

Timo Koski

RETENTION IN FREE-TO-PLAY MOBILE GAMES
- A CASE STUDY



JYVÄSKYLÄN YLIOPISTO
INFORMAATIOTEKNOLOGIAN TIEDEKUNTA
2019

TIIVISTELMÄ

Koski, Timo

Pelaajapysyvyys ilmaisissa mobiilipeleissä - tapaustutkimus

Jyväskylä: Jyväskylän yliopisto, 2019, 115 s.

Tietojärjestelmätiede, pro gradu -tutkielma

Ohjaaja: Abrahamsson, Pekka

Ilmaisia mobiilipelejä tulee päivittäin valtavasti lisää suurimpiin markkinapaikkoihin. Kilpailu käyttäjistä on kovaa, sillä pelien on pidettävä kiinni käyttäjistään, jotka voivat helposti vaihtaa pelistä toiseen. Tämän tutkimuksen tarkoituksena on syventää ymmärrystä pelaajapysyvyydestä ja erityisesti siitä, millaisia keinoja pelinkehittäjillä on pelin sisäisillä mekaniikoilla saada pelaajat palaamaan peliin useana päivänä. Vastauksia käyttäjapysyvyyden tärkeyteen ja ominaisuuksiin sekä ilmaisten mobiilipelien menestystekijöihin tutkittiin kirjallisuuskatsauksen, haastatteluiden, menestyneiden pelien analyysin ja tapaustutkimuksen keinoin. Haastateltavina oli julkaisijoita, joilla on paljon dataa peleistä ja pelaajista. Menestyneiden mobiilipelien analyysillä peleistä löydettiin mekaniikkoja, jotka sopivat eri pelaajatyypeille. Tapaustutkimuksen kohteena oli ilmainen mobiilipeli *Zombiefall*, joka julkaistiin tutkimuksen aikana kuusi kertaa. Jokaisella kerralla peliin oli tehty pieniä muutoksia. Julkaisuista saatu data osoitti muutosten nostaneen pelin käyttäjapysyvyyttä, mutta ei paljoa. Tutkimusmateriaalista muodostettiin kahdeksan empiiristä päätelmää. Tutkimuksen tuloksena oli, että pelaajapysyvyys on tärkeää pelin menestykselle. Pelialalla ei ole yhtenäistä näkemystä siitä, milloin pelaajapysyvyys on riittävän hyvä julkaisuun. Pelissä edistyminen on tärkeää pelaajapysyvyydelle ja edistyminen voi tapahtua monella tapaa. Menestyneet ilmaiset mobiilipelit pakottavat pelaajan odottamaan, ennen kuin pelaaja voi jatkaa pelaamista tai saa palkintoja. Lisäksi menestyneet ilmaiset mobiilipelit ottavat kaikki pelaajatyypit huomioon. Mekaniikkoja pelaajapysyvyyden nostamiseksi on monia, ja mekaniikat voidaan jakaa kolmeen kategoriaan. Havaintojen perusteella pelaajapysyvyyden nostaminen on vaikeaa.

Asiasanat: pelaajapysyvyys, mobiilipeli, ilmaispelejä, pelinkehitys, ydinmekaniikka

ABSTRACT

Koski, Timo

Retention in free-to-play mobile games - a case study

Jyväskylä: University of Jyväskylä, 2019, 115 p.

Information Systems, Master's Thesis

Supervisor: Abrahamsson, Pekka

The number of free-to-play mobile games in the biggest marketplaces increases rapidly every day. The competition is fierce as games need to hold on tight to their users which can easily switch from one game to another. The purpose of this research is to deepen the understanding of retention in mobile games. This study specifically focuses on what means the game developers have to keep players returning to the game for multiple days. Answers to the properties of retention, its importance, and success factors of free-to-play mobile games were researched with a literature review, interviews, an analysis of successful mobile games, and with a case study. Publishers were interviewed as they have a lot of data at their use and the analysis of successful mobile games found mechanics that fit different player types. The case study focused on a free-to-play mobile game called *Zombiefall* which was released six times during this research. Every time it was improved slightly. The data from the releases shows that the changes made did raise the retention but not by much. From the material eight primary empirical conclusions (PEC) were formed. As a result for the study it was shown that retention is vital for the games success and that there is no industry wide retention threshold for releasing a game. It is important for games to have good progression mechanics, which there can be multiple of. Successful mobile free-to-play games make the player wait a while before the player can resume playing and gain rewards. The analysed games also have mechanics for all player types. There are many mechanics to raise retention and they can be categorized into three groups. Increasing retention was found to be hard.

Keywords: Retention, Mobile, Game, Free-to-play, Game design, Core loop, Core Mechanic

FIGURES

Figure 1. The ARM Funnel (Fields 2014).	13
Figure 2. Cynefin framework (Kurtz & Snowden 2003).	17
Figure 3. Free-to-play games. Lovell 2013.	20
Figure 4. Basic core loop. Luton, 2013.	20
Figure 5. Basic core loop with waiting. Luton, 2013.....	21
Figure 6. Core loop with sessioning. Luton, 2013.....	22
Figure 7. Four Bartle archetypes (1996).....	25
Figure 8. Eight Bartle archetypes (2005).....	27
Figure 9. Gardenscapes in-game core-loop.	60
Figure 10. Missions pop-up.....	80
Figure 11. Zombiefall alpha 4 main menu	93
Figure 12. Zombiefall icons	94

TABLES

TABLE 1 Gameplay systems in the core loop of Pokémon Go.....	54
TABLE 2 Higher retention mechanics found in Pokémon Go.....	54
TABLE 3 Other retention mechanics in Pokémon Go	54
TABLE 4 Gameplay systems in the core loop of Candy Crush Saga.....	58
TABLE 5 Higher retention mechanics found in Candy Crush Saga.....	58
TABLE 6 Other retention mechanics in Candy Crush Saga.....	59
TABLE 7 Gameplay systems in the core loop of Gardenscapes.....	62
TABLE 8 Higher retention mechanics found in the Gardenscapes core loop....	62
TABLE 9 Other retention mechanics found in the Gardenscapes	63
TABLE 10 Gameplay systems in the core loop of Clash of Clans	66
TABLE 11 Higher retention mechanics found in the Clash of Clans core loop .	67
TABLE 12 Other retention mechanics found in the Clash of Clans.....	67
TABLE 13 Gameplay systems in the core loop of Guns of Glory	70
TABLE 14 Higher retention mechanics found in the Guns of Glory core loop .	70
TABLE 15 Other retention mechanics found in the Guns of Glory	71
TABLE 16 Gameplay systems in the core loop of Zombiefall A1	75
TABLE 17 Higher retention mechanics found in the Zombiefall A1.....	75
TABLE 18 Other retention mechanics found in the Zombiefall A1	75
TABLE 19 Zombiefall ad performance in Alpha 1 (03.08.2017 - 08.08.2017)	76
TABLE 20 Zombiefall Game performance, Alpha 1 (03.08.2017 - 08.08.2017) ...	76
TABLE 21 Gameplay systems in the core loop of Zombiefall A2.....	81
TABLE 24 Zombiefall ad performance in Alpha 2 (26.10.2017 - 01.11.2017)	82
TABLE 25 Zombiefall Game performance, Alpha 2 (26.10.2017 - 01.11.2017) ...	82
TABLE 26 Gameplay systems in the core loop of Zombiefall A2.1.	83
TABLE 27 Higher retention mechanics found in the Zombiefall A2.1.....	83
TABLE 28 Other retention mechanics found in the Zombiefall A2.1.....	84

TABLE 29	Zombiefall ad performance in Alpha 2.1 (07.12.2017 - 13.12.2017) ...	84
TABLE 30	Zombiefall Game performance, Alpha 2.1 (07.12.2017 - 13.12.2017)	84
TABLE 31	Gameplay systems in the core loop of Zombiefall A3.....	88
TABLE 32	Higher retention mechanics found in the Zombiefall A3.....	88
TABLE 33	Other retention mechanics found in the Zombiefall A3.....	88
TABLE 34	Zombiefall ad performance in Alpha 3 (19.03.2018 - 27.03.2018)	89
TABLE 35	Zombiefall Game performance, Alpha 3 (19.03.2018 - 27.03.2018) ...	89
TABLE 36	Gameplay systems in the core loop of Zombiefall A3.1.	91
TABLE 37	Higher retention mechanics found in the Zombiefall A3.1.....	92
TABLE 38	Other retention mechanics found in the Zombiefall A3.1.....	92
TABLE 39	Zombiefall ad performance in Alpha 3.1 (06.08.2018 - 13.08.2018) ..	92
TABLE 40	Zombiefall Game performance, Alpha 3.1 (06.08.2018 - 13.08.2018)	92
TABLE 41	Gameplay systems in the core loop of Zombiefall A4.	94
TABLE 42	Higher retention mechanics found in the Zombiefall A4.....	94
TABLE 43	Other retention mechanics found in the Zombiefall A4.....	94
TABLE 44	Zombiefall ad performance in Alpha 4 (06.08.2018 - 13.08.2018)	95
TABLE 45	Zombiefall Game performance, Alpha 4 (06.08.2018 - 13.08.2018)...	96
TABLE 46	Zombiefall day seven performance (06.08.2018 - 13.08.2018).....	96
TABLE 47	Summary of Zombiefall alpha KPI's and retention mechanics	97
TABLE 48	Higher and other retention mechanics in the analysed games	98

TABLE OF CONTENTS

TIIVISTELMÄ	2
ABSTRACT	3
FIGURES	4
TABLES	4
TABLE OF CONTENTS	6
1 INTRODUCTION	8
1.1 Motivation.....	8
1.2 Research question	9
1.3 Scope of work	10
1.4 Structure of the thesis.....	10
2 GAME DESIGN	12
2.1 Retention	12
2.2 Reasons for playing	15
2.3 Core loop.....	18
2.4 Pleasure	22
2.5 Player types	24
2.6 Mobile games success factors.....	28
3 RESEARCH METHODS.....	30
3.1 Interviews	31
3.2 Interview questions	32
3.3 Empirical study on success factors.....	33
3.4 Case study context: Zombiefall.....	34
4 EMPIRICAL STUDY	36
4.1 Interview analyses	36
4.1.1 Interviewees and the companies.....	36
4.1.2 Data acquisition	40
4.1.3 Key retention metrics.....	43
4.1.4 Determinants of retention	46
4.1.5 Summary	48
4.2 Review of successful mobile games	48
4.2.1 Pokémon Go.....	50
4.2.2 Candy Crush Saga.....	54
4.2.3 Gardenscapes	59
4.2.4 Clash of Clans	63
4.2.5 Guns of Glory.....	67

4.3	Empirical results from Zombiefall alpha releases.....	71
4.3.1	Alpha 1 (03.08.2017 - 08.08.2017).....	72
4.3.2	Alpha 2 (26.10.2017 - 01.11.2017).....	77
4.3.3	Alpha 2.1 (07.12.2017 - 13.12.2017).....	82
4.3.4	Alpha 3 (19.03.2018 - 27.03.2018).....	84
4.3.5	Alpha 3.1 (06.08.2018 - 13.08.2018).....	90
4.3.6	Alpha 4 (21.1.2019 - 03.02.2019).....	93
4.4	Summary.....	96
4.4.1	Zombiefall data.....	97
4.4.2	PECs.....	99
5	DISCUSSION.....	101
6	CONCLUSION.....	108
6.1	Answers to research questions.....	108
6.2	Limitations.....	111
6.3	Future research and Zombiefall.....	112
	REFERENCES.....	114

1 Introduction

This chapter explains my own interest and background, the research topic, and what is included in the study. Lastly the structure of the thesis paper is explained in chapter 1.4.

1.1 Motivation

Playing mobile games is a common way of spending the boring bits of a day. More and more people play games on their phones as the phones get more powerful and games get more clever and mainstream. The market for mobile games is very crowded and games compete for the attention of players who can at any time switch to another game as most mobile games are free. This incentivises developers to act to try and keep hold of their players. This study tries to deepen the understanding of what mechanics game developers can use within the game design space to retain the players.

My motivation for this study comes from my own interest in the field of games. I have been playing games from my childhood and since then I have always wanted to create games as a hobby and job. This aspiration has been realized, as I currently work at Zaibatsu Interactive, a small independent mobile games developer from Finland. While working in there we developed a game called Zombiefall. While the development progressed, I quickly realized how

much retention data affected how our game was created. The publisher we were closely working with drove the game through tests and after every launch, we would hope that the retention would have grown. From this perspective, we had discussions on how to make the retention higher and at that time I started working on this thesis. Ultimately what went into the game was shaped by our vision on how to create a game that will most likely retain customers. I was not working at Zaibatsu Interactive when the core gameplay of *Zombiefall* was in development, so my knowledge of the game comes from working on the supposed retention mechanics, although I started before the first alpha launch.

While video games have always been around in my life, mobile free-to-play games are a relatively new experience for me. Mobile games have evolved far from Nokia's *Snake* back in 1997, which is regarded often as the first successful mobile phone game (Mäyrä, 2015. *Mobile Games*). The rise of the smartphones and distribution channels like Appstore and Google Play has changed the landscape of the industry and making games has never been easier. The side effect for this is of course the problem of how to stand out. How to make the player choose your game over the others and how to make him or her stay?

1.2 Research question

The goal for this study is to deepen the understanding of player retention in free-to-play mobile games. The aim is to form PECs (Primary Empirical Conclusion) that can guide developers to evaluate games and see what systems their game is potentially missing. For game researchers the study aims to give a practical tool for evaluating different free-to-play games and to help them understand what makes successful games tick. The goal is to extract mechanics in games that allow the game to retain players well. To meet these requirements, the study has been given a research question:

What affects retention in free-to-play mobile games?

Before answering that question, the study needs to validate what role retention has in the mobile game's success. This is done by answering three sub-questions that aim to answer what makes a free-to-play game successful and if retention is as important as I initially had thought.

- 1. How is success defined for free-to-play mobile games?**
- 2. Is retention important for mobile free-to-play games success?**
- 3. What are the success factors for free-to-play mobile games?**

The questions try to answer a few basic things about free-to-play mobile games. Firstly, what defines success should be a straight forward answer. Then the question about retentions importance should validate whether this research topic is important or not. Lastly, question three answers what makes a free-to-play game successful.

1.3 Scope of work

This study concentrates on what affects retention inside the free-to-play mobile game. Excluded are external variables like the quality of user acquisition and reputation of the company behind the game or publishing. They are mentioned to affect retention in the interviews conducted for this study, but their importance is not measured in any way. The focus will be on the western mobile gaming market with western audiences of mobile gaming in mind.

1.4 Structure of the thesis

Chapter 2 introduces the field and key concepts used in the study. Retention is defined and why players play games in the first place is studied. Literary review

was conducted for the definitions and concepts used in the study. Chapter 3 explains how and why the empirical study is conducted. Why interviews were held and what questions were asked. Chapter 3 also introduces *Zombiefall*, the game used in the case study. Chapter 4 contains all empirical research done from interviews, game reviews and *Zombiefall* alpha launches. The analysis from empirical data is also presented as PECs formed from the interviews and reviewed games. *Zombiefall* data is also presented and analysed.

Chapter 5 discusses the resulting PECs in terms of if they bring new information to the field, if they validate existing knowledge or if they present conflicting ideas to previous knowledge. What are the implications of the PECs? Chapter 6 concludes the research by giving answers to the research questions and discussing the shortcomings of the work and potential future research topics. Future of *Zombiefall* is also briefly discussed.

2 Game design

In this chapter, the main terminology of the study is explained and illustrations of key concepts are presented. A literary review was conducted to better understand gaming and players in general. There were insufficient amount of studies done on the topic of retention, so the empirical research of chapter 3 proved to be necessary to answer the research questions.

2.1 Retention

User retention is a keyword in the current mobile game industry as companies are trying their hardest to hook players into incorporating the game into their daily routines. Every time the player starts playing, it is a monetization opportunity for the game. When players are happy with the game and like to spend time on it, they might spend money on it. Retention in technology and software use means the act of coming back to a product after the initial try. Luton, in his 2013 book *Free-to-Play, Making Money From Games You Give Away*, defines retention as the number of users retained over a given period of time. The definition is good and is used in this study. Retention is a percentage-based number. 100% retention would mean that all users return to the product on a set amount of time and 0% is of course the opposite. N Day retention measures how many of the users come back on a particular day (Amplitude, 2018). For example, day one retention is measured when the user returns to the product on the next day. Day one retention can make or break a game. Developers and publishers are gathering massive amounts of data from every play session in most mobile games and early in the games production and lifecycle, retention is the most looked at numerical data. After all, mobile games lose most of the players after the initial install and test (Drachen, Lundquist, et al. 2016). This is true whether it is a premium or a free-to-play game. The decrease in retention is much more obvious in free-to-play games where the customer can install a game and after trying it, decide that's it's

not worth their time. In premium games, where the user pays upfront before the install, the risk of losing customers is much less problematic for the game provider, because they already got the income from that user. For the players, premium games are more of risk to get into, because of the price tag associated with them, so they often do more research on the subject prior to the purchase.

Fields (2014) point to how user retention is a way to keep the game alive for a long period of time. By keeping old players and using the revenue generated from them to acquire new players, the drop-off of users is not killing the game. This is called the ARM funnel (acquisition, retention monetization). While much of the player base is changing often, having high retention is allowing the company to support the game and get new users. The ARM funnel is presented in the figure 1.

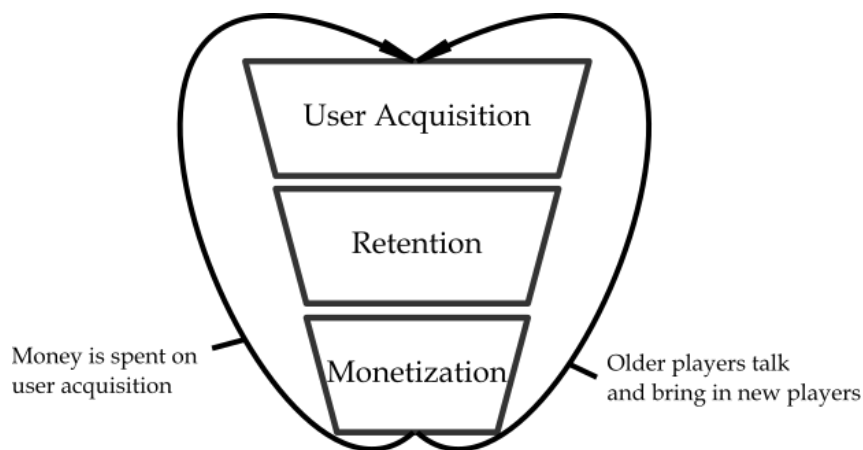


Figure 1. The ARM Funnel (Fields 2014).

Day one retention means how many users return to the product after one day. A high number of first day returners is key on making a profitable game using a freemium model. In a freemium model, the game is designed around making the users pay small amounts of money through in-app-purchases (IAP) multiple times. The IAP is optional as the game is not truly free-to-play if it is mandatory. Even the users who don't turn in revenue from the IAPs are often targeted with ads that bring some value from those users. One estimation to monetization is that only 1 -3% of users are actually bringing in the revenue to the game through

in-app purchases. Very few players spend large quantities of money in them. To make this business model viable, game publishers and game studios need to hit a large number of downloads and the retention percentage needs to be high. (Callaghan, 2014, Using Game Analytics to Measure Student Engagement/Retention for Engineering Education). User acquisition is expensive and it's getting more expensive every year, as more and more companies and studios are entering the market with their games. Gone are the days when mobile games were few and far between. The number of games released every month and even on a single day is staggering. Ever since Apple launched the first iPhone in 2007 and the App-store later in 2008, the market has flooded with new developers in hopes of becoming the next Angry Birds or Candy Crush Saga (Behrmann et al. 2011). Currently the IOS store is getting over 500 new game releases every day (Pocketgamer, 2018. App Store Metrics). Getting data from the android Google Play is a bit harder, the number of applications in the marketplace is rising steadily with over 3 500 000 total applications on December of 2017 (Statista, 2018, Number of available applications in the Google Play Store from December 2009 to December 2017). That number contains every application released on the platform, not just the games, but it gives a clue on how saturated the marketplace is.

The amount of research done for retention in mobile games is still lacking and the field of study is in its infancy. Although mobile games have been a big new field. Majority of the previous works only acknowledge retention as an important aspect of mobile games monetization model, as is with all freemium products. The majority of the work is done around the monetization, in-app-purchases (IAPs) and how to predict the user making purchasing decisions. Research has been done on user retention, but sadly it is lacking a practical application. Drachen et al. created a model in 2016 for predicting customer retention using heuristics and machine learning but the dataset they used, and the heuristics don't take notice of different game mechanics and gameplay elements and only focus on metrics such as playtime length and total sessions etc. The predictive nature of that study fails to be much of use for game creators and this study.

At least one major publication of retention study in videogames is the 2011, *Modeling Player Retention in Madden NFL 11* by Weber, John, Mateas and Jhala. It focuses on studying what gameplay loops keep getting players to come back to the game on a daily basis and even on a yearly standard. This study is focused more on how retention influences future work and the product in its current state. This is a common trait of many studies on retention. For this reason, a throughout study on nature of playing is needed before we can study how players are being retained by games.

2.2 Reasons for playing

To fully understand the reasons why players return to certain games there needs to be sufficient understanding as to why people play games in the first place. Games are often researched with same theories as other information systems and while this arrangement works, it has some problems (Hamari, Keronen, 2017). Mostly information systems are used solely for their utilitarian values, such as the value of doing a specific task or helping solve a problem. This is a different matter in games where primarily the reason for playing games is the enjoyment of the game itself. (Salen & Zimmerman, 2003.) This is a hedonist reason and while hedonism is the primary reason to play games, there are many games where utilitarian reasons are just as valid. Many studies have been created to find the reasons why people play games, researchers are still not unanimous about why games are used. (Hamari, Keronen, 2017.)

