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APPLYING GAMIFICATION ELEMENTS TO AN ONLINE CASINO PLATFORM

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Abstract

Gamification is one of the most effective ways of creating and keeping high engagement among people. It is a deep exploration into what makes a game fun and how to apply those fun and engaging elements in real-life productive activities. The average lifetime of a player in online casinos is not long within iGaming, players tend to play very few times and they never come back. Even if a player has a specific favorite game, they can many times find the same game on other sites. The lack of interaction between friends within iGaming could be a reason for a player to easily go elsewhere. The increase of streaming of iGaming is a strong indicator that there are many that like to socialize over a common interest such as iGaming.

This thesis provides a study of gamification in collaboration with the casino domain. It presents the basic concepts of gamification, that someone might need to implement, in order to examine if gamification elements have a positive or negative effect in the casino.

Initially, the project focused on how to invite an existing player into another's user social network and then how to elaborate and introduce gamification techniques. The development was iterative in 3 cycles, each one of approximately 3 weeks. At the end of each iteration, changes were implemented according to the feedback from the development team. The evaluation was conducted with 15 users, some of them were experienced and some others were not. Results found that the user using the gamified version was more engaged and using gamification elements can indeed achieve high engagement.

Keywords

Gamification, iGaming, online casino, Social Network, Octalysis Framework

Sammanfattning

Gamification är ett av de mest effektiva sätten att skapa och hålla högt engagemang bland människor. Det är en djupundersökning av vad som gör ett spel roligt och hur man kan tillämpa dessa roliga och engagerande element i vardagens produktiva aktiviteter. Den genomsnittliga speltiden för en spelare på online kasinon är inte lång inom iGaming, spelare tenderar att spela väldigt få gånger och kommer inte tillbaka. Även om spelare har ett specifikt favoritspel kan de ofta hitta samma spel på andra sajter. Bristen på interaktion mellan vänner inom iGaming kan vara en anledning att spelare lätt söker sig annanstans. Ökningen av streaming av iGaming är en stark indikator på att det finns många som gillar att umgås över ett gemensamt intresse som iGaming.

Det här examensarbetet utgör en studie av gamification i kontext av online kasinon. Det presenterar de grundläggande koncepten för gamification, som någon kan behöva implementera, för att undersöka om element har en positiv eller negativ effekt i kasinot.

Ursprungligen fokuserade projektet på hur man bjuder in en befintlig spelare till en annan användares sociala nätverk och sedan hur man utvecklar och introducerar gamification-tekniker. Utvecklingen upprepades i 3 cykler, var och en på cirka 3 veckor. I slutet av varje iteration genomfördes ändringar enligt feedback från utvecklingsteamet. Utvärderingen genomfördes med 15 användare, några av dem var erfarna och andra inte. Resultaten visade att användaren som använde den gamifierade versionen var mer engagerad och att använda gamification-element kan verkligen uppnå högt engagemang.

Nyckelord

Gamification, iGaming, online kasinon, Sociala Nätverk, Octalysis Framework

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Pavlos Karageorgiadis

Table of Contents

List of Figures

List of Tables

List of acronyms and abbreviations

DOM: Document Object Model

DSRM: Design Science Research Methodology

GAME: Gather Act Measure Enrich

MDA: Mechanics, Dynamic and Aesthetics

MDE: Model-Driven Engineering

MMORPG: Massively Multiplayer Online Role-Playing Game

NPM: Node Package Manager

QA: Quality Assurance

RAMP: Relatedness Autonomy Mastery Purpose

ROI: Return on Investment

SDT: Self Determination Theory

SNSs: Social Network Sites

UI: User Interface

UX: User Experience

WoW: World of Warcraft

6D: Six D's

1 Introduction

This chapter describes the specific problem that this thesis addresses, the context of the problem, the goals of this thesis project, and outlines the structure of the thesis.

Online gaming as iGaming[1] is the wagering of money or some other value on the outcome of an event or a game using the internet. The iGaming activities include poker, online casinos, sports betting, etc.

In the iGaming industry, it is rare for operators to have their own games. Games are built by gaming companies (NetEnt, Evolution Games), which in turn are used by various operators, LeoVegas for example. So a specific online casino game for instance, can be found on countless of online casino sites. What differs between the casinos is the amount and selection of games they host as well as the overall experience besides the game itself. For instance, payment methods, customer support, ease of use of the site, etc.

Many different definitions of gamification have been stated in literature. Aparicio A. et al. in [2] define gamification as *"... the use of game design elements in non-gaming context. It can be used as a tool to improve the participation and motivation of people in carrying out diverse tasks and activities that, basically, could not be too attractive. Its application is not restricted to any specific area and can be used in contexts as diverse as education, the development of respectful behavior towards the natural environment or to improve the well-being of the elderly"*.

Generally, gamification is described as the process of improving the product or the service by using concepts from the gaming world. Gamification is adding game mechanics into nongame environments. The goal of gamification is to engage with consumers. The central idea of gamification is to transfer the motivational potential of video games to non-game environments.

Gamification is one of the most effective ways of creating and keeping high interest among people. It is a deep exploration into what makes a game fun and how to apply those fun and engaging elements in real-life productive activities. Previous research [3] has shown that the gamification service is a strong determinant of one's intentions to continue using a service. The service can be any game, website, or anything that someone can introduce gamification techniques to. Gamification is a complex topic nowadays and is changing continuously [4]. The last few years there has been an increasing interest around the notion of gamification amongst the research community [4][5].

1.1 Background

This project was carried out together with LeoVegas Mobile Gaming Group. LeoVegas offers online casino games, live casino games and sports booking. LeoVegas was founded in 2011 and is trying to introduce new technologies in the industry continuously.

The essence behind gamification is that it has become a popular method of enriching information technologies. However, [6][7] most of the implementations will fail due to a poor understanding of the principles of gamification. According to K. Robson [6] more than 70% of the world's largest public companies are using gamification, and there are warnings that more than 80% of them will fail to meet the objectives. A likely reason for this is the lack of understanding how gamification works and more specifically, how to apply gamified processes to inspire players. Nowadays, even though the academic literature has grown on this field, what is available does not offer a clear direction on understanding the gamification and the design principles of it.

Chou [8] states that effective gamification is a combination of game design, UX/UI (User Experience and User Interface), neurobiology, technology platforms, as well as ROI- driving business implementations. This thesis focuses on the technology aspect and designs. Applications like Foursquare and LinkedIn are using gamification to try keep users motivated to perform tasks that require the user's collaboration.

Any gamification technique requires some interaction from the user. Thus, the need for a network between users is an essential component. Figure 1.1 illustrates an example of a social network between users.

