Mobile game development: "Risto Räppääjä ja Sevillan Saituri"

Forsman, Kenneth Sebastian

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The main purpose of this thesis was design and development of a cross-platform mobile game with an existing franchise. The target mobile platforms were Google's Android, Apple's iOS and Microsoft Windows Phone 8.x.

The project began with studying different types of development and design methods to start developing a game project for a customer. This document will describe the various steps of game design and development and mention how to solve some problems a developer might face in a game development project.

The project consisted of the development of a 2D endless runner game for iOS, Windows Phone and Android. Starting with a study of the customer requirements, benchmarking of other successful similar games were analyzed.

Next, the game design process was established, including the concept, story and mechanics of the game, which were the blueprints in the actual development of the game. Using Unity3d as the game engine for the development work and C# for the programming language.

Game development, Unity3d, C#, Risto Räppääjä

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Terms and abbreviations

2D	2nd dimension a flat surface or image
Android	Google's mobile operating system
Apple	Apple Inc. produces consumer electronics and develops
API	Application Programming Interface
App Store	Apple's digital distribution platform
C#	Programming language
F2P	A game designed to be free to play
Frame	A single picture in animation
Game Engine	A software framework designed to create video games.
Google	Google Corporation develops Google search engine
Google Play	Google's digital distribution platform
IDE	Integrated Development Environment
iOS	Apple's mobile operating system
Java	Programming language
SDK	Software development kit
Sprite	Single image of animation
P2P	A game designed with the pay to play model
PNG	Portable network graphics
Unity3d	A modern game engine

1   Introduction

The mobile game industry is growing every year. According to a Newzoo estimate the mobile games market will overtake the console sales in 2015 see Figure 1. With the increase in the mobile games, there is a higher need for more quality games than before.

This thesis is divided into four main sections the introduction, methodology, theoretical background, the development of Risto Räppääjä mobile game, the evaluation and the conclusion. Introduction will present the company, the background and reasons for the project, objectives and the scope and limitations.

The third part will focus on the research approach and various research methods used in the project. The following part will focus on the knowledge base for the rest of the project and describe the concepts related to the project. The fourth part discusses the design and development of Risto Räppääjä mobile game, publishing of the game, the feedback we received, the evaluation and conclusion of the project.
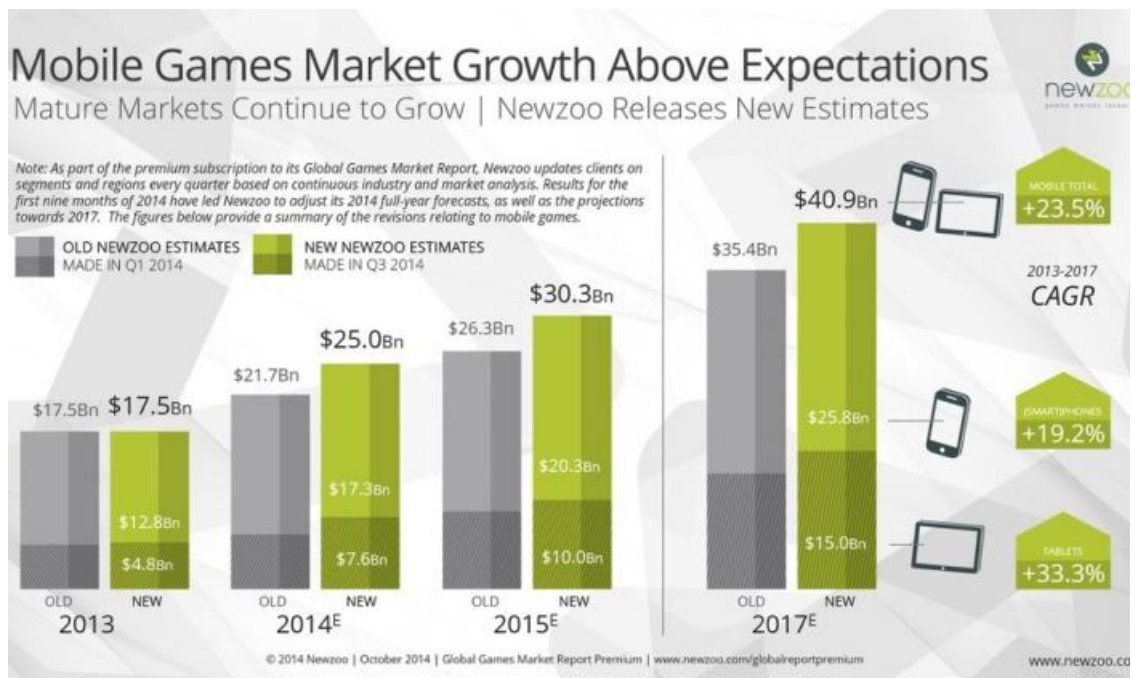

Figure 1: Mobile game market growth estimate (Newzoo 2014)

1.1 Company background

In this project there are two main companies, Artista Filmi OY as the customer and holder of the Risto Räppääjä movie intellectual property and Virgo Entertainment OY as the developer.

Artista Filmi Oyj (2014) is a Finnish movie and TV-program production company since 1994. Timo Koivusalo is the managing director and owner of Artista Filmi Oy. Timo Koivusalo has many roles in Artista Filmi such as producer, director, writer among many others. Artista Filmi have created many successful films, and is in charge of filming the famous Risto Räppääjä movies see Image 1. Artista Filmi OY mainly operates near Pori where most of the movie production studio is located.

Virgo Entertainment OY (2014) is a digital entertainment company that focuses on mobile application development, video game development and other IT project related work. Established in 2012 by Kenneth Forsman and in 2014 made into an OY. Riki Länsilahti was appointed CEO and would take charge in all business related matters. Virgo Entertainment has two offices in Finland one in Espoo in Kilo and in Pitäjänmäki Helsinki.

Image 1: Risto Räppääjä movie poster

1.2　Project background

Artista Filmi OYj approached Virgo Entertainment OY in fall of 2014 to create a mobile video game for their upcoming movie Risto Räppääjä ja Sevillan Saituri. Artista Filmi had not done this before and were not familiar with the video game industry. The video game was to focus on the movies target audience, kids from ages 5 to 15. The video game was to have a cheerful and positive look and feel with happy music, the video game would be used to promote the movie and used as a new advertisement platform for any other upcoming movies.

Virgo Entertainment OY was in charge of developing the Risto Räppääjä mobile game. Kenneth Forsman was in charge of drawing the game art and planning the game as a game director Kenneth was also the main contact person between Artista Filmi and Virgo Entertainment OY. Riki Länsilahti acted as the lead programmer and was in charge of creating the game itself and programming the majority of the game and how it would work.

1.3　Objectives

The objective of this thesis was development and implementing of a cross platform mobile game for a customer. The thesis project consist of how Risto Räppääjä mobile game was designed and developed, what sort of challenges the project faced during development and how customer feedback improved the game in some development stages and how the game was implemented using the mobile marketplace to distribute the game to mobile devices.

1.4　Scope and limitations

This thesis focuses on the design and development of Risto Räppääjä mobile game, with some aspects of publishing, update plans and expansions to the game. This thesis will also focus on the customer feedback, user experience and how it measures with other competitors with benchmarking. The final part will be a summary of the entire game development experience and if the project was a success or a failure.

2　Methodology

This thesis project was divided into research and development. To gain a better understanding of the game development processes certain methodologies had to be used.
The development of the mobile game used the waterfall development model to keep the development process as clear as possible with some aspects of rapid application development (RAD) that allowed corrections to be made that the waterfall model would not allow.

The research part used qualitative research methods to help gather information for the game development with the use of focus groups, interviews with end users, benchmarking and game design documentation.