Hamari and Keronen found 48 research articles in 2017 in their meta-analysis of the currently available research on the subject. Many of the theories relied on older theories of technology and software acceptance and the most used theory was the Technology acceptance model (TAM) which focuses on attitude towards technology and in this case the attitude towards games. This has been brought up again in other theories like the theory of planned behaviour by Ajzen

(1991). In the Hamari and Keronen meta-analysis, attitude towards games and gaming had the strongest relationship to playing games. Enjoyment and perceived usefulness also played a significant role in intentions to playing games. Other variables that had impacts on players playing intentions were: satisfaction (How the game meets expectations of perceived enjoyment), perceived ease of use, perceived playfulness (what it feels like interacting with a game), subjective norms (social influence), critical mass (players perception of peers playing) and Csikszentmihalyi's flow (1990). These variables are listed from a strong correlation to a weak one. Interestingly, while many studies that were included in the meta-analysis included gender as one variable that would have an impact on playing intentions, the analysis showed that there was no correlation.

From a designer's perspective, studies on why people play are a bit more focused on the hedonic reasons and why previously mentioned enjoyment and other variables work the way they do. Salen and Zimmerman in their book, *Rules of Play: game design fundamentals* (2003) have stated that pleasure is the most distinctive characteristic of games. More about pleasure under the chapter 2.4 pleasure.

Players intention to play and return to play are correlated but are not synonyms. Just like a person loving a movie may never see it again, a person can love a game and never return to it. Salen and Zimmerman (2003) state that there is no single answer as to why players start to play a game and why do they return. This can happen for many reasons, one of them being the fact that some games are more linear or short than other. If a game is designed to be beaten in one sitting and it so linear that other playthroughs would be for the most part be just identical, there is not much incentives for the player to return. This happens less in more arcade focused games than heavily narrative games and most freemium games are situated in the arcade side of the spectrum.

It is important to know how and why people act the way they do. Coming back to a mobile game is a decision so it is important to understand the motivation for the people. This study aims to find game elements that lead to people

wanting to come back and even getting addicted. Designing the mechanics that facilitate this behaviour also requires decision making. The Cynefin framework which was created by Snowden and his colleagues in IBM, was originally created for management level decision making. Since its creation it has been used in many different fields and it has been found to be a useful tool even in academic research. The framework is based around domains of order (Complicated & Simple) and un-order (Complex & Chaotic). (Kurtz & Snowden 2003.) Figure 7 explores the five decision making domains of Cynefin framework.

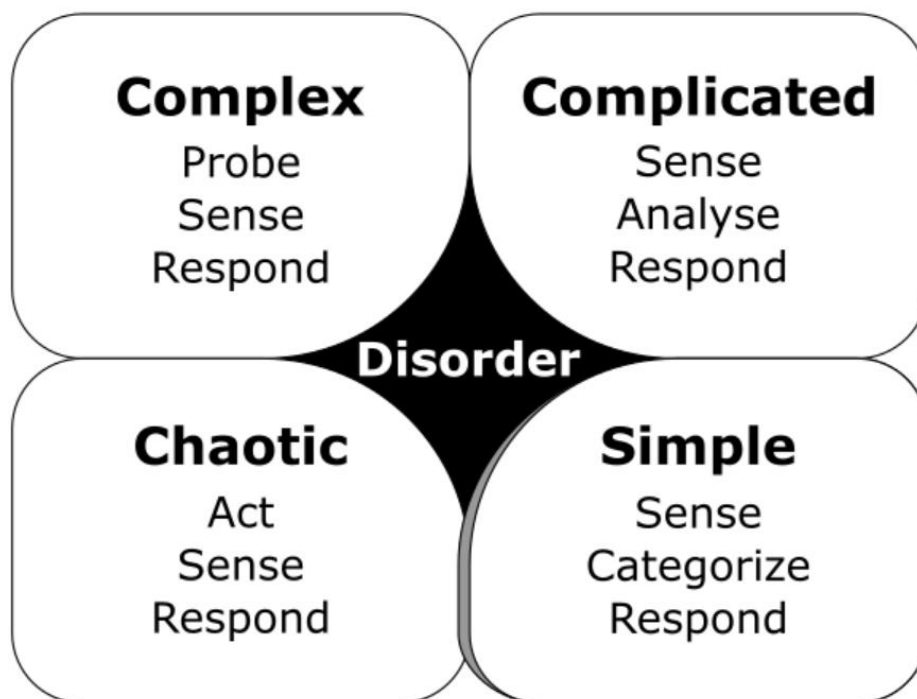


Figure 2. Cynefin framework (Kurtz & Snowden 2003).

Simple domain consists of decisions in which cause and effect relations exist, they are predictable and they can be repeated with same results (Kurtz & Snowden 2003). There should always be optimal decision or best practise.

Complicated domain contains decisions where there is a cause and effect, but it is not as clear and requires analysing before it can be determined. Problems often

have multiple solutions and therefore instead of singular best practise there are multiple good practises (Kurtz & Snowden 2003).

Complex domain consists of decisions where cause and effect are only clear after the action has occurred. Decision making is based on tests and trial and error (Kurtz & Snowden 2003). This is the domain of most game designers as results from playtests can only be observed after the test.

Chaotic domain is when there are no cause and effect, or they are so complicated that nobody will understand the logic behind them even after they happened (Kurtz & Snowden 2003).

Disorder is the domain of not knowing where the decision takes place (Kurtz & Snowden 2003). In this domain, decision making should be halted until the right domain has been identified with gathered information.

2.3 Core loop

Every game has a core mechanic that is used and performed by the players repeatedly. In the book - Rules of Play, Salen and Zimmerman call this aspect of game design the core mechanic, but it is often also called the core loop. Core loops are essentially the extension of core mechanic, as the core mechanic can be something as simple as moving a paddle in pong in such a way that it bounces the ball. The core loop on the other hand could be the whole game of pong, where two players compete against one another trying to bounce the ball behind the other players paddle. The core loop is the repeatable foundation of games (Lovell, 2013). By designing a core mechanic and a core loop around that, designers can create meaningful play and some form of pleasure. If a game isn't particularly fun or pleasurable, it is most often fault of the core mechanic. (Salen & Zimmerman, 2003.)

Salen and Zimmerman also note that if the core mechanic is fun enough, then the player might not even care if they win or lose. They describe the phenomena same-but-different experience as a crucial part of players intentions to playing a game repeatedly. If the core mechanic is well designed, it allows for this same-but-different gameplay to emerge. Repeating the core mechanic should make it offer new variations to gameplay experience. This effect is occurring outside the core mechanic when the player plays the game more than one time. Then the whole game should offer meaningful play and variation to the gameplay. (Salen & Zimmerman, 2003.)

Core loop rarely is the complete game and most often it needs a retention game on top of it to make it pleasurable in any sense of time. In older games this could be something as simple as a highscore that you want to beat. (Lovell, 2013.) Figure 3 is Lovell's 2013 explanation of a free-to-play game in a pyramid form. On the bottom is the core loop, the foundation of the game. On top of that is the retention game, which keeps players interested in the core loop for a longer time, and on top of that is the almost optional superfan game. Superfan game, in Lovell's pyramid is the endgame that cater for big spenders, it often is highly competitive and social. This layer of the game is designed for players that regard the game as more of a hobby than a game. (Lovell, 2013.) The € symbols and Free tag in the core loop section represent the potential revenue generated with each part of the game in free-to-play games. Core loop needs to be free in order the game to function as a free-to-play game, but often the core loop can be designed in a way that makes progression faster with players spending money.

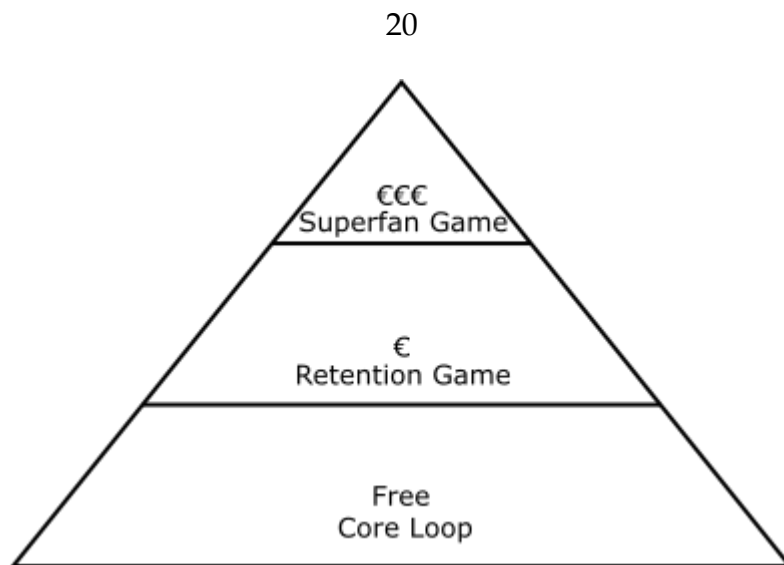


Figure 3. Free-to-play games. Lovell 2013.

The core loop should be in some ways pleasurable for all players and offer a natural end-point for players to leave the game and a reason for returning. (Luton, 2013.) Often free-to-play games have built in core loop that await player input, then reward the player for doing so and then a natural progression for players to return to the action phase (Figure 3) This progression is slated as upgrade in the Lutons core loop because they often are implemented as such. They are there to deepen the gameplay and making progression move visible and tangible. By adding waiting to this default core loop, there is incentive for players to leave and return to the game (Figure 4).

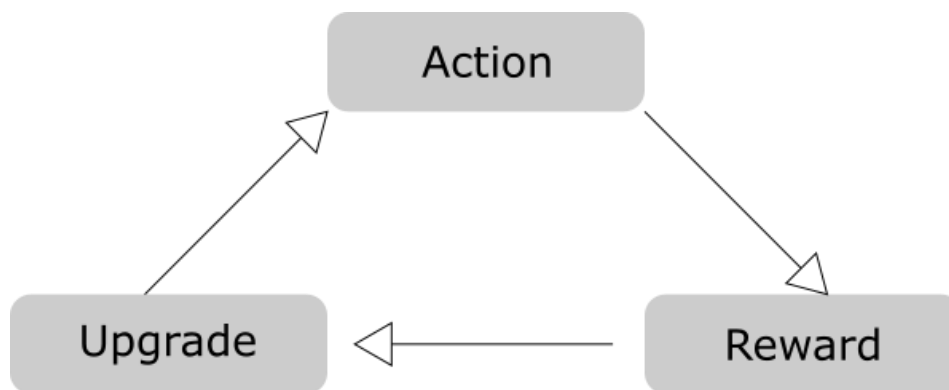


Figure 4. Basic core loop. Luton, 2013.

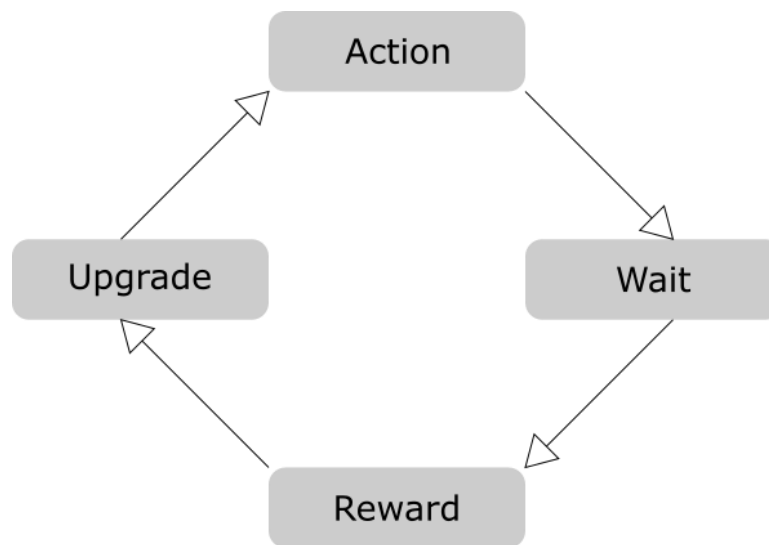


Figure 5. Basic core loop with waiting. Luton, 2013.

The core loop can also repeat multiple times within one play session. By implementing sessioning into the core loop, the developers can lengthen the lifespan of the game (Figure 5). Sessioning can be artificial in a sense that the core gameplay loop cannot be continued without taking a break from the game. This is often implemented to leave players wanting more and showing players when it is most suitable to stop playing. (Luton, 2013). An example of this can be seen in the commercially highly successful, Candy Crush Saga -game. In Candy Crush Saga, players cannot continue playing the game after a set number of failures on levels. Implementing sessioning and waiting into the core loop can be the best way to keep players interested in the game for a long time, as players are rewarded after a set period of time, (Luton, 2013.)

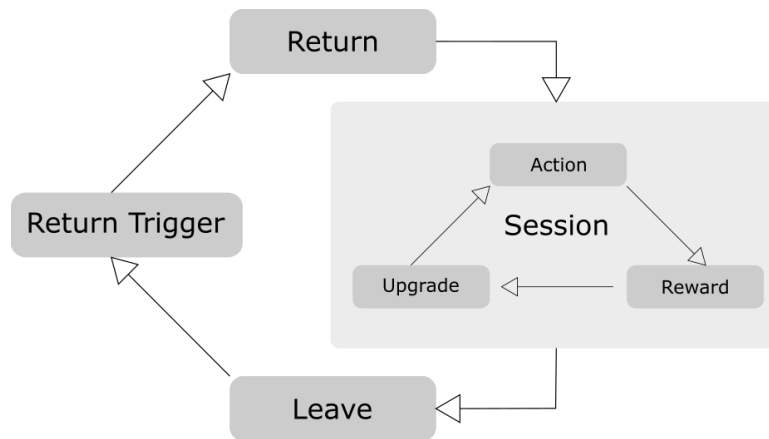


Figure 6. Core loop with sessioning. Luton, 2013.

Appointment mechanics often allow the player to decide when to return to the game when it is most suitable (Lovell, 2013.) Like in Clash Royale (Supercell, 2016) where the player can start opening different reward chests with varying wait times. The player in that game can plan when they want to return. Return triggers can also be tied to multiple different loops of actions that take different amount of time like in Gardenscapes the game informs when all hearts are replenished, but also when timed events are about to start or end. Lovell notes also that while this type of sessioning is almost always monetized they are there mostly for the retention game.

2.4 Pleasure

Pleasure in game design is a hard term to narrow down, because not all games are pleasurable in the words most obvious sense. Games offer Hedonic- or what Salen and Zimmerman (2003) call it autotelic pleasure, which is pleasure for its own sake. Games are often played just for the pleasure of playing. Games also in some cases offer utilitarian- or extrinsic pleasure, which is pleasure from gaining something or completing a task outside the game.

There are many lists for what pleasures games can induce and most of them cover the same bases. Hunicke, LeBlanc & Zubek (2004) propose a list of eight

categories of pleasure in their Mechanics-Dynamics-Aesthetics (MDA) framework. The eight categories are:

- | | |
|---|---|
| 1. Sensation
Game as sense-pleasure | 5. Fellowship
Game as social framework |
| 2. Fantasy
Game as make-believe | 6. Discovery
Game as uncharted territory |
| 3. Narrative
Game as drama | 7. Expression
Game as self-discovery |
| 4. Challenge
Game as obstacle course | 8. Submission
Game as pastime |

These categories are easy to understand and quite self-explanatory. It should be noted that while categories of pleasure are useful when describing what kind of pleasure games can provide, they don't offer much help in balancing the pleasure found in a game. Salen and Zimmerman criticize the categorization for their lack of weighting different types of pleasure. A game can offer multiple forms of pleasure, but these categories don't have any way of describing how much they affect the feeling of gameplay. (Salen & Zimmerman, 2003.) The categorization is also flawed in that they it doesn't cover all forms of pleasure found in games and this is even addressed in the original article but it is vast enough that it fits the needs of this research well.

Games can addict players, this can happen for many reasons, but certainly one of the most obvious ways this can happen is the fact that games are built to be pleasurable. Core loops previously mentioned are built to reward players for systematic playing and making a habit out of playing. This can lead to games being hard to quit because not playing leads to dissatisfaction (Wan & Chiou, 2006). Commercially speaking, addiction is a strong and mostly positive trait for game designers. If a game is addicting to many players, it is more likely a commercial success. Salen and Zimmerman call this kind of behaviour a sign that the game is good. Addiction is a term used by both game enthusiasts and medical experts. Both parties use the word meaning different things. Addiction for most gamers means the act of playing the game often for its pleasurable traits, maybe players socialise within a game or unwind with it. This is not a negative trait. Addiction is also used to describe the medically ill. The people who cannot

control their own gaming and playing becomes pathologically addictive. In 2018, the World Health Organization classified gaming as a mental health disorder. The classification focuses on the people who cannot control the gaming sessions and who continue playing even when it leads to negative consequences. Addiction to gambling is closely related. (World Health Organization, 2018.) The classification is still in its draft form, but it has led to discussions on gaming's addictive traits.

2.5 Player types

Designing for mobile devices is hard and platform specific challenges need to be taken into consideration on the design. Knowing the forms of pleasure is crucial, but so is knowing your audience. Most trending and top grossing games on mobile marketplaces can be associated with a casual tag, but even amongst the casual games, there are numerous differences and nuances. Some games are harder and designed for more of a competing audience while some games are designed all around being social within the game. Different players want different things, which is something that Richard Bartle, a famous games scholar emphasises with his four player archetypes. These archetypes are:

Killers enjoy the gameplay because they want to kill other players or other vice cause havoc and terror. They are competitive and strive towards their personal goals. Killers are proud of their reputation. (Bartle, 1996). In mobile games this could be trying to get high up in the leaderboards or simply enjoying player versus player games.

Achievers enjoy cumulative points, gathering levels or collecting various things in the game. Progression is key for them and this can lead to playing games that incorporate such things well. (Bartle, 1996). In mobile games this is often fulfilled with achievements, rare drops and missions. Making these achievements and

missions require multiple play sessions should be one way of increasing day one retention.

Socializers are playing the game because they can do it with other people. Getting to hang out with people and interacting with them is the most important part and the game is just a way to express that. (Bartle, 1996). In mobile games they tend to like features that allow playing with friends and comparing or sharing the experience. Mobile games are expanding the ways they can interact on social media pages with share buttons that allow players to show off something cool or otherwise interesting.

Explorers like to find new things and exploring the game throughout. Knowledge of the games intricate systems makes them proud. Knowledge is cumulated for the player during the play session and the is the key thing driving these players. (Bartle, 1996). In mobile games this is often troublesome because these players may want to change the game often if they feel like they have already figured it out. This is of course a challenge for the design team to keep these players satisfied with a deep game.

These four archetypes are not hard defined, and most players can be categorized as at least two of these types. The interactions of these types are explored in Figure 7.

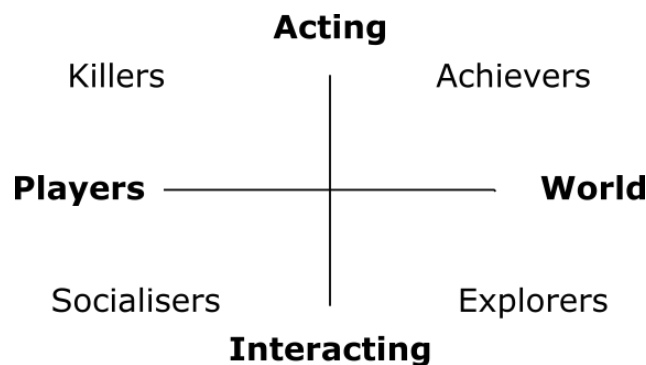


Figure 7. Four Bartle archetypes (1996)

To understand the figure, one must look at the archetypes and the adjacent concepts of the game. On the horizontal axis there is players and world, and on the vertical one acting and interacting. (Bartle 2005). Most multiplayer games can be described as PvP (Player versus Player) or PvE (Player versus Enemy) and that reflects on the horizontal axis where players and enemies who belong in the world are separated. Acting and interacting are different from each other in a sense that acting is more about doing to rather than doing with. Killers act on players and socializers interact with players. Achievers are also acting on the game but differently than killers, instead of griefing and causing havoc, they tend to focus mostly on getting good and winning.

Bartle's original categorization into four archetypes is flawed in some ways and while it can be used as a base for understanding players, Bartle has expanded it in 2005. One of the biggest flaws are the subtypes that emerge. The model was fixed to accommodate this by adding a third axis, Implicit and Explicit. The need emerges from the realization that some action and interaction are done on purpose (Explicit) and other are done by not thinking about it through (Implicit). Figure 8 explains the new archetypes.

