Playlab fOr inNovation in Games

Technical Design Document

Developed by

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Summary

Brave Kids Team

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1. Project Goal

1.1 Target Service

We aim to provide a real time multiplayer service through the use of Google Play Games Services, which also includes the possibility of matchmaking, build leaderboards and create achievements. We also intend to provide an interaction with social networks (Facebook) allowing players to share their results with friends.

1.2 Target Platform

Game's target platforms are mobile devices, both smartphones or tablets.
This choice has been made for several reasons:

1. Mobile gaming represents the perfect target for the type of game we decided to develop because one of the main characteristics of its users is to prefer quick and fast paced sessions of playing.
2. The enormous number of mobile users makes the game easily to deliver to the largest number of users possible.
3. Mobile users are very used to pay in-app contents, stimulating their desire to play and making the mobile environment perfect to publish freemium of free-to-play games.
4. Mobile gaming is strictly connected to the social networks world and can be easily bounded to it, facilitating the distribution of the game.

We also decided to start our development from the Android environment because is easier to develop and publish on it. Of course we don't preclude developing our game for Apple devices.

1.3 Game engine

We decided to use Unity to develop our game for its great spread and because it provides good support for developing both on android and apple devices.

2. Value Added Services

We will provide technical support via email or social network dedicated page.
Leaderboards and achievement in game will be implemented and we will also give users the chance to link their Facebook account to the game and share their scores and achievements, invite their friends and challenge them.

3. Market

3.1 Competing platforms

We identified windows phone as the only plausible competing platform. We decided not to develop for this platform because of the little number of users did not justify the effort to develop for an additional platform.

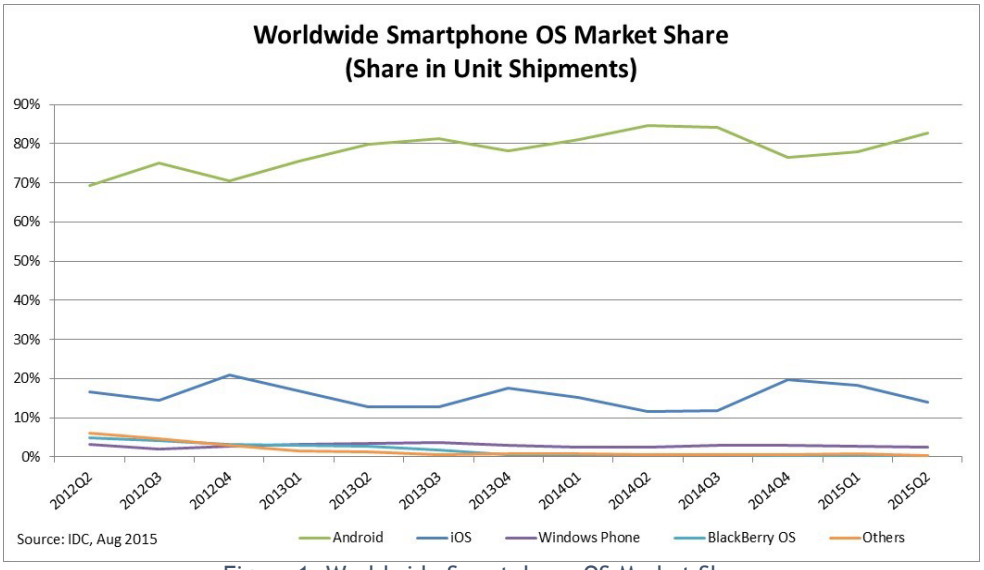

Figure 1: Worldwide Smartphone OS Market Share

4. Delivery

4.1 Estimated delivery time

The project began in April 2016, at the end of June 2016 we estimate to have a playable demo of the game. Afterwards a phase of playtesting and bug fixing will follow in parallel to the development of all remaining functionalities making possible to have an Open Alpha version of the game in early 2017. An Open Beta version will be available in late 2017. A further phase of playtesting and bug fixing will follow and we estimate that the game will be released in summer 2018 considering that the distribution through Play Store/App Store extremely reduces delivery time.

We have to consider a possible delay in the development time predictable between 10% and 15% which would add from 3 to 6 months to the delivery time.