2.1   Research methods

In September 2015 when the game design document was being created, benchmarking different games that were on the mobile marketplace was used to know what the look and feel of the game should be. The customer had given written recommendations of the content of the game but the appearance and the game play was the developer's responsibility. While benchmarking many different games were tested on many platforms but after some playtesting two games were selected based on the graphics and the game play to be used as example cases for the development.

Feature Chart	Jetpack Joyride	Rayman Jungle run	Subway Surfer	Tiny Wings
All Ages	X	X	X	X
Violence	X			
Colorful Graphics	X	X	X	X
Fun Characters		X		X
Multiple levels		X		X
Replay Value		X		
Achievements	X	X	X	X
Micro transactions	X		X	
Online features	X	X	X	
Questions				
Which game did you enjoy		X		X
Would you pay for this game		X		X
If Risto Räppääjä was one of these games which would it be				X
Which game was the best				X

Table 1: Benchmarking and focus group testing results

During the mobile game development all communication between developers and customer were done by telephone, email and Facebook (2015) conversations. A meeting was held to meet the all Artista Filmi OY staff, partners and actors of the Risto Räppääjä movie as well as a screening of the movie. This meeting also was to let Artista play a demo of the game and

get important feedback from them if the game was being developed correctly according to their expectations.

The first playtest was held in early November of 2014 with friends and family of the development team, with the knowledge from the first playtest a lot of useful information to help in the development. All the play test sessions were documented and analyzed to be used for the project. During the fall of 2014 many emails and skype conversations were held with the customer to make sure that the art style and the characters were created according to their standards more of this will be covered in the Game art section of this thesis.

To find out the best practice of game development and to avoid making the same mistakes as professionals and other game companies I had to study a lot of game development books and web sites. This would help me in making good design choices and development decisions to keep the project going and ensuring future expansions would be available. Analysis was also used to see if certain design choices were compatible with current best practices.

With the help of benchmarking, a research method that allows improvement by comparing one product to a similar product. While benchmarking we discovered many competitive games on the market places. The idea of benchmarking is to learn from already existing games and what makes them the best and use similar yet improved features in your own game (Gibson, J. 2014).

3   Theoretical background and knowledge base

This chapter contains several key concepts related to the project and are explained to provide a deeper understanding and the choices that had to be made. To understand the project completely some of the topics mentioned are needed to get the full picture of the project.

3.1   Pre-production

The next step after the concept and idea phase is pre-production phase see Figure 2. Pre-production is the phase where all the designers, programmers, producers and writers come together to create the storyboarding and putting together a comprehensive design document detailing the game's goals, level designs, gameplay mechanics and overall blueprint (Moore, M. 2014).

Depending on the type of game that is being developed can cause some limitations to the pre-production team. When a game is being developed on a completely original concept, the pre-production team does not have limitations and can create straight from their imagination.

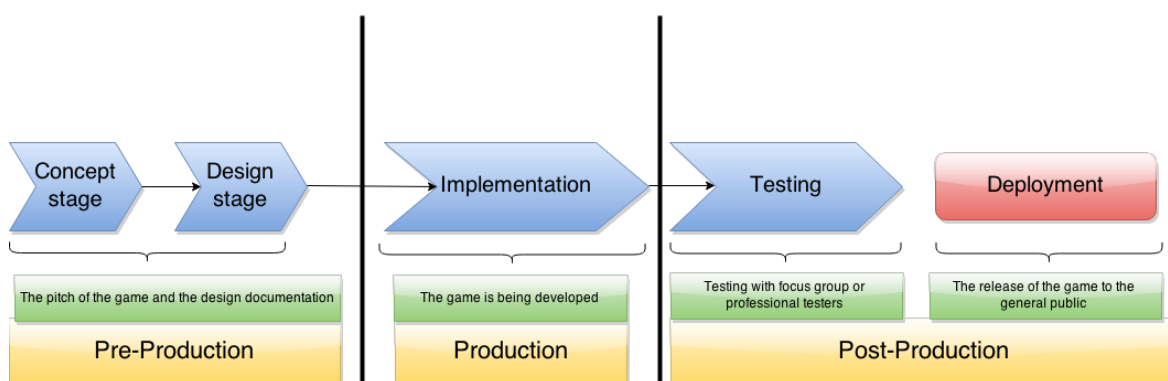The story and characters are only limited by the imaginations of the people on the pre-production team.

Figure 2: Illustration of entire game development process

When a game is being developed based on a licensed franchise, the creative freedom is limited to the realm of the franchise. If a game is being developed based on Disney´s Mickey Mouse (2015), there will be restrictions with what the characters can do or say. The company who owns the license to the franchise usually give guidelines that instruct precisely what the characters in the game must look like.

One of the phases in the pre-production, is writing of a broad design document for the game. The design document will also include the designers overall blue print for exactly how the game will be played, what each menu or screen in the game will look like, what the controls for the character or characters are, what the game's goal is, and the rules for how you win/lose in the game, and maps of the different worlds or levels within the game (Gibson, J. 2014).

This is the part for designers and software developers to decide what happens on the screen when a specific button on an input device is pressed. The team also have to decide what can and cannot be interacted with, what scripted events occurs, and how the NPC (non-player controlled) characters react to the players choices. This is so that the programmers and artists will be able to know what needs to be coded and created. The parties involved must also take into consideration the technical limitations of the platform that the game is being created on and, especially on mobile devices and tablets where the hardware is very limited.

3.2   Game design

Game design is another part of the pre-production phase. The main focus of the game design phase is to describe how everything works, reacts to player made decisions, how the controls

work and how everything should look. The goal of the game designer is to provide players with the opportunity to make meaningful decisions in relation to playing the game. Before production can begin, the development team produce the first version of a game design document including most of the ideas from the original pitch of the game.

The design document describes the idea of the game and how the game should be played in detail. This can include initial sketches of various aspects of the game. When the design document has content of the game so that a playable prototype can be developed from a section of the game. Design document is a living document throughout the development often changed weekly or even daily (Tekinbas, K. & Zimmerman, E. 2003).

3.3   Designing for end users

User-centered design approach is a good way to design a product that the end-user will enjoy. The main difference between UAD and other product design methods is that user-centered design tries to enhance the product around the users on how they can, want, or need to use the product, rather than forcing the users to change their behavior to fit the product.

In some cases player studies used gameplay situations that were presented to the focus group in a comic strip format. After analysis the key information and summarizing it into design requirements so that they could be used in the game design. A player-centered game design approach can be hard work and is difficult, but the information gathered is used for inspiration for the design. For this reason the end-users should be involved in product development to give critical feedback to the developers, this way products can be tailored to the experience and expectations of the end-user rather than the development staffs. (Ermi, L. & Mäyrä, F. 2004).

3.4   Game development

Video game development is the process of creating a video game. Game developers take on a development project for a video game, the projects vary from a single person to a hundreds of people working on the same project. The most common way to start video game projects is for a publisher to fund a development team for several years while the game is being developed. Independent games studios can take less time and can be produced cheap video games usually referred to as Indie games. The indie game industry has seen a rise in recent years with the growth of new online distribution systems and the mobile game market.

Compared to PC or console games, mobile games are much faster to develop. Mobile games are commonly published as early as possible, sometimes after five months of development, in

order to see how they compare to competitors or to see the end-users reaction. While some mobile games can be done by a single developer, large game studios can have up to 100 people working for a single project such as Rovio's Angry Birds (2015).

3.4.1 Game engine

A game engine is a software framework designed for the creation and development of video games. Video game developers use them to create games for video game consoles, mobile devices and personal computers.

