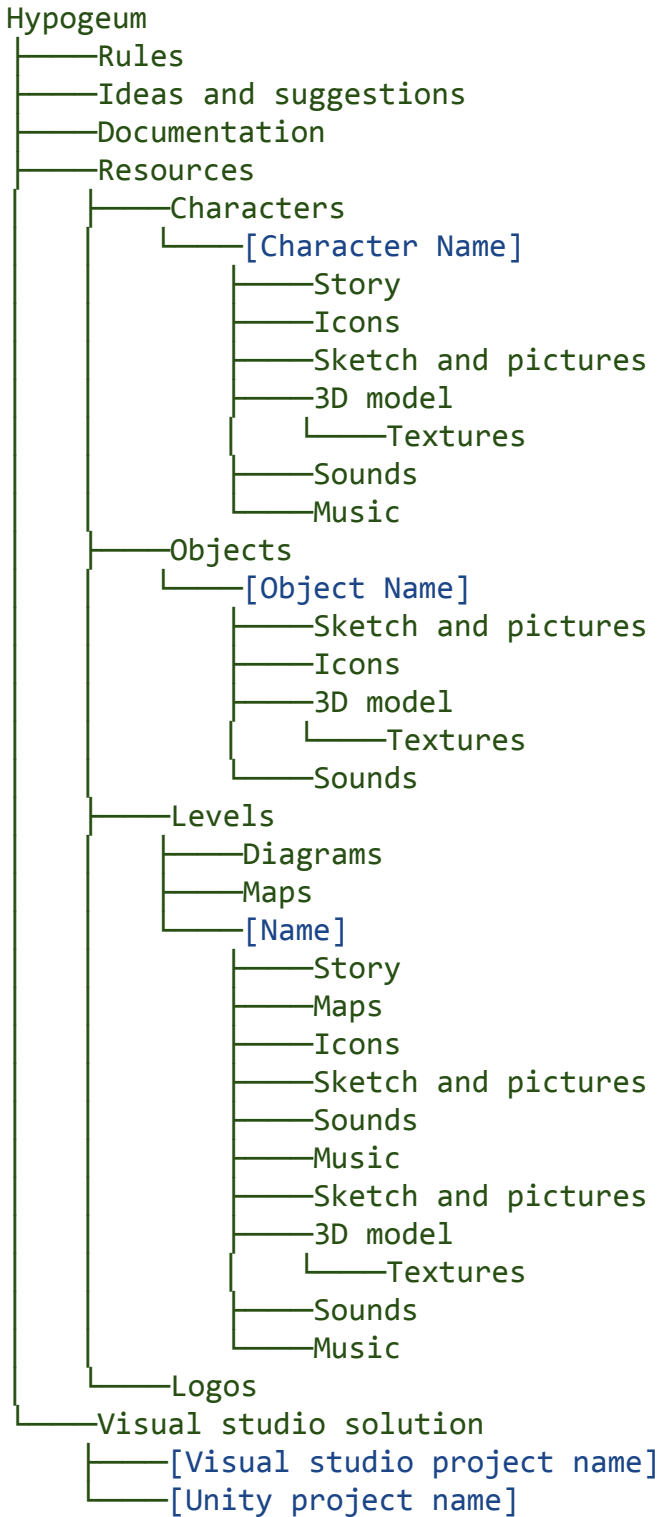
#### 10.2.1 Information

The project repository can be found at the following **url**: <https://github.com/andreadecosmo/LamaOGDAIVG>.  
 The **administrator** is: Andrea De Cosmo (andrea.decosmo@studenti.unimi.it).

### 10.3 Paths and project structure

The **project directory** is the one containing the .git folder (for more information about Git, see Section [10.2 Version control](#)).