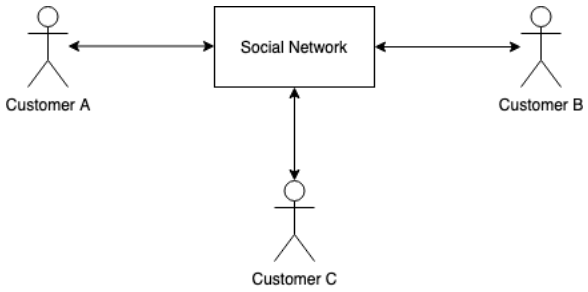

Figure 1.1: Social Network

This is where the concept of social network and interaction between friends come to the attention before the actual gamification mechanisms. Gamification mechanisms chase people's natural desire to socialize, most of the well-known gamification elements do not require necessarily some network to interact. However, making the rewards for accomplishing tasks visible to other players encourage them. Social networks with a combination of gamification can motivate the users even more to return on the website and continue interacting.

1.2 Problem area

The online casinos are facing a problem of customer retention. In many situations, people are creating accounts trying out games and then moving to another provider.

There are various studies[9][10][11] showing that gamification techniques can benefit various domains (pedagogical applications, health applications, volunteering programs). However, there is a lack of available studies that focus specifically on the field of online casino games. Currently it is unclear if gamification has positive or negative effect in online casino games in terms of engaging the players more, and if it has a positive impact, which available gamification elements can benefit the industry.

Since UX benefits other genres by introducing gamification elements, will it have a similar effect to online casino games?

1.3 Purpose

The purpose of the work was to examine the effect of well-known gamification elements (badges, progress bar, LeaderBoards) by using the Octalysis Framework on the LeoVegas website.

1.4 Ethics, Risks and Sustainability

As gamification becomes more popular among businesses, one should worry about the manipulative or exploitative potential of gamification. A. Marczewski in [12] state that gamification techniques can become unethical when the implementation uses the psychology of players to manipulate them to do things that are not in their best interest. On the other hand, according to T. W. Kim and K. Werback [13] it seems that gamification experts and stakeholders found diverse areas of ethical concerns. There is no robust framework that has been conducted for gamification designers and not many studies have been conducted, however, Tae Wan Kim et al. in [13] try to propose a base framework. The framework builds a systematic evaluation only for major cases. As described by Kim gamification involves two

sets of actors (individuals or organizations) and two kinds of experiences (the game world and the outside), a combination of those actors with experiences leads to 4 different combinations of concerns. It is clear that this thesis focuses into the game world only, as a result only the *manipulation* or *character* can be considered as options of concerns. If providers create an environment where the players do not make decisions in their best interest and instead the decisions are taken to serve the provider, then the issue is *manipulation*. If instead there is an intention such that players act to satisfy the game's objectives the issue is called *character*. Manipulation can be considered as one concern for this thesis, the user is not having enough freedom to choose what to do, instead the user follows predefined flows. In this thesis work none of the previously mentioned categories can fit into this work clearly. Hence, even though someone might think that there are ethical issues, the examination of that would need in-depth research and is outside of the scope of this work. Any gamification technique that might raise obvious ethical concerns was discarded from the beginning.

Where *manipulation* is the combination of the provider with the game world, the provider is manipulating the user by not giving the freedom to the user and instead the user is making choices to serve the provider. On the other hand, we have the combination of the human with the game world, fundamental human values are in challenge and the character of the player is in challenge.

This work has an impact only on the game world and not the outside. The gamification techniques selected and used in this thesis work are focused on making the experience more fun, no bonuses or extra spins will be granted to users to avoid any benefits outside of the actual gaming experience. In practice, it is not the gamification as a concept that can be harmful, it is mostly the way that gamification is used that can be harmful. There are certain ethical and social aspects related to gamification and online casinos that need to be examined. However, limited exploration of the ethics is available in gamification[13]. Casino companies are one of the domains that have really strict regulations, Spelinspektionen [14] is the Swedish gambling authority that has been given the task of ensuring the legality, safety, and reliability of the Swedish gaming and gambling market. The aim of the authority is to provide a framework for fair gaming and prevent any harm in the society which gambling may entail. It is important to point out that any new idea and feature goes through the legal department and the gambling authority of each country, to make sure that complies with the regulations.

The advantage of this work has limited risk. The way of the implementation and the approach followed throughout the research has low risk, the possibility of failure into the implementation or not being able to present reliable and concrete results can be considered as the only risks.

Also, as explained in 3.3 and 3.4 the collected data from the participants were treated with care. The data from the participants were stored with care, using usernames for anonymity. Participants were informed about the purpose and how their answers will be used and consent for that use.

1.5 Goals

The long-term goal of this work is:

- Examine gamification elements.
- Define a basic understanding on how and which gamification elements might produce positive effect.

1.6 Research Methodology

In order to address the question raised in the problem, this work was divided into three main steps: pre-studies, design and implementation, and evaluation.

At the first step literature studies were done to get knowledge about similar works and related approaches to find possible solutions to the question raised. It was important to fully understand what gamification is and what are the mechanisms that can be implemented. A best effort, to examine the most prominent mechanisms of the gamification, was done. The reason for choosing Octalysis Framework was that first, it has already shown that it can be used in different domains and second, it is a framework with a practical way of increasing the motivation of a human to use a game, and lastly it can produce fast results. A more detailed analysis and comparison of the available frameworks can be found in section 2.1.

Based on the work done in the first step, the second step performed an iterative process of developing a prototype. The most significant and feasible gamification elements for the domain were selected and implemented.

The third step was the evaluation, and two methods were used. Heuristic evaluation to examine the engagement of the user and a user engagement method that indicates the quality of the user experience and the positive aspects of the interaction. As all the criteria were qualitative, this work did not run any experiments to gather quantitative data. Thus, the conclusion is based on inductive reasoning [15].

1.7 Delimitations

Monitoring the long-term consequences of the implementation was outside of the scope of this work, since it required more time and resources than were available. Most of the work was done on the web application and then the mobile version. The scope of this work was not to attract new users to the website. A/B tests were not conducted since it required more time and evaluation for many more departments.

1.8 Structure of the thesis

The structure of this thesis and the respective intentions of the different chapters are listed below:

Chapter 1 provides an introduction to the domain this thesis is applied upon. It explains the problem, the purpose, and the goals of this work. It also gives a brief introduction into the background, ethics, the research methodology used, and finally the delimitations throughout the work.

Chapter 2 offers information about the fundamental knowledge and core ideas regarding gamification.

Chapter 3 is where the methodology used in this project is described. In addition to this, ethics that relate to this thesis are discussed.

Chapter 4 focuses **on** the system design and explains all the design steps in this project.

Chapter 5 contains the core information about the development of the system, what technologies were used and what were the main components of the implementation. It also offers an example showcase, to demonstrate how the mechanism works.

Chapter 6 sums up all the results from the conducted evaluation methods and analyzes those results.

Chapter 7 concludes the project as a whole and possible extensions to the project for the future.

2 Background

In this chapter, the background foundation and the necessary concepts for understanding the solution are introduced. Section 2.1 presents available gamification frameworks and explains in more depth the Octalysis* Framework, section 2.2 and 2.3 present the gamification elements and finally section 2.4 summarizes the related work.