3.4.2 Unity3d

Unity is a multi-platform game development tool created by Unity Technologies. Unity 5 is the latest version and it supports the following platforms PC, consoles, mobile devices and websites. "Keep your code working across all the platforms and many devices. For platform specific tweaks, do runtime platform checks, employ code pre-processors and integrate tightly with platform specific code and plugins." Unity has a large community and great number of tutorials, courses and items in their "Asset store". Developers can sell 3D models, editor extensions, audio and other types of content in the Asset Store. Unity 3D has a free version with limited functionality. Unity Pro offers more options in the Unity Editor and unlocks more features, there is a yearly subscription at 1128€ incl VAT or a onetime license fee 1875€. (Unity Technologies 2015, cited 10.4.2015.)

3.4.3 Programming language C#

The criteria for the programming language was object orientation and compatible with most systems. C# was selected for the project, Java script was the alternative selection but for mobile programming it was not a good decision. C# is a programming language about strong typing, imperative, declarative, functional, and generic and object orientation. Microsoft developed C# within its .NET initiative and later approved as a standard. C# is one of the most popular programming languages for the CLI (common language infrastructure) and other development needs. C# is planned to be a simple, modern and for all object oriented programming.

3.4.4 2D Graphics and sprites

In computer graphics, a sprite is a two-dimensional image. Sprites are commonly used for animating movement of characters and other objects in video games. Sprites are also used for mouse pointers commonly referred to as cursors and for writing letters to the screen.

In video game development using sprites in a 3d environment is referred to as billboarding. A billboarding sprites is a flat 2d image that is position to always face the camera, this was very common in the 1980s to early 2000 video games. The advantage in billboarding is performance and a visual advantage. Because 3d rendering has advanced since the early 21st century, most 3d rendering engines can process sprites much faster. For this reason it is no longer wise to use flat 2d images, but instead use 3d objects to achieve the same performance and visually much better than any 2d image. Commonly sprites are desirable because it can be made visually to look realistic and to help create phenomena such as fire and smoke.

3.4.5   Animation

Computer animation is the digital successor to stop motion techniques used in traditional animation with 3D models and frame-by-frame animation of 2D illustrations.Animations created with computers is more controllable than other physical based animation techniques, such as constructing miniatures for effects. With the help of computers the creation of these effects could not be possible using any other technology.
Computer generated animation allows artists to produce such content without the use of actors or expensive set pieces.Modern computer animation use 3D objects and are animated using a virtual skeleton and special software. 2D computer graphics are still used and the main benefit low bandwidth and faster rendering in real time. Creating the illusion of movement for animation, a single image is displayed on the screen of the computer and replaced by a new image that is similar to it in a blink of an eye this is referred to as frames per second and the most common amount of frames is 24 to 30.

For 3D animations, 3d objects are created on the computer using software and 3D figures are rigged with a virtual skeleton. 2D animation is created when separate images are put on transparent layers used with a virtual skeleton or without incase of traditional 2d animation. The parts of the object to be animated limbs, eyes, mouth, clothes are moved by the animator on key frames in the animation software.

3.5   Quality assurance and product testing

Quality assurance is one of the key parts in game development, although there is no set standard methodology for quality assurance. Developers and publishers each have their own way of doing it. Depending on the size of the development staff or company there might not always be a QA department or anyone who is responsible for the quality testing.

Game testing is one of the critical part in game development. Testing for quality control of video games ensures that the product will meet certain standards and helps eliminate potential problems early on. Testing software or any interactive entertainment software requires high technical expertise, analytic competence and evaluation skills. Early in the game development when the game approaches an early playable state commonly referred to as alpha stage. The testing team focuses on daily feedback for new additions to the code. During the testing phase a lot of mistakes happen sometimes features are reported as bugs even if they are not and sometimes programming team fails to fix issues that are reported early on during testing.

Developers send regularly exclusive versions of the game to the testing team. The team start to play the game to find glitches and errors in that could make it unplayable or if there is bad design in the levels. Testing requires creativity while playing the game to find glitches and bugs. For some bugs the documentation is not so difficult, but many require detailed description so a developer can find the bug or recreate the situation in the game that caused the error. Concurrency control is a key part during testing, this helps avoid reporting the same bug constantly. Many video game companies separate technical requirement testing from functionality testing altogether since a different testing skillset is required.

4   Development of Risto Räppääjä mobile game

The following chapter will discuss the development of Risto Räppääjä ja Sevillan Saituri the mobile game developed for Artista Filmi Oy. I will talk about the development phase by phase following the waterfall model in chronological order. I will explain design and development choices of the mobile game. The development choices were based on best practice and findings of the various research methods.

Development of the game started in October 2014.

4.1   Customer requirements

In September 2014 the concept stage had started with gathering the requirements from the customer. This was done by telephone conversation, skype and email messages with Susanna Palin from Artista Filmi, who was the assistant director of the Risto Räppääjä movies. The original game requirements can be found in Appendix 1. More detailed information about the requirements was collected during the concept stage. After the requirements were gathered we mapped the target audience and the game requirements.

"Kids always want what is made for an audience older than their own age group. For example, an 8 - year- old kid wants to play a game that is made for a 10 - year- old kid. A 10 - year- old kid wants to play a game that is made for a 13 - year- old kid. A 13 - year- old kid wants to play a game that is made for an 18 year old. Many kids aren't interested in playing games directly targeting their age range."(Rogers, S. 2014)

Risto Räppääjä mobile game is for children age 5 and up the most important thing for the game was that it had to be fun. This is done by creating colorful and happy characters, colorful level design, easy controls and happy music. The main feature of the mobile game was to allow the end users to purchase movie tickets straight from the mobile game, this was accomplished by creating a link to Finnkino (2015) web site. The mobile game would be used as a promotional platform for other movies as well Mrs. Palin asked that the game needs to have a trailer of the movie and also links to their social media pages.

The game play was Virgo Entertainments responsibility to make enjoyable, the requirements were that there would be two playable characters Risto Räppääjä and Nelli Nuudelipää. The game itself had to be an infinite runner game, where there is no ending the world loops forever until the player either stops or dies. The mobile platforms selected for the game was Android, Windows Phone 8.x and iOS for apple devices. The release date for the game was set to mid-January 2015 so that the mobile game would be advertised in cinemas and television to get a lot of downloads. Artista Filmi had a lack of experience with the mobile marketplace they left the task to Virgo as well, for this an update plan had to be made and the details can be found in later chapters of this thesis.

4.2   Choosing the development method

The development team chose for this project to use the Waterfall model with some features from rapid application development (RAD). Waterfall model is a simple development life cycle model and for this reason it is easy to use and implement. The development of the game is divided into pieces and the development is focused on each piece in order, when one piece is completed the development of another piece can begin

The waterfall model used in this game development project is shown in Figure 3. Waterfall model is not always the best option for development, once a piece has been completed and the development for the next piece has started, the team cannot revisit nor change anything for previous pieces. For this reason rapid application development was chosen to compliment the waterfall model.