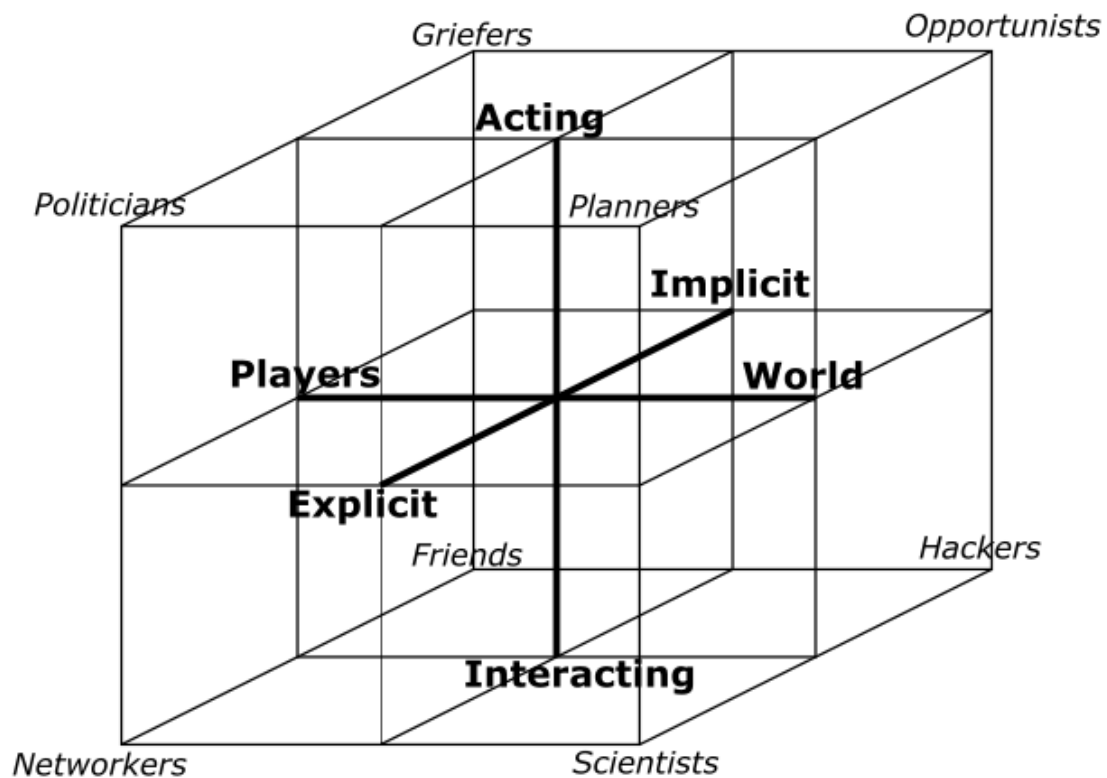


Figure 8. Eight Bartle archetypes (2005)

Now there are eight archetypes in the model. The figure works like the previous one (Figure 7), looking at the archetype and the surrounding elements of play the model explains how, why and to who the player is acting on. The four original archetypes have been divided into implicit or explicit sides (Bartle, 2005).

Griefers (Implicit killers) Exploit other players and cause havoc for their own fun. Often want a bad reputation.

Politicians (Explicit killers) Try to get power over the gameworld. Act with planning and subtly try to exploit other players. Want a good reputation.

Friends (Implicit socialisers) Hang out with people they already know. Often don't care about the fellow players minor issues.

Networkers (Explicit socialisers) Make effort to getting to interact with new players. Try to get to know fellow players and asses who is worth their time.

Hackers (Implicit explorers) Experiment to solve meaning. Seek new phenomena and mechanics.

Scientists (Explicit explorers) Want to understand how a game works. Do experiments to solve mechanics.

Opportunists (Implicit achievers) Try numerous things. Often give up on obstacles but try to take chances when given.

Planners (Explicit achievers) Set goals for themselves and aim to reach them. Try to play optimally for set goals.

One of the biggest problems with this model is that most people don't align with any single of these archetypes. People change playstyles with changing games and even within the same game given opportunities and different mood. This is a problem for the older division too, but not as substantial. For this reason and because of the scope of the work, the study mostly uses the original four archetypes while acknowledging the other archetypes within.

2.6 Mobile games success factors

Key success factors for free-to-play mobile games success have not been mapped previously. Some studies are too old to be relevant in the mobile games market of today, or don't focus on either mobile games or free-to-play games. Marketing factors have been noted to be more important for the game's success than product design factors like graphics, scenario, enjoyment and many others. Consumer willingness to pay influences how the game is priced. Targeting the game to a

right audience and often keeping that audience as large as possible is key for success and If the games brand is already known, this helps the consumer trust the game is at least decent and often gives that game a try over another one with unknown brand. (Hyun Jung Park, Sang-Hoon Kim, 2013) The article emphasises that many things affect the games success, but these three are the most important ones. The article was first started in 2011 and since the market has changed a lot. Mobile gaming was a bit different back then as mobile gaming consoles were more relevant. Marketing the game right is definitely one avenue for success, but it' doesn't help developers to create better games.

This research identifies key success factors in mobile games using empirical testing in multiple successful mobile games in chapter 4.2. Success factors are tied to retention methods used in each of the games.

3 Research methods

The study is built on four methods of data gathering. Firstly the literary review is conducted to get a focus on the essential problems of retention methods and the terminology of the field. Secondly interviews were held to get a baseline and fact check for what the industry thinks of retention methods and numerical data surrounding it. It also opened new discussions about how to affect retention and what is important when publishing games. Thirdly, a set of highly successful games were chosen for closer inspection in hopes of finding success factors for mobile games. The idea is that by looking at what mechanics are in place, the study can then assign each mechanic with its player type and see what mechanics are important for which players. Lastly, data was gathered from the numerous *Zombiefall* test launches. *Zombiefall* was tested in different markets for a couple of weeks during its development. The version of the game was updated and improved in hopes of bringing better retention numbers from the last test. This is helpful for the study, as we can compare retention numbers from different versions of the game and see what has changed within the game on different releases. By comparing what mechanics the top grossing games chosen for the inspection and *Zombiefall*'s versions have in common, we can suggest what works to improve retention and what has a little to zero impact.

Before the interviews, a literary research was conducted to understand and define keywords like what retention means. What makes player enjoy games and why do we choose to spend time with them. After understanding a bit about games in general the focus is on free-to-play mobile games. The initial results of the literary review suggest that day one retention should be around 35-40%. This aligns with the assumption that the developers of *Zombiefall* have been under. In a *Gamasutra* article, Trevor McCalmont states that while these numbers usually mean a good successful retention of players, they vary depending on the game genre. For endless runners, successful retention numbers usually are lower than

for games such as role playing games. (McCalmont, How Do I Know I Have a Healthy Game? 2013, Gamasutra.)

While doing the literary review, it became clear that further answers were needed in so particular topics. These topics were mostly about publishing games and what defines success in free-to-play mobile games. The literary review prepared the study for the interviews where the numerics were checked and validated.

3.1 Interviews

Three anonymous interviews were held with industry veterans from large international publishing companies. All of them had long careers behind them and were involved with releasing games to global markets. From them we can clarify some industry standards for releasing games. A lot of testing is being done for most games. The first interviewer is from a company that publishes mostly third party games into the mobile games marketplaces. The goal for them is to find successful games to release. The idea is that by testing a lot of games with their expansive userbase, some games work well and others fail. If the tests go well, then the game is being readied for global release. The first interviewee is also the publisher behind all *Zombiefall* test launches.

Problems arise from having such few interviews. The fact that all of the interviewed people are higher ups in the company can be seen as elite bias, but as they are the people that make the decisions on what to put out, I believe it is the best level of entry for this research. Also, while the interviewees represent their companies, there are hundreds of other publishers and developers that have varying opinions.

3.2 Interview questions

The interview had two parts. First few questions were about the person and the company. The second part was about publishing games in a highly competitive market and data gathered from games. Questions about retention are at the end so that the we can study if the interviewees would highlight the importance of retention without asking about it. The interview was semi-structured as I had questions prepared in advance, but I was also able to adapt to the answer on the go.

While two of the three interviewed persons wanted to stay anonymous, a good understanding of their background is important as the interview is based on trusting the knowledge of these individuals. The questions for the first part were:

1. What can you tell me about yourself?
2. What company do you represent?
3. What can you tell me about the company?
4. How many games have you published?
 - a. - yearly?
 - b. - in total?
5. What is the most successful game for the company and what defines that success?

The goal was to set the company and person interviewed into perspective and to get an understanding on how much industry knowledge do they possess. The question number five has two questions in it where the emphasis was on the definition of success. Success can mean different things to different people and this came up in the interviews. The second part of the interview was more about the act of publishing games, collecting data and how to use it. Few of the last questions were about retention in general as I was hopeful to hear tips and best practices about retention. Questions asked were:

6. How do you decide what games to publish?
7. Does the theme or genre of the game affect the publishing decision in your opinion?

8. What kind of data are you collecting from the games?
9. What is the most crucial statistic when deciding what games to publish in your opinion?
10. What affects the games success the most?
 - a. If its retention, then why is retention important?
 - b. If it's not retention, then why is that more important than, let's say, retention?
11. Is there a threshold on the retention rate for games that are released?
12. How is retention data gathered?
13. What affects the retention most?
14. Do you have any best practices to make retention higher?
15. What else comes to mind about retention
16. Anything else you want to discuss

Question 10. was a two-part question where I would either ask portion a or b depending on the answer to the initial question. Question 11 was an important one as these numbers are crucial for publishers. If they think the game is good enough to be launched then those are the metrics game developers should aim for.

3.3 Empirical study on success factors

Five top grossing games were played for this research extensively for four weeks. By disassembling the play experience in the successful games, gameplay systems emerge, and we can assign forms of pleasure and player types to them. Looking at the retention mechanics presented and then the four player types discussed earlier in chapter 2.5, the study can try to assign parts of the gameplay for different players. The gameplay systems that are found in the successful games are retention mechanics and are used as success factors. The retention mechanics are assigned to different playertypes according to the descriptions given in chapter 2.5. Like noted in the discussion on Bartle's (1996) player types, many of them are overlapping and this is reflecting on the mechanics as well. Many of the mechanics can easily be labelled for multiple player types.

3.4 Case study context: Zombiefall

Zombiefall is a free-to-play mobile game set in the endless runner -genre. Typically, endless runners are simple games where the main focus is to get as far as possible while avoiding obstacles. There are many types of games that can be categorized as endless runners but some good examples of endless runners that have been successful are: Hill climb racing -by Fingersoft, Subway surfer -by Kiloo, Jetpack joyride -by halfbrick studios, Crossy road -by hipster whale, and to some extent, flappy bird -by GEARS. These games are quite similar in many ways while still having vastly different gameplay and feel. In all of them, the goal is to go as far as possible controlling a single entity. A single play session length varies depending a lot on the game and the skill of the player. A round of Flappybird can last a few seconds while lengthy games in Hill climb racing can be several minutes even for mediocre players. Zombiefall sits in the middle of the field in terms of whether it is a casual or hyper-casual game. It has elements of both types of games.

Zombiefall is a mobile game developed by Zaibatsu Interactive. It's an endless runner type game, where instead of travelling horizontally with one character, the player controls a horde of zombies with ragdoll physics applied to them. The goal of the game is to gather as high of a score as possible and to do so players must gather new zombies and avoid obstacles while falling endlessly in a semi-randomly generated level. Levels are only semi-random, meaning that they are formed from pre-set parts that are then constructed together by an algorithm.

Monetization in Zombiefall is constructed to mimic other successful mobile games, especially endless runners. There are two forms of currency in the game. Coins, a soft currency which the player can collect while playing and Juiz, which is a stylized juice box used as the hard currency. Soft currency in game development means the currency which the player does not need to pay for in real life. Soft currency often is easier to get and much less valuable than hard currency. It's uses are often more limited than with hard currency. Hard currency is the

currency which players trade real money for. Hard currency can often be exchanged for special goods and services. Hard currency can often be exchanged into soft currency but not vice versa. In *Zombiefall* the player can buy Juiz with real money and then spend that in the game. Juiz can be spent in purchasing new zombie cosmetics or purchasing a continue after first loss in each round. The continue allows the player to continue the same round with a new zombie, after a second loss the round is over, and the player is sent back to the main menu. Cosmetic items in *Zombiefall* consist of different skins players can unlock for the zombies. The skins come with different textures and some of them have varying other accessories like hats or handheld items. The skins don't change gameplay in any form. They only affect the visuals in the zombie and background. Background colours change depending on what themed zombie the player is using. There are multiple themes that have different music and colour scheme attached to each one. All changes are still only for visuals and audio. Hard currency – Juiz, can purchase a single zombie of the players choosing. With Soft currency, coins, the player receives a random zombie after purchase.

In chapter 4.3 *Zombiefall* is studied to a larger extent. *Zombiefall* has seen six alpha launches. The game has been thought to be feature ready on all of them, but the game was updated several times in-between tests. The research method is to see what changes are implemented in the game and how have they affected the data gathered from the game.

4 Empirical study

This chapter presents the results from the empirical research conducted for the research. Firstly, the interviews are presented in a linear way - question by question. Presented secondly are the reviews of successful free-to-play mobile games. Thirdly the review of *Zombiefalls* multiple launches and the gathered data is presented. Lastly, PECs are formed from the analysis of *Zombiefall* releases and the retention mechanics found in the successful free-to-play mobile games.

4.1 Interview analyses

Keeping anonymity was important for two of the people interviewed as the market they compete in is very competitive. So, the first few questions are to state the industry knowledge. There were three interviews and from now on the interviewees are just called by the order of the interviews held.

4.1.1 Interviewees and the companies

The first interviewee started his career in 2007 in a browser-based gaming platform. He mostly has experience from the game's economy, monetization and analytics side of things. Currently he is working as the CEO of a games publishing company. The company is a subsidiary of another larger game studio. The idea is that the subsidiary company can publish and test games without it affecting the branding of the parent company. Mostly they work with external studios that reach out to them. *Zombiefall* is one of the games tested by this company. They test a lot of games, but few of them get a global launch. When the interview was held, they had published three games globally within a year. They slowly increase the traffic and user acquisition for the games as to minimize the risks.

The second interviewee had experience in games market for at least 14 years. With this amount of experience in the field he has seen the market transform

greatly. First, he was working in browser games and since 2012 changed company and moved to the mobile market. Currently he is leading an internal studio within the company. The company is large and operates internationally. The company mostly makes casual puzzle games with their own branding, but sometimes external products are also tested. The road to release is hard and long as about one game makes it into the world wide release every year. This is very different from the other interviewee's answers where the first one has published multiple games in a year and the third has set a goal for the team to publish three or four games every month. The attention to polish is the key for them to success.

The third interviewee has experience of at least 7 years working within two large publishing companies. He works as a game designer managing multiple games at the same time. Some of the games are created by external studios, but all of the games run through the same hurdles of getting to publish. The games that he is working on are hyper casual free-to-play games, where the emphasis is on easy to learn but hard to master core gameplay.

Hyper casual games are a type of free-to-play games, where the aim is not to keep player within the same game for a long time. Of course long player retention is great for a hyper casual game as well but cheap user acquisition and strong ad monetization that divers the player into the next hyper casual game is more than enough for some hyper casual studios to be profitable. Hyper casual games are often much faster to make and don't usually rely on IAP's to generate revenue. Hyper casual games are often heavily skill based in their core gameplay and the core loop is often very simple, stated the second interviewee. Usually just the Luton's (2013) basic core loop is all the games have to offer and that is ok for them, as the gameplay aims to keep the player engaged in it for multiple rounds. The games are heavily monetized by ads, and the IAP often involves a change to turn off all ads from the game. An example of highly successful hyper casual game is Voodoo's Helix Jump, released in 2018.

Success is defined by the first interviewee as a match with the audience and the game. They drive customers from the parent company's largest games with

targeted ads into the games they test. With the most successfully released game for the subsidiary company having over 10 000 000 installs on Google play and more on iOS. There are many successful games for very niche audiences, but for him, the success comes from how well the game makes money back.

The second interviewee stated that they define success as the ability for the game to climb to the top spots in a markets top grossing list. It translates for them that a lot of people like to play the game and like it so much that they are willing to spend some money on it. The number of downloads is in millions for their top game. The goal for them is to have successful games in the USA's market. He states that the USA marketplace is ideal, as it simulates the other western marketplaces well. It also houses most of the capital in the western markets. As for Asian markets, he thinks that they are possible, but first comes the success in western market, then maybe in the Asia. This is because of the cultural differences. For them, it is best to focus on a single market and really hone the game there. Asia houses a few very different markets and cultures in it from China, Republic of Korea and Japan. It is hard to develop game that suits all markets.

Third interviewee states success as combination of two things. How large of an audience did the game receive and how much value they bring. The largest game for the team has over 50 000 000 downloads in Google Play.

The first interviewee tests a lot of games. The funnel starts by an external team contacting them with their game. They try it internally to see if it technically works. They will not test games that are not technically working well. Also, they reject games that are blatant copies of another game. The developer also needs to be serious about the game for them to test it. Then they do a soft launch test in a few selected countries. The test is run by showing ads in one of the parent company's biggest game. The test runs for seven days and then the KPI's (Key performance indicators.) are checked. There are at least two test launches for the game. Firstly, the engagement round, where KPI's like day one retention is looked at. If the day one retention is higher than 30% then the game can move into the monetization round. The company also feels how the co-working

relationship works with the external studio. Usually the games first fail the engagement round, but in most cases, the team is given a change to “fix” the game based on the data and then try again. This also shows them how well the studio can work on the game. *Zombiefall* did this multiple times as seen in chapter 4.3. The day one retention is looked as the most important KPI for the first round as longer retention statistics are hard or impossible to gather from such a short test. Another important KPI for them is how many impressions (advertisements shown) they need for an install. The second round is the monetization round, where the game is closer to finish. There the KPI's that are important are a little different and more dependent on the game. About 70% of all games tested for the engagement round, don't make it to the monetization round. At the time of the interview, the number of games tested was around 120, and of them three were published globally.

The second interviewee had a different perspective on publishing games as he mostly worked with internal projects as supposed to mostly external teams like interviewee one and three. First, the development starts by choosing what type of game or for what audience the game is being made. The team then brainstorms ideas and when they reach the point of where they want to develop a prototype, they start on that. With the prototype they aim to validate core gameplay. The prototype stage lasts a maximum of a month. If all seems good, then the pre-production starts where the games ideas and systems are refined before implementation. After that the team grows and the production of the game starts full time. The production time is kept to a minimum before the soft launch. The game is soft launched with minimal features. If that goes well, then the game is launched globally. Most projects die before reaching that event and the elimination can happen in any stage. Different types of test are ran on the game during its development time from focus group testing to showing it to colleagues and the strategy is really put to the test. Production should not continue unless the game feels like it really could reach its goals. Goals can be something like being the number one game of its category. In the soft launch, KPI's like retention is

looked at to validate if the players who come to try the game actually like it and return. The monetization data is something to look at later. The basic principle is to compare Cost per Install (CPI) against revenue generated. This is the principle in the Field's model of supporting game by user acquisition (2014).

The second interviewee also wanted to mention the importance of testing because of branding reasons. They have fans and if they publish a game, they must try and push that game for its full potential for a year at least. Then publishing a game is a kind of a promise for the fan as some of them will like it. They cannot drop the game after a month it's been out. If they notice the game isn't going to perform well enough, it's better to kill it and move on to the next project.

The third interviewee had a similar approach to the publishing of games as did the other two. They have development milestones, where each game project is validated by a series of tests. The first parts of the funnel are internal, where the game is being tested by the internal team and others around the company. This is to see if the game is fun and it has a future. If they believe they have a good product, they then do a soft launch of the game with a minimum viable product build to test the KPI's. If they look promising, the development is continued until the game is ready to be released worldwide. They also use focus groups to test the game on people during development.

4.1.2 Data acquisition

All three interviewees gather a lot of data from the games. They also were quite secretive of what kind of data is gathered, but some of the things they mentioned include tracking first time user progression, playtime lengths, and of course retention for different periods of time.

During the engagement round the first interviewee is mostly interested in the retention data. Currently they mostly work with day one retention rates, but they are planning on taking the day two, three and all the way to day seven into consideration more. Within the player experience they are looking at how long do the rounds last and how many sessions are the players playing per day. The

most useful data for them is the day one retention data. It is what they use as the base for their testing environment. Average revenue per daily active user (ARPDau) is another really important metric for them. Those are the biggest KPI's that they look for.

The second interviewee also stated that they are collecting a lot of player experience data. Seeing what levels are hard, how far do the player play and for how long. Anything that helps them balance the game better. He points a flaw in this type of user research, which they try to take into consideration. All of the data and surveys they run within a game, are all collecting data from the players that are already playing the game and probably like it. It is much harder to capture data from the players that dislike the game. The most important data for them is the retention data, as it measures how good the game is. It often shows if the game is good and fun. It just shows if the players come back to the game. It doesn't matter if the monetization works great if the game doesn't retain its players. For the game to be successful, it first needs great retention numbers.

The third interviewee also stated that they are interested in business data like how many ads do the users see during the playtime and how much revenue are they bringing to the company. They also collect the same user data as do the other interviewees. Most useful statistic for them is the cross between cost per install (CPI) and life time value (LTV) as it allows them to decide if they want to pursue and push a game or not.

On the question about what affects the games success the most, the interviewees had a lot of variance between them. The first interviewee stated that it's equal parts of how good the game is and user acquisition. How good the game is obviously is a big reason for success but matching the game with the right audience is what makes the great game a success. This goes back to the player types discussed in chapter 2.5. Having a great game of course helps with the user acquisition. When thinking about the game's design side, the game needs to be well balanced in all of its areas. If the player wants to use money in the game, it needs to be possible and rewarding, while the players that don't want to spend, can still

play and enjoy game. Content in the release and later additions need to be interesting and suit the core gameplay well. Good onboarding is also very important.

The second interviewee states that the games success is greatly affected by how fresh it seems in the market. Making copies of other games undoubtedly never works well and combining two types of games in hopes of getting the interest of both audiences doesn't work either. The game should be clearly something the player recognises but with a new twist that turn the game into something completely new. Those games are easy to market and that is the key to a successful game.

The third interviewee said that retention is the most important thing for games success. Then they explained that retention also measures how fun the game is. This point came across in the second interviewees point of what data is the most important for them. It's good to note that while retention only calculates how many of the players return to the game, it is also being used by interviewee two and three to demonstrate how much fun the players are having in the game. Even interviewee one stated in the question about how important retention is for the success of the game that it is essential and that it is the most important measure of how much people like the game. If the players have fun in the game, then it's likely that they will come back and invest more time into the game. If the players are playing the game often and for many days, it exposes them for more ads, which is the preferred way of monetization in their games, as they are hyper casual in their core design.