M. Friedrichesen [16] argues that with the increasing number of members and participants of any social network on the internet, a completely new world has been introduced regarding communication and interaction. According to Y.-K. Chou [8] many companies now subscribe to the belief of, "If your company does not have a social strategy, it will become irrelevant". J. Nielsen stated in 1994 [17] that more than 50% of organizations will have used some flavor of gamification by 2015. However, after so many years is hard to verify if this prediction was correct. Statistics in studies [18] [19] shows that most likely around 40% of organizations have used gamification. According to T. Rogers and R. Davidson [20] well known organizations such as Facebook and LinkedIn are by definition venues of social activity and within recent years, gamification has become a trending topic.

2.1 Frameworks of Gamification

But what is gamification? Gamification is adding game mechanics into nongame environments. The goal of gamification is to engage with consumers. The central idea of gamification is to transfer the motivational potential of video games to non-game environments.

According to Katie Seaborn[21] only a few frameworks exist concerning how gamification systems can be analyzed and this is something supported by Hamari[22] too who claims that gamification is still a young topic. Many gamification frameworks have been proposed, A. Mora [23] presents a literature review on gamification frameworks; MDA, Octalysis, SDT, 6D, GAME, RAMP are some of the best-known available gamification frameworks. Hunicke et al. in 2004 [24] presented MDA, one of the first gamification frameworks in the industry. It is a tool used to analyze games by decomposing them into three smaller components: Mechanics, Dynamics, and Aesthetics. GAME is one of the simplest frameworks in the industry and consists of two phases. First, planning and designing, and second the implementation of the best solution to achieve the goals.

SDT (self-determination theory) [25] which is similar to 6D is a framework provided by Edward Deci and Richard Ryan. According to SDT the developer - researcher should:

a) Define the reasoning to gamify.

b) Identify players characteristics.

c) Set the goals.

d) Evaluate.

e) Play and test.

Mora et al. [23] argues that 6D is considered the best-known design framework. According to this framework developers and management should:

a) Define the objectives of a business.

b) Describe the behavior that is expected from the players.

*Octalysis Framework: The Octalysis Framework is a human-centric gamification design framework that lays out the eight core drives for human motivation developed by Yu-Kai-Chou.

c) Set goals according to the target group.

d) Design a system so the player can progress. This ensures that the player is engaged in the game.

e) The player should have fun by performing any activities of the game.

f) Implement the gamification system.

The last outstanding framework presented in[23] is RAMP. RAMP (Relatedness, Autonomy, Mastery, Purpose) is a motivation framework, the design must refactor in iterations. RAMP is constructed through four main cores. Relatedness is when people feel they are socially connected to each other in some way. Relatedness in our world is similar to the friendships we create. Autonomy is the ability to make free choices without being limited by restrictions, which can be really hard to accomplish in the real or virtual world. In a gamified solution this can be accomplished easier though; you give to the user the chance to be creative. Mastery is the desire of being master on something, the idea of overcoming difficulties and becoming better and better. The last one is the Purpose, a person's need to feel that what they do fulfils some purpose.

A proper analysis between different frameworks was done by A.Mora et al.[23] where the existing frameworks were divided into two categories, Business-specific frameworks and Generic frameworks. The study focuses on the most popular category generic framework called Octalysis. A.Mora et al.[23] argues that Chou's Octalysis [8] is one of the most complete and practical frameworks in the gamification field, which analyzes the core drives in human motivation. Even though is hard to choose an appropriate framework for online casinos, Octalysis has already shown that can be used in healthcare [26], education [27], marketing and product design [28] to increase user engagement . The reason for choosing the Octalysis framework according to Yu-Kai Chou [29] is because of the foundation that the framework serves, the framework focuses on the human. It is a practical way of increasing the motivation of a human to use a game and it can produce fast results. Octalysis is a framework that can implement good gamification design into a product, it is a way to improve a product by using scientifically proven methods.

The Octalysis Framework is a human-centric gamification design framework that lays out eight core drives for human motivation. The eight-core drives of motivation presented in Octalysis are: Meaning, Empowerment, Social Influence, Unpredictability, Avoidance, Scarcity, Ownership , and Accomplishment. Chu divides some of them as positive drives (Accomplishment, Meaning and Empowerment) two neutral drives (Social Influence, Ownership) and three negative ones (Scarcity, Avoidance and Unpredictability). Figure 2.1 presents the gamification Framework. The positive ones are those that let you express your creativity and makes you feel successful through skill mastery. Negative drives are the ones that by doing something you do not know what will follow and you are constantly in fear of losing something, or you are constantly struggling with achieving things. All of them are great means of motivating people, however, the negative does not seem to be an appropriate way to motivate people and sometimes can be considered as unethical.

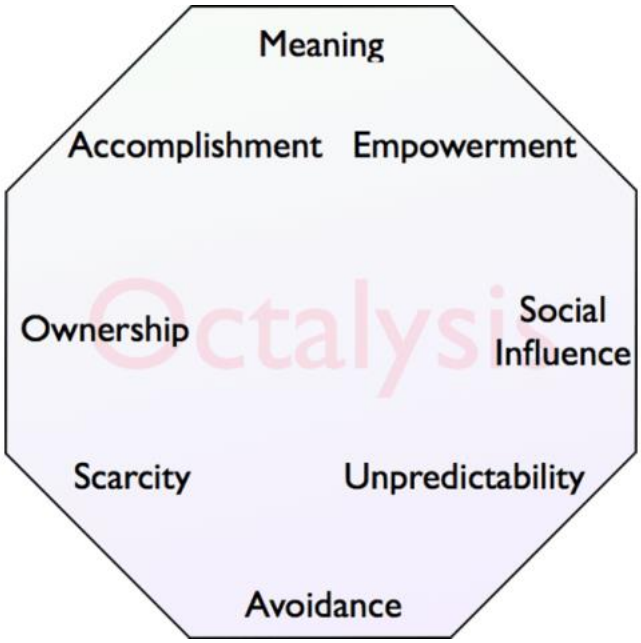

Figure 2.1. Gamification Framework Octalysis[29] (used with permission)

Table 2.1 summarizes the sub-domains for gamification in the Octalysis model [3, 7] with some examples of each core idea. The focus of this thesis is based on two specific categories, Social Influence and Accomplishment. Social Influence considers as a neutral drive and Accomplishment as a positive drive. No negative drives are taking into consideration to avoid any unethical approaches. According to Y.-K. Chou [8] Social Influence and Relatedness is the fifth core drive within Octalysis gamification and involves activities inspired by what other people think, do, or say and the second core drive within Octalysis is the Accomplishment and Development.

	Core Drive	Examples
1	**Epic Meaning & Calling**	*Beginners Luck, Free Lunch*
2	**Development & Accomplishment**	*Points, Badges, Leaderboards, Progress Bar, Win Prize*
3	**Empowerment of Creativity & Feedback**	*Milestone Unlock, Real-Time Control, Boosters*
4	**Ownership & Possession**	*Avatar, Collection Set, Monitoring, Earned Lunch*
5	**Social Influence & Relatedness**	*Social Invite, Bragging*
6	**Scarcity & Impatience**	*Throttles, Prize Pacing, Patient Feedback*
7	**Unpredictability & Curiosity**	*Easter Eggs, Sudden Rewards, Oracle Effect*
8	**Loss & Avoidance**	*Status Quo, Scarlet Letter, Progress Loss*

Table 2.1: Sub-domains of Gamification

2.2 Development and Accomplishment

Accomplishment is what focuses on a career path, generates our enthusiasm and commitment to learning new skills. It is a common experience for many people, for instance Starbucks has an application that promotes customers loyalty by using "My Starbuck Rewards". Customers increase their level of loyalty – depending on the number of purchases – to get more in addition to free products.