This would allow the development team to quickly prototype features from each piece before completing it. RAD allowed the developers to try many alternative ways to completing a task since it is not dependent on lots of planning, this is best suited for graphical projects that deal with graphical user interfaces (Mürch, R. 2012).
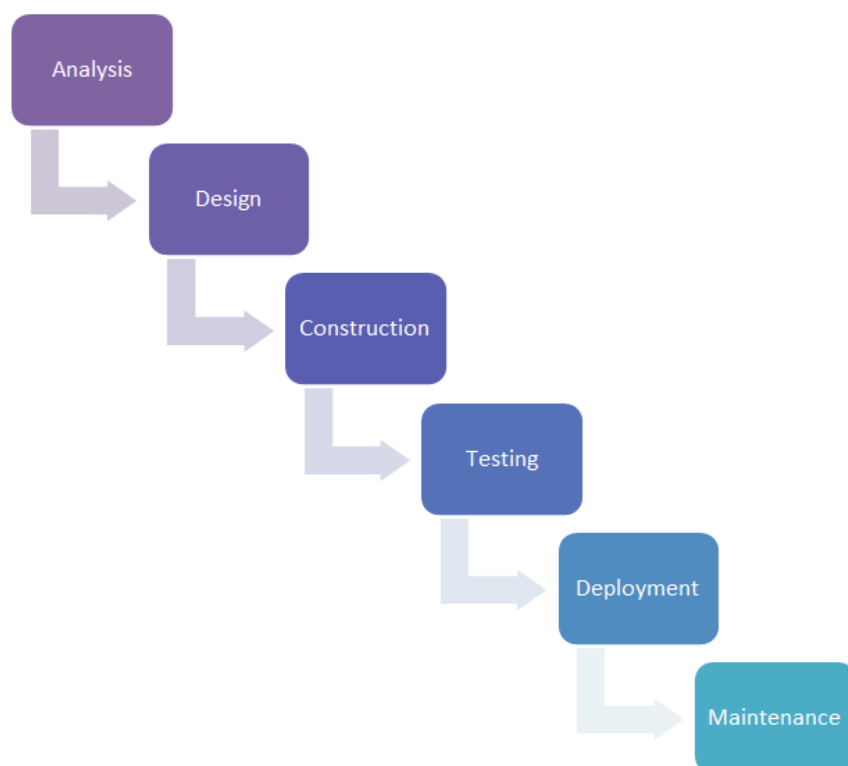
Figure 3:Waterfall development method

4.2.1   Choosing a game engine

During the planning phase we had to choose what game engine we would use for the development of Risto Räppääjä mobile game. The game engine had to support all platforms and be flexible to allow future expansion on the mobile game. A comparison between game engines was made for full comparison see Appendix.

For the development of Risto Räppääjä we had chosen to use Unity3d for its cross-platform support and cheap license fees. Unity3d has many benefits and features that would support us in the development of the mobile game. The key benefit of having multiple platform support, was that playtesting and showing game demos to Artista Filmi become much easier. Instead of pre-releasing the game on the mobile market place it could now be hosted on a web site and played via the Unity web plugin. A full list of Unity3d features is in the Appendix.

4.3 Planning the game

This chapter discusses the planning of the development project. The design phase included benchmarking infinite runner games for mobile devices. This was to view the games from a player perspective of the feel of the gameplay and what features other developers had added to their game to make it more enjoyable. When the planning stage had been completed the workload had to be divided equally into categories and completed one at a time.

The development was split into Art which contained all graphical work, the menus, the cinematics, splash screens and animation work for the game. The programming of the game included player behavior, objectives, scoring, spawning and deleting of game objects, and creating the entire work of the game.
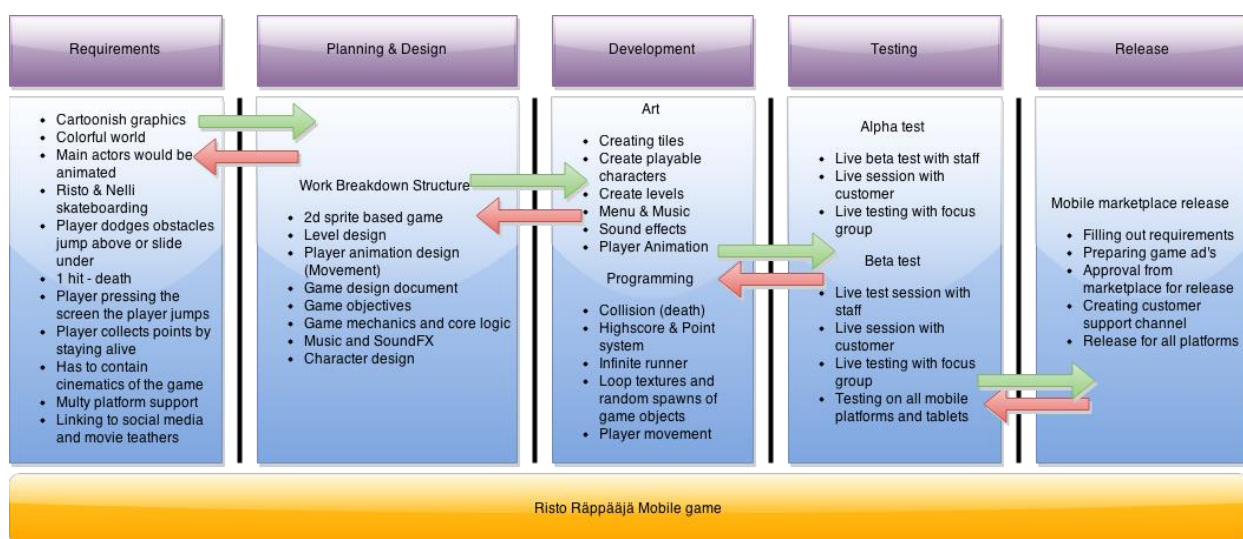

Requirements	Planning & Design	Development	Testing	Release
• Cartoonish graphics • Colorful world • Main actors would be animated • Risto & Nelli skateboarding • Player dodges obstacles jump above or slide under • 1 hit - death • Player pressing the screen the player jumps • Player collects points by staying alive • Has to contain cinematics of the game • Multy platform support • Linking to social media and movie teathers	**Work Breakdown Structure** • 2d sprite based game • Level design • Player animation design (Movement) • Game design document • Game objectives • Game mechanics and core logic • Music and SoundFX • Character design	**Art** • Creating tiles • Create playable characters • Create levels • Menu & Music • Sound effects • Player Animation **Programming** • Collision (death) • Highscore & Point system • Infinite runner • Loop textures and random spawns of game objects • Player movement	**Alpha test** • Live beta test with staff • Live session with customer • Live testing with focus group **Beta test** • Live test session with staff • Live session with customer • Live testing with focus group • Testing on all mobile platforms and tablets	**Mobile marketplace release** • Filling out requirements • Preparing game ad's • Approval from marketplace for release • Creating customer support channel • Release for all platforms

Risto Räppääjä Mobile game

Figure 4: Project lifecycle

4.3.1   Game art

During the planning phase together with Artista Filmi we had to agree on what the characters and the game world would look like. Artista had set a requirement that the game was to be colorful and the characters cartoonish and cute. Virgo had asked in an email conversation if already existing content should be used as reference such as books or posters, but this was not acceptable by Artista Filmi. The content was supposed to be new and original.

"And ultimately, artists work with a sense of intentionality. They understand their medium thoroughly, and they seek not to imitate existing 31 Greg Costikyan: I Have No Words & I Must Design work, or improve on it incrementally – but to conceive the effects they want from the beginning of a project, to understand what techniques lend themselves to those effects, and to execute the work so that each and every aspect of it supports the desired goals"
(Citation Costikyan, F. 2002)

The process to create Risto and Nelli for the game was long and hard and had to be redone many times during development phase. The characters appearance was not only Artista decision to make but also Sinikka and Tiina Nopolas decision as the owners of the Risto Räppääjä trade mark. See image 2 for the final version of Risto Rääppääjä and Image 3 for the artstyle that was suggested by the owners of Risto Rääppääjä.

Image 2: Risto playable character made by Kenneth Forsman

Image 3: Nopola sketch of Risto and Nelli

Image 4: Different houses used in the background made by Kenenth Forsman

During the creation of the game the main menu and user interface had to be designed many times. The original colors of the main menu and user interface was orange and yellow but according to the test users this was too bright and not a cheerful color to use.