The next question was changed depending on the previous answer to see if the first question would bring up how important retention is. If retention was not brought up, then it was asked about. The first interviewee stated that retention is the most important measurement of how much players like the game, as it shows how willing are they to return. He noted the importance even more by saying that it is the most important thing for the success of the game is the whole picture is taken into consideration.

Interviewee number two noted that they consider games as a hobby for the players. They are creating hobbies that last for months or years. For them, retention is very important. As for hyper casual games, where the core gameplay is often very skill intensive and the games are not meant to last for months, the retention might not be as important. He continued by explaining that the players are often retained within multiple different games, as the companies behind hyper casual games often can transfer their players into the next game as they have a network of these sorts of games.

Third interviewee mentioned that retention is important for them because the market is so crowded with free to play mobile games that are all fighting for the players attention. All three interviewees agreed on that retention is needed for the game to be successful.

PEC 1.	Retention is vital for the game's success.
--------	--

4.1.3 Key retention metrics

Likely one of the most important questions for this study is the question regarding if there is a retention threshold for releasing a game for these large companies. If they are willing to spend a lot of money in user acquisition, they need numerical data that it is feasible. The interviewees had differing opinions on what the threshold or industry standard should be and interviewer number two didn't want to give their data away.

Interviewee number one was really open with the information on retention thresholds for them. As they systematically try to publish externally produced games, they need a clear goal for the developer to pursue. For them, the engagement round should be 30% on day one. He mentioned that while 30% is rather low and not very good for long term support, they are using the backfill of their userbase for the tests. That means that they drive the less valuable customers into the tests to see if they stick. The backfill customers are from areas that usually are not loyal to any one game. In most of their test this means India as a region. He

used an example of one of the successful games they published. The retention in their tests showed about day one retention of 30%. When the game was published in all regions, the games retention jumped on android to 35%. With the global audience and better user acquisition this can be even higher. He also notes that iOS users fare better in all of their retention tests than android users. The number changes a lot depending on the genre as well, as good match-three games often have day one retention of over 50%. Before doing a global launch, they want to see day one retention to be over 40%. He also suggested that the industry standards are about 40% for the day one, over 20% for day seven and for day 30 the retention should be around 10% or more. Again, these numbers change depending on the game as he mentioned that casual games that he knows of rarely achieve day 30 retention of 10%. He also mentions that day 30 and even day 90 is more important than day one retention for the games long term success, but because they cannot test those easily, the day one retention is what they look for.

The second interviewee didn't want to open their threshold numbers as they change depending on the type of the game by a lot. For hardcore games the retention might be lower at start but for lengthier times they usually can hold people well. Casual games on the other hand often have higher initial retention, but lack in the long run. He makes a claim that the people who really fall for a game are the people who make the business feasible. They are the people who play for many hours a day and spend money often are the ones who make the revenue. The people who spend once after a few days make a tiny portion of the whole revenue of the game. When asked about industry standards for retention metrics, he answered that a couple of years ago the numbers for puzzle games were 40% for day one, 20% for day seven, and 10% for day 30. Interviewee continued by mentioning that people have since learned to make better games and the numbers are higher nowadays. It's interesting that these are the same metrics that the first interviewee stated still to be industry standards He is more interested in the day 180 retention, although that data takes a long time to access. This

is more in line with what the interviewee number one had in mind when he was discussing the importance of day 30 and 90 retention.

The third interviewee had higher retention goals for their game. He stated that they are looking for high retention with a low cost per install (CPI). They aim to release games that have retention of 50% or higher for day one. If the CPI is very low, meaning that the game is easy to market to people, then they can move ahead and release a game with less than 50% retention for day one. They always try to increase retention by making tweaks to the core gameplay. The retention goal is higher than what the interviewee one had in mind, although interviewee one and two both stated that games that are casual usually have higher retention numbers in the first few days. All interviewees had different opinions on what the day one retention should be. Interviewee two also emphasized the long-term retention goals over day one.

PEC 2.	There is no agreement on what the industry wide retention threshold is or what retention metric is the most important one.
--------	--

The first interviewee calculates retention by looking at how large percentage of people come back after a certain period of time. For them the day one is the most important one. He mentioned that they are working on implementing a feature that allows them to look at how many sessions does the player do. Then instead of day retention, they can look at how many of the players that played once, played the second time and third and so on without it being dependent on any day.

The second interviewee stated that they look at the day seven data when they do their soft launches. If that goes well, then the day 30 retention. Their launch plan is to gather data and slowly expand the game accordingly. The amount of money moving in the user acquisition is an significant part of the company's overall costs, so if the data doesn't support the games growth, it can be costly. The third interviewee wasn't sure they should answer this question.

4.1.4 Determinants of retention

What affects retention the most was an important question as it offers answers to the research question. Interviewee one had ideas that user experience is really important, but for long term retention, the game needs to have a solid progression model for the player. He suggested that it could be a map to progress levels in or a picture the player can build. There needs to be a goal for the player to pursue. Something that rewards the player after coming back. It is not enough in his opinion to just chase a bigger high score doing the same thing over and over.

The second interviewee had very similar approach to this question, as he also answered that the game needs great progression goals. Sometimes it can be a map to progress through or a league to fight other players in. He stated that there can be many progression avenues in a single game because there are many types of players. The core gameplay needs to stay fun to play through and the player must have a way to see that they are getting better, powerful or some other rewarding progression.

The third interviewee stated that the game needs to stay fun and catchy for long periods of time. Visuals and themes in the game can help this greatly. Good user acquisition helps bring the right people to the game. Regular updates and improvements help keep the players engaged in the game for longer times. It's good to note that the third interviewee is creating hyper-casual games, where the core gameplay is the hook for the player. Interviewee one and two on the other hand both emphasized the importance of progression mechanics.

PEC 3.	Progression mechanics affect the long-term retention of the game significantly.
--------	---

The next question was about if the interviewees had any best practices to raise retention. First interviewee again mentioned the importance of progression avenues for the player. Then again, he mentioned that push notifications are important as well, but they should be giving the player a real reason to return.

The second interviewee answered that instead of looking at what mechanics are in place; the importance is in what emotions does the game provoke. So, the player should feel rewarded and challenged. When asked to expand on this, he stated as because his experience is mostly in puzzle games, the pacing of challenges and rewards is key to the players being engaged in the game. Same is true for many other games, for example player versus player games, the matchmaking needs to work well, to allow for fair matches. So, pacing of progression and challenge is what developers should focus on.

The third interviewee said that first and foremost, the games core needs to be fun and addictive. After that is achieved, the developers need to think about what short-mid-long-term goals the player could have. By adding features and goals that supplement the core gameplay, then the players have a reason to return.

Lastly, the interviewees were asked if anything else comes to mind about retention. The first interviewee pointed out that retention is what helps the developers pay their rents as it's a big part of the lifetime value (LTV). This whole thing is quite simple; the LTV needs to be higher than cost per install (CPI).

Interviewee number two on the other hand gave some examples as to how increase retention by small amounts. Giving rewards for continuous daily logins is one thing and push notifications allowing the player to know what's up in the game are another. They can help a little, but if the core is not working then they cannot save a game. Then he asked about the study goals for the research. He stated that the industry has for many years tried to look for years at what mechanics do what, and that it should start to look more at how games make players feel. For retention, he brings up the importance of good user acquisition as getting the right players into the game helps tremendously. Cross promotions within multiple games also help with user acquisition if it is possible.

The third interviewee mentions that there is no exact formula in how to make a successful free-to-play game. From his experience he gathered that all great successful games have high fun factor. Easy to learn but hard to master

gameplay, progression that is suitable for the theme and genre of the game and a social aspect. The social aspect can be sometimes faked, with for example rivals that have names that sound like they are other players but are actually bots.

4.1.5 Summary

In conclusion, the interviewees had differing opinions on many things but all of them noted heavily the importance of retention for the commercial success of the game. While all the companies had different publishing strategies, they all had similar thoughts about what defines success and why testing is important for publishing games. Retention metrics used changed in every company, as the first one only looked at day one retention and the second tried to hook players for a longer period of time. Although they stated that because extensive testing is hard, they also had to look hard on the retention metrics available for them. The third interviewee also used day one retention as a threshold. The retention goal changes depending on the game genre and theme, but for the green light on publishing, the first interviewee uses day one retention of 40%. The second interviewee could not tell the threshold and the third interviewee used day one retention of 50% as a goal. According to interviewee one the industry standards for retention for day one- seven- and 30 were: 40%, 20% and about 10%. Interviewee number two said these numbers were from few years back and now they are higher. All interviewees mentioned the importance of progression and goals for the players as one of the most important aspects of raising retention. The core gameplay needs to be fun for a long time, and the progression should link to the core gameplay.

4.2 Review of successful mobile games

Multiple retention mechanics have been noticed while doing this study. There can be categorized into different groups based on what they are and how do they

impact the gameplay. This study has grouped them into three retention groups which differ in terms of importance and effect:

1. Core retention mechanics
2. Higher retention mechanics
3. Other retention mechanics

Firstly, the core retention mechanics consists of themes and the core loop. It aims to keep the player in the game and offer a pleasurable playing experience. This is highly player dependant and different types of games retain players differently. Core loop is the thing players keep doing in the game. It's supposedly the reason they keep playing and start playing in the first place. For most games, it is also the reason they want to come back. This is not always true though and some retention mechanics can work on some player even if they don't enjoy the core loop that much. For example, socializer players might feel obliged to log into the game to help other players. While other gameplay and retention mechanics are built on top of the core loop, the core loop should be why players keep playing the game. This came up also in the interviews where, Interviewee two emphasised that gamers want to feel good while playing and that the focus on what mechanics are in place may lead to focusing on wrong aspects. Gameplay mechanics and elements that are firmly related to the core loop are also in this group.

Secondly the higher retention mechanics group is built on top of the core mechanics of the game. They often are more advanced and aim to keep the player engaged for a longer period of time. They are not necessarily even linked to the gameplay but may offer different endgame goals or reasons for the player to turn the game on as a part of a daily routine.

Thirdly, other retention mechanics are techniques of player retention that are often seen in any game without having almost anything to do with the core loop or gameplay itself. They can be loosely connected but are not an integral part of the gameplay itself. They often just remind the player of the games existence and reward the player for daily playing.

The eight forms of pleasure from the MDA framework by Hunicke, LeBlanc & Zubek (2004) are used to describe what the mechanic in question is trying to achieve. Some types of pleasure were more common than others like fellowship for example, which is a pleasure associated with all social mechanics in the game.

Games chosen for the analysis were some of the top grossing games of United Kingdoms at the end of Q2 (2018). United Kingdoms was chosen because it offers a well-rounded cultural mix of players. Games chosen are:

1. Pokémon go, (#1 grossing)
2. Candy Crush Saga (#2 grossing)
3. Gardenscapes (#3 grossing)
4. Clash of Clans (#4 grossing)
5. Guns of Glory (#7 grossing)

Guns of glory was chosen over Candy Crush Soda Saga (#5 grossing) and Homescapes (#6 grossing). The reason for the decision made is that it's beneficial to research more varied games that are successful. The list already had one Candy Crush game and Gardenscapes game. The games are quite similar to their counterparts with themes and few mechanics changing. Progressions and core loops are almost identical.

4.2.1 Pokémon Go

Pokémon Go was released in the summer of 2016 with massive popularity right from the start. Pokémon Go is an augmented reality (AR) game where players collect monsters from the Pokémon franchise, level and battle them. Pokémon is a franchise managed by The Pokémon Company - a Japanese consortium between Nintendo, Game Freak, and Creatures. The game was developed and published by Niantic.

The First-time user experience start with the player having to choose a character, customize it and then get a first Pokémon and some items. After that, the game opens up and there are a few things the player can do. The game uses the phones location to place the player on a map where it then can spawn Pokémon and other things for the players to collect. The core gameplay loop revolves

around exploring in the real world, encountering either Pokémon to capture or items to collect. After that the player gets to use those items to upgrade the Pokémon and then explore some more. This core basic core loop implements sessioning into the core loop by players either getting physically tired of walking around, or by them running out of pokéballs and pokéstops to visit. Pokéstops are locations where the player can collect more pokéballs and other useful items. The locations reset every five minutes after using, so the sessioning timeout enforced by this limit is not long. It is very hard to play Pokémon Go without walking around and this makes the game both appealing to some and unappealing to others. Because pokéstops and gyms are generated into landmarks, this makes the game almost impossible to play in very rural areas, as these locations are what keeps the players item supply going. Pokémon go is unlike other games that was studied in the way that players engage with it. Sessioning happens naturally as players choose when to play as playing Pokémon Go requires a different type of commitment that something that you can play while waiting for other things.

There are hundreds of different Pokémon to capture and some of them are either time restricted or location restricted. Gameplay is fairly simple to start, but there are a lot of nuances on how to capture and best upgrade the Pokémon. This is exactly what explorer players might enjoy. Collecting all Pokémon is a huge task that achiever players might enjoy. There are many ways of avenues for players to progress in the game. While there are no levels to beat or map to progress, the player can gather experience point from basically anything they do in the game and this raises the players level. The player level gates some portions of the game from new players and unlocking features is a goal for the player early on. The player level also affects the gameplay as Pokémon's combats points are capped with each player level. Whenever the player levels up they are rewarded with items. Another way of progression for the player is to collect all or as many Pokémon as they can. Pokémon can be collected by either finding and capturing them, hatching them from eggs, by evolving or by trading them with other players. Every Pokémon collected is useful for the player as they gain experience and

other resources from them. The Pokémon can be evolved into the next evolution if they have a form after the current one. Evolutions raise the hit points and combat points of the Pokémon, meaning that they fare better against other Pokémon's in a battle. Candy is gained by whenever the player receives a new Pokémon. The Pokémon can also be powered up with candy and another resource, this increases the combat points of the Pokémon. So, another way to progress in the game is to make as good of a Pokémon collection as possible. Capturing Pokémon and evolving them is a long-term task for the player.

The players of the game can join one of three teams that fight over the control of the gyms in the game. The player is incentivised to join one as they offer benefits and allow for new avenues of gameplay. Gyms allow players to fight against other players Pokémon's. Controlling a gym allows for the team members to leave a Pokémon in the gym to defend it. The Pokémon stays at the gym until its motivation drops to zero. Motivation drops slowly over time and by losing battles. The owner can give items for the Pokémon defending the gym to raise its motivation. Leaving the Pokémon at a gym and if it stays there for a day rewards the player with the hard currency of the game. Battles work in a Pokémon vs Pokémon system. Both Pokémon have their own combat power and health points. Depending on the combat points, the enemy Pokémon's health points drain. Every few seconds the player gets to use one of the Pokémon's better moves. The Pokémon have different types that affect the combat in a rock-paper-scissors system where some types are better against some other types. There is a lot that goes in the level, battle and type systems that is not explained here as it does not really relate to the study topic. Just note that there is depth in the gameplay systems that many of the player types can find enjoyment in. For example, the killer players probably enjoy competing in leagues and fighting gym battles. Achievers probably like to collect all of the Pokémon and upgrade them to their fullest potential and explorers at least in the early stages of the gameplay enjoy finding hidden features of the gameplay systems. Socialisers can find a lot to like in the

game, as most features are meant to be played as a group like raids, which are battles where multiple players take on a special boss Pokémon.

The player can also add friends in the game, but they can only interact when they are on the same place. Some features are locked behind having a strong enough friendship status with another player. This is a feature that a player either likes or dislikes, depending on if they have friends playing or not. Making friends through playing is also quite easy, as all players walk around while playing and meeting other players even a few years after the game's release is quite common. After the player has made friends with someone, they can start player versus player Pokémon fight. Both players are rewarded for doing so, even if they lose. Players are rewarded for playing with the same friends every day, as the friendship can gain a streak bonus. After a long streak, the players are rewarded with the ability to play against one another without having to be in the same space.

The game uses different appointment triggers depending on what the player does in the game. The game uses distance walked in real life as a return trigger. The player can hatch eggs in an incubator and depending on the egg and incubator, the player must walk a certain distance for the egg to hatch. When the egg is hatched and the player returns to the game, they are rewarded with a new Pokémon and experience. This appointment trigger is mostly controlled by the player, as they can decide what egg they want to put in the incubator. Distance walked tracks even if the game is not turned on in the phone, if the player allows for it in the settings menu. If the player is leaving a Pokémon in a friendly gym, then the game notifies the player when it returns via a push notification.

The game has some other retention mechanics as well. The player is rewarded for playing each day, by a first capture of the day bonus experience and a first spin of the day bonus (Pokéstop). The game keeps a count on how many consecutive days the player does either of these tasks. For the six first days, the reward is the same, more experience and items. For the seventh day however, the rewards are much bigger. The game does a poor job at explaining this in the game though and new players might miss a day quite easily and then the streak ends.

The game also has special events that are either tied to an in-game event like a legendary Pokémon being added to the game or real life events like Christmas. The region locked content can also be considered a retention mechanic as people who travel to another region, might come back to the game just to capture the one Pokémon they miss from before. Tables 1, 2 and 3 explore the core, higher and other retention mechanics with the player type and form of pleasure analysed for each.

TABLE 1 Gameplay systems in the core loop of Pokémon Go

Mechanic	Player type	Form of pleasure
Collecting	Achievers	Challenge, Discovery, Sensation
Sessioning	-	-
Exploration in real life	-	Submission

TABLE 2 Higher retention mechanics found in Pokémon Go

Mechanic	Player type	Form of pleasure
Collection management	Achievers	Challenge, Discovery, Expression
Progression, upgrading	Achievers, Explorers	Discovery, Expression, Sensation
Player level	Achievers	Discovery
Social, competing	Killers	Fellowship
Social, collaboration	Socializers	Fellowship

TABLE 3 Other retention mechanics in Pokémon Go

Mechanic	Player type	Form of pleasure
Daily capture streak	Achievers	Submission
Daily item streak	Achievers	Submission
Social, streak	Socializers, Killers	Submission, Fellowship
Notification	-	-
Special events	Explorers, Achievers, Socializers	Challenge, Discovery, Sensation
Region locked content	Achievers, Explorers	Challenge, Discovery

4.2.2 Candy Crush Saga

Candy Crush Saga is a match-3 type game developed and published by King in 2012. It has gained massive success in all platforms it has launched in. The goal is to create chain of or more same colour candies by swapping one candy

horizontally or vertically with its neighbour. When a chain is complete, it disappears, the player gets score and new pieces fall into its place. The gameplay is very similar to other match-3 games. Match three puzzles have been a genre of their own after the mass success of Popcap with Bejeweled in 2001, although it was not the first as Russian Eugene Alemzhin created Shariki in 1994. In some level the objective changes, but the basic concept is always the same. By matching bigger rows of candies, the player is rewarded with special powerups that can be used during the level.

After beating a single level, the next one opens. The progression is very linear, as the levels are on a single line on a map. There is very little narrative progression as some levels open with a character saying some sentence. Usually about how much they like candy or that they need help with something. The map is divided into areas and beating an area continues to the next one. The little narrative that there is includes travelling to new areas in the map and finding out what's wrong with the mascot there and then helping them. At least in the opening levels, the mechanics of gameplay evolve slightly, as the game offers new types of challenges and powerups for the player. For every chain the player receives points. Combos and bigger chains give a lot of points. Points have no other use than to get higher start ratings and getting higher in the leaderboards. All levels are scored with one to three stars. Failing a level leads to the player losing a life. The player starts with five and can purchase to replenish them if they run out. Other option is to either wait or ask a friend.

The core loop in Candy Crush Saga is quite simple. It follows Luton's basic core loop until the player has lost all of their lives and then it transforms into core loop with sessioning. This seems to be common in match-3 type games, where multiple tries are often needed to beat a level. This formula is repeated in Gardenscapes, another game we studied and discuss in chapter 4.1.3. The core loop goes as follows. The player plays a level, after finishing it is rewarded and progression on the map opens next level. This repeats for as long as there are lives. Candy Crush Saga does not use notifications like the other games we played,

instead the player gets notifications in their Facebook notifications, if the player has connected the game to Facebook and the notifications are turned on in the game's settings. This seems counter intuitive, as a lot of players either don't want to link the game to Facebook, or don't have Facebook at all. When connecting the game to Facebook, the notifications can start to be overbearing, as there can be a lot of them if many of the players friends play the game and ask for help. This also took some time to figure out and it had an effect in my playing during the weeks while I played the games for this study. I noticed I played Candy Crush Saga less, because I didn't receive notifications where I wanted them, and other games took the spotlight. This is of course very dependent on the player and my experience is only my own. It is hard for the player to set up appointments with the game as they cannot control when hearts are refilled. Some events also trigger notifications.

The highscore lists is not global, as it doesn't show every player, but instead shows around 20 other players, depending on how many of your friends are playing and what list you are looking at. The game arbitrarily assigns new players to a group of friends and players can then invite others to become their friends. The group is used for the highscore lists and asking and receiving help. There are three highscore lists:

1. Rank
2. Current level
3. Levels this week

Rank seems quite arbitrary for new players at least as it's something that they have almost no control over. The player receives experience points by beating levels. After some amount of experience points are gathered, the player receives a new level and all lives are refilled. Current level shows in which level the player currently is. Levels this week resets every Sundays and it shows how many levels did you beat in a week. There is also a highscore list for each level, that is shown before every level and at the end. The game encourages players to compete

against their friends by always showing how well someone has played in a given level. Beating highscores set by friends can be very fun and something that killer players could like.