#### 10.3.1 Project structure



## 10.4 Export formats

We have **specific export formats** for some types of files:

File type	Extension	Format
<b>3D objects</b>	.blend	
<b>Raster image</b>	.png; .jpg; .tiff	32px; 256px; 512px; 800×600px
<b>Vector image</b>	.svg	2000×2000
<b>Music and sounds</b>	.mp3	320 kbps

## 10.5 Media list

Group	Media type	Description
Menu	Image	Title screen background
		Species scene background
		Story scene background
		Leaderboards scene background
		Setting scene background
Level	3D model	Arena 1
	Image	Mini map
Character	Image	Lion card
		Eagle card
		Rhino card
		Shark card
	3D model	Lion's car
		Eagle's car
		Rhino's car
		Shark's car
		Spider robot
		Tank robot
		Goliath



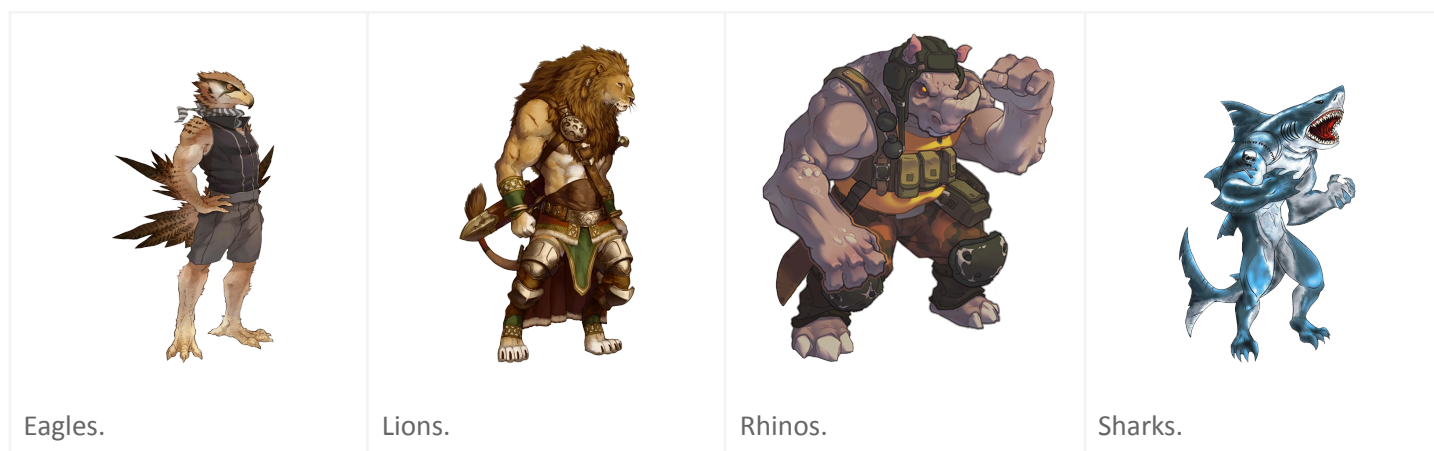
HUD	Image	Speedometer
		Objective bar
		Hype-o-meter bar
		Health bar
		Reason and instinct coins
Level props	3D model	Ramps
		Dinosaur skeletons
		Arch of Triumph
		Barrel
		Banners
		Flags
Weapon	3D model	Lion's spear-gun
		Eagle's ballista
		Rhino's cannon
		Shark's harpoon cannon
		Rhino's shield ability
		Lion's grenade ability
		Eagle's net ability
	Particle system	Tornado
		Explosion
		Fire
Bullet	3D model	Spear
		Arrow
		Cannon ball
		Harpoon
Item	Image	Claws
		Brain

	3D model	Coin
		Power up coin
Traps	3D model	Mine
		Spin trap
		Mud
		Geyser
		Meteorite rain
Music	Sound	Menu theme
SFX	Sound	See Section <a href="#">10.1.2 Sounds</a>
Voice	Sound	Audience voice

### 10.6 Additional reference images

In the following, we present **additional reference images** for the artists, divided by category.