World of Warcraft (WoW) is a massively multiplayer online role-playing game (MMORPG) created by Blizzard Entertainment. Accomplishment and Development are probably the most fundamental aspects of gamification within World of Warcraft. WoW has been engaging millions of players since it was released in 2004. A. Rapp [30] presents one of the reasons that WoW became popular in the online gaming industry of RPG games: "*By gaining experience points, collect weapons through the land of Azeroth, players can progress through different levels of play, even if WoW does not have an ultimate goal, due to its open-ended nature, the main goal of each player is to bettering their character…*".

2.2.1 Badges

Achievement badges are one of the most used gamification methods where a badge is awarded for achieving a specific goal. In most of the cases, an award has no real-world value. L. Hakulinen and T. Auvinen [31] state that typically, that kind of award leads to gain mastery on a specific field like learning platforms, most of the people had already high interest without using badges, using badges would not lead always to higher interest. However, in other cases like online casinos, badges might

produce high interest for the player, and this is something that the research in the academic community has not investigated in depth. And statements like the one from M. Jakobsson[32] *"systems where players gain badges that are separated from the rest of the game have seen a dramatic rise in popularity during the last few years"* which can increase the belief towards a positive effect for online casinos. In the case of this work, players are gaining badges separately from the actual game, they gain badges according to the number of friends they have invited.

2.2.2 Leaderboards

The purpose of a leaderboard is to show players where they rank in a gamified system. Those at the top enjoy the notoriety it brings; as for everyone else, the leaderboard shows them where they stand relative to their peers.

The simple goal of rising up the ranking serves as a powerful motivator to continue. People like to keep score. Understanding this and providing easy ways to do it is a great way to foster engagement in gameplay. For some, the mere sight of their rank on the leaderboard is all the reward they seek. Leaderboards should always be encouraging and never discouraging. One way to head off this scenario is to simply show the player as being smack in the middle of the standings, no matter the actual rank and showing only the ones above and below. G. Zichermann and C. Cunningham in [33] show that Leaderboards can be sliced in a variety of ways, allowing individuals to view themselves relatively to different populations. Unless the player is at the top, the player should be appearing higher on leaderboards in smaller samples than in bigger samples. For instance, E. Sun et al. in[34] present a similar approach for ranking in leaderboards, an individual score closer to the top on a leaderboard that is populated between his/her friends on Facebook should be preferred than a leaderboard showing results between everyone in the region.

2.2.3 Progress Bar

Many years ago, LinkedIn realized the value of the progress bar. The profile progress bar not only displays the percentage complete, but it also motivates us to push further. The main goal was to make the interface more motivating. Y.-K. Chou in [8] argues that by having an incomplete progress bar in front of us and being at 70% it gives us that extra push to finish the desired actions and achieve completeness.

2.3 Social Influence

Social influence is the desire to connect and compare with others. More and more companies nowadays are trying to work on introducing or even optimizing this. J. Hamari and J. Koivisto [3] present that almost every application these days tries to convince you to invite your friends into a specific service. Social networks are created with different purposes in mind. While some of them are designed for users to interact, others provide useful information and unite users based on their interests.

2.3.1 Social Network

A social network is composed of a community of individuals that are connected by a common interest. The main idea behind this model is to allow users to interact with each other directly, establish personal connections, and unite in groups. Sites like Facebook, LinkedIn are examples of well-known social networks and they have been gaining a tremendous amount of attention and users in recent years, according to [35] around 4 billion people use social networks, and the average person has 8.6 social network accounts. The most significant characteristic of those networks is that

they allow users to define their social network. SNSs (Social Network Sites) are exploiting the network for a variety of reasons. For instance, Facebook for News Feed or recommend other friends, Linkedin for recommend connections. According to I. Guy et al. [36] the main goal focuses on motivating people to invite more friends. Figure 2.3 illustrates a simple referral link of a friend for Revolut. Revolut is one of the first truly global financial application and many of the available features are relying on having a social network.

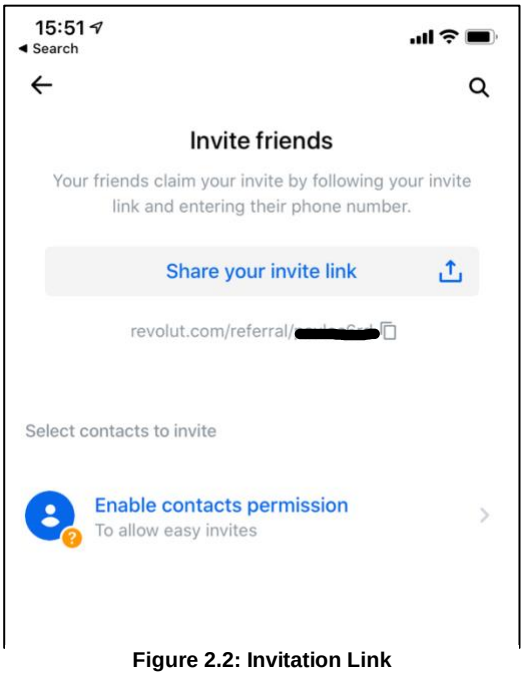

Figure 2.2: Invitation Link

2.4 Related Work

Previous research has shown that gamification has positive effects in most of the cases [22], but this depends on the context in which the gamification is implemented.

According to Hamari [37] implementing the gamification mechanism of badges, does not guarantee increase of user activity. Only the ones that actively earned badges were motivated to interact more. Denny Paul [38] tried to understand the impact of a badge-based achievement system in an online learning platform. The badges had a significant positive effect and also most of the users in the online learning platform really enjoyed being rewarded with badges for their effort.

Leaderboards[22] are one of the most effective gamification techniques, B. Reeves and J. L. Read [39] argue that with leaderboards the idea of fairness in a game or between friends can be transparent. Leaderboards can be found in multiple domains. Gabe Zichermann and Christopher Cunningham [33] point out three reasons related to leader boards: motivate people - attracting attention, earning status and leading others. When constructing social networks leader boards can be categorized into two types [32][33]: *no-disincentive* and *infinite* leader boards. No disincentive leader boards are the ones that show the player always somewhere in the middle no matter if he is #40 or #4000. Infinite leaderboards present players in sliced leaderboards in various ways: globally, locally, socially. For instance Socially, the player can see the ranking among his social network.

A summary of related works can be found in table 2.2.