Candy Crush Saga offers a few ways to interact with other players if the player chooses to connect the account to Facebook or King's own service. If the player has not connected the account to either service, the game uses the same arbitrary users it uses for the leaderboards as friends. Mostly the interactions are about asking or receiving help from friends, but this system enforces a lot of social pressure to help. When you receive a request to help, it is often easy to justify that, as sending lives is easy, and the benefit for the other player is easy to grasp. There is also monetary benefit, as purchasing lives can be associated with real money. If the player has received help from friends in the past, it seems like there is a social obligation to do the same. This creates an ecosystem where players rely on each other. Previously, advancing to next areas on the map was also locked behind friends help, real money or a long - 72 hours wait period. This feature was removed from the mobile versions of the game in 2017 and now all the areas open after the previous one instantly.

The games boosters are available for purchase using the games hard currency - Candy bars. However, the game often rewards the player with free powerups, that the player can use whenever they want. The powerups are all one time use items and make the games levels much easier to complete. Boosters are a good reward, as they help the player progress and as such, they feel like they supplement the core gameplay loop. When the player is failing the level, the game also offers the player to purchase a few extra moves to continue playing. The player can also spin a wheel occasionally to receive either moves or powerups. If the player receives powerups, then the player needs to spin another wheel to get moves to use them, but this time spinning it costs hard currency. The player can also take part in challenges that appear sometimes as a pop-up in the map. The challenges involve beating levels in a row without failing or something similar. The challenges last for a couple of days and some of them involve

having a friend contribute progression also. This can be great if many of your friends are active players and is something the socializer players like.

Other retention mechanics include a daily booster wheel, where the player can play a minigame where they stop a spinning wheel at the right time. The wheel opens up once a day and using it daily accumulates free boosters for the player. The game also has a 7 days calendar starting from the day you first start playing and it repeats once it's complete or the player misses a day. The aim of the calendar is to have the player come back to the game for seven days in a row. The player gets a free present each day containing boosters. The further you are on the calendar the better the prizes can be. Similar to the calendar is also daily win bonus, where player have to win a level for six days. Unlike the calendar however, the counter does not reset if you miss a day. Candy crush offers many of these types of retention mechanics and together with strong social pressure and easy to understand, but addictive core loop has allowed it to rise to the top of grossing charts for many years. Tables 4, 5 and 6 show the core, higher and other retention mechanics found in Candy Crush Saga.

TABLE 4 Gameplay systems in the core loop of Candy Crush Saga

Mechanic	Player type	Form of pleasure
Puzzle	Achievers	Challenge, Sensation, Submission
Sessioning	-	-

TABLE 5 Higher retention mechanics found in Candy Crush Saga

Mechanic	Player type	Form of pleasure
Progression, levels	Achievers, Explorers	Challenge, Discovery
Progression, narrative	Achievers, Explorers	Narrative, Fantasy, Sensation
Player level	Achievers	Challenge
Highscore lists	Killers, Achievers	Challenge, Fellowship
Level score	Achievers, Killers	Challenge, Fellowship
Social, competing	Killers, Achievers, Socializers	Fellowship, Challenge
Social, collaboration	Achievers, Socializers	Fellowship
Asking and sending help	Socializers	Fellowship
Events	Achievers, Socializers	Fellowship

TABLE 6 Other retention mechanics in Candy Crush Saga

Mechanic	Player type	Form of pleasure
Notification	-	-
Special Events	Explorers, Achievers, Socializers, Killers	Challenge, Discovery, Fellowship
Daily streak reward	Achievers	Challenge, Submission
Daily booster reward	Achievers	Challenge, Submission
First win reward	Achievers	Challenge, Submission
Hard currency tease	Achievers	Sensation

4.2.3 Gardenscapes

Gardenscapes is a casual match-3 type game created by Playrix. It was published globally in 2016 and has since been on top of many charts on both Google play and Appstore. It is quite similar to the Candy Crush Saga but its structures differently in terms of progression. Both games offer the same style of gameplay loop, where beating levels unlocks next level and some other things. In Gardenscapes the player beats levels in order to get stars which are used to unlock new areas of the game world, the garden, and upgrade it. Upgrading is told through a linear story where your butler Austin, gives you tasks and helps you clean the area. You meet new characters through the story, and they interact with Austin.

The core gameplay revolves around matching fruit on a board and completing objectives, such as break 50 apples. All levels are also capped with a certain number of moves the player can do before the level ends and results in a loss. The gameplay in Gardenscapes follows Luton's (2013) core loop with sessioning almost perfectly. Player plays a level, gets rewarded for doing so and then uses that reward to upgrade the garden. This core loop then repeats for as long as the player keeps playing or when the player loses too many times during a level. The player has five hearts at the start of the game and losing in a level causes one of them to break. After all the hearts are gone, the player needs to either wait for them to replenish or buy new ones with the game's hybrid currency - coins, which can be earned by playing but are also available for purchase. The player can also ask for hearts from friends if the player has linked the game to their Facebook account. When there are no more hearts, the core loop changes into the core loop with sessioning. It basically forces the player to quit the game as there

is very little to do if the player has not more hearts. Then the game notifies the player to return when the hearts are refilled, and normal core loop can continue. The appointment trigger is a notification from the game. This is very similar to what the core loop is in Candy Crush Saga. The game shows the core loop to the players as part of the tutorial, but it leaves out the sessioning portion that happens after failing beating levels too many times. Figure 9 shows the Gardenscapes in-game core-loop.



Figure 9. Gardenscapes in-game core-loop.

Progression in Gardenscapes happens by completing levels and receiving stars as reward. Each level gives at least one star, while harder levels can give more. Then the stars are used to complete tasks that Austin, the butler, has given to the player. Each task has something to do with the garden the game takes place in, be it cleaning rubble or fixing the fountain. The player can customize the garden a little by using visually different parts. Austin has a lot of personality and he keeps the story going. The progression slows down the further you play, as tasks start to require multiple stars to complete. Some tasks have a timer attached to them. They start when the player uses the stars to complete the task and once they are finished, the task is complete and Austin gives you the next task. Levels

can be played in advance, so that the player can still continue playing and earning stars even when there are no tasks left to finish as some of them take time. Each area of the garden is darkened at the start of the day and unlocking the next area involves completing the previous one. Once all tasks are done on a particular area, the game progresses to the next in game day. The game also has a in game social network where the player can read on the events and characters of the game. The player also earns other prizes and resources by playing levels.

The game has multiple appointment mechanism that can affect the player retention greatly. With the implemented core loop with sessioning, players can play as long as they can or are willing to pay or receive help. The longer tasks set up return triggers in the form of notifications. Also waiting for the hearts to refill is a return trigger and the game lets the player know when they are fulfilled. The player cannot however affect the wait time in any way. Once the hearts run out they are out and the player cannot choose when to start gaining more. The hearts start refilling even if you have hearts left, so the session length can be quite long for moderate players.

As discussed earlier, the social features in Gardenscapes often revolve around sending or asking for help. Once the player has connected the game to Facebook, all of the Facebook friends the player has that are also playing Gardenscapes show up. You can only send and receive one heart from a single friend each day. The game is also lacking more in the highscore list compared to the Candy Crush Saga, as there are no always on highscore list. There are event specific highscore lists that run for a certain time. There is almost always some event running and there is a league system where players can compete. Usually there is a day of waiting in-between events. There are seven leagues, which are from the lowest to the highest, wood, bronze, silver, gold, platinum, emerald and ruby. The highscore list shows about 150 players chosen from the same league as you. The ones who do the poorest in the league, get demoted to the next lower one and the ones who do well, get rewarded with powerups and a possibly league promotion. The higher the league you are competing in, the better the rewards

are. This incentivises players to complete the even specific tasks as well as they can and also offers killer player types something to fight over.

These social elements and appointment mechanics have been built on top of the core loop. The social elements help motivate the players and help the players play for longer without sessioning. When the session ends and return triggers work, they inform the player that it is suitable to return to the core loop. For the other retention mechanics the game has to offer a daily lucky spin, where the player can receive one free powerup every day. This is almost identical to what it was in Candy Crush Saga. The daily login rewards for Gardenscapes are for the most part quite limited, compared to the Candy Crush Saga, but feel more rewarding as the powerups often are more useful in Gardenscapes.

There are also limited time events other than the league associated ones such as Christmas and Halloween. Limited time events offer usually new levels and themed cosmetic items for the player to unlock. They are heavily monetized as players might feel pressure to purchase if they feel like they would miss out on something (Hamari et al. 2016. Why do players buy in-game content? An empirical study on concrete purchase motivations). Tables 7, 8 and 9 show the core, higher and other retention mechanics.

TABLE 7 Gameplay systems in the core loop of Gardenscapes

Mechanic	Player type	Form of pleasure
Puzzle	Achievers	Challenge, Sensation, Submission
Sessioning	-	-

TABLE 8 Higher retention mechanics found in the Gardenscapes core loop

Mechanic	Player type	Form of pleasure
Progression, levels	Achievers	Challenge, Discovery
Progression, narrative	Achievers, Explorers	Narrative, Sensation, Discovery, Expression
Highscore list	Killers, Achievers, Socializers	Fellowship, Challenge
Social, competing	Killers, Socializers, Achievers	Fellowship, Challenge
League system	Killers, Socializers, Achievers	Fellowship, Challenge

Events	Achievers	Challenge, Fellowship, Discovery, Narrative
Asking and sending help	Socializers	Fellowship
Customization	Explorers, Achievers	Expression, Narrative, Fantasy

TABLE 9 Other retention mechanics found in the Gardenscapes

Mechanic	Player type	Form of pleasure
Notifications	-	.
Special Events	Explorers, Achievers	Challenge, Expression, Narrative, Sensation
Daily booster reward	Achievers	Submission

4.2.4 Clash of Clans

Clash of clans was developed and published by Supercell in 2012. It has both iOS and Android versions. The main idea of the game is to build and defend your village while also attacking other villages. The gameplay revolves around gathering resources and spending them in incremental upgrades and troops. Each player has their own village and is tasked to protect it. This becomes clear in the first-time user tutorial, which guides the player for the first tasks of the game. After the tutorial ends, the player has everything they need to continue playing on their own. This includes resource gathering buildings and buildings to train troops. The tutorial also shows how combat works in the game. Defending is shown first, when a group of NPC (non-player character) goblins attack the village. The player can only watch as the cannon building defends the base. Attacking is more involved for the player, as the player places troops around the enemy village. From there the troops attack automatically the closest buildings. The player is rewarded for successful attacks with resources which can be used to purchase more troops and base upgrades. Building anything in the game takes time and there are limited amount of actions that can be done simultaneously. Here, the game implements waiting into the core loop and there is almost nothing that the player can do if all builders are at work and all troops are suspended.

There are a few ways for the player to track progress in the game. The player can try and climb a league system. Each attack and defence either grants the

player trophies or takes some away. The amount can vary depending on the opponent and his or her trophy score. The more trophies a player has the higher they are in the leagues. Matchmaking is done accordingly, so player should only be matched against players that are in the same league. This is the most basic way of tracking progress in the game as building better defences automatically can raise the trophy count a little. If the player really wants to climb and compete, then attacking other players successfully is the best way to climb. Progression can also be tracked by the players goal to build the base more and more. Unlocking new troops and buildings is always just a few buildings always, so the player is constantly being rewarded for sticking with the game. The player can unlock another village, called the builder base, where some of these gameplay elements change quite a bit. The builder base has its own goals and leagues. Buildings and troops behave and upgrade differently. So, progression can be continued on the main village or in the builder base quite separately. Builder base is even more for player versus player matches as both players attack each other's bases the same time.

The player can also progress in a single player sense by attacking goblin NPC villages. The goblin villages are similar to player villages, but they lack most buildings. Progression against them happens on a map, with the player unlocking new goblin bases to attack after defeating the previous ones. The player is rewarded with resources and experience points for successful attacks. Each attack is also rated with one, two or three stars depending on how successful the attack was. Experience is another progression goal for the player, as experience raises the players level in the game. Higher levels only unlock new decorative items in the base. Experience points are gained through most game actions, as successful attacks and defences grant some experience, donating troops for clan also give experience and upgrading and building the base also grants experience points.

The game also has achievements that are visible in the game. On android they are also linked to the google play account of the player. Achievements are

tasks that the player can cumulatively progress on. They grant experience points and even gems, the hard currency of the game. The harder challenges work well as a long-term goal for the player.

The game sets appointment triggers whenever the player quits, telling players that one of their buildings is complete, that the troops are done, or if the player has joined a clan, any activity from them. Like mentioned before, messages about another player attacking the player might incentivise the player to return. Building anything is triggered by the player – be it building new structures, upgrading old ones, making troops and brewing potions. This makes it easy for the player to decide when to come back, as time that it takes is always clearly labelled. The player can decide to build something that takes less time if they know they can return soon to the game. This also makes planning your play sessions in advance easier and it allows for the player to incorporate the game into their daily routine. Push notifications tell the player information about the game mostly and the player can choose what notifications they allow. Some notifications exist only for the players that have left the game already, as the game tries to remind of its existence with messages like their village needs them to come back.

Social features in Clash of Clans are quite robust. The core loop revolves around attacking and defending against other players, so it should be given that there are many ways to interact with players. If you are attacked in the game, you get a notification about it, mentioning your attacker. Then when you get back into the game there is an option to revenge on the last attack. This allows for the player to raid back some of the resources lost. The chain of revenge end there, and the player cannot be raided back as a revenge of the revenge. Players can communicate via a global chat in the left side of the screen. It's not always visible, so it's more optional here that it is in Guns of Glory. Players can report other players messages or hide any messages from a single user. Players can also see other players profiles, showing statistics from the season and the base. The base is also available to be seen and this is a good strategy for base building, as the player can see other players bases and compare their layouts to their own. Players

can also invite friend into a friends list, but this feature has little uses, as there is no way of interacting with the players on the list.

Clans are a big part of Clash of Clans. Clans compete against one another in a ranking chart like the players, but the trophies are a combination of all trophies of all clan members. The bigger your clan is the higher it can get. Clans have a maximum of 50 players in them. The players can join or start a clan fairly early on in the game. Joining a clan has some benefits that the player can take advantages over. Firstly, clans have their own chatroom, where messages stay for long. Players can also ask for troop donations and send their own troops to help other players. The troops gained from donations can be used either in attacking or defending. Clans can also partake in clan wars. Clan wars are clan events that last for two days. Two clans are matchmaked against the other and after that, player have one day to prepare, send troops and chat about who attacks what. Then on the second day, each player has two attacks against the other clan. All successes are combined and then the clan who had more successes wins the war and gets all the spoils raided from the attacks. The losing team also is rewarded a little with resources. Clans can also take part in some events in the game.

The game also contains seasonal events that players can partake in. Most of the seasonal content is almost purely cosmetic though as for example Christmas event changes some of the buildings to look different and Christmas trees can grow instead of normal trees. Some gameplay is affected as well, as often new spells or troops can be used while the event is on. The events help retention in the long run. Other than the events, Clash of Clans is very light on the other retention mechanics as it doesn't have any daily login bonuses outside of normal core loop. Tables 10, 11 and 12 show the core, higher and other retention mechanics.

TABLE 10 Gameplay systems in the core loop of Clash of Clans

Mechanic	Player type	Form of pleasure
Strategy	Achievers, Killers, Explorers, Socializers	Challenge, Discovery, Fellowship, Fantasy, Sensation, Expression

Waiting	-	-
---------	---	---

TABLE 11 Higher retention mechanics found in the Clash of Clans core loop

Mechanic	Player type	Form of pleasure
Progression, upgrading	Achievers, Explorers	Challenge, Discovery, Expression
Progression, levels	Achievers	Challenge, Narrative
Level rating	Achievers	Challenge
Player levels	Achievers, Socializers	Challenge
Social, competing	Killers, Achievers	Fellowship, Challenge, Expression
Social, collaboration	Socializers, Achievers	Fellowship, Challenge Expression
Social, group (Clan)	Socializers, Killers, Achievers, Explorers	Fellowship, Expression
Social, event	Socializers, Killers Achievers	Fellowship, Challenge
Asking and sending help	Socializers	Fellowship
Social, chat	Socializers	Fellowship, Expression, Submission
Leaderboard	Killers, Achievers	Challenge, Fellowship
Leagues	Killers, Achievers	Challenge, Fellowship
Player controlled appointment triggers	-	Submission

TABLE 12 Other retention mechanics found in the Clash of Clans

Mechanic	Player type	Form of pleasure
Achievements	Achievers	Challenge
Notification	-	-
Special event	Explorers	Discovery, Expression, Challenge
Hard currency tease	-	Senstation

4.2.5 Guns of Glory

Guns of Glory was developed by Kings group and published by FunPlus in 2017. The game massively multiplayer online (MMO) strategy game where the player controls a castle of sorts. The game feels like a heavy version of Clash of Clans with its massive number of features and elements. The main idea in the game is to build up your estate and form an army. The endgame content is mostly about raiding and playing with other people in alliances. The game progresses both narratively and through upgrades in many areas.

Firstly, the game starts with a short narrative cut scene and after that the player is led into the game with a tutorial that forces the player to build the needed structures to continue playing on their own. This is very similar to how the Clash of Clans tutorial worked, although in Clash of Clans the tutorial was much shorter. Here, the player builds a few resource gathering structures and a few troops to attack a nearby monster. The game uses the Luton's (2013) basic core loop with waiting. Combat in the game is simulated by the player sending troops from the estate in an open map into enemy encampments and estates. The troops march on after sending them and once they reach their destination, the combat resolves after the game calculates how the fight turned out. The map where the troops are marching happens in real time, and other players troops and estates can be seen on the map. Winning combat gives resources, which the game has a plethora of. The estate provides the player with basic items and resources but some of the items can only be obtained elsewhere in the game. The player can spend resources in building and upgrading buildings, troops or a few other places. Both upgrading and building takes time, so this is where the core gameplay establishes waiting, just like Clash of Clans, into the core loop. Also, the march times can be long for the troops, so that also can incentivise players to perform sessioning themselves. When all builders are working, troops are being created and resources are running dry, the player has little to do in the game. This is not as severe as it is in Clash of Clans however, as the player can manage portions of the army separately and there also is dungeon crawling minigame where the player can clear floors.

Progression happens in the game through narrative, upgrading the estate, climbing player levels and alliance ranks. There is a lot of depth in most of the systems in the game, so this study only covers the basics. The narrative progression happens in the early of the game by messages the player receives every few levels. This helps the player focus on an aspect of the game by guiding the player to muster troops or attack key targets. Player rank is tied to the lord avatar that the player has. Each level the player can assign skill points to increase a bonus on

some portion of the game, be it economic building or fighting. Then by building and upgrading buildings around the estate, the player gains access to better troops, faster resource gathering and many other upgrades. Some upgrades can be passive buffs to troops or buildings, like an upgrade to march speed. Players power is also tracked. The lord avatar can also equip items that grant buffs.

The game allows for the player to control a bit of the appointment triggers for playing. As everything in the game takes time, the player can choose upgrades and troops that take a shorter amount of time if they want to return sooner. By making the player return to collect resources every now and then incentivises the player to assign time in their daily routine for the game. It also feels natural for upgrades and buildings to take time, as building structures naturally take time. For this reason, the waiting built into the core loop feels more justified than the sessioning implemented in games like Candy Crush Saga and Gardenscapes. Other players can also raid your estate and thus collection and spending of resources before that offers reasons to come back often.

As the game is a MMO, there are many ways of interaction with other players. During almost any screen of the game, the player can see a global chat window in the bottom of the screen. This allows for the player to chat about what they want with other players of the game. There is also a chat for alliances. Alliances are player groups that have their own goals. Alliances have a leaders who can start events that focus on the endgame content. Alliances allow the trade of resources and other benefit within the players of the game. The player can request help in researching upgrades for example.

Monetization in the game works by allowing the player to skip wait times and instantly do things that usually take time. This very similar to what the monetization looked like in Clash of Clans. Players can also spend money on upgrades that are out of limits for free-to-play users like extra builders and cosmetic changes to the estate and lord avatar.

The player is rewarded for playing for multiple days in a row. This retention mechanic has been seen on every one of the games studied, except Clash of Clans.

Other than that, the game also offers a daily spin on a wheel, with benefits ranging from hard currency to normal resources. The wheel is also a recurring retention mechanic, although it was missing in Clash of Clans and Pokémon Go. Its inclusion here feels forced, as playing it doesn't feel like it benefits the core gameplay loop like it does in the match-3 games.

The game is heavy on notifications, as alerts from alliance activity sprung up often. The notifications work as return triggers quite well, as they rarely are not gameplay related. Notifications about helping another alliance member and incoming attacks can be very helpful if the player is invested in the game. The player can also tailor the notifications to suit their needs as the player can choose which notification groups are on and off. Tables 13, 14 and 15 show the core, higher and other retention mechanics.

TABLE 13 Gameplay systems in the core loop of Guns of Glory

Mechanic	Player type	Form of pleasure
Strategy	Achievers, Killers, Socializers, Explorers	Challenge, Discovery, Fellowship, Fantasy, Sensation, Expression
Waiting	-	-

TABLE 14 Higher retention mechanics found in the Guns of Glory core loop

Mechanic	Player type	Form of pleasure
Progression, upgrading	Achievers	Challenge, Discovery, Expression
Progression, narrative	Achievers, Explorers	Challenge, Narrative, Sensation, Discovery
Player levels	Achievers	Discovery, Challenge
Social, competing	Killers, Achievers	Fellowship, Challenge, Expression
Social, collaboration	Socializers, Achievers	Fellowship, Challenge, Expression
Social, group (Alliance)	Socializers, Killers, Achievers, Explorers	Fellowship, Expression
Social, event	Killers, Socializers, Achievers	Fellowship, Challenge
Asking and sending help	Socializers	Fellowship, Expression
Social, chat	Socializers	Fellowship, Expression
Leaderboard	Killers, Achievers	Challenge, Fellowship
Player controlled appointment triggers	-	Submission

Dungeon minigame	Achievers	Challenge, Discovery, Fantasy, Sensation, Narrative
------------------	-----------	---

TABLE 15 Other retention mechanics found in the Guns of Glory

Mechanic	Player type	Form of pleasure
Daily streak reward	Achievers	Submission
Daily booster reward	Achievers	Submission
Achievements	Achievers	Challenge
Special event	Explorers	Discovery, Expression, Challenge

4.3 Empirical results from Zombiefall alpha releases

Zombiefall has been updated throughout the testing. For the most part, the core loop has always been the same, but some changes have been made to the gameplay and especially for the first time user experience (FTUE). Zaibatsu Interactive really tried making the game as good as possible with the information and resources they were given, and while the retention numbers have gone up considerably with time. The game ultimately, at least with our data, and based on the interview assessments of what defines success, shows that it might not have what it takes to compete in the market.