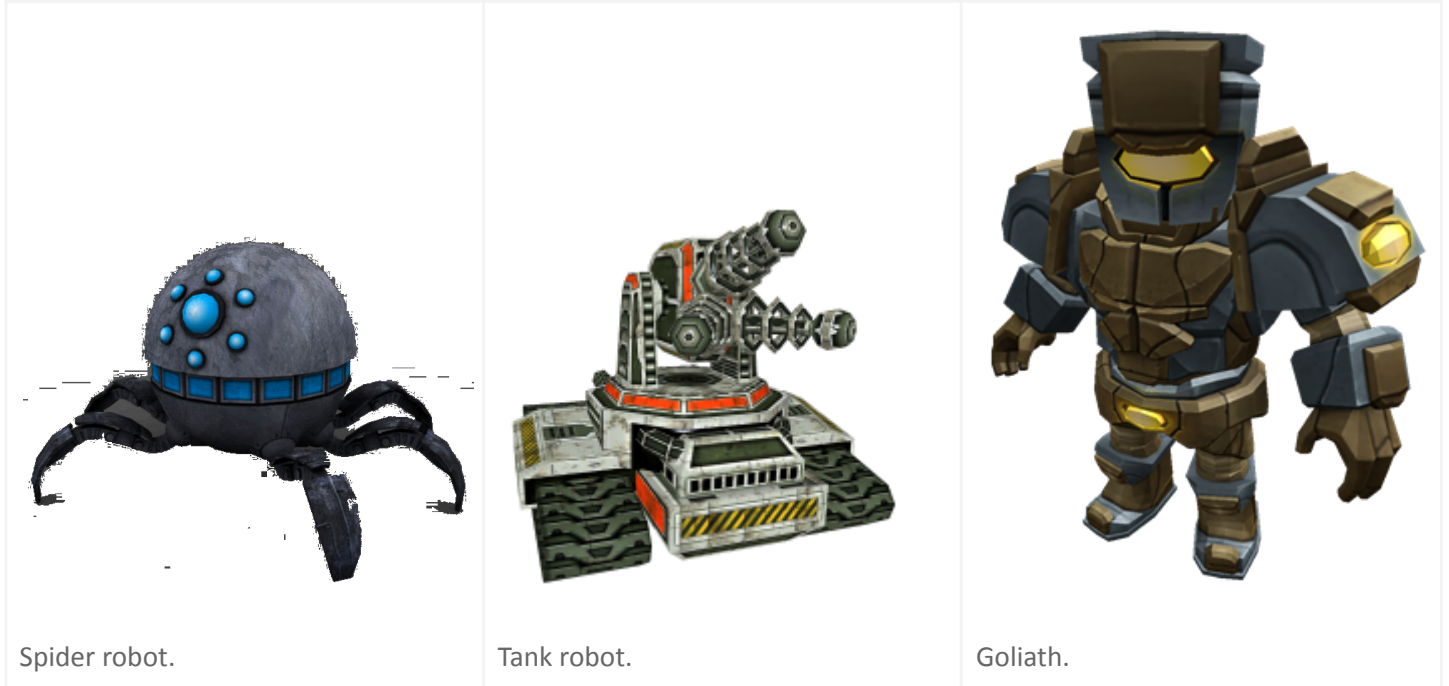
#### 10.6.1 Characters



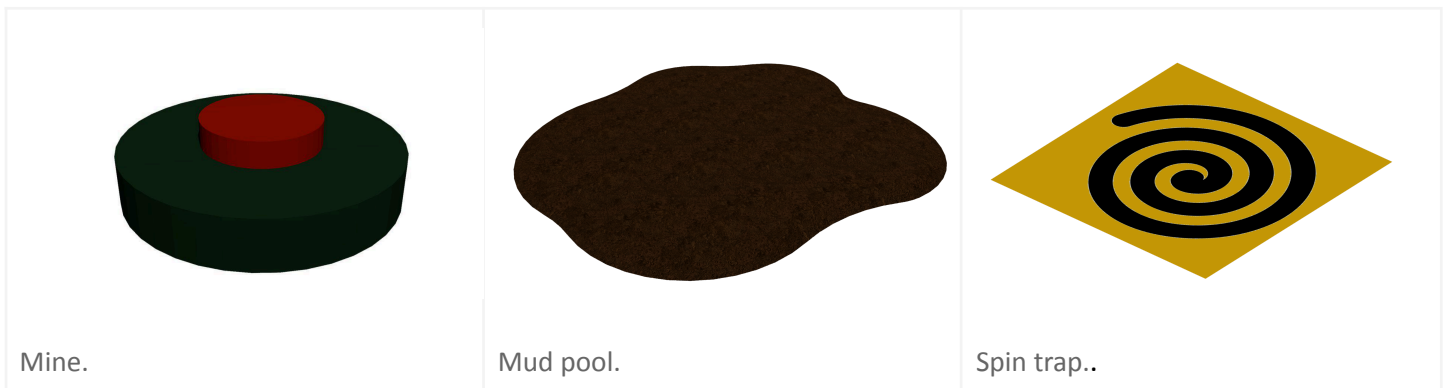
#### 10.6.2 Cars



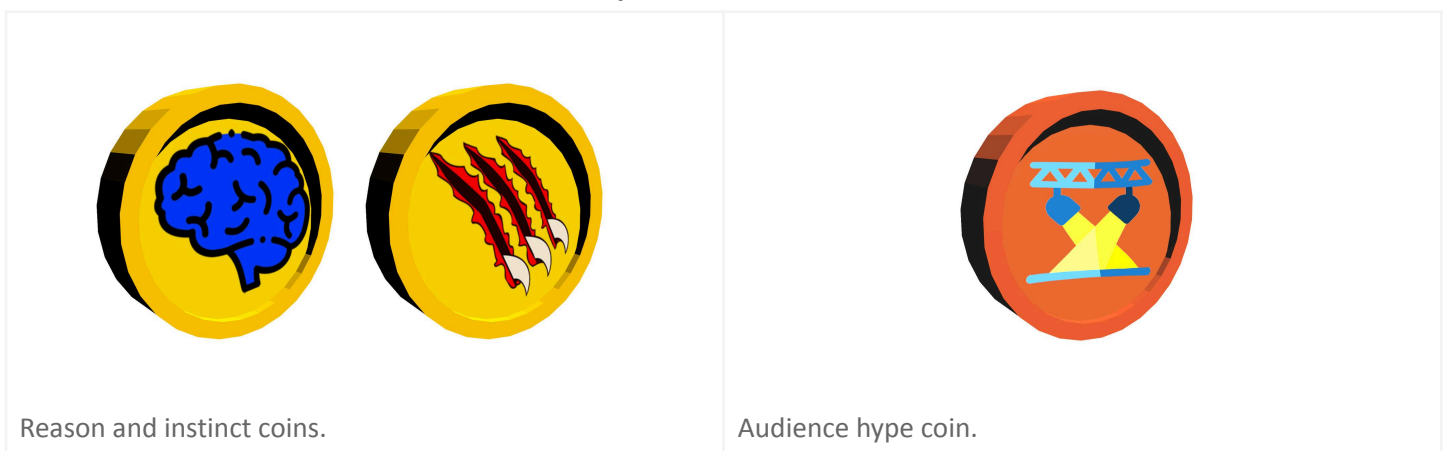
### 10.6.3 Enemies



### 10.6.4 Traps



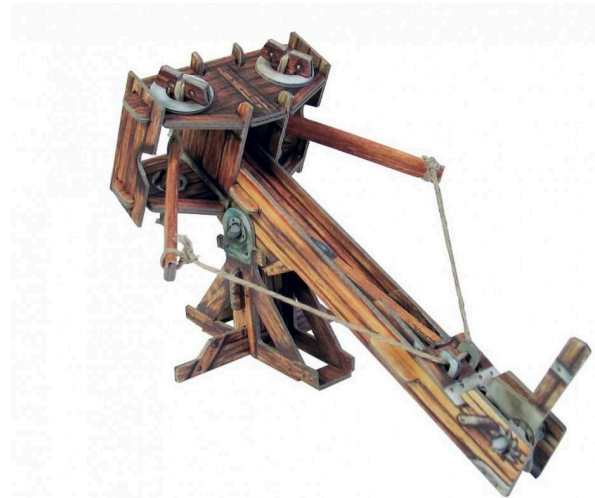
### 10.6.5 Instinct and Reason coins / Power-ups



### 10.6.6 Weapons



Cannon.