After studying color theory and selecting a new color template and better icons to a final menu and user interface was created for Risto Räppääjä game. See Image 5 for the original concept and Image 6 for the final menu.
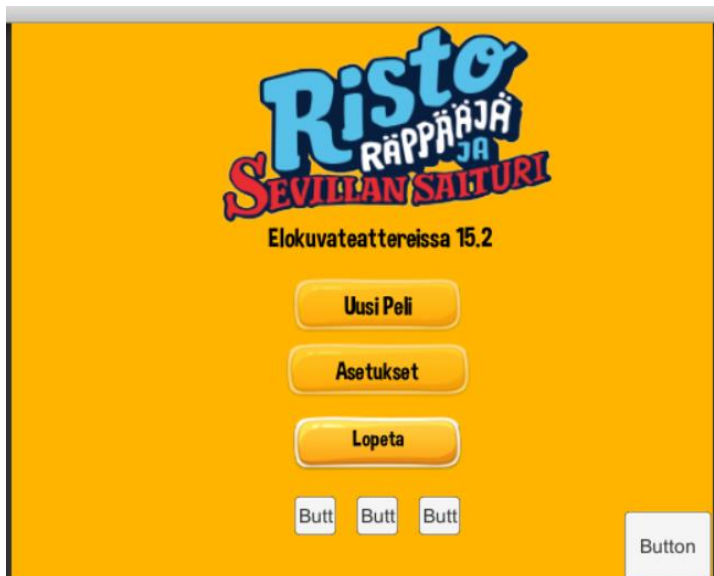

Image 5: Original plan for the main menu date of the movie was incorrect

Image 6: Final menu

4.3.2   Programming the game

The programming tasks were done by the lead programmer of the project. During the design phase the team decided to create the game based on an existing template to speed up the process. This decision saved time on programming of the game, however the risk in this was that errors and bugs had to be investigated and would take a lot of time to fix.

The programming of Risto Räppääjä mobile game was split into two categories the main game logic and the boot and menu of the game. The main logic of the game consisted of the player movement, player controls and the drawing of game objects created in a loop as shown in Figure 5.

Figure 5: How the game loops

The booting of the game contained the post screen, cinematic video, music and the main menu. The boot order in the game can be seen in Figure 6.
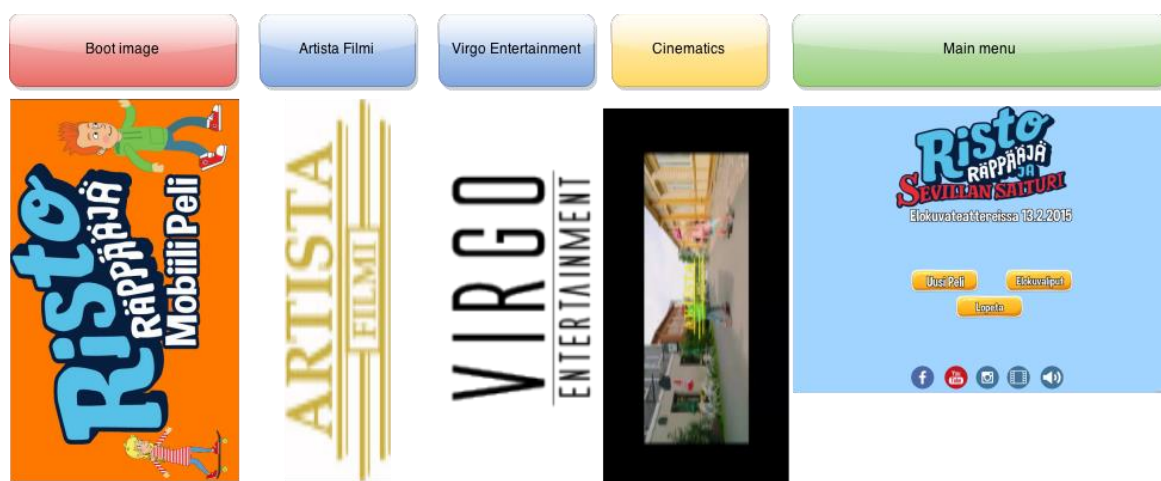

Figure 6: Booting of the game in sequence

To achieve this boot sequence a simple script was created in C#.
First all variables had to be declared.

```
1.    public int guiDepth = 0;
2.    public string levelToLoad = ""; // this has to correspond to a level (file>build settings)
3.    public Texture2D splashLogo; // the logo to splash;
4.    public float fadeSpeed = 0.3f;
5.    public float waitTime = 0.5f; // seconds to wait before fading out
6.    public bool waitForInput = false; // if true, this acts as a "press any key to continue"
7.    public bool startAutomatically = true;
8.    private float timeFadingInFinished = 0.0f;
```

The next step in the code was to enable all the variables to be changed in the editor as well as declaring what they do.

```
1.    public enum SplashType
2.        {
3.            LoadNextLevelThenFadeOut,
4.            FadeOutThenLoadNextLevel
5.        }
6.        public SplashType splashType;
7.
8.        private float alpha = 0.0f;
9.
10.       private enum FadeStatus
11.       {
12.           Paused,
13.           FadeIn,
14.           FadeWaiting,
15.           FadeOut
16.       }
17.       private FadeStatus status = FadeStatus.FadeIn;
18.
19.       private Camera oldCam;
20.       private GameObject oldCamGO;
21.
22.       private Rect splashLogoPos = new Rect();
23.       public enum LogoPositioning
24.       {
25.           Centered,
26.           Stretched
27.       }
```

The code needed an image that would gradually fade in for a cinematic effect, after the image was displayed on the screen it would gradually fade out until it was no longer visible and then the next image or scene would load up.

To switch scenes I created a script.

```
1.    public class level1 : MonoBehaviour {
2.        public string levelToLoad = "";
3.        // Use this for initialization
4.        public void OnClick()
5.        {
6.            Application.LoadLevel (levelToLoad);
7.        }
```

```
8.   }
```

This script would look from Unity scene manager the name or number of a specific scene you wanted to load up. I decided to use the names of the scenes since they did not change, the number would change when new scenes were created. For the cinematics I tried using many different scripts but got none of them to work.

```
1.   function Start () {
2.       Handheld.PlayFullScreenMovie ("StarWars.mp4", Color.black, FullScreenMovieControlMode
     .CancelOnInput);
3.     }
```

This script was suggested by Unity but it did not work, in the end we decided to purchase a mobile movie package from Unity asset store. After the cinematic had been added, our testers informed us that it was not practical to wait 2 minutes and 30 seconds every time you started the game because of the cinematics. To solve this waiting issue I created a skip button during the cinematics

```
1.   public class skip : MonoBehaviour {
2.
3.           // Use this for initialization
4.       IEnumerator Start () {
5.           yield return new WaitForSeconds(148);
6.           Application.LoadLevel (3);
7.       }
8.
9.     }
10.
```

The skip button would fade in after 5 seconds of the cinematic and if pressed it would load the next scene.

For the social media buttons I had created a script to open the social media and ticket web sites.

```
1.   public class instagram : MonoBehaviour {
2.       public void OnClick() {
3.           Application.OpenURL("http://instagram.com/ristorappaaja");
4.       }
5.   }
```

4.3.3   Game flow

Risto Räppääjä is a fast paced endless runner that focuses on movement based abilities. Players must make decisions with good reflexes in order to make their way through a hazardous city environment where every run has randomized obstacles and patterns.