Technically, Zombiefall has been developed with using multiple versions of Unity. All the tests were run on Android and lasted for about a week. The publisher then funnelled users from their successful game with banner, interstitial and video ads. Some of the plugins don't work on iOS and thus all of the tests were done with android only. Plugins are used to implement features like leaderboards and IAPs. This allows for faster development times. Google play games plugin for Unity allows the game to connect to Google which then allows for cloud save, leaderboards and achievements. Unity3D Android notification plugin is used for the notifications that are intended to work as the return triggers for the game. Unity Ads and Unity IAP are also used. With Mesh Deformer the games platforms were created from a single cube mesh. FMOD is used to create the soundscape of the game since Alpha 3.

4.3.1 Alpha 1 (03.08.2017 - 08.08.2017)

The game's core is very intact even in this first test. The core gameplay revolves around zombies falling on an infinitely long level while avoiding hitting the bottom or the top of the screen. The player controls multiple zombies at a time and tries to fall for as long as possible. Controlling of them is not very precise though, as the zombies are constantly falling and guided by the physics engine. The player can only apply horizontal force on them and the zombies will fall in that direction. The screen moves on its own pace and speeds up increasingly, making the game difficult after a while. There is one other hazard that kills the zombies, and that is the electric boxes. Touching them kills the zombie instantly. The game continues for as long as at least one zombie is alive. NPC-characters can be collided with and they then become zombies to control.

The game uses a very stylized 3D look, inspired by 90's cartoons like *The Ren & Stimpy Show* (1991) and *Rocko's Modern Life* (1993). This inspiration can be seen in the game's user interface, as some buttons shake and the backgrounds are all deformed. The characters are also crude caricatures of their inspirations. Like the King, who is a zombie in an Elvis costume. The game also features some rather crude humour in the character descriptions which often tell how the characters became zombies in the first place. Continuing the crude humour, the zombies sometimes farts while the game is running. This feature serves no other purpose than to be funny.

The core loop of the game is the Luton's basic core loop presented in chapter 3.2 figure 3. The player plays a round moving zombies around in an endless fall, trying to survive for as long as possible. Then all of the zombies inevitably die and the round is over. The player is rewarded with coins, juice and score. Then they player can use the earned coins and juice to unlock new variants of the zombie. The variations don't affect gameplay, as only the texture changes on the zombie mesh. The core loop then repeats if the player chooses to play another round. The game does not implement any waiting or sessioning in the core loop itself as the player can play for as long as they want to. All of the games studied for this

thesis, *Zombiefall* is the only one that has no waiting or sessioning implemented and relies on the player having good judgement on when it is good to quit and return. Other retention mechanics do have timers and the game pushes them hard on the player with notifications.

There is very little in terms of progression for the players as there is only one endless level which is randomized for every playthrough. There is no narrative progression or other levels to unlock on a map. Tutorial in the start of the game does not explain how these zombies are in the area and neither do the NPC's. Each Zombie variant is only cosmetically different, and they share almost nothing in common with each other in terms of narrative design. The descriptions and names the zombies have are jokes or wordplay. The player gathers coins which are the soft currency in the game and Juiz-juice boxes which are the hard currency. The rewards are all tied to these currencies. With coins the player can unlock a random zombie to play with and with Juiz the player can unlock the zombie of their choosing. Progression comes mostly from the players own desire to unlock a specific zombie or from unlocking them all. This can be a good goal for Achievers, but other player types are not that interested. The goal of the game is presented as the highscore, which the player can try to break. If the player connects the game to Google Play Game Services then the highscore is saved online and the player can try to climb daily, weekly and all time highscore lists. This can also be an avenue of progression for killers, achievers and even socializers to some extent like discussed earlier in chapter 2.5.

During gameplay, there is a brain meter that fills a portion every time the player infects humans into zombies. A brain particle flies from the human into the meter. This meter tracks how many humans the player has infected during a round. Once the brain meter is filled by infecting 30 humans, the gameplay changes and brain party mode starts with a flurry of confetti particles and a spinning light at the bottom of the screen. During the brain party mode, the brain meter drains and all platforms disappear. The camera focuses on the zombies as they freefall. The player cannot lose any zombies during this time and cannot

infect any humans. The mode lasts for 30 seconds and the object for the player is to collect as many coins as they can during this frenzy mode. The feature then resets and the player can start collecting brains again. While this feature is neat, it adds very little to the gameplay for most players as our testing shows that only a very small percentage of all the players ever reach it. The feature is not explained in the tutorial, so the meaning of the meter gets lost for most players.

The tutorial in the Alpha 1 is very basic. It plays the first time the player starts a round after installing the game. It is a short animation that illustrates the finger movement on a screen and the zombie falling behind it. The animation loops for a few seconds and then shows that the edges of the screen are an hazard. Then the animation repeats to start. The player can press ok and continue to the gameplay. Once a human is on the screen, another tutorial animation pops up teaching the player to collide with the human to infect it. The tutorial can be turned back on in the settings menu.

Social features, seen in all of the studied games, are for the most part missing from *Zombiefall*. *Zombiefall* has highscore lists for the players that linked their google play accounts in the game, but other than that, there are zero mentions of other players in the game. The highscore lists themselves feel a little out of place as it is, since they require the Google Play Game Services to function and that uses a totally different pop-up window from the base game.

The game contains in-app purchases and ad monetization. *Juiz*, the hard currency, can be bought with real money. There are six bundles for sale ranging in price. The price depends on what country the player is in. Most ads are voluntary and rewarded, meaning that the player can choose to watch them to have something in the game. Player can watch an ad to continue a round after the first fail state. If the player does not use the continue option and is never watching ads, the game takes notice and starts to play interstitial ads for the player every now and again. In the shop page the player can watch four ads for coins. This resets every 20 hours, and there is a notification once it is back.

Other retention mechanics are already in the game at this point. The game offers a few incentives for the player to return to the game. There is a daily challenge that involves collecting letters during gameplay to form a word in the main menu. After the word is complete, the game rewards the player with coins and a timer starts counting until the next word is available. The timer runs for 20 hours. 20 hours was chosen so that it incentivises the player to return to the game the next day and thus making the D1 retention higher. A notification triggers when the timer hits zero. The main menu also contains a free gift, that gives a seemingly random amount of coins. The free gift is also on a timer, increasing from one minute to 8 hours, depending on how many times it has been opened. Once the gift has been opened enough times, the next timer is always 8 hours. The game sends notification every time the gift is available to be opened. Both of these timers and the rewarded ad timer in the shop try to implement a sort of sessioning loop into the game, but as the core loop is not affected by them, the affect is minimal. Notifications are plenty in the Alpha one build of the game, but sadly we cannot track which if any work as a good return trigger for the player. Tables 16, 17 and 18 show the core, higher and other retention mechanics in Zombiefall alpha 1.

TABLE 16 Gameplay systems in the core loop of Zombiefall A1

Mechanic	Player type	Form of pleasure
Runner	Achievers	Challenge, Sensation

TABLE 17 Higher retention mechanics found in the Zombiefall A1

Mechanic	Player type	Form of pleasure
Highscore	Achievers, Killers, Socializers	Challenge, Fellowship
Customization	Achievers	Expression, Sensation
Collecting	Achievers	Discovery

TABLE 18 Other retention mechanics found in the Zombiefall A1

Mechanic	Player type	Form of pleasure
Notification	-	-
Daily challenge	Achievers	Challenge, Submission
Timed gift	Achievers	Submission

Rewarded ad	-	Submission
-------------	---	------------

Data gathered from the Alpha 1 test showed promise as it was higher than most games tested by the publisher at the time. While the team was a bit let down by it, we quickly started to refine the game some more. The game didn't have many metrics to track at the time as there were no funnels that track player behavior. The data was gathered from the publisher's cheaper countries. The tests were running on India, Ireland, Filipins and Netherlands. Most of the users came from India in all of the tests for Zombiefall. Finland was also open, but the advertising campaign didn't run in Finland and thus there is almost zero users from there in the data. The main KPI's that were collected by the publisher during the Alpha one test are presented in the tables 19 and 20.

TABLE 19 Zombiefall ad performance in Alpha 1 (03.08.2017 - 08.08.2017)

Impressions	Clicks	Conversion	CTR	IR	Impressions for install
2063376	110731	931	5,37%	0,84%	2216

TABLE 20 Zombiefall Game performance, Alpha 1 (03.08.2017 - 08.08.2017)

D1 low	D1 High	D1 Average	Total users	Users per day	Sessions per user	Daily play time per user	Average session length
16,58%	26,17%	22,2%	847	141	1,56	384	256,00

The first table shows statistics from the test outside of the game. Impressions mean the number of adverts were shown during the duration of the test. Ads that were used in the test were, banner ads, interstria's and video advertisements. Clicks mean the amount of times the ads were pressed. Some of the times the player is interested in the game after seeing an ad and wants to go check it out. Sometimes though the clicks are accidental. Conversion means the total amount of installs the game has gotten during the test run. CTR (Click through rate)

means what percentage of people who saw an ad clicked it. The higher the amount the better the ad works. It is calculated by dividing clicks with impressions. IR (Install Rate) is calculated by dividing conversion with clicks. From this we see that only 0,84% of all users who visited the Zombiefall store page installed the game. Impressions for install is quite self-explanatory, it just shows how many ads were shown for a single install.

In table 2. are shown the data gathered from inside the game. D1 means the day one retention, which was the main KPI for the test. D1 low shows what was the lowest day one retention the game had during the test. D2 high shows what was the high point of day one retention. D1 average is the average day one retention for all players within the test. D1 average was the most important single KPI for the game during all the tests.

Total users show how many players were noticed during the test. Interestingly, the game was installed more, but this indicates that some players installed the game, but never played it. Users per day shows how many players on average played on any day during the test. Sessions per user show how many times did the players on average play the game within one day. Daily playtime per user combines the average playtime for a single user for one day. Average session length measures how long do the player on average spend time on the game within one session.

While these statistics are very interesting, this study mainly focuses on the D1 average statistic for each of the launches. The point of this study is to get better understanding of what affects retention. The rest of the data is shown because I want to offer a better picture to the reader as to what kind of KPI's were looked at while development of the game continued.

4.3.2 Alpha 2 (26.10.2017 - 01.11.2017)

Zombiefall Alpha 2 release happened after two months of development time. The aim was to update the game and make it better. The game was overall kept the same, but some improvements were made in most areas of the game.

The first thing that has changed drastically is the tutorial. Now when the game is started the first time, the tutorial starts right away without first tossing the player into the main menu. The screen starts with a zoom in on a human character with a speech bubble saying “feels good to be alive” a joke regarding what happens instantly once the screen is pressed. A zombie falls from the top of the screen and lands on the human. Then the camera zooms out a little and there is prompt to hold right side of the screen. After the zombies have hurled over to the right side and fallen for a bit, the prompt changes to the left side and player is encouraged to press there. After that, a text saying “keep going” appears and disappears. The gameplay starts instantly, and this is something that games like Clash of Clans have done well. The player is introduced to the gameplay mechanics instantly. What fail in this tutorial is that the game never explains what the fail state is. In the Alpha 1 tutorial, it was at least mentioned that the top and bottom parts of the screen are dangerous. If the player also fails to press the right or left side of the screen the zombies get crushed by the top of the screen and the game throws the player into the main menu, without the player knowing how to play.

Other changes range from small improvement to larger additions in hopes of getting the attention of different player groups. The ads and Icon of the game changed quite a bit during development time. The first icon uses a lot of pink and a drawn zombie, while the second one use purple as the main colour and switches the zombie to a 3D render. Changes to the icon and marketing materials in general happened largely due the publisher’s feedback. User interface elements have animations and the daily challenge has changed into a daily word. The function is mainly similar, but the rewards are changed. Now collecting letters tracks for five days. Complete the word every day, five days in a row and receive a bigger reward each time. This is very similar to the daily win challenge in Candy Crush Saga and the intent is the same. Similarly, the free gift that is presented in the main menu has gone through changes. The first few opens are rigged for the player. The first gift is worth 1000 coins, the second one is worth

600 coins and third is 300 coins. After that, the pattern becomes truly random. The intent in this change is to let the players more easily unlock new random characters early in the game.

Maybe the biggest change the game received in this version is the mission system. The player can access missions pop-up menu from the main screen, and from there see the missions they have currently. There are three missions in the start. First few are easy. For example, gather a horde of two zombies, which equals to one infection. From completing these missions, the player receives experience, which is tracked in the same screen. Once a missions is complete, a timer rans for six hours and a new mission appears. The player can skip this wait time by watching an ad. The player can also skip a single mission and get a new mission instantly by watch an ad. This removes the old mission and replaces it with a new one. The mission is not removed from the game but instead moved to the back of the line of missions. Finishing enough missions and receiving experience from them, grants the player levels. The level is just an indicator in the main menu and missions screen. The player is rewarded with coins from every level. The game still uses notifications, but they lack information about missions. The player is not notified about new missions being available. Figure 10 shows the missions pop-up.



Figure 10. Missions pop-up

Another big addition to the game was the achievements. If the player has connected the game to Google Play Game Services, the game tracks progress in many ways for the player. Distance fallen, humans infected, zombies unlocked, and a few others are now achievements that the player can gain. Progress in these is cumulative so the player can play as many rounds to achieve them as they wish. Achievements are common in games and they were used in Clash of Clans as

well. There the achievements game rewards in game as well, but not here. Their inclusion is good here even without them, as they offer a goal for some player.

The game also introduces 22 new skins for the zombies. The trend of comical names and descriptions continue. The inclusion of them is welcome, but as there already were 30 skins, adding 22 more doesn't really do much. Tables 21, 22 and 23 show the core, higher and other retention mechanics as previously.

TABLE 21 Gameplay systems in the core loop of Zombiefall A2

Mechanic	Player type	Form of pleasure
Runner (Updated)	Achievers	Challenge, Sensation

TABLE 22 Higher retention mechanics found in the Zombiefall A2

Mechanic	Player type	Form of pleasure
Highscore	Achievers, Killers, Socializers	Challenge, Fellowship
Customization (Updated)	Achievers	Expression, Sensation
Collecting (Updated)	Achievers	Discovery
Player level (New)	Achievers	Challenge
Missions (New)	Achievers	Challenge, Discovery

TABLE 23 Other retention mechanics found in the Zombiefall A2

Mechanic	Player type	Form of pleasure
Notification	-	-
Daily challenge (word)	Achievers	Challenge, Submission
Timed gift	Achievers	Submission
Rewarded ad	-	Submission
Achievements (New)	Achievers	Challenge

The biggest addition to the list was missions and achievements. Both of these are problematic, as some players never see them. The missions unlock after three rounds of play and as such it is possible to miss it. The player might easily stop the game before that. Free gift is unlocked after the first round which is the tutorial. Then on the second round, daily word is unlocked. The achievements on the other hand require a Google Play Game Services account and some players either don't have one or don't want to connect to it.

Overall, the update had good things in it. The advertisements for it worked much better, as impressions for install went down by 615 impressions. That is a big change. As a result, the total users in the test almost doubled. Sadly the D1

retention data took a big hit, and D1 average was just 19,69% compared to the previous 22,2% which is the same as the D1 high was this time around. The KPI's collected from alpha 2 launch are presented in tables 24 and 25.

TABLE 24 Zombiefall ad performance in Alpha 2 (26.10.2017 - 01.11.2017)

Impressions	Clicks	Conversion	CTR	IR	Impressions for install
3335550	227278	2084	6,81%	0,92%	1601

TABLE 25 Zombiefall Game performance, Alpha 2 (26.10.2017 - 01.11.2017)

D1 low	D1 High	D1 Average	Total users	Users per day	Sessions per user	Daily play time per user	Average session length
13,33%	22,22%	19,69%	1637	272	1,47	298	203,00

4.3.3 Alpha 2.1 (07.12.2017 - 13.12.2017)

Development time for alpha 2.1 release was short as it was supposed to be tested before Christmas. Changes are smaller compared to what was done after alpha 1 moving to alpha 2.

The biggest change in this version of the game is the first-time user experience (FTUE). The tutorial has been reworked again, as players still died very early on in the game. Our FTUE funnel show that around 50% of our players died in the first three generated level chunks during alpha 2 launch. To combat this, a better tutorial was created. The tutorial starts out as the same, but as soon as the zombie fall to the screen, arrows point out the deadly top and bottom of the screen, and a big danger text flashes on the screen. Circular saws are also introduced in the top and bottom of the screen to emphasize the danger. Camera also only starts moving after the player presses the right prompt to move right. The player has to navigate the zombies from the side to side multiple times before the tutorial really ends. The circular saws move with the screen and touching them kills the zombie. The point of them is to create a sense of danger for the player,

as they are much easier to understand as dangerous than just touching the top or bottom of the screen.

Once the player dies for the first time, the game teaches the player to use the free gift in the main menu. A finger indicator is pressing the free gift button and everything else is darkened on the screen. The player must open the gift for them to be able to continue the game. The same thing happens when the player first gathers 2000 coins. Then the game forces the player to open the zombie skins menu. Then in there the player can purchase a skin for the coins. A big red “!” is fighting for the players attention on the purchase button. The player can ignore that and close the menu. Also, the daily word button has a text saying it’s new when it opens. The missions menu also opens up automatically when the player has completed a mission.

Other changes in the game are smaller, as some of the menu elements have changed. The button to purchase a random zombie has changed from a black zombie silhouette to a picture of a zombie slot machine. There are more animations in the menu. A few examples, the level progress bar fills with experience and the gift dances when it’s available. There are much more humans in the levels, making the game easier and more chaotic as the player is more easily able to control a big group of zombies. Tables 26, 27 and 28 present the core, higher and other retention mechanics in alpha 2.1.

TABLE 26 Gameplay systems in the core loop of Zombiefall A2.1.

Mechanic	Player type	Form of pleasure
Runner (updated)	Achievers	Challenge, Sensation

TABLE 27 Higher retention mechanics found in the Zombiefall A2.1.

Mechanic	Player type	Form of pleasure
Highscore	Achievers, Killers, Socializers	Challenge, Fellowship
Customization	Achievers	Expression, Sensation
Collecting (updated)	Achievers	Discovery
Player level	Achievers	Challenge
Missions (updated)	Achievers	Challenge, Discovery

TABLE 28 Other retention mechanics found in the Zombiefall A2.1.

Mechanic	Player type	Form of pleasure
Notification	-	-
Daily challenge (updated)	Achievers	Challenge, Submission
Timed gift (updated)	Achievers	Submission
Rewarded ad	-	Submission
Achievements	Achievers	Challenge

This update doesn't add much new into the game but instead refines most aspects. This was a great update and it shows in the data as well. The D1 average retention grew a lot from the last test, while also making the average session length longer and keeping the impressions for install almost the same. The KPI's collected from alpha 3 launch are presented in tables 29 and 30.

TABLE 29 Zombiefall ad performance in Alpha 2.1 (07.12.2017 - 13.12.2017)

Impressions	Clicks	Conversion	CTR	IR	Impressions for install
2258162	171555	1383	7,60%	0,81%	1633

TABLE 30 Zombiefall Game performance, Alpha 2.1 (07.12.2017 - 13.12.2017)

D1 low	D1 High	D1 Average	Total users	Users per day	Sessions per user	Daily play time per user	Average session length
18,6%	34,38%	25,98%	1129	161	1,51	443	293,00

4.3.4 Alpha 3 (19.03.2018 - 27.03.2018)

The team was happy with the last tests results, but the first-time user experience was still tweaked as many players still died very early on in the game. The Alpha 3 update was big and introduced a lot of changes even in the core gameplay. Core loop stayed the same.

The core gameplay changed quite a bit. When before the camera moved independently and the zombies would die from touching the bottom and top of the screen, now the camera moves according to the most bottom zombie. This changes how the player moves in the game as they are not in danger of falling too fast anymore. The bottom circular saw that was introduced in the alpha 2.1 is

no longer there and the top saw has seen some changes. Now the top saw is not tied to the top of the screen as strictly as before, but instead follows the top of the screen in a rubber band kind of way. When player goes fast, the saws are left behind and are not visible, the zombies don't die to the top of the screen. When the player slows down, the saws come down and keep on coming down independently. The circular saws are also accelerating in their downward momentum, so the game's way of making the round harder and harder stays the same even with this change. This type of moving through the level feels much more natural and follows more precisely other successful runner games like Crossy road, where the camera moves with the player when they go fast, but still is a threat if the player is too slow.

The first-time user experience has changed again quite a lot. The game now starts with the new tutorial, which shows the zombie dangling in the sky endlessly. There is a prompt to press right and left a couple of times before the zombie truly starts falling. The player loses control of the zombie while it falls through the roof of a building. Then when the zombie hits the ground the top circular saw is introduced and it starts very slowly coming down. The player is prompted to start moving right to left. When the first human is introduced to the player, the game stops for a while and everything else but the humans is darkened. A text appears saying "tasty human" and a button to continue is given to the player. The player infects the human and both zombies continue going from side to side. The game pauses again and all is darkened except the zombies. A text teaches the player with a message: "Bite humans → Get Zombies". Few more humans are introduced and the game starts normally after a while. All of the heads-up display (HUD) elements are presented after the tutorial.