Study	Year	Results
J. Hamari, J. Koivisto, and H. Sarsa [22]	2014	- The academic interest has increased a lot the recent years. - Gamification has become a big trend and is attracting more companies. - The effectiveness of gamification depends on the context in which the gamification is being implemented. - Leaderboard is one of the most effective gamification mechanisms
J. Hamari [37]	2013	Game mechanism of badges for those who actively use them showed that can increase the user activity
P. Denny [38]	2013	Badges between students or gaming platforms like Xbox Live has a positive effect. Little evidence to support the efficiency in particular domains regarding the badges.
B. Reeves and J. L. Read[39], G. Zichermann and C. Cunningham [33]	2009, 2011	-Leaderboards promote the feeling of fairness and transparency between players. - 3 main reasons that leaderboards can attract attention: attracting attention, earning status and leading others

Table 2.2: Table of related work

3 Methods

With the existing literature available, there is a limited research methodology in gamification K. Robson et al. in [6] stated the lack of academic research in gamification. This chapter describes the methodology used to carry out the project and how methods were selected for this work according to the plan.

The plan of the work was this:

- Choose the appropriate framework and methodology.
- Setting up a community of users in order to have interaction, which sets up the basis for the development team to apply the gamification framework.
- Choose the appropriate gamification elements for LeoVegas online casino customers.
- Implement gamification elements in order to examine if they have positive effect.
- Collect data and evaluate.

3.1 Methodology Selection

Morschheuser et al. in [40] presents four main reasons why methodology in gamification is difficult to design:

1) The complexity of gamification.

2) The Gamification does not require only development it requires also consideration of behaviour impact.

3) The domain that gamification is applied to might bring more constraints.

4) Gamification requires important dependence on the designer's ability to produce, for instance, nice designs.

Applying gamification in online casinos has not been explored so far, thus the need for exploring the broader domain. The criteria of the selected methodology is based on similar studies about gamification. In fact, most of the available gamification studies have used similar approaches and methodologies.

Design science research(DSRM) [41] is mainly used in the Information Science and Computer Science, because it is a method that works with humans, organizational social kind of problem-solving through artifact development. It includes the following steps: 1) identification of the problem, 2) definition of objectives, 3) design and development, 4) demonstration, 5) evaluation, 6) communication of the problem. Table 3.1 summarizes some related methodologies approaches for gamification in other researches.

Design thinking [42] is a non-linear, iterative process which seeks to understand users and create innovative solutions for new domains: 1) empathizing, 2) defining, 3) ideating, 4) prototyping, 5) testing the solution.

Method for engineering gamified software [40] Morschheuser et al. combines existing literature on gamification and interviewing 25 gamification experts. By examining all the above they conclude that methods can be divided into the following seven steps: 1) Project Preparation 2) Analysis, 3) Ideation, 4) Design, 5) Implementation, 6) Evaluation, 7) Monitoring. In practise the actual implementation of the design is using seven phases to go through: a) team-allocation b) selection c)

project manager naming, d) selection of responsibilities, e) evaluation, f) design and g) implementation.

Gamified [43] is a social dynamic methodology that allows designers to identify and address the problem. It includes 5 steps (identify, evaluate possible methods, identify the evaluated methods, clarification in-depth, apply the appropriate methods and evaluate them)

Methodology	Suitability assessment
Design Science Research Methodology[41]	DSRM looks to find user insights first and then design a solution based on the findings, not the other way around. Following the defined steps can lead for the best design solutions.
Design Thinking [42]	Is an outside the box thinking. However, is a too general approach.
Method for engineering gamified software [40]	Is used as the main technique for most of the gamification projects. It takes into consideration DSRM.
Quasi-GBL[44]	The biggest disadvantage is that it is complex , the steps mentioned are not fully explored and are used mostly for role-playing games.
Gamified [43]	Highlights the importance of people-consumers in the development process.

Table 3.1: Available Methodologies

By analysing all the above methodologies, there are several methods for accomplishing goals within design projects. What all the above mentioned methodologies have in common, is the attempt to include the end-user in the process and that they use some kind of analysis, synthesis, and evaluation. The most concrete methodology that has been tested against many more methodologies is the one presented by Morschheuser et al. [40] that takes into consideration also DSRM. In order to conclude on this methodology Morschheuser et al. conducts a hermeneutically-oriented iterative review. The first step is to examine all the relevant sources and keywords, the second step involves interpretation and evaluation of the results. After this process and removing duplicates, 41 articles that include important information about gamification are examined. Moreover 17 methods are extracted from the articles. The examination of the articles reveals seven main phases; (1) Project preparation, (2) Analysis, (3) ideation, (4) Design, (5) Implementation, (6) Evaluation, (7) Monitoring. Additionally to that Morschheuser et al. interviewed more than 90 experts from gamification.

The *method for engineering gamified software* is a method of methods since it synthesizes other frameworks and knowledge from gamification design. The *method for engineering gamified software* was used in this work. Because 1) It is one of the most well-known techniques used for gamification. Is a comprehensive, complete and provides practical utilities as a method. 2) It has been built according to many other gamification techniques. 3) All the steps are well-defined and not complex, compare it with other methods that often lack a detailed description. 4) has already proof that is efficient in other domains.

3.2 Research Process

This section analyses each step of the methodology ("Method for engineering gamified software") used in this project.

1) Project preparation: all the activities that need to be done before the project starts. Project plan, List of objectives and Project conditions should be considered at this step.
2) Analysis: The process of understanding the users, the whole project and the goal of it.
3) Ideation: Any idea that can fulfil gamification design. This can be any well-known game elements such as points or badges for instance. On the other hand, this can be also a brainstorming activity.
4) Design : Design and creation of prototypes. This phase is highly correlated with the ideation phase. Design is an iterative process.
5) Implementation: Actual software to be used. This phase can be iterative.
6) Evaluation: Test and evaluate the generated software. This phase can be iterative.
7) Monitoring: Monitoring the performance of the software.

3.2.1 Project preparation

The project preparation is the first step in the creation of the project and consists of establishing the needs from the business perspective as well as discussing the purpose and direction of the project. The main purpose of the preparation is to clarify the goals of the project, the objectives and the vision. Clarifying those objectives from the beginning makes it easier to measure if the project successfully completed.

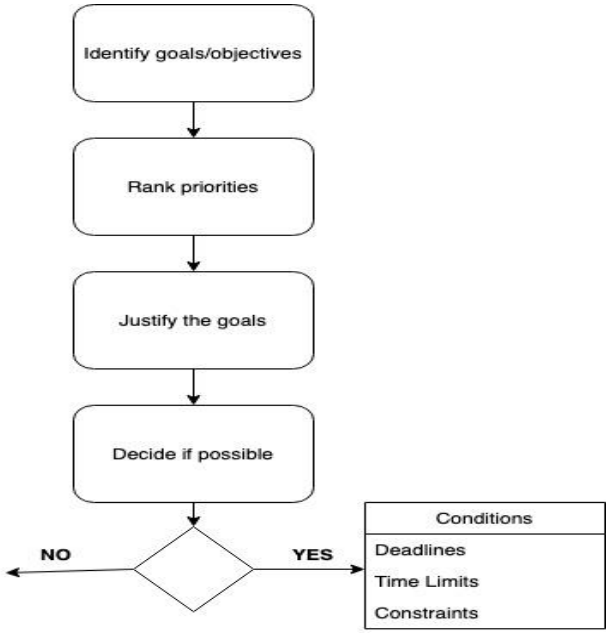

Figure 3.1: Project Preparation

The process also focuses on creating a project that would benefit the business and being flexible for modifications and minimizing the risk of wasting work effort in creating concepts and prototypes. Initially, according with the goals of the company different ideas were suggested, however because

of different reasons like time constraints and limited resources in other departments specific goals were qualified. This was a process that was done from the business mostly.