"There can be no game without a struggle. A game requires players to struggle interactively to-ward a goal." (Greg Costikyan)

The concept of Risto Räppääjä game is very straight forward, you run until you die. Despite its simplicity, Risto Räppääjä is an end-less running game which are among the most popular currently in the mobile app stores. Endless running games are designed differently but technically all work with the same principle the player character has limited movement while random obstacles spawn in different patterns for the player tries to navigate and survive.
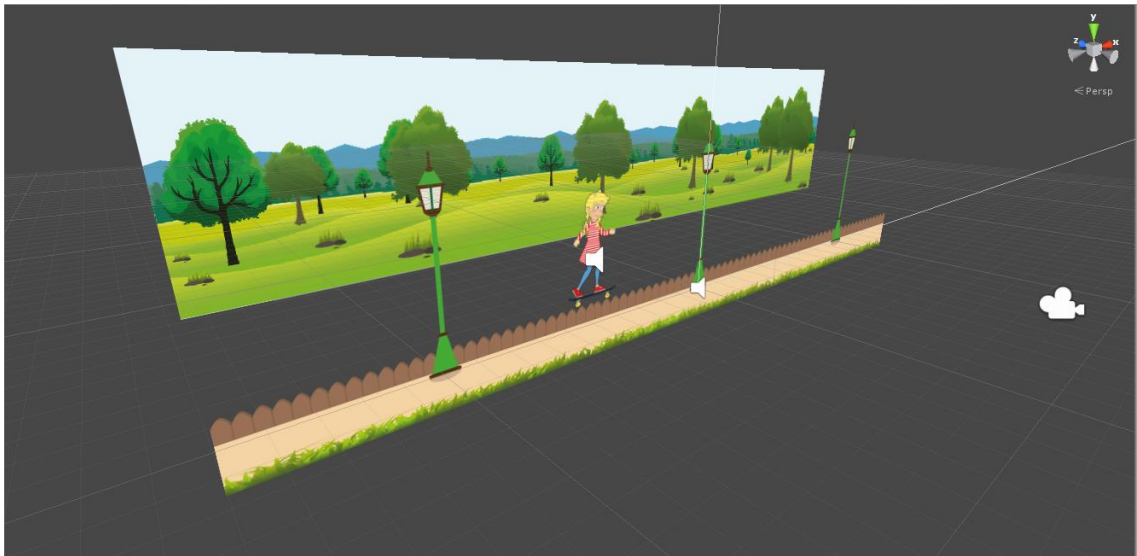

Image 7: Side view of an endless runner game

The objectives of an endless runner game is simple, there is no ending goal. The objectives of the game is to collect tokens to gain points while getting as far as possible to increase your score. There are a variety of hidden objectives an endless runner can offer such as unlocking levels or new playable characters, but these goals are cosmetic and do not affect the game-play at all.

4.3.4   Key features

Making a good game requires some good features to keep it interesting. During the planning phase Leblanc's taxanomy was used as a guiding tool to help plan for the development. Leblancs taxanomy focuses on 8 different categories to help guide developers in making a more enjoyable experience for the player. The categories are sensation, fantasy, narrative, challenge, fellowship, discovery, expression, and masochism. Each category is equally important in making a great game (Costikyan, F. 2002).

The main categories for Risto Räppääjä mobile game was sensation and fantasy. The game was created to be a marketing platform for Risto Räppääjä movies, and for this reasons not all categories could be used.

The key features of Risto Räppääjä game was a cinematic trailer, colorful characters, existing brand, social media features and addictive music and sounds.

4.3.5   Sound and Music

During the development of Risto Räppääjä the development team and Artista had a meeting to discuss the progress of the game development, one issue was raised and that was the sound effects and music. Virgo entertainment wanted to use sound from the movies, but Artista had an idea to use the voices of the actors and they would provide the music for the game.

"audio, music, sounds effects, and voiceovers in a game isn't game play, although the audio certainly enhances the ambience of the world and provides great feedback."
(Citation Moore, M)

Following the rules of game design we added the sound effects provided by Artista to the game but noticed that they did not fit the game style and could not be added to the final product, but were stored for future updates.

To create custom sounds for Risto Räppääjä game I used an online tool called Bfxr (2014) to create some sound effects for the game but were not implemented into the game release.
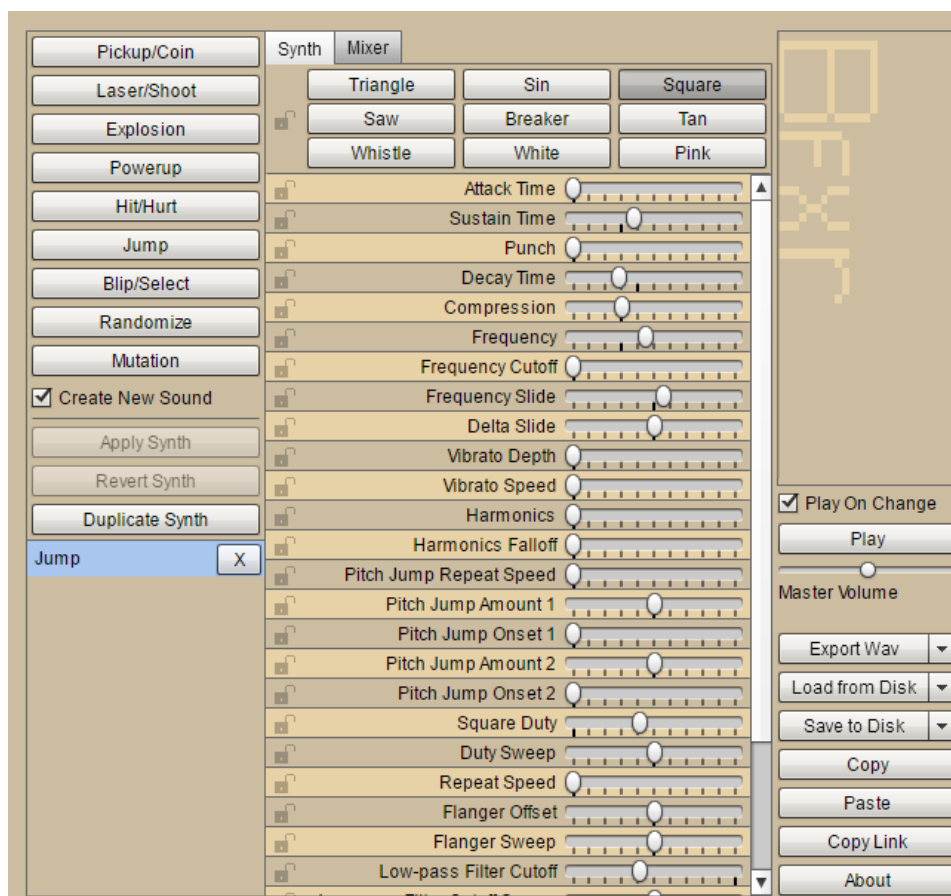
Image 8: Using Bfxr to create jump sounds

4.4   Publishing the game

When the development of Risto Räppääjä was complete the release of the game started. During a face to face meeting with Artista, they mentioned that a marketing firm called Dingle OY would be in charge of creating and advertising of the game once it had been released on all marketplaces.

The first and second release was done on Google Play and Microsoft Store. Apples App store was the most difficult to release due to the strict requirements and peer review of each app and game that would be released, the average waiting time was over 2 weeks, the average waiting time for the other platforms was 1 to 2 days. Currently 25 of May 2015 the game is yet to be released on IOS even completing all peer testing and reviews.

The main differences in the mobile marketplace requirements can be found in the appendix.

Date	User	Status
February 27, 2015 15:52	Apple	Pending Developer Release
February 27, 2015 13:18	Apple	In Review
February 21, 2015 11:16		Waiting For Review
February 20, 2015 15:22	Apple	Rejected
February 20, 2015 14:08	Apple	In Review
February 05, 2015 07:49		Waiting For Review
February 02, 2015 15:11		Prepare for Submission

Image 9: Apple Appstore version history (emails have been removed from image)

4.5   Testing

The most important part of any game development process is the testing phase. Game testing plays a huge role in the development cycle because it allows for designers to test their own work to try and find flaws and critique their own work.

"As a game designer, the first and last play tester of the games you design will most likely be you. You will be the first person to try out each of your ideas, and you'll be the first person to decide whether the game mechanics and interface feel right." (Citation: Gibson, J. 151)

During the development of Risto Räppääjä game there were many playtest and prototyping sessions held. At the beginning of the development phase to try and find the right look for the game, at the middle a playtest to get a feel of the game and to know that the game was developed correctly and lastly after every update playtests had to be made to find any new bugs in the game. See image 10 and 11 for a before and after example for play testing.