4.2 Delivery platform and strategy

Given the decision to develop the game for mobile devices, the choice of delivery platforms is limited to the Google Play Store and the Apple App Store. This choice allows to greatly limit distribution costs on payment of the fee for publishing on these platforms. The game will be distributed as free-to-play with the chance to make in-app purchases in order vary the gameplay experience.

5. Development

5.1 Major software development tasks

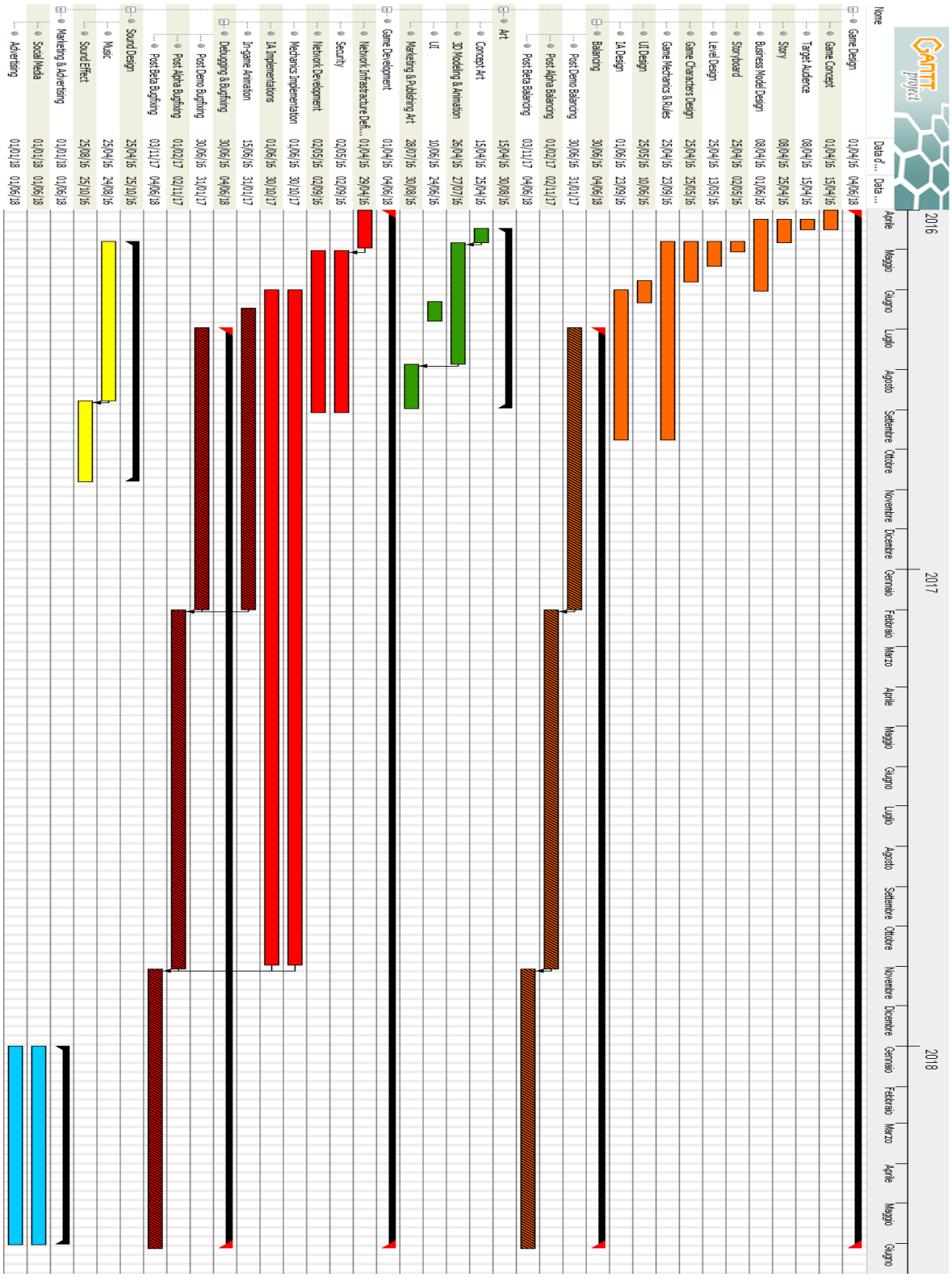

Figure 2: Gantt chart of game development

6. Infrastructure Details

6.1 How services are deployed on servers

To offer our services to the users we rely on big **black boxes** developed by Unity, Facebook and Google. By using theirs SDKs and the API, already available in Unity, we can connect to theirs services and provide ours.