In the menu, the FTUE continues as the game first presents the missions instead of the free gift. Completing the tutorial completes the first mission, and the player is rewarded with a level and coins. When the player closes the missions pop-up the game forces the player to open the zombies menu and purchase a random zombie. The first level gave the player 2000 coins, which are then used

to teach the player to unlock new zombies. The first unlocked zombie is rigged, and the player always receives a rare ninja zombie.

After the second round is over in FTUE, the game forces the player to press the daily word button in the main menu. The intent is to show the player that there is a daily streak challenge that they can try. The letters are still quite hard to collect during gameplay. The free gift is revealed and forced after the third round.

The zombie collection has been changed quite drastically. Zombies are now grouped into categories with unifying themes. There are eight themes and each of them has five zombies in total. Four of the zombies are like previously, but the last zombie in each group is now considered a rare zombie. Rare zombies have props on them. The props can be headgear like a hat or a hand item such as a ukulele. One rare zombie has a backpack. The way of earning the skins is the same, but the rare zombie costs 250 Juiz instead of 125 like the others. There are also five new models for the characters that humans and zombies can use. There are male and female versions with each having three variations that change if the character is skinny, overweight or in-between. The humans have also received new skins to suit these new models.

The zombie categories change the audio-visuals of the game. Each of the themes has their own colour identity that changes all of the background colours accordingly. Also, the platforms and walls change depending on the theme used and so does the roof that the zombie crashes through at the start of every round now. Some themes also have different music variations of the theme that plays while the round is going. While themes are a good addition to the game and there are a few new zombies, a lot of zombies were cut from the game as they didn't fit in any of the categories. The game now has 40 different zombies and eight of them have new props that alter how they look. Themes are separated in the zombie collection menu by different name label and background colour.

Missions pop-up has also changed and now the levels also unlock new mission slots. The player starts with one mission and when they reach level three,

the second missions slot opens up. The third mission slot opens when the player reaches level five. The reward for each level is also shown in the level progress bar. This allows the player to plan if they want to chase a harder mission in hopes of the reward. The player level is also now more of a progression goal for the player. Once the player reaches level 6, the rewards also give a everlasting score boost as the game gives the player a multiplier of two for all score. Previously, the score multiplier worked on the number of zombies the player controlled, and it does after it, but the player always starts at two instead of one. Overall, the structure of the missions was improved, as the changes in the unlocking and showing rewards in advance really helps. Missions were also tweaked to suit the new structure of unlocking new mission slots. Also, the player doesn't need to wait anymore for new missions as completing a mission always opens the next one. The players can still skip missions they don't like.

The game not tracks also how far has the player fallen in each round. The game then presents a sign in the level that tells the player what the height was when the previous and record rounds ended. The placement is tied to the fall distance and not score, so the player might have passed the record distance but still be behind of their best score. The signs might be confusing to the players because, they are not explained anywhere. For some players they offer another goal during a round, similar to the score, but possibly easier to reach, as the previous sign changes place after every round.

The game has evolved a lot visually in this version. The font used in all of the texts in the game was changed to a more readable one. In the main menu, the zombie is constantly falling in the sky while clouds whirl past. When the play starts, the zombie crashes through a roof. Zombies colliding with the walls and the floor leaves a green splatter on in. Crashing through windows and hitting walls and other objects also now show a comic book styled visual sound effects (onomatopoeia) like "Crash" and "Zap". There are more particles when the zombies hit things and if the crash is hard enough, the screen shakes a little. The circular saw in the top is attached to a motor that shakes violently and emits skull

shaped smoke. The human characters have motions that they perform. They can be dancing or just shaking their heads. When the zombie gets close, they jump up in the air scared. The humans also have a few faces and expressions that they can do. The background image is now separated into three layers that create a parallax effect when the camera moves past. Some of the background elements such as the fountain and palm tree are also animated. This in addition to better sound control offered using FMOD makes the world seem more alive. Coins that the player can collect are smaller while the game also introduces big coins that are worth ten coins each.

The brain party feature was removed from the game and the HUD was adjusted to be clearer. The brain party was removed from the game as it felt that it didn't fit the game anymore. Similarly, the random farts of the zombies were removed. The removal of the brain party was justified also with the data that showed that under one percentage of our players in the test ever reached it so it wasn't going to be missed. The updated list of core, higher and other retention mechanics are shown in tables 31, 32 and 33.

TABLE 31 Gameplay systems in the core loop of Zombiefall A3

Mechanic	Player type	Form of pleasure
Runner (updated)	Achievers	Challenge, Sensation

TABLE 32 Higher retention mechanics found in the Zombiefall A3

Mechanic	Player type	Form of pleasure
Highscore	Achievers, Killers, Socializers	Challenge, Fellowship
Highscore, distance	Achievers	Challenge
Customization (updated)	Achievers, Explorers	Expression, Sensation
Collecting (updated)	Achievers	Discovery
Player level (updated, progression goal)	Achievers	Challenge, Discovery
Missions (updated)	Achievers	Challenge, Discovery

TABLE 33 Other retention mechanics found in the Zombiefall A3.

Mechanic	Player type	Form of pleasure
Notification		-
Daily challenge (updated)	Achievers	Challenge, Submission
Timed gift (updated)	Achievers	Submission

Rewarded ad	-	Submission
Achievements	Achievers	Challenge

The biggest change for the game was in the core gameplay. Being able to go as fast as the player wants really helps with the flow of the gameplay. Progression was also improved, as collecting the zombies was made more interesting. The player level and mission systems are also better at teaching the player to complete missions.

Another country was added to the test group. The purpose of it was to see how that market handled the game and if the game would get traction in there. Most of the users in all of the tests this far were from India. Now Mexico was added to the pool. This makes the data a little distorted as we cannot compare them anymore as they were from the same sample. This was ok for the development and publishing side, as the aim for the data is to see how well the game performs now in the markets, while this study focuses on comparing the results. The amount of traffic gained from Mexico is relevant, but India is still performing much better and most of the users still came from there. Tables 34 and 35 present the publishers KPI data from the test.

TABLE 34 Zombiefall ad performance in Alpha 3 (19.03.2018 - 27.03.2018)

Impressions	Clicks	Conversion	CTR	IR	Impressions for install
4123155	322848	1979	7,83%	0,61%	2083

TABLE 35 Zombiefall Game performance, Alpha 3 (19.03.2018 - 27.03.2018)

D1 low	D1 High	D1 Average	Total users	Users per day	Sessions per user	Daily play time per user	Average session length
22,22%	32,62%	27,94%	1664	185	1,58	544	344,00

Retention numbers for the day one went up again which was a positive thing. As a team we were a little disappointed that the numbers weren't better. The average session length went up again which was another KPI that the publisher started to emphasize more.

4.3.5 Alpha 3.1 (06.08.2018 - 13.08.2018)

The alpha 3.1 saw only a few changes to the previous version. The mission and tutorial systems were changed again. The games speed was increased 20%. Additionally, some minor visual improvements were made and some other changes too.

The tutorial of the alpha 3 was quite heavy and held the players hand for a long time in the early game. The alpha 3.1 tutorial aims to fix this by allowing the player to play straight from the start. The change is subtle, but now the tutorial allows the player to move in any direction in the start and the zombie falls much faster through the ceiling of the world. This speed up the FTUE and hopefully made it more interesting. Another big change in the game is that there are always transparent buttons on the bottom of the screen. Previously the buttons have been on the screen only during the tutorial and even there, only for a small part of it. The player could press either side of the screen which is still true in this version, but the buttons make it easier to understand how to control the zombies. A big problem that was seen in our playtests outside of the alpha launches, was that a lot of players used swipe controls, instead of just pressing and holding either side of the screen. The swipe controls do almost work, and players that try it, often don't realize that it's not the intended way of playing. The buttons were created to combat this behaviour. While the buttons are mostly transparent, they still can be problematic, as they get in the way of the players sight of the level. The player is always moving towards the bottom of the screen and having buttons there may cause issues for some players.

Another gameplay change is that there are now circular saws in the level as obstacles. Previously, only electric boxes were a hazard in the levels, but now

there is another hazard to worry about. The zombie dies instantly when touching the saw and a spray of green particles is ejected from the saw. Visually the saws are smaller than the electric boxes, so they are more easily fitted into levels. They also emit a constant stream of spark particles, to make them easier for players to notice them.

The gameplay was changed to be much faster. This was achieved by making gravity 20% stronger. Now zombies accelerate much faster downwards. The players horizontal movement speed was also raised by 20% to compensate the increase in vertical speed. To keep the game hard the starting speed of the top circular saw was also raised.

The tour of the main menu in the FTUE has changed again. Now the gift is forced again when the player first arrives in the main menu. The player receives 2000 coins and then they are forced to purchase a random zombie. The zombie is again of the rare rarity, this time a jungle explorer. The missions pop-up is available from the start, but the player is not forced to open it ever. The pop-up doesn't open automatically either. Instead, a big red exclamation mark swings on the button when the player has completed missions. The missions are not automatically completed anymore either, and the player must press a claim button to get the rewards and a new mission. Mission slots are no longer tied to the player level either. The player starts with one slot and is able to purchase new slots with the hard currency. The second mission slot costs 10 Juiz and the third one costs 50. Daily word unlocks now after the fifth round and the player is forced to open the pop-up.

IAPs stayed basically untouched from the alpha 1 test to alpha 3. In this version the number of hard currency packs the player can purchase was increased to nine from six. The three new packs were added in the middle, to allow cheaper purchases. Tables 36, 37 and 38 show the core, higher and other retention mechanics in *Zombiefall* alpha 3.1.

TABLE 36 Gameplay systems in the core loop of *Zombiefall* A3.1.

Mechanic	Player type	Form of pleasure
----------	-------------	------------------

Runner (updated)	Achievers	Challenge, Sensation
------------------	-----------	----------------------

TABLE 37 Higher retention mechanics found in the Zombiefall A3.1.

Mechanic	Player type	Form of pleasure
Highscore	Achievers, Killers, Socializers	Challenge, Fellowship
Highscore, distance	Achievers	Challenge
Customization	Achievers, Explorers	Expression, Sensation
Collecting	Achievers	Discovery
Player level (updated)	Achievers	Challenge
Missions (updated)	Achievers	Challenge, Discovery

TABLE 38 Other retention mechanics found in the Zombiefall A3.1.

Mechanic	Player type	Form of pleasure
Notification	-	-
Daily challenge	Achievers	Challenge, Submission
Timed gift (updated)	Achievers	Submission
Rewarded ad	-	Submission
Achievements	Achievers	Challenge

The list of countries the game was going to be tested was updated with this test. Now the countries chosen were India, Turkey, Vietnam, Thailand, Saudi-Arabia and Iraq. This makes the data not 100% compatible with the previous ones. The old test countries and Finland were still updated and open, but the advertising campaign didn't run in those countries. India still dominated all test categories and most users came from there. The KPI data from the alpha 3.1 launch is presented in tables 39 and 40.

TABLE 39 Zombiefall ad performance in Alpha 3.1 (06.08.2018 – 13.08.2018)

Impressions	Clicks	Conversion	CTR	IR	Impressions for install
1106879	31991	228	2,89%	0,71%	4855

TABLE 40 Zombiefall Game performance, Alpha 3.1 (06.08.2018 – 13.08.2018)

D1 low	D1 High	D1 Average	Total users	Users per day	Sessions per user	Daily play time per user	Average session length
22,99%	36,71%	29,42%	610	87	1,51	484,14	319,72

4.3.6 Alpha 4 (21.1.2019 – 03.02.2019)

The alpha 4 was a “go/no go” test for the game. It was the last time Zombiefall would be tested with the publisher. The game had been in development for over a year and ten months. After the alpha 3.1 test, development of the game had slowed down considerably as the team needed to work on other things. The Alpha 4 update saw only a handful of changes. Most of the development time for this test was spent on the new advertisement material and a single new character. Figure 11 shows what the main menu looks like in alpha 4.

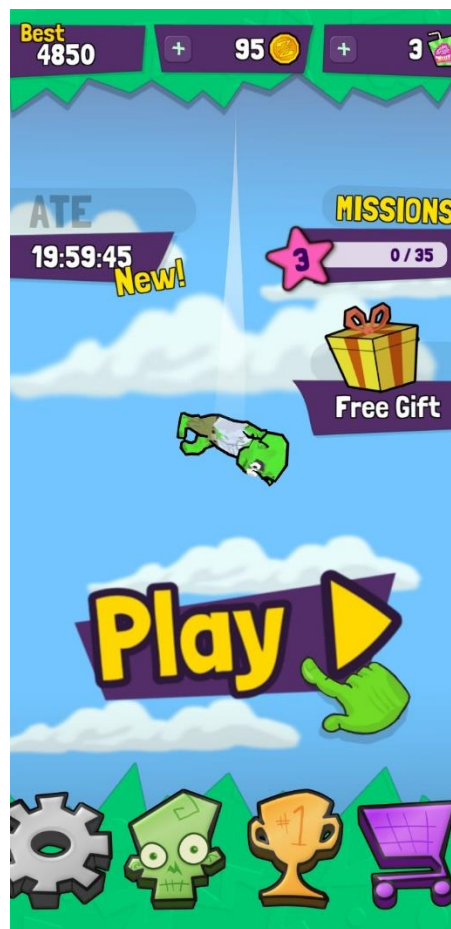


Figure 11. Zombiefall alpha 4 main menu

The character that was added was a rally themed zombie. The player unlocks the new zombie as their first unlock in the game. The new zombie was also used heavily in the game’s advertisements and icon. Figure 12 shows how the Zombiefall icon has changed since alpha 1 launch.



Figure 12. Zombiefall icons

The FTUE is the same as in the Alpha 3.1 test, but the new character is unlocked instead. Notifications were worked on in this release as well. Previously, often notifications would bombard the player too much, and this was balanced. The game would inform the player of the other retention mechanics found in the game as well as it would alert the player of its existence if the player had not played in a while. Tables 41, 42 and 43 present the core, higher and other retention mechanics in the last alpha test.

TABLE 41 Gameplay systems in the core loop of Zombiefall A4.

Mechanic	Player type	Form of pleasure
Runner	Achievers	Challenge, Sensation

TABLE 42 Higher retention mechanics found in the Zombiefall A4.

Mechanic	Player type	Form of pleasure
Highscore	Achievers, Killers, Socializers	Challenge, Fellowship
Highscore, distance	Achievers	Challenge
Customization (updated)	Achievers, Explorers	Expression, Sensation
Collecting	Achievers	Discovery
Player level	Achievers	Challenge
Missions	Achievers	Challenge, Discovery

TABLE 43 Other retention mechanics found in the Zombiefall A4.

Mechanic	Player type	Form of pleasure
Notification (updated)	-	-
Daily challenge	Achievers	Challenge, Submission
Timed gift	Achievers	Submission
Rewarded ad	-	Submission
Achievements	Achievers	Challenge

Unlike the other tests, this test ran for two weeks. The idea for this to be the definitive test to see if Zombiefall could be something the publisher wanted. Like before, the data from previous test was positive, but not quite there. The two weeks allow for a larger sample size and real day7 retention data. The country set was also larger than before, so most of the data gathered from the alpha 4 isn't really compatible with the other results, but retention is fairly similar within all tested countries in the set. The countries that ran the user acquisition campaign were India, Turkey, Vietnam, Thailand, Saudi Arabia, Greece, Czech Republic, United Kingdom and Sweden. All previous countries were still open and this probably causes some distortion on the data. For example, the selected countries had a total of 8978 users while the game had 9324 users during the test. The table for the data is also quite different, as countries are segmented more. The countries are segmented by the publisher into groups depending on how expensive the user acquisition is. The ad performance data from the test countries is presented in table 44 and tables 45 and 46 present the other important KPI's.

TABLE 44 Zombiefall ad performance in Alpha 4 (06.08.2018 - 13.08.2018)

Country set	Ad type	Impressions	Clicks	CTR	New users	Imps/install
India	Banner	5 940 000	729 000	12,27%	5 927	1 096
	Interstitial	548 000	16 500	3,01%		
	Video	10 400	110	1,06%		
	Total	6 498 400	745 610	11,47%		
Turkey, Vietnam, Thailand, Saudi Arabia	Banner	1 660 000	110 000	6,63%	2 552	806
	Interstitial	391 000	8 020	2,05%		
	Video	5 660	44	0,78%		
	Total	2 056 660	118 064	5,74%		
Greece, Czech Republic	Banner	144 000	4 710	3,27%	338	1 025
	Interstitial	187 000	1 950	1,04%		
	Video	15 400	60	0,39%		
	Total	346 400	6720	1,94%		
UK, Sweden	Banner	196 000	5 920	3,02%	161	1 582
	Interstitial	58 500	671	1,15%		
	Video	124	0	0,00%		

	Total	254 624	6 591	2,59%		
--	--------------	---------	-------	-------	--	--

TABLE 45 Zombiefall Game performance, Alpha 4 (06.08.2018 – 13.08.2018)

D1 low	D1 High	D1 Average	Total users	Users per day	Sessions per user	Daily play time per user	Average session length
23,70%	31,76%	27,31%	9324	666	1,47	383,00	261,18

TABLE 46 Zombiefall day seven performance (06.08.2018 – 13.08.2018)

D7 low	D7 High	D7 Average
2,82%	4,22%	3,53%

The data was still not good enough and the publisher decided to drop the game. While some of the things were good in the test, the retention metrics were lacking.

4.4 Summary

Zombiefall has improved a lot in its development time. While this has gone on, the mobile gaming market has changed too. The big names studied for this research are still big and making a lot of profit. At the time of writing this article, App Annie - the site that tracks mobile gaming marketplaces, has zero endless runner type games in its Android top 100 grossing games. In fact, the first endless runner game on the list is Hill Climb Racing 2 - which has also level-based progression and not endless running only. The first big purely endless runner game on the list is Subway Surfer by Kiloo at 325. (App Annie, 2019. App Annie, top grossing, Android, United Kingdom, 9.4.2019) This indicates a shift in the market, as endless runner games have previously been very profitable. Looking at the games studied the list contained two match-3 puzzle games, two strategy games and one real world alternative reality monster collecting experience. The two

puzzle games are quite relaxed and easy to pick up, while the others had a lot of social mechanics and depth in their gameplay.

4.4.1 Zombiefall data

The data gathered from Zombiefall is interesting. It shows that Zombiefall has improved over time, but that the improvement has raised the day one retention by only a few percentages. Different countries in the last few tests mean that some disturbance in the data is occurring and we cannot compare it as easily. The table 47 summarizes the gathered data from the numerous Zombiefall releases. Interestingly, the alpha 3.1 had the lowest number of users while the game was available in more countries than in the previous tests. The tests were successful in finding how players interact with the game and if the players would come back.

TABLE 47 Summary of Zombiefall alpha KPI's and retention mechanics

	D1 Average	Total users	Average session length	Core retention mechanics	Higher retention mechanics	Other retention mechanics
Alpha 1	22,2%	847	256	1	3	4
Alpha 2	19,69%	1637	203	1	5	5
Alpha 2.1	25,98%	1129	293	1	5	5
Alpha 3	27,94%	1664	344	1	6	5
Alpha 3.1	29,42%	610	318	1	6	5
Alpha 4	27,31%	9324	261	1	6	5

The changes made into Zombiefall during the development were all quite minor. None of the updates really changed the way the game was being played and the core loop stayed the same each time. The FTUE was changed in each of the tests and we have no way on knowing what version worked the best for most players. We can estimate that it worked well in the last few tests, as the retention was high in the alpha 3 through alpha 4. On the other hand, the average session length was the highest in alpha 3, so maybe the FTUE was best then. The game was sped up by around 20% in the alpha 3.1 test, so maybe the decrease in average session

length comes from the player completing rounds faster. These ideas are just guesses but they shed light into the problems of the developers.

Alpha 2 release improved most things from the alpha 1 release. The biggest improvement was the addition of longer retention methods in the game, as missions and player level first were introduced. The word challenge was also improved to give the player a better reward for playing multiple days in a row. Alpha 2.1 saw only smaller changes, as the FTUE was updated and along it, the missions and other daily activities. Interestingly, the average day one retention went down from 22,2% to only 19,69%. The average session length also went down significantly. Alpha 2.1 FTUE changes and the introduction of dangerous circular saws in the screen might have saved the game, as they really improved both revenue and session length.

Zombiefall received its biggest update in the alpha 3 release. The core gameplay was changed to allow the player play as fast as they want. Alpha 3 also updated the mission and the player level system. The player level mattered for a while, as the player could unlock new mission slots. Zombies were grouped into themes. Alpha 3 saw a good increase in retention and play session length.

Alpha 3.1 had the best average retention, but it also lacked users. Changes were more minor as the increase in speed was the most significant one. Then alpha 4 only improved the notifications and added a new character. Ads for Zombiefall were improved. Table 48 indicates the number of higher and other retention mechanics found in the analysed successful free-to-play mobile games.

TABLE 48 Higher and other retention mechanics in the analysed games

Game	Higher retention mechanic	Other retention mechanics
Pokoemon Go	5	6
Candy Crush Saga	9	6
Gardenscapes	8	3
Clash of Clans	13	4
Guns of Glory	12	4

Comparing the successful games against the Zombiefall retention tests shows that Zombiefall is lacking in many areas. The successful games are very well crafted and, in their core, very deep but for the most part -simple to pick up.

4.4.2 PECs

The successful games all have either a waiting or sessioning in their core loop. While Zombiefall has waiting in its systems like the daily world challenge, the player can still run through the core loop for as long as they want to.