Image 10: Final version of a level and playable character during playtest

During the first release of the game we received a lot of feedback from end users on Google play regarding the instructions of the game being unclear. The original design of the game had players pressing the left screen to jump and the right side of the screen to gain a more movement speed to make better jumps.

To fix the unclear instructions I created a jump and speed button on the lower part of the screen for the player and made the UI scale according to the players mobile screen size.

Image 11: New jump and speed buttons added after feedback.

4.5.1   Testing on different platforms

After the first version of Risto Räppääjä was complete, we had to start device testing of the game. One of the main requirements for the Risto Räppääjä game was that it had to be playable on all mobile platforms.

We started with Android and IOS devices and found that they were identical had because Unity3d had full support for these devices we knew that the same updates would work on these devices without further device testing. However because Unity did not have full support for Windows Phone 8.1 I created a separate version of the game that was only playable on Windows Phones, this version of the game had some limitations such as there is no cinematic trailer.

After all the differences were separated all play tests had to be done on Windows Phones to see if new features could be added or if they were only exclusive to IOS and Android devices.

4.5.2   Customer satisfaction

After the games initial release, we immediately started collecting user data and monitoring reviews. During the initial launch of the game we received mix messages from the end users mostly 20 to 30 year olds giving negative feedback based on the trademark Risto Räppääjä but no actual gameplay related feedback, while others commented with 5 star ratings.

After a few days we started receiving actual gameplay related feedback but we received no mobile data or crash reports to clarify the problems of the end users. See image 12 and 13 for reviews and ratings.
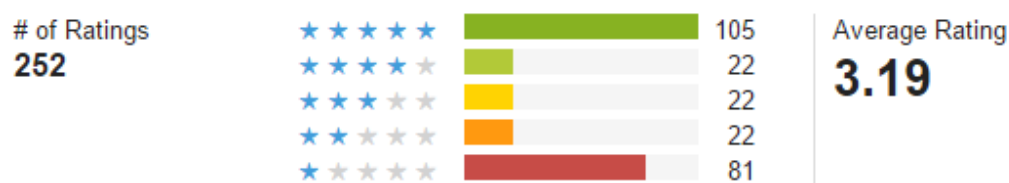

Image 12: Google play user review score 25 May 2015.

After a few months of receiving no critical feedback and no feedback I started to reply to the end users messages to contact Virgo Entertainment via email to get a better understanding what the problem of the game was. See appendix for general response message.
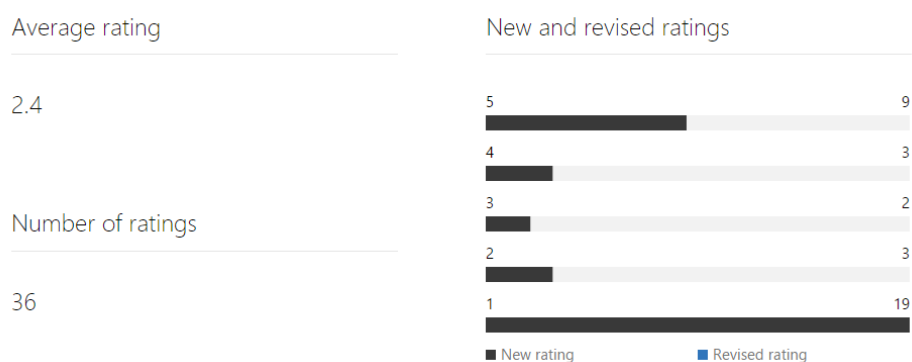
Average rating	New and revised ratings	
2.4	5	9
	4	3
	3	2
Number of ratings	2	3
36	1	19
	■ New rating ■ Revised rating	

Image 13: Windows Store user review score 25 May 2015.

4.5.3   Collecting and analyzing feedback

The last phase in Risto Räppääjä development was running parallel to the initial release which was the quality assurance testing (QA), the process was handled by the development staff, and the end user feedback. The QA testing was the most critical part of testing and implementing and requires the development staff to look at their product from a new perspective.

"As with everything in design, your ego has no place in a playtest. Listen to the feedback that play testers are giving you, even (or possibly especially) if you disagree with it. This isn't the time to defend your game; it's the time to learn what you can from the person who is taking time out of her day to help the design improve." (Citation: Moore, J. 154)

The gathering of feedback is an endless loop, after the release of the game the data is gathered and analyzed to help prepare for a fix, or if there is a need to add more game content. Image 14 illustrates the process of the feedback and review process for updates.
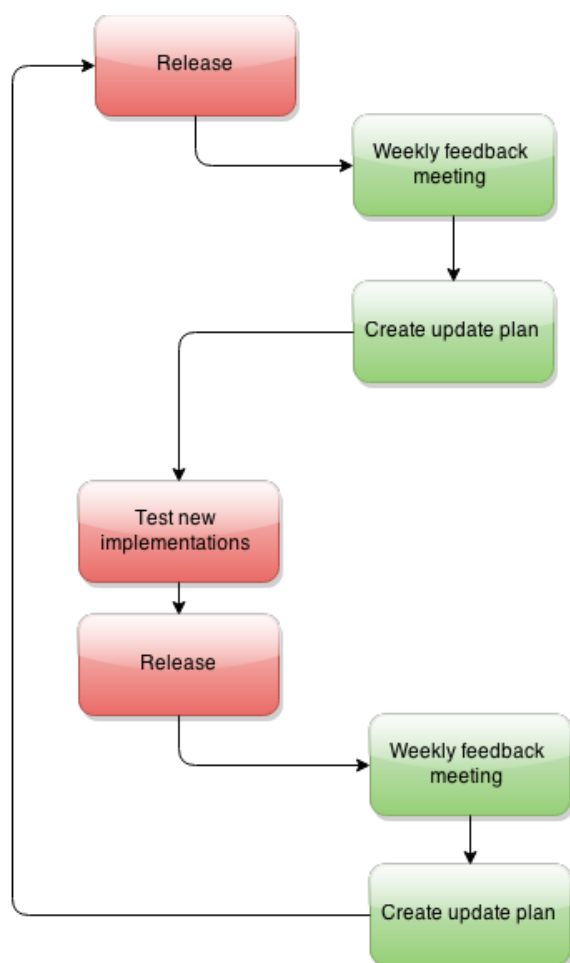
Image 14: Process of update, testing and pushing a new release

5 Evaluation

The game has been released on 2 out of 3 platforms and is still collecting data and being up-dated and improved. The game can be downloaded and played by anyone with an Android device or Windows Phone 8.x smartphone. Because the IOS version of the game is still not released this thesis cannot give a complete evaluation on the development project. During my work in Virgo Entertainment I had informed Artista Filmi about potential updates in the future to the game to increase its replay value and add more content to make it enjoyable. I in-formed them that my replacement would take over the development of the game completely and see to it that the game was updated and published on all platforms.

The main goal of the Risto Räppääjä game was to increase the awareness of the new Risto Räppääjä movie and for the game to be used as a marketing platform to reach new audienc-es. Artista Filmi wished that the analytical data would be shared with their marketing team

Dingle OY to help study the customers and measure the success of the game as a marketing platform. Unfortunately these updates will be added in the near future. Because Artista Filmi will be creating more movies about Risto Räppääjä in 2015, the reusability in the initial investment of the Risto Räppääjä game still exist and can be used to promote the new movie and the others yet to be released. In a telephone conversation with Artista Filmi the development of the game has been good and certain goals have been reached while others have yet to be completed. Artista Filmi is yet to be fully satisfied with the investment of the project until all requirements are met.