The first and fundamental service we offer is the **multiplayer functionality**: this provide the possibility to play together with friends or strangers through internet and also include a match making feature. This feature connects the player with his/her friends allowing them to play and also supports finding the best match when playing with strangers, according to their experience points. To do this we use the High Level API (**HLAPI**) provided in the UnityEngine.Networking namespace developed by Unity. Using this API we can connect to the Unity servers and use them to exchange messages between player and make them play online.

We also use the **Google Play Games Services** (avaible both on Android and iOS) to provide functionality like login, leaderboard and achievements and also to store the level of the player. To realize this, we use the dedicated API from Unity and also the Google Play Games plugin that allows us to connect to the Google Services.

Social Interactions is provided by **Facebook integration.** Facebook supply us an SDK for Unity that we can use to connect to the Facebook services.

6.2 How servers are connected

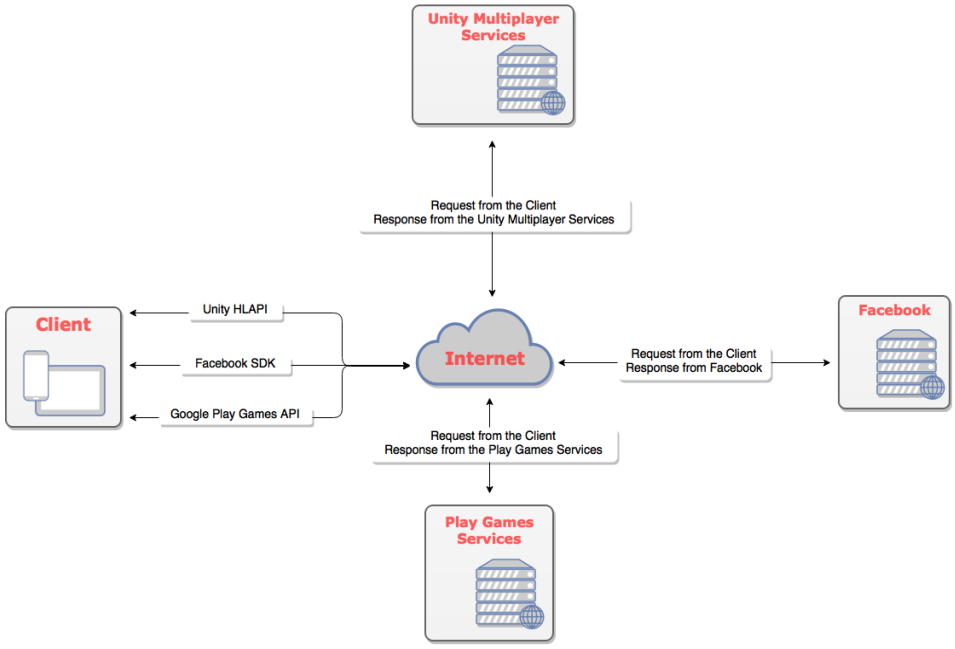

Figure 3: Services connection graph

As we can see from the chart the clients interact with all the services through the internet using API and SDK already implemented. Each server that provides services to the clients can't interact with other servers directly. Every interaction between them has to be done by the client side (e.g., shows the user ID taken from the Play Games in the opponent interface through the Unity Multiplayer Services).

6.3 Scalability and extendibility

Unity Multiplayer supports, by default, a Peer-to-Peer network topology in which one client (the "Host") acts as the Server. Unity Multiplayer infrastructure is **globally distributed**, utilizing data centers in the United States, Europe, and South East Asia. Thanks to this, and considering that we aim to reach **500.000 active users** per month, we have no problems in terms of scalability because everything is managed by Unity Multiplayer.

In addition, the large set of functions offered by the various API and SDK we use provide lots of possibilities thanks to their **flexibility**, giving us no particular issue of extendibility.