The goals that were qualified are listed below:

- Setting up a community of users in order to have interaction, which sets up the basis for the development team to apply gamification Framework.
- Choose the appropriate gamification elements for LeoVegas online casino customers.
- Implement gamification elements in order to examine if they have positive effect.

3.2.2 Analysis

The second step is to understand the context and the target user group according to Morschheuser et al. [40]. In the present work the target group was defined from the beginning, the players of online casino in the LeoVegas website. The idea is to understand the characteristics of the users. To do this a qualitative method was used, an informal interview was arranged with experts from LeoVegas. Two UX designers and a team lead explained the basics in two meetings, where they presented a general overview of the way they develop each idea and project and how the website works. They also gave an overview of the users and what previous research and A/B testing has shown about the users of the LeoVegas website. Also, at this stage was discussed ethical or regulatory aspects that might affect the project. During the meeting it was discovered that some of the gamification techniques might not be appropriate for implementation (section 1.4).

3.2.3 Ideation

Once the analysis is done, the next step is to develop the actual gamification design. As explained in the background, the Octalysis gamification framework was used, which uses particular patterns and mechanisms and assumes that a combination of these mechanisms can invoke engagement. The detailed process of selecting mechanisms is explained in Chapter 2. However, using only predefined methods can harm creativity. Instead of just focusing on existing frameworks and eventually harm the creativity of gamification, it is recommended to use an iterative brainstorming activity.

Explorative brainstorming has been highlighted as an important approach to understand the space of possible design alternatives Figure 3.2.

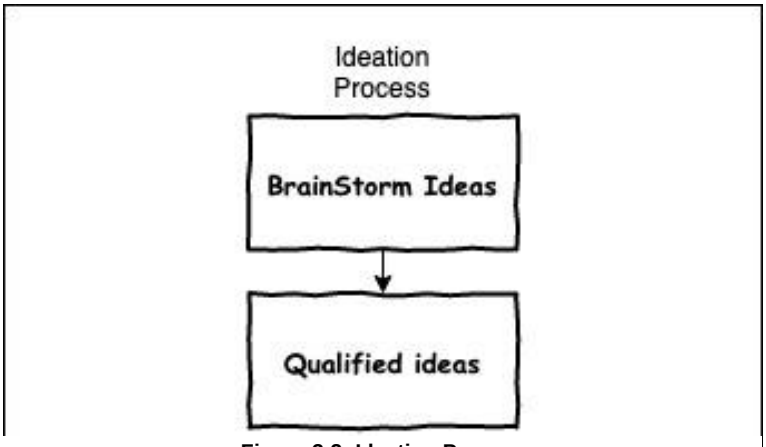

Figure 3.2: Ideation Process

A workshop for brainstorming was with the team (UX, Backend developers, Frontend developers, QAs, and management) working in more depth with the specific field and had more experience. This workshop had a duration of 3 hours with 8 participants, every participant was interacting with a digital board and had initially to propose some ideas and then argue on the value of each and the time that is needed to be implemented.

Figure 3.3 presents all the proposed ideas. These notes were sorted into different domains and categories. The ideas were represented as post-it notes in an online platform for that purpose. After the brainstorming, some were discarded because of the complexity or being irrelevant. The person in charge for collecting and taking the final decision was the author. More than 20 ideas were proposed, however some of them were intersecting with different domains like betting on sports and the focus was only online casino. The ideas have come from people that have been working in this field for many years and have done and analyzed surveys to many customers in the past. In practice many of those ideas were actually really interesting and were qualified, however, the timeframe of this work was a constraint against trying something complex.

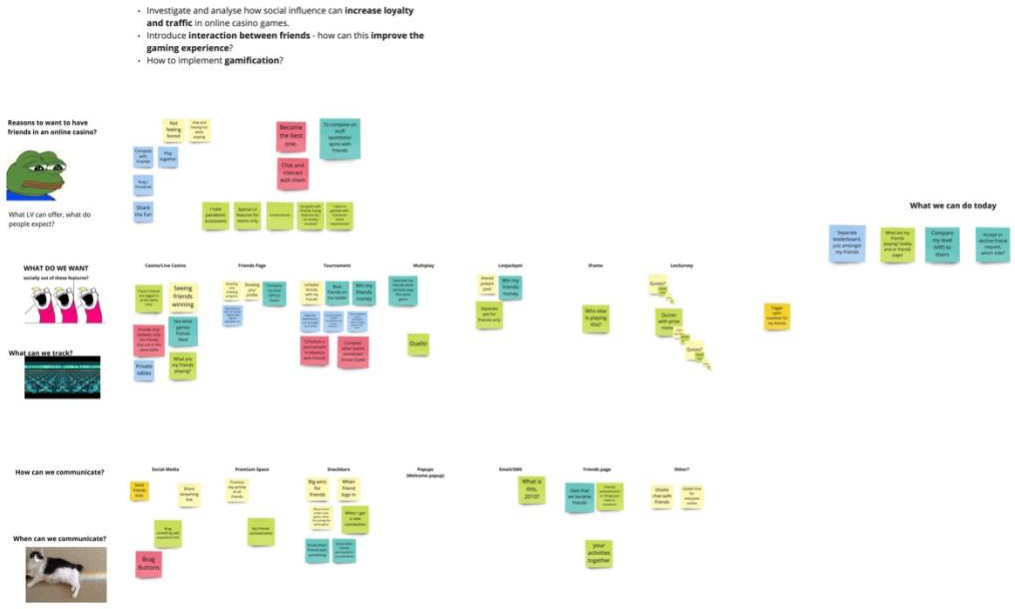

Figure 3.3: Brainstorming workshop

The biggest inspiration for the brainstorming session is the Octalysis framework as already explained in section 2.1 . The Octalysis framework divides some ideas as positive, negative or neutral. The focus is not on the negative drives but instead on the neutral and positive ones. At least one element of each category is selected. One element also from the creativity during the brainstorming is selected, this is crucial to make sure not to harm the creativity. Table 3.2 depicts the core ideas selected from the Octalysis framework.

Idea	**Core drive**
Badges, Progress Bar	Positive
Social Influence	Neutral

Table 3.2: Core Ideas

3.2.4 Design of prototypes

After collecting all the ideas from Ideation, the fourth step is highly related to the previous one and focuses on the efficiency of the prototypes. The prototypes are recommended to be frequently improved and updated until they seem to be efficient and promising that they will reach the final goal. Designs were created in Sketch app [45] by the designer of the company Sida Yin.