PEC 4.	Top grossing games have core loops that either have waiting or sessioning.
--------	--

The successful games also had a plethora of ways to retain the players. This can be seen in the amount of higher and other retention mechanics found in the games. Many mechanics of retention varying in their effect and connection to the core loop were found. Games often had multiple mechanics for the players to engage with.

PEC 5.	Games can have multiple retention mechanics. Core retention mechanics are tied to the core loop. Higher retention mechanics offer goals or deepen the play experience. Other retention mechanics are not integral for the game experience and can be loosely tied to it.
--------	--

Typically, the successful games all have multiple ways to engage the players and multiple sources of pleasure. All player types are covered in all of the studied successful games. The player can find many things to like about the games whether they like socializing or just playing on their own.

PEC 6.	All player types should be satisfied with retention mechanics to keep the maximum number of players interested.
--------	---

All of the successful games studied had multiple progression goals for the player. Interviewees pointed out that progression is vital for the games long term retention. Progression could be the most important retention mechanic as it offers goals for the player to reach.

PEC 7.	Top grossing games have multiple progression mechanics.
--------	---

Developing Zombiefall has been an interesting journey of learning. While the developers often would benchmark successful games, the implementation of retention mechanics has proven to be hard. Game design choices were hard, as the team had multiple ideas on what should be improved or fixed. Zombiefall was tested six times and six times it has failed to reach the day one retention of 30%, that was needed to progress.

PEC 8.	Increasing retention is very difficult.
--------	---

5 Discussion

From the interviews and the studied games, PECs were formed. PECs are the summary of what was learned during the study. From the interviews three PECs were formed.

PEC 1.	Retention is vital for the game's success.
--------	--

This PEC is really not news to the gaming industry, as there is a reason why companies track retention metrics so closely. It is still a good thing to note, as the interviewees all used retention as a measure of how fun the game is. This finding validates the thought of what retention is for games and free-to-play games in particular. The interviewees all shared the thought that the games development should not be continued if it fails to preserve retention goals set up for it. Success can come in many forms but for the interviewees, success was calculated in terms of profit. As for *Zombiefall*, the game has not left the developers hands and as such has failed to be successful. Partly this is because the game failed to reach the retention goals.

PEC 2.	There is no agreement on what the industry wide retention threshold is or what retention metric is the most important one.
--------	--

This PEC was an interesting discovery. Before the interviews I had the impression that there was a uniform industry wide retention threshold. The threshold being almost the same as what the interviewee two said was a couple of years ago for puzzle games. In a Gamasutra article McCalmont states that good retention goals would be 35-40% for day one, 15% for day seven, and 5% for day 30. (McCalmont, How Do I Know I Have a Healthy Game? 2013, Gamasutra.) Interviewee two states that the numbers are 40% for day one, 20% for day seven and 10% for day 30. The numbers are higher in our interview results. Interviewee

three also had retention goal of 50% for day one. This all indicates that like interviewee two said, the market has learned to make better games and the numbers are now higher than before. When McCalmont wrote the article in 2013, the retention numbers might have been good then. After that, a couple of years ago, the numbers were again higher as stated by interviewee two and are even higher now like both interviewee two and three stated. The retention threshold changes with every company and different genres have different goals but overall the threshold for successful launch is getting higher.

PEC 3.	Progression mechanics affect the long-term retention of the game significantly.
--------	---

Importance of progression was both noted in the interviews and in the successful mobile game's reviews. Visible progression goals that impact the gameplay or make the player feel or seem stronger or better than previously are what drives players interest. Interviewee one and two both stated that progression mechanics that give the player a goal to pursue are what affects the retention the most. This was new information, as none of the articles found for success factors for mobile games or even about player retention mention how important progression mechanics are. Progression is mentioned to be one of the important factors in games for achiever players. This is enforced in the Rules of Play by Salen and Zimmermann (2003) where the two state that the games goal is the largest single element that drives player motivation and pleasure. The goal is the reason why they play but is never too easy to reach. There is often another goal after the previous one, just out of reach.

From the studied successful mobile games and the Zombiefall alpha launches five more PECs were formed. The successful games have multiple similar retention mechanics.

PEC 4.	Top grossing games have core loops that either have waiting or sessioning.
--------	--

Firstly, all of the successful games studied forced the players to take a break from playing or to pay up. The two strategy games used waiting and the other games used sessioning. The principle being the same in both cases; the player is almost forced to stop playing and is then rewarded for returning to the game. In Clash of Clans and Guns of Glory the games used waiting mechanics efficiently. Anything the player does in those games usually takes time. The core gameplay revolves around upgrading buildings and troops, so the waiting is mandatory for players. If the player wants to have the benefit they chose previously, they need to come back into the game and get it and maybe set up the next upgrade while they are at it. Waiting core loops are great for player investment in the way they allow for player determined appointment triggers. The other games used the sessioning core loop, where the initial core loop can be played repeating for many times, until the player hits a fail state too many times or runs out of some resource. This then forces the player to take a break from the game. When they return, the player can continue the core loop and is often rewarded. The PEC can be considered a key success factor for free-to-play mobile games.

PEC 5.	Games can have multiple retention mechanics. Core retention mechanics are tied to the core loop. Higher retention mechanics offer goals or deepen the play experience. Other retention mechanics are not integral for the game experience and can be loosely tied to it.
--------	--

The retention mechanics were categorized into three different groups as they had different ties to the core gameplay. The categorization is new and it should help game developers focus development on the important mechanics. Zombiefall had mechanics in all categories, but the focus was a lot on the higher and other retention mechanics, while the core gameplay was left untouched for majority of

the time. Zombiefall had six higher retention mechanics in place during the alpha 4 launch while the successful games had more in most cases. The strategy games had 12 and 13 higher retention mechanics and only four other retention mechanics. The focus in the games is both in the core loop with waiting and higher retention mechanics. The same balance of core- higher- and other retention mechanics can be seen in four out of five successful games studied. The exception being Pokémon Go, where the game is much more about core mechanic - exploring in real life.

All the studied games have multiple retention mechanics. The balance in them is crucial though, as there needs to be enough reasons for the player to get interested in the notifications and daily presents seen in most games. Interviewee two gave a good example of how notifications and daily rewards can increase the retention a little but cannot save other vice bad core experience.

PEC 6.	All player types should be satisfied with retention mechanics to keep the maximum number of players interested.
--------	---

The Bartle's (1996) player types were all covered by the successful games. Achieves had the most mechanics associated with them. Killers, Socializers and Explorers share a similar amount of mechanics changing a bit in each of the games. Like stated before, the player types are overlapping, and this is also something the game can benefit from. While players might be interested in one aspect of the game initially, they can get hooked on other aspects of the game after trying them out. Interestingly, interviewee there stated that while all successful games have a social aspect, it can actually be faked. The Successful studied games all had a social aspect, and in all of them the social mechanic and players behind it were genuine. The strategy games had many social elements and the more casual match-3 games only had a handful of social elements. Explorer players also had much more to dig into in the strategy games, as the gameplay systems were much deeper. Interestingly, Pokémon Go also had a lot of depth in its systems that explorer players could find interest in. Most of the

systems were not easily explained in the game though and players should often find information about the systems outside of the game.

This study did not find anything particularly new in regard to the player types. The retention mechanics found in the games were mostly easy to label for player types. Some mechanics were not marked for any player type, as they were not a reason anyone would play the game over if there wasn't something else for them too. A game's only appeal cannot be something like notifications. A mechanic that in this study was not labelled for any player type can be used as part of the core loop and it can aim to please any particular player type. For example, in Pokémon go, the gameplay loop revolves around the player actually walking around the local area. That is a mechanic that is integral for the core gameplay but one that all player types can either hate or love. Also it is good to note that just because the game targets many player groups, the implementation of the mechanics has to be sufficient.

PEC 7.	Top grossing games have multiple progression mechanics.
--------	---

Progression was told to be key for long term retention in the interviews as PEC three states. All of the successful games studied had multiple progression mechanics. This then allows for different players to find goals that they care about. In Gardenscapes renovating the garden is fun for some players and that is a goal to pursue, but some players might enjoy climbing the event rankings and leagues. The successful games often had progression mechanics that suit different player types.

Zombiefall on the other hand had no progression mechanics in its final alpha test. The player could only track how well they play by looking at the highscore list and the fall length records. While they indicate that the player is doing better, they were not marked as progression for any of the games studied. Interviewee one also stated that chasing high score is not enough as the only progression goal. The marked progression mechanics were mechanics that the player can easily work towards and it affects the core loop in a meaningful way.

Progressing in a map like in Candy Crush Saga, offers new levels and challenges for the player while getting better score in Zombiefall and even in Candy Crush does not. Zombiefall had a moment of progression that changed how player levels affected the gameplay. In alpha 3 the player was able to unlock new mission slots by levelling up and just playing.

PEC 8.	Increasing retention is very difficult.
--------	---

Given how many tests were run on Zombiefall and the amount of retention that was gained with each update, it is safe to say that implementing mechanics that raise retention is hard. The initial day one retention in alpha 1 was only 22,2% and after five more releases the average landed in 27,31% with a difference of 5,11%. The intention was always to increase retention by making a better first-time user experience and giving more reasons to play tomorrow. Notifications were tweaked, missions adjusted, and skin rewards expanded on. The core gameplay loop was left almost untouched, and the game never really got substantial progression mechanics.

In chapter 2.2 the The Cynefin framework was introduced and the domains of decision making explained (Kurtz & Snowden 2003). Like mentioned there, most of the game design choices made by the game designers and developers take place in the complex domain, where the cause and effect can be seen only after trial and error. This proved to be true for the development of Zombiefall. There never was an easy route to raise retention and the successes and failures of the update could only be seen in the data after each test. Even the data was ambiguous as often there were multiple changes and it is hard to know which change caused what in the data.

In the interviews, the publishers stated that most games never see a global release and that the production is stopped if the game fails to meet the key performance indicators. Retention is maybe the biggest KPI for the publishers interviewed for this study. Maybe the development should have stopped a long time

ago for Zombiefall or the updates should have addressed issues regarding the core loop more. The core loop never introduced sessioning or waiting and the first round of gameplay is the same as the tenth. The gameplay never progresses and only visual changes happen with unlocking new zombies. If the core gameplay is not interesting enough, then adding other and even higher retention mechanics doesn't seem to save the game like stated in the interviews.

6 Conclusion

This research studied what affects the players willingness to return to a game for multiple days. In chapter two the focus was on literary review and key concepts that help understand gaming as a whole and mobile gaming market. Chapter 3 explained the research methods used to come up with answers to the research questions. Three interviews with publishers were held and five successful free-to-play games were studied. Six times was a campaign for Zombiefall launched. Chapter 4 presented the findings and in chapter 5 the implications of those findings were discussed.

This chapter concludes the thesis and gives answers to the research questions. Possible research topics that could expand the work are presented and limitations of this research are discussed. Zombiefalls future is discussed briefly.

6.1 Answers to research questions

The study set out to find answers into retention in free-to-play mobile games. The research question was: **What affects retention in free-to-play mobile games?** To answer that interviews were held, and successful games were studied. PECs about retention and mobile free-to-play games were formed.

Three sub-questions were asked to better understand the concepts and phenomena around free-to-play mobile games. The sub-questions were:

1. **How is success defined for free-to-play mobile games?**
2. **Is retention important for mobile free-to-play games success?**
3. **What are the success factors for free-to-play mobile games?**

Answering the question; **how success is defined for free-to-play mobile games** - was quite easy. Success was defined by all the interviewed persons as how well the game can generate revenue. Free-to-play games are in this tough market where the player can choose what do they want to play and even then, if they

want to pay anything about it. Making games and keeping developers in their jobs costs something so the game must keep making money somehow. This definition of success was used when deciding what games should be chosen for the empirical review. The answer then is the games ability to generate revenue. Success of course means different things for different people but competing in the free-to-play mobile games market demands a focus on the monetary value of the game.

The second sub-question was: **Is retention important for mobile free-to-play games success?** The answer for that question also comes mostly from the interviews, but also from the literary review. Fields in 2014 showed how retention is used to keep a free-to-play game running. This was presented in figure 1 in chapter 2.1. Only a small percentage of player ever spend money in free-to-play games and most players drop a game after a few tries if not sooner (Drachen, Lundquist, et al. 2016). The revenue generated from the players is used to introduce new players into the game with user acquisition. Word of mouth from already retained players also contribute to the games long term player base. The interviewees all shared the importance of retention for the game. The PEC 1 states that Retention is vital for the game's success.

The third sub-question was: **What are the success factors for free-to-play mobile games?** Surprisingly, the literary review could not find sufficient answers for this. The games marketing was noted to be more influential to the game's success than the games design factors. Targeting it to the right audience and keeping that audience big is important. Having a well-known brand helps too. While these things are very important for the game's success, the researches scope of work doesn't really cover them, as the main focus is on the game itself. How design of the game can affect it success. From the PECs the study can answer that the key success factors are covered with following PECs 3-7. The game should have good progression mechanics (PEC 3 and PEC 7). The core loop should force the player to take a break from time to time with waiting and sessioning. The player should be rewarded for returning (PEC 4). The game should

have multiple retention mechanics with more emphasis on mechanics that are more integral for the core loop. More higher retention mechanics than other retention mechanics (PEC 5). All player types should be taken into consideration and satisfied with mechanics (PEC 6). Those are the key success factors of free-to-play mobile games. Another game could be tested to validate the success factors. Testing a game with all of these success factors implemented and then comparing the retention data with *Zombiefall* would either validate or disprove the success factors.

The main research question for this study was: **What affects retention in free-to-play mobile games?** There are many things that affect retention in free-to-play mobile games as evidenced in the interviews and the game analysis. First of all, the game needs to have a good progression model, this came up in the interviews as the top contributor for long term retention (PEC 3 and 7). Then there are game design elements that can be categorized into three different retention groups; core retention mechanics, Higher retention mechanics and other retention mechanics (PEC 5). Core retention mechanics are what the player does constantly while playing. They are vital for the game and consist of the core loop and the themes and genres of the game. They affect retention greatly if the player finds them enjoyable. Higher retention mechanics affect retention by giving the player goals outside the core loop. They also deepen the play experience transforming the core loop experience into something larger. Other retention mechanics are game elements that may have no connections to the core loop but often reward the player for playing for multiple days and remind the player of their existence. The core loop and if it implements waiting and seasoning has a big impact in player retention. Difference in waiting and seasoning is in how the core loop works. Waiting is a step in the core loop in each of its cycles but seasoning allows the player to play the core loop multiple times before it transforms and forces the player to wait. In both cases the player cannot continue playing until they have waited some time and are then usually rewarded for returning (PEC 4). To raise the retention higher, the game can target a large audience. By

appealing to many player types, the game can catch players that are interested in multiple aspects of the game and are then more easily retained. Then variables that are not part of the game design can have a big impact in retention as well. The variables are outside of the scope of this work however. The interviewee one and two both raised the importance of good user acquisition and match between game and players. Also having other successful games also helps, as the company can have fans and then cross promoting games is cheap and effective.

6.2 Limitations

This research only interviewed three people which means that only a small portion of all publishers were reached. Three interviews are suitable for a study of this magnitude, but it leaves room for improvement. While I believe that the results and insight gained from the interviews are good and that the interviewees had plenty of unified thoughts, they cannot be generalized to cover all publishers in the mobile gaming market. Interviews are also always maybe a bit flawed as the situation is never optimal. The problems of interviews are covered well in the article; the qualitative interview in IS research: Examining the craft by Myers and Newman (2007). The interviewees could have trouble trusting the researcher as they represented not just themselves but the companies too. Another problem could easily be the artificiality of the interview which means that the person interviewed is under a weird situation where they give or create opinions under a time pressure.

For the review of successful games, more games could have been chosen and with more variation in the genres. Currently, the research had two match-3 games, two strategy games and an AR monster collecting game. *Zombiefall* is an endless runner game so comparing the successful games to it is maybe unfair. Regardless, *Zombiefall* and the successful games shared a lot of higher and other retention mechanics and they compete within the same market. The problem arises more with the number of games studied, as many of the PECs were formed

from analysing the successful games, so only having 5 games, may not make generalizing the PECs as easy as was intended.

To combat both of these limitations more data should be gathered using more interviewees and a larger sample of successful games. By doing this, the theoretical value of the PECs formed would be strengthened.

My personal involvement in the development of *Zombiefall* could also be a limitation for the research. I could have a biased interpretation of the data and the game in general. I only can state that I tried to be as objective as possible. However, by using *Zombiefall* as the case study in this research a lot of data was possible to be used. Not often can researchers use data from so many releases as *Zombiefall* had.

In summary, more data should be gathered from having more interview participants and more successful games should be reviewed to strengthen the formed PECs.

6.3 Future research and *Zombiefall*

The research only focused on free-to-play mobile games and as such it left a large portion of games out. It would be good to study what role and effect does retention have on free-to-play games in the PC or console gaming market, where the market is more saturated with premium games and only a few very successful free-to-play games. Then another study could focus entirely on retentions effect and role in premium games either in mobile markets or elsewhere. Free-to-play games live off of retention as was evidenced in chapter 2.1, but premium games usually only need the player to purchase the game upfront and then the player is exhausted of the revenue already. So, do the premium game need to retain players to be successful then?

This study could be expanded upon by studying new cases. By running another game through similar tests as *Zombiefall* did. Different retention mechanics

would yield new results that should be easily comparable. If the game would cover all the success factors (PEC 3-7) would the game be successful?

Success factors could be mapped more extensively for mobile games and on genre by genre basis, as it would allow more exact factors to be taken into consideration. The success factors found in this study were all broad and easily generalized so more focused group of games could yield more genre dependant results.

As to what happens to *Zombiefall*? I cannot yet know. Currently, *Zaibatsu* is looking for a new publisher that could take the game out of our hands. Based on the findings of this research, the game is not going to be a massive success without some improvements and changes. Looking at the results from this study, the player should find a progression goal in the game, but currently there are basically none. Core loop should also be tweaked to implement sessioning or waiting. If however a publisher with the right audience appears and the game has cheap and effective user acquisition, I can see it being profitable. Just not the huge success story we hoped it would be.

REFERENCES

- I Ajzen, 1991. The theory of planned behaviour. University of Massachusetts, Amherst, USA
- App Annie, Top Chart, 2018. Read on 21.1.2018 from www.appannie.com
- Bartle, 1996. Hearts, clubs, diamonds, spades: Players who suit MUDs
- Bartle, 2005. Virtual Worlds: Why People Play
- Behrmann, Noyons, Johnstone, MacQueen, Robertson, Palm, & Point, 2011, State of the Art of the European Mobile Games Industry. On: <https://cordis.europa.eu/docs/projects/cnect/2/288632/080/deliverables/001-MobileGameArchD3121122011PU.pdf>
- Callaghan, 2014. Using Game Analytics to Measure Student Engagement/Retention for Engineering Education.
- Drachen, Lundquist, Kung, Rao, Klabjan, Sifa, Runge (2016). Rapid Prediction of Player Retention in Free-to-Play Mobile Games.
- Fields, 2014. Mobile & social game design: Monetization methods and mechanics. 2nd ed. Taylor & Francis Group.
- Hamari, Alha, Järvelä, Kivikangas, Koivisto, Paavilainen, 2016. Why do players buy in-game content? An empirical study on concrete purchase motivations. *Computers in Human Behavior*, Volume 68
- Hamari & Keronen, 2017. Why do people play games? A meta-analysis. *International Journal of Information Management*, Vol. 37, No. 3, 01.06.2017, p. 125-141.
- Hunicke, LeBlanc, Zubek, 2004. MDA: A Formal Approach to Game Design and Game Research.
- Hyun Jung Park, Sang-Hoon Kim, 2013. A Bayesian network approach to examining key success factors of mobile games. *Journal of Business Research*. Volume 66, Issue 9.
- Kurtz & Snowden, 2003. The new dynamics of strategy: Sense-making in a complex and complicated world.

Lovell, 2013. The Pyramid of Free-to-Play game design. Read on 10.2.2018 from: https://www.gamasutra.com/blogs/NicholasLovell/20130919/200606/The_Pyramid_of_Freeto

Luton, 2013. Free-to-Play, Making Money From Games You Give Away. Upper Saddle River, New Jersey: New Riders Publishing.

McCalmont, 2013. How Do I Know I Have a Healthy Game? Gamasutra. Read on 29.6.2018 from: <https://www.gamasutra.com/blogs/TrevorMcCalmont/20130228/187460/>

Myers, Newman, 2007. The qualitative interview in IS research: Examining the craft. Information and Organization Volume 17, Issue 1, 2007, Pages 2-26

Mäyrä, 2015. Mobile Games. University of Tampere. The International Encyclopedia of Digital Communication and Society, First Edition.

Pocketgamer, 2018. App Store Metrics. Read on 7.1.2018 from: <http://www.pocketgamer.biz/metrics/app-store/>

Salen, Zimmerman, 2003. Rules of Play: Game design fundamentals. MIT Press.

Shiu, 2018. 3 Ways To Measure User Retention. Read on 29.8.2018 from <https://amplitude.com/blog/2016/08/11/3-ways-measure-user-retention/>

Statista, 2018. Number of available applications in the Google Play Store from December 2009 to December 2017. 7.1.2018 on: <https://www.statista.com/statistics/266210/number-of-available-applications-in-the-google-play-store/>

Wan, Chiou, 2006. Psychological motives and online games addiction: A test of flow theory and humanistic needs theory for taiwanese adolescents.

Weber, John, Mateas, Jhala, 2011. Modeling Player Retention in Madden NFL 11. Innovative Applications of Artificial Intelligence (IAAI)

World Health Organization, 2018. ICD-11 Beta Draft, 6C71 Gaming disorder. Read as of 12.2.2018 from: <https://icd.who.int/dev11/l-m/en#/http%3a%2f%2fid.who.int%2fid%2fentity%2f1448597234>