6.4 Potential security issues

Google supplies us an anti-piracy feature for Android games only. If anti-piracy is turned on our game, the Games service checks if a user is licensed to play your game. If none of the user accounts on a device are licensed for our game, the Google Play games services calls sent by the game will fail and return a LICENSE_CHECK_FAILED status code. To be licensed users must install it from Google Play. The license checking takes place regardless of whether the game is a free or paid app.

This function is not necessary on Apple devices considering that iOS doesn't allows to install app that have not been published on the Apple Store.

To ensure security on the multiplayer side, we use functions on Unity that perform callback to the server for validate the movement of client authoritative objects.

7. Estimated Resources Needed

7.1 Hardware for development

Product	Unit Price	Qnt	Total
Alienware Area 51 or equivalent	€3.669	6	**€22.014**
Corsair Vengeance M65	€67	6	**€405**
Corsair K70	€165	6	**€992**
BenQ XL2720Z or equivalent	€429	14	**€6.019**
Sennheiser HD598	€161	9	**€1.457**
MAC PRO	€3.449	1	**€3.449**
TOTAL			**€32.877**

7.2 Mobile Hardware

Considering the huge number of mobile devices commercialized, in addition to the ones already listed below, there is a possibility that we may buy some others. During the Alpha and Beta phases we plan to collect usage and game issues with regards to the terminal used by the user. Analyzing the data collected we may decide to buy new devices.

Product	Unit Price	Qnt	Total
Apple iPhone 6S 16GB	€779	1	**€779**
Apple iPhone 6 16GB	€669	1	**€669**
Apple iPhone 5S 16GB	€889	1	**€889**
Apple iPad Mini 4 16GB	€399	1	**€399**
Apple iPad Pro 12.9 32GB	€919	1	**€919**
Apple iPad Air 2 16GB	€439	1	**€439**
Google Nexus 5X 16GB	€429	1	**€429**
Google Nexus 6P 32GB	€699	1	**€699**
Google Nexus 9 16GB	€449	1	**€449**

Samsung Galaxy S7	€729	1	**€729**
LG G5 32GB	€699	**1**	**€699**
Huawei P9	€599	**1**	**€599**
TOTAL			**~€8000**

7.3 Network hardware

We plan to use a pretty basic network configuration, whereas we don't need server to expose services. Besides equipment for basic connectivity of the offices such as switches, access points and firewall, we would use some NAS to perform **data backups**.
To do so we decided to use **Git** which represents an excellent alternative in the field of version control system. Since Git is usually only used for code versioning, and considering the need of artists and sound designers, we also plan to buy a professional backup software.