3.2.5 Implementation of a design

Based on the ideas presented in the brainstorming and the initial designs, the purpose of the design phase was to develop a pilot. At this step is highly recommended to follow an iterative approach, where technical issues or any other issues can be identified in an early stage. According to the methodology, in most of the cases, the process of building a gamification solution is inside the developing team and is less frequent to reach external developers for this process. The development of the ideas was iterative in 3 cycles. Each cycle took approximately 3 weeks. At the end of each iteration, changes were implemented according to the feedback from the team.

Iteration one – Main components and invitation link:

The first iteration was also an introduction to new technologies, thus was the hardest step. A new menu on the website was implemented and the invitation mechanism was also introduced.

Iteration two – Badges, Progress Bar:

First of all, a lot of improvements from the first iteration, more details about the improvements can be seen on section 4.2.2. After that the rest of the gamification elements that were chosen through the background study were implemented.

Iteration three – More advanced and specific gamification technique:

Through the initial brainstorming session some concepts were flagged as advanced and more complex. Recommending latest played games by your friends was implemented . This idea cannot be considered as a well-known gamification technique, instead was an idea that came from the experts (UX designers) that could fit in online casinos.

More details about each iteration can be found in section 4.2.

3.2.6 Evaluation

The focus of this phase is to evaluate if the implementation that was done meets the goals defined in the project preparation phase. Gamification can be tested in a variety of ways like A/B testing.

The A/B testing was not possible in this work, since it required a longer process and many more requirements to reach that stage. Instead, two other evaluation methods were selected: Heuristic evaluation and User Engagement. Many more available evaluation methods exist for gamification, those are explained in section 3.5.

3.2.7 Monitoring

The last step describes the monitoring process. The goal is to make sure that the system is working as it is supposed to be. One of the common mistakes in this method is for not considering this step as an important one as stated from Morschheuser et al. [40], therefore, monitoring is often not planned and budgeted in practice. A successful gamification project should be an endless process.

However, monitoring was outside of the scope of this thesis since it requires long term aspects and consequences which were impossible considering the time limitations of a master thesis.

3.3 Data Collection

This work relied on getting feedback from users for evaluating the results. Some of that information can be considered sensitive and private, like how often someone is playing online games. All the data was stored on a computer under the control of the author with usernames instead of the full names. The only way to decode the usernames is to have access into the company's database.

Users that participated in the survey were found through internal communication. The rest of the participants were outside of the company, and they were selected through personal communication, and they were friends of the development team that had account in the company. Fifteen participants were recruited for this research out of thirty-two users that were asked to take part in the survey. Three out of fifteen participants were women and the other twelve were men. The participants had to be in Sweden with access into internet and smartphone. Most of the participants were familiar with the website already but no requirement for the users to be familiar with casinos was required. The participants already familiar with the product were selected randomly from the company.

All the participants had to agree and consent for their participation in the survey. However, they were people that did not take part in the survey were mostly people that did not have the time. Also, all of them were informed about the purpose of this research project. After a brief explanation in the beginning each participant inspected the interface alone.

All the personal information and the data collected from the research were anonymous, only administrators of the database have access to match usernames with actual users. As stated in General Data Protection Regulations (GDPR) every user should have the option to withdrawal the consent anytime and the withdrawal must be as easy as giving the consent[46]. Thus, all the users participated were informed about the GDPR and the option for withdrawal if they want.

3.4 Assessing reliability and validity of the data collected

Unlike quantitative research, who apply statistical methods for evaluating, this project relied on qualitative data, such as surveys and it was by nature harder to evaluate the reliability and validity of the data. Accounting for personal biases and personal views can affect the outcome and is hard to distinguish it, all the humans hold somehow their own subjective view. Even the conducted survey could have been influenced by a subjective attitude. Because of the nature of the methodology used throughout this thesis, it was hard to ensure the trustworthiness of the findings.

Reliability and validity are closely related. The reliability of the data was accomplished by increasing the sample of people through the data collection. Also, the validity was examined by trying to evaluate how the answers diverge between people.

3.5 Evaluation frameworks

As mentioned in the previous section 3.2.6 one of the most used approaches for evaluating is A/B testing, however, this was not possible. A/B testing is a way to compare two different versions, typically version A is examined against version B to determine if the second one had a positive impact. Instead, two other evaluation methods were selected: Heuristic evaluation and User Engagement. The downside with those two approaches is that they do not keep track of the long-term effects. This point comes in contradiction with the last step in the methodology (Monitoring). But as already mentioned the long-term consequences were not examined in this project.

3.5.1 Heuristic Evaluation

Heuristic Evaluation[47] is an informal method of usability analysis. It is one of the most informal methods and is based on engagement which is hard to measure because of its abstract nature. Heuristic evaluation is simply letting the user to investigate the interface and judge according to evaluator's opinion. In real life, most interface evaluation is conducted through heuristic evaluation as stated by J. Nielsen [47]. Nowadays, with the evolution of technology new tools have been introduced to improve the efficiency and the validity of the interaction. Eye tracking technologies that can track the behavior can be used, as well as EEG technology that can track the neuropsychological behavior of the user with high accuracy. The principal remains the same today, with more tools that can be used.

Nielsen[47] proposes to conduct Heuristic Evaluation with up to 5 people for the evaluation, and they should act independently of each other. Increasing the number of people would not bring better results, instead, it will be better to use that time in some other engineering method. In this work 15 people were asked, even though most of them have a good insight of the domain, the decision to increase the sample was taken to make sure that more information can be grasped and that the sample has more probabilities of including representative people. Half of the people were regular users of the LeoVegas website, and the other half were people that knew the product and have been part of the development of the website.

After a brief explanation in the beginning each evaluator inspected the interface alone. This procedure was important in order to make sure independency from the evaluator, and that the user was not influenced by the instructions. All the participants were asked to write down their replies. However, in some cases there was a need to interrupt the user and give him/her some guidance or reply to questions, which was helpful for cases that the user was not familiar with the website. This is one of the main differences, between heuristic evaluation and user testing. In user testing we are examining regular users and it could be hard for them to navigate, therefore there was a need to provide the necessary help. At the same time three out of the fifteen participants could be considered as experts (they have applied gamification mechanisms in the past and know the product very well).

Nielsen[47] found out that in the best scenario only 50% of the problems can be found through Heuristic Evaluation. But having that as a base is always better than not finding any problems at all. This brings consequently the need of combining this method with another to increase the total number of problems found. Table 3.3 shows the advantages and disadvantages of this method.

Advantages	Disadvantages
Does not require finance resources.	Does not provide a way to tackle an issue.
Simply and easy to motivate others to participate.	Relies on biased participants.
It can be done at any step of the development process.	Most probably will not bring innovative ideas in the design process.
Does not require planning in advance.	