6   Conclusion

I believe that the development of the Risto Räppääjä project was successful while the release, testing and updating of the game is not yet completed, due to Artista Filmi not being satisfied. However Virgo Entertainment will carry on developing and updating the game without me and hopefully complete the game I helped to create and design, even if some aspects of my design were not added to the game. For the game and project to be completed the following areas have to be sorted out, IOS release, adding more content and new features to the game, adding more interactions with the players, adding achievements and a competitive online leaderboard to make the game more challenging and giving it a goal. The updates mentioned are already partially implemented in the game, they have simply not been activated or the scripts added to game objects to be visible by the player. I am sure Virgo Entertainment can carry out these tasks without me and am looking forward to the final version of the game of all platforms.

References

Artista Filmi. Accessed 20 May 2015. www.artistafilmi.com

BFXR. Accessed 10 Januart 2015. http://www.bfxr.net/

Costikyan, F. 2002 I Have No Words & I Must Design:
Toward a Critical Vocabulary for Games. Accessed 1 Marh 2015.
http://www.digra.org/wp-content/uploads/digital-library/05164.51146.pdf

Disney. Accessed 20 May 2015. www.disney.com

Engels, R., Granic, I. & Lobel, A. 2014. The Benefits of Playing Video Games. Article from The American Psychological Association. Accessed 9 February 2015.
http://www.apa.org/pubs/journals/releases/amp-a0034857.pdf

Ermi, L. & Mäyrä, F. 2004. Player-Centred Game Design: Experiences in Using Scenario Study to Inform Mobile Game Design. Article from University of Tampere. Accessed 9 February 2015. http://www.gamestudies.org/0501/ermi_mayra/

Facebook. Accessed 30 May 2015. www.facebook.com

Finnkino. Accessed 30 May 2015. www.finnkino.fi

Fullerton, T. 2014. Game Design Workshop: A Playcentric Approach to Creating Innovative Games. 3rd Edition. Natick: A K Peters

Gibson, J. 2014. Introduction to Game Design, Prototyping, and Development: From Concept to Playable Game with Unity and C#. 1st edition. Indianapolis: Addison-Wesley Professional

Keith Stuart. 2014. Accessed 10 March 2015
http://www.theguardian.com/technology/2014/oct/23/mobile-games-revenue-overtake-consoles-2015#img-2

Moore, M. 2014. Basics of Game Design. 1st Edition. Natick: A K Peters

Murch, R. 2012. Rapid Application Development Lifecycle- RAD - The Complete Guide: Amazon Digital Services, Inc.

Rogers, S. 2014. Level Up! The Guide to Great Video Game Design. 2nd Edition. New York: Wiley.

Rovio OY. Accessed 20 May 2015. www.Rovio.fi

Tekinbas, K. & Zimmerman, E. 2003. Rules of Play: Game Design Fundamentals. Cambridge: The MIT Press.

Peterson, S. 2013. Mobile to be "primary hardware" for gaming by 2016. Article from GamesIndustry.biz. Accessed 9 February 2015.

http://www.gamesindustry.biz/articles/2013-04-30-mobile-to-be-primary-hardware-for-gaming-by-2016

Virgo Entertainment. Accessed 30 May 2015. www.virgo.fi

Images

Figures

Tables

Appendixes

Appendix 1: Risto Räppääjä game requirements

RISTO RÄPPÄÄJÄ JA SEVILLAN SAITURI
AIKATAULU: Peli nettiin viimeistään 13.1.2015 (kuukausi ennen ensi-iltaa).

Sisältö:
- Peli pitäisi toimia mainosalustana – leffan mainoksena!

Aloitusvalikko:
- Kun pelin appsin avaa niin siihen ilmestyy aina mainos elokuvastamme, jota ei voi ohittaa.

Linkit:
- Making off pätkiin
- FB
- Instagramiin linkki
- elokuvan traileriin linkki
- Yhteistyökumppanien sivuille linkkejä?

Ulkoasu:
- Sarjakuvamainen grafiikka.
- Iloinen värimaailma!!
- Päänäyttelijämme animoitaisiin.
- Risto / Nelli skeittaavat pelissä (pelaaja saisi valita kummalla hahmolla pelaa)
- Pelin tausta – Naantalin tapaista puukorttelia, merenrantaa, idyllistä värikästä.

Minkälainen peli:
- Skeittailu
- R tai N hahmo väistelee esteitä ruudun sivuttaissuunnassa hyppäämällä yli tai ali
- Jos hahmo osuu esteeseen hahmo "kuolee" *Esteet joita skeittaaja kohtaa = esteitä tiellä + elokuvien muita hahmoja;

Onko eri vaikeustasoja? Jos on niin jonkun tason taustassa voisi olla Sevillan katuja?

Ohjattavuus:
- Pelaaja painaa näyttöä saadakseen skeittaavan hahmon hyppäämään esteiden yli.
- Mitä pidemmin pelaaja painaa näyttöä sitä korkeammalle hahmo hyppää.
- Pelaajan tulee koittaa pysyä pelissä ("Hengissä") mahdollisimman pitkään.
- Kosketusnäytölle sopiva

Sälää:
- Rauha-tädiltä saa juomaa ja välipalaa – energiaa. Energialaskuri jossain näkyvillä?

- Jos ei käy välillä juomassa tai "syömässä" hahmo "kuolee"
- Nellin Alpo-kissa pehmolelu voisi välillä makoilla jossain taustalla.

Alusta:

- Peli soveltuu Tietokoneelle, mobiililaitteille sekä tableteille

Äänet:

- Musiikki elokuvasta
- Hauskoja ääniefektejä

Appendix 2: Unity 3d Features

General

- Scripting with C#, JavaScript or Boo
- Action-Packed Physics
- Life-Like Animation
- One-Click Deployment
- Optimized Graphics
- Unmatched Import Pipeline
- 64-bit Editor
- Fully Extendible Editor

Graphics

- Physically-Based Shading
- Shuriken Particle System
- Enlighten-powered Real-time Global Illumination
- Low-Level Rendering Access
- Dynamic Fonts with Markup
- Static Batching
- Render-to-Texture Effects
- Full-Screen Post-Processing Effects

Animation

- Retargeting
- Blend Trees
- State Machines
- Integrated Animation Editor
- Inverse Kinematics
- Sync Layers and Additional Curves

2D

- Automatic Sprite Slicing
- Automatic Sprite Animation
- Alpha Cutout
- Sprite Packer
- 2D physics

3D Physics

- Multithreaded Simulation
- Cloth Component
- Advanced Vehicle Physics
- Super-Accurate Collision Detection
- Bake-free Scaled MeshCollider Support

Optimization

- Occlusion Culling
- Profiler
- Level of Detail
- Deferred Rendering
- Stencil Buffer Access
- GPU Skinning for DirectX 11 and OpenGL ES 3.0
- Fully-Fledged Streaming with Asset Bundles
- Dynamic Batching

Scripting

- Webplayer debugging
- .NET Socket Support
- Inspector GUI for custom classes
- Access to Web Data Through WWW Functions
- Open a URL in the User's Browser
- Native Code Plugin Support
- Script Access to the Asset Pipeline

Audio

- Transition the mood of your soundscape
- Native Audio Plugins
- Hierarchies of mixers
- Call scripts from within the animation playback

Misc

- External Version Control Support
- Terrains
- Integrated SpeedTree support
- Multiplayer Networking with RakNet
- NavMeshes and Path-Finding
- Net Streaming (not supported on iOS)
- iOS Crash Reporter
- Linux headless player
- Instantaneous playtesting

Appendix 3: General feedback reply on Google Play

"Hei kiitos palautteesta! Valitettavasti emme valvo aktiivisesti google play arvosteluita, voisitteko ystävällisesti laittaa sähköpostia feedback@virgo.fi ja kerrotko mikä ei mielyttänyt ja parannus ehdotukset, peliä kehitellään jatkuvasti ja palautteesi on meille tärkeää ,jotta pelistä voidaan tehdä mielyttävämpi."