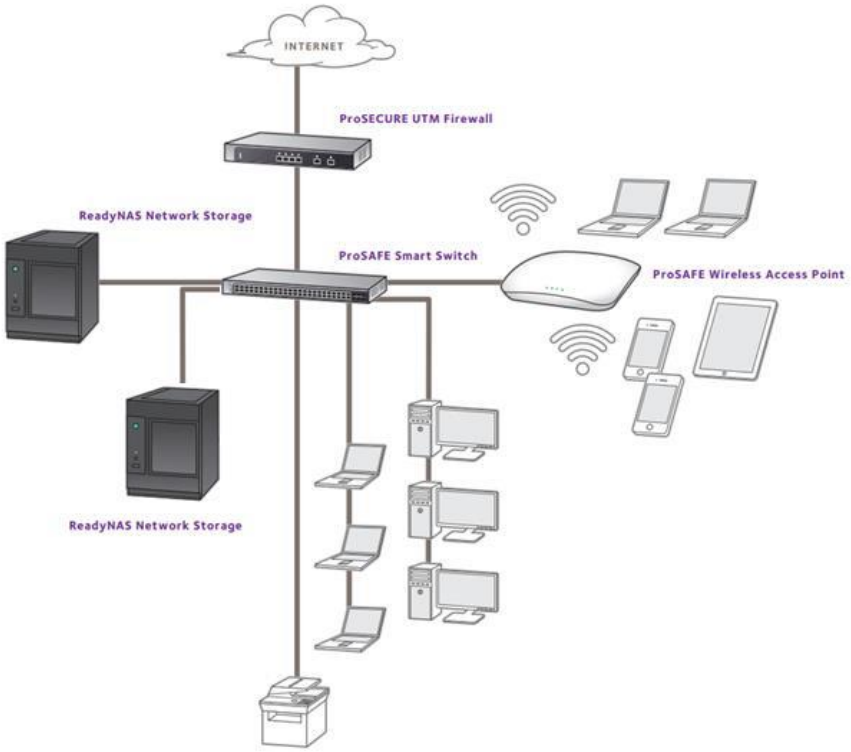

Figure 4: Network infrastructure graph

Product	Unit Price	Qnt	Total
NETGEAR ProSafe Quad WAN Gigabit SSL VPN Firewall	€600	1	€600
NETGEAR ProSafe FS728TP 24 Port 10/100 Smart Switch with 4 Gigabit Ports and 24 Ports PoE	€281	1	€281
NETGEAR ProSafe Wireless N 450Mbps Dual Band Access Point	€294	1	€294
Intellinet - patch cable - RJ-45 (M) - RJ-45 (M) - 5 m	€8	20	€166
TOTAL			€1.343

7.4 Storage

Product	Unit Price	Qnt	Total
Netgear ReadyNAS 300 24TB 6-Bay Desktop NAS	€2939.5	2	€5.879
TOTAL			€5.879

7.5 Other hardware

Hardware for Graphic Artists

Product	Unit Price	Qnt	Total
WSX6 V2 Workstation	€4.166	2	€9.998
RS-D2850 Rendering Workstation	€4.166	1	€4.999
NEC MultiSync EA234WMi 23"	€259	1	€259
Wacom Intuos Pro Small	€224	2	€449
Dell UltraSharp 24'' Monitor - U2415	€400	2	€800
Monitor HP Pavilion 24xw 23,8"	€458	2	€916
TOTAL			€17.422

7.6 Software licenses

Product	Unit Price	Qnt	Total
Adobe Creative Cloud Suite	€67/month	4 x 26 months	**€7.278**
Unity Pro	€98/month	4 x 26 months	**€10.192**
Unity Pro + iOS Pro + Android Pro	€295/month	2 x 26 months	**€15.340**
Microsoft Office 365 Business Premium	€10/month	12 x 26 months	**€3.276**
GitHub Organization Plan	€32/month	6 x 26 months	**€4.992**
Autodesk 3DS Max	€1600/year	2 x 3 years	**€9.200**
Autodesk Maya	€1600/year	2 x 3 years	**€9.200**
Pixologic zBrush	€795	2	**€1.590**
Quixel NDO Painter	€116	2	**€232**
Visual Dynamics V-Ray	€439	2	**€878**
Backup software	€1000/3 years	3	**€3.000**
TOTAL			**€62.178**

7.7 Connectivity

Product	Unit Price	Qnt	Total
Fastweb Unlimited Business Prime + 1TB Google Drive	€90/month + €60	1 x 26	**€2.400**
TOTAL			**€2.400**

7.8 Staff for development (people and time)

Considering our needs, we figure out that our workload won't be uniform going thought different phases of the process. Taking into consideration this aspect we plan to hire some members of the staff for limited time, such as some Game Designer, an IT Security Consultant, a Sound designer & Composer and other professional figures.

The staff must be composed of the following professionals for development time:

- Lead Game Designer - 26 months (Open-ended contract)
- Game Designer - 26 months (Open-ended contract)
- Game Designer - 6 months (CO.CO.PRO)
- Game Designer - 6 months (CO.CO.PRO)
- Lead Game Programmer - 26 months (Open-ended contract)
- Gameplay Programmer - 26 months (Open-ended contract)
- Gameplay Programmer - 26 months (Open-ended contract)
- IA Programmer - 26 months (Open-ended contract)
- Network Programmer Consultant - 6 months (CO.CO.PRO)
- IT Security Consultant - 4 months (CO.CO.PRO)
- 3D/2D Artist - 26 months (Open-ended contract)
- 3D/2D Artist - 26 months (Open-ended contract)
- Sound designer and Composer - 6 months (CO.CO.PRO)
- Help Desk – 26 months (Open-ended contract)
- Help Desk – 26 months (Open-ended contract)

For staff salaries see 7.11.4.