Ballista

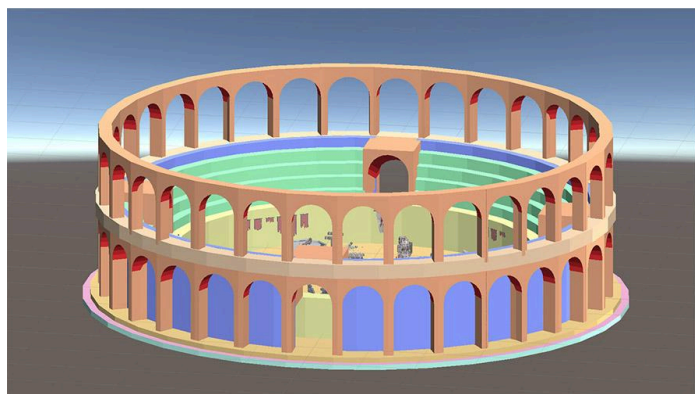


Harpoon cannon

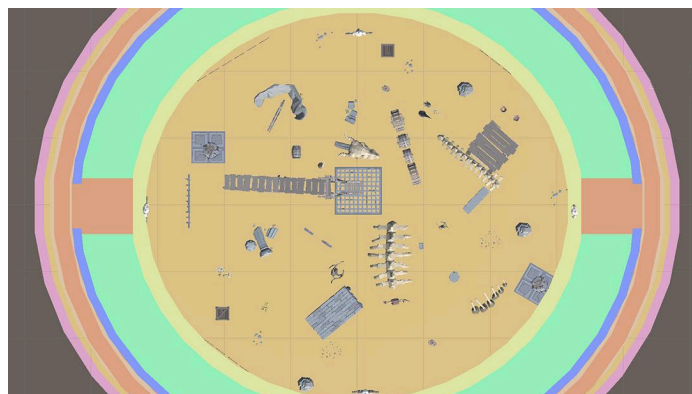


Spear gun.

### 10.6.7 Settings

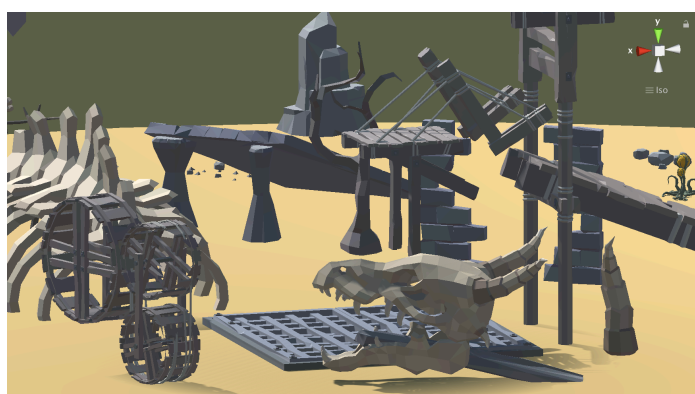


Outside view of the arena.



Vertical view of the arena.

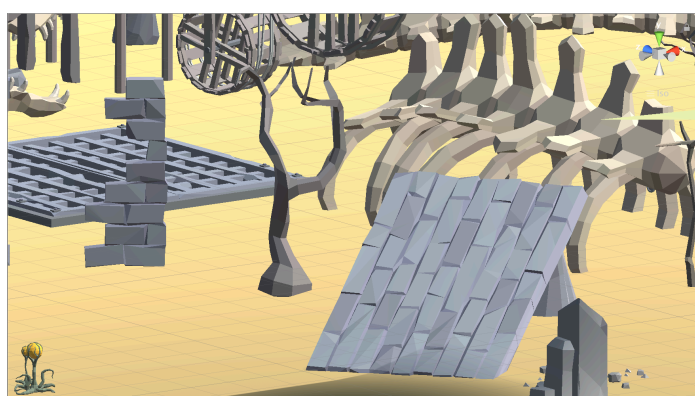
### 10.6.8 Arena props



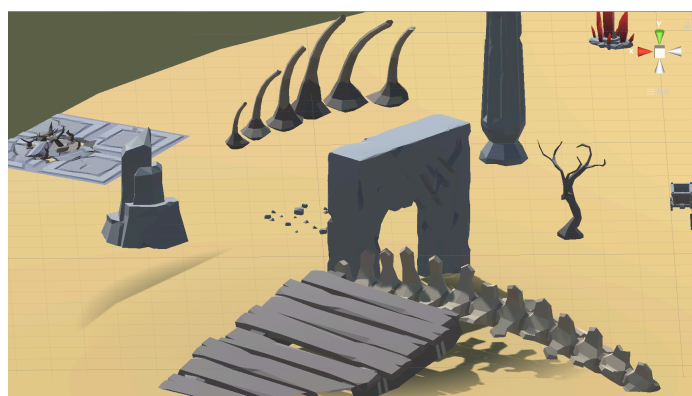
Detail of some elements of the arena.



Detail of the longest ramp.



Detail of a medium ramp.



Detail of an arc.

### 10.6.9 Other resources

**Other visual references** can be found on the **GitHub repository**, in the folder `./Resources` (see the following link <https://github.com/andreadecoso/LamaOGDAIVG/tree/master/Resources> for more details) and will be **added** and **updated** during the whole development process.