7.9 Staff for production stage (people and time)

When the production stage begin the team will need to acquire more professional figures:

- Story teller & Video Maker - (Paid performance)
- Business, management & Marketing - 6 months (CO.CO.PRO)
- Social Media Manager – 6 months (CO.CO.PRO)

7.10 Estimated cost

7.11.1 Unity Multiplayer

In order to use Unity Multiplayer services, we have to afford monthly costs based on: concurrent player, weight of messages exchanged, number of messages and expected utilization. This data is used by the tool of Unity Multiplayer to estimate the monthly fee for use their services.

We estimate to reach 500.000 active users per month which result in 5000 Current Player, according to the the tool, where 100 Monthly Active Players is equivalent to 1 Current Player. We estimate 20 messages per player per second where messages are 100 bytes each. About the expected utilization on average we consider plausible the default parameter of unity that estimate a 25%. Considering all these parameters:

Estimated cost per month per Unity Multiplayer	**Maximum** cost per month per Unity Multiplayer
$3,000	$12,000

Anyway we do not need to pay Unity Multiplayer for the initial development stage but only for the Alpha and Beta version, and obviously after the publication.

7.11.2 Maintenance/Insurance

Product	Unit Price	Qnt	Total
Cleaning Service	€320/month	26 months	**€8.320**
Insurance	€5.000/year	3 years	**€15.000**
TOTAL			**€23.230**

7.11.3 Advertising

Product	Unit Price	Qnt	Total
National tv advertising	€380.000	1	**€380.000**
Search engine optimization	$7.000 + $500/month	6 months	**€10.000**
Facebook ads	€714/day (reaching from 340.000 people to 890.000)	14 days	**€10.000**
TOTAL			**€400.000**

7.11.4 Staff Salaries

Position	Unit Salary	Qnt	Total
Senior Lead Game Designer	€4.439/month	26 months	**€115.414**
Game Designer	€3.058/month	26 months	**€79.508**
Game Designer	€3.058/month	6 months	**€18.348**
Game Designer	€3.058/month	6 months	**€18.348**
Senior Lead Game Programmer	€5.112/month	26 months	**€132.912**
Gameplay Programmer	€3.305/month	26 months	**€85.930**
Gameplay Programmer	€3.305/month	26 months	**€85.930**
Senior Network Programmer Consultant	€4.545/month	6 months	**€26.270**
IA Programmer	€3.305/month	26 months	**€85.956**
Senior IT Security Consultant	€6.080/month	4 months	**€24.320**
3D/2D Artist	€2.305/month	26 months	**€59.930**
Sound designer and Composer	€3.025/month	6 months	**€18.150**
Story teller & Video Maker	€10.000	Paid performance	**€10.000**
Business, management & Marketing	€7.595/month	6 months	**€45.570**
Social media manager	€5.104/month	6 months	**€30.624**
Help Desk	€2.100/month	26 months	**€54.600**
Help Desk	€2.100/month	26 months	**€54.600**
TOTAL			**€946.410**

7.11.5 Other costs

Transaction Fee

Using Google Play Services, we have to consider Google politicizes about in-app purchase. For applications and in-app products that we sell on Google Play, the **transaction fee** is equivalent to 30% of the price. We'll receive 70% of the payment. The remaining 30% goes to the distribution partner and operating fees.

Spaces

Product	Unit Price	Qnt	Total
Rent	€3000 month	26 months	**€78.000**
Desk	€150	5	**€750**
Drawer	€70	5	**€350**
Chair	€50	12	**€600**
Desk Lamp	€28	15	**€420**
Bookshelf	€104	1	**€104**
Lamp	€28	15	**€420**
Armchair	€300	4	**€1200**
Tv Support	€35	1	**€35**
Installing	€1.000	1	**€1000**
TV LG OLED 55''	€2.749	1	**€2.749**
TOTAL			**€84.879**

7.11.6 Total cost

Considering all of above, we have estimated the total cost for the development and advertising. We have also estimated the monthly cost for maintenance and development of future aspects and the TCO per user.

Details	Total
Development & Advertising	**€1.584.618**
Future development	**€50.000/€100.000 per month**
TCO per user	**€3**