Table 3.3: Heuristic evaluation overview

Different heuristic criteria can be found like the one proposed by Shneiderman in [48]. But the most well-known is the one proposed by Nielsen and the criteria in this method are the following:

1) Help and documentation (the user should not have hard time interacting with the app).
2) Visibility of system status (the user should have feedback from the website on each of his actions).
3) Match between system and the real world (the user should have the same experience as before and not worst).
4) User control and freedom (should be possible for the user to revert any action done)
5) Consistency and standard (the UI should be similar and consistent)
6) Error prevention (minimizing the probability for the user to make mistakes)
7) Recognition rather than recall (the user should be able to navigate around without instructions).
8) Flexibility and efficiency of use (all the users should be able to use the website with no special knowledge).

Having in mind the above criteria 8 questions were conducted to cover as much as possible the defined criteria. Some of the questions were covering more than one criterion. All the questions can be found in section 6.1.1 and the replies in Appendix B. The questions were formed by having in mind to be easily understood.

Question 1 and 2 reveals the downsides and the remarkably points of this work. Focuses on covering the criteria 3 and in general tries to reveal pros and cons.

Question 3 focuses on criteria related to the user UI/UX difficulties that the user might have. Covers criteria 1, 5, 7, 8. One of the most important questions since it covered a lot of the above criteria.

Question 4 covers criteria 8. Are the regular users the only ones that can navigate without instructions?

Question 5 and 8 are complementary, tries to explore possible gaps between the conducted questions.

Question 6 covers criteria 2 and 6. The user should be encouraged to use the feature and the feature should talk by itself; the UI should be helpful in the level of helping the user to avoid doing any mistakes.

Question 7 however is not focusing on some specific criteria above, instead is focusing on a specific decision made with no data, and the question is focusing on evaluating that decision. What kind of upper limit in the progress bar would the user like to see? Is the decision correct?

3.5.2 User Engagement Evaluation

User engagement is one of the most fundamental concepts in designing a website. S. Attfield et al. in [49] presents user engagement as a metric that indicates the quality of the user experience and the positive aspects of the interaction. There are different methods to measure User Engagement. O'Brien and Toms [50] present a reliable framework to measure user engagement in an online shop. It relies on the following six factors: Perceived Usability, Aesthetics, Novelty, Felt Involvement, Focused Attention and Endurability. However, the engagement could be different among application domains and user groups. S. Attfield et al. in [49] depicts and discusses some characteristics associated with user engagement it takes into consideration Obrien's study too. Engagement elaborates over three main dimensions: emotional, cognitive and behavioral. Lastly, E.

N. Wiebe et al. presents in [51] a simpler model compare it with O'Brien's model, this model relies on four factors: Focused Attention, Perceived Usability, Aesthetics and Satisfaction. Those three frameworks are not exhaustive, but they integrate concepts related to gamification.

A summary of the above studies is presented in table 3.4 in relation on how each attribute can be measured. Although, they have some differences they are based on the same fundamentals as presented by OBrien and Toms.

#	Attribute	Definition	Measures
1.	Aesthetics	The visual beauty of the interface.	Online activity (curiosity, behavior)
2.	Endurability	Remembering things that produce willingness to repeat.	Online activity (bookmarks etc.)
3.	Novelty	Surprises, unexcepted outcomes-results.	Psychological sensors (blood pressure, face detection etc.)
4.	Perceived Usability	User friendly experience	Online activity (curiosity, behavior)
5.	Felt Involvement	Emotions experienced during interaction	Psychological sensors (blood pressure, face detection etc.)
6.	Focused Attention	Focusing attention to the exclusion of other things.	Distorted perception of time, how fast was the task performance

Table 3.4: Attributes and measurements

Some of the attributes in table 3.4 demand special equipment to be measured, for instance, blood pressure. However, this was not possible mostly because of the costly equipment that is needed. Instead, face detection was done by recording the interaction (not in all the cases) by the user and analyzing it. In order to measure the above attributes interviews were conducted to match the above categories.

Different Likert scales exist, in this thesis a 5-point Likert scale was used. Using 5-points gives the option to the user to have a neutral opinion, the odd number of this scale provides the option, to choose level 3. At the same time it gives one level between 'disagree strongly' and the neutral point. Obviously, adding more levels like 7-points Likert scale gives more options to the users, but it also introduce less reliability which can produce worse results. On this thesis adding a 7-points Likert scale could lead to worse results since most of the participants in the survey are not experts and could find difficulties on distinguishing those small differences between the levels.

4 System Design

This chapter describes what the system should have and is based on the requirements according to qualified ideas from the ideation process. The chapter describes in detail the system design according to what has been presented in chapter 3.

4.1 The goal of the system

Defining the goals-objectives is the first step. The first meeting was between myself, the team leader and the designer were we defined the goals of the system. In combination with the inspiration of what other companies are doing in the market as gamification techniques. Finally, we set up a deadline for the project and a time schedule.

After this meeting a clear view of the goals for the system was achieved. The work aimed to explore the effectiveness of gamification techniques in online casino games provided by LeoVegas website. Improving the gaming experience for the players by providing new gamification elements(badges, leaderboards and etc.). Users can interact by using gamification mechanisms to achieve this.

4.2 Design of Prototypes

The design of prototypes is the fourth step of the selected methodology. At this step UX designers were highly involved to provide the most effective designs according to their experience, mockups were created. Visualizing with mockups was helpful to understand the complexity and to spot possible issues in advance, before starting the development.

The mockups also gave the opportunity to understand where we should add the new feature into the existing website. Figure 4.1 depicts how to navigate in the Friends – social network page. The user has to login and then navigate to the Friends page.

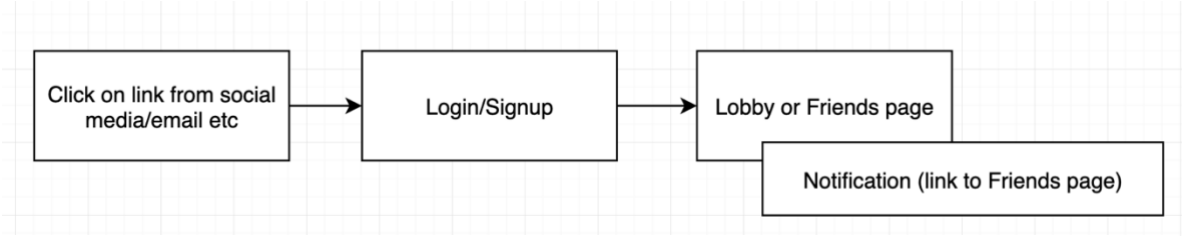

Figure 4.1: Navigation

4.2.1 First iteration

During this phase, the focus was on creating the social network. An in-depth discussion took place on where the social network and the gamification elements should be placed on the website. One of the main core ideas by the company was to eliminate the number of tabs on the website and keep it as simple as possible, so introducing a new tab into the menu for that was not an option. Following that, the social network section was added inside the existing Contact details tab. Each user has a tab with personal contact details like email address, country, address and so on. Figure 4.2 depicts a

red rectangle with the existing Contact details page, under the red rectangle we can see what was added in the first iteration (contact details information is not part of this thesis). More details about the link and how it works can be found in section 5.4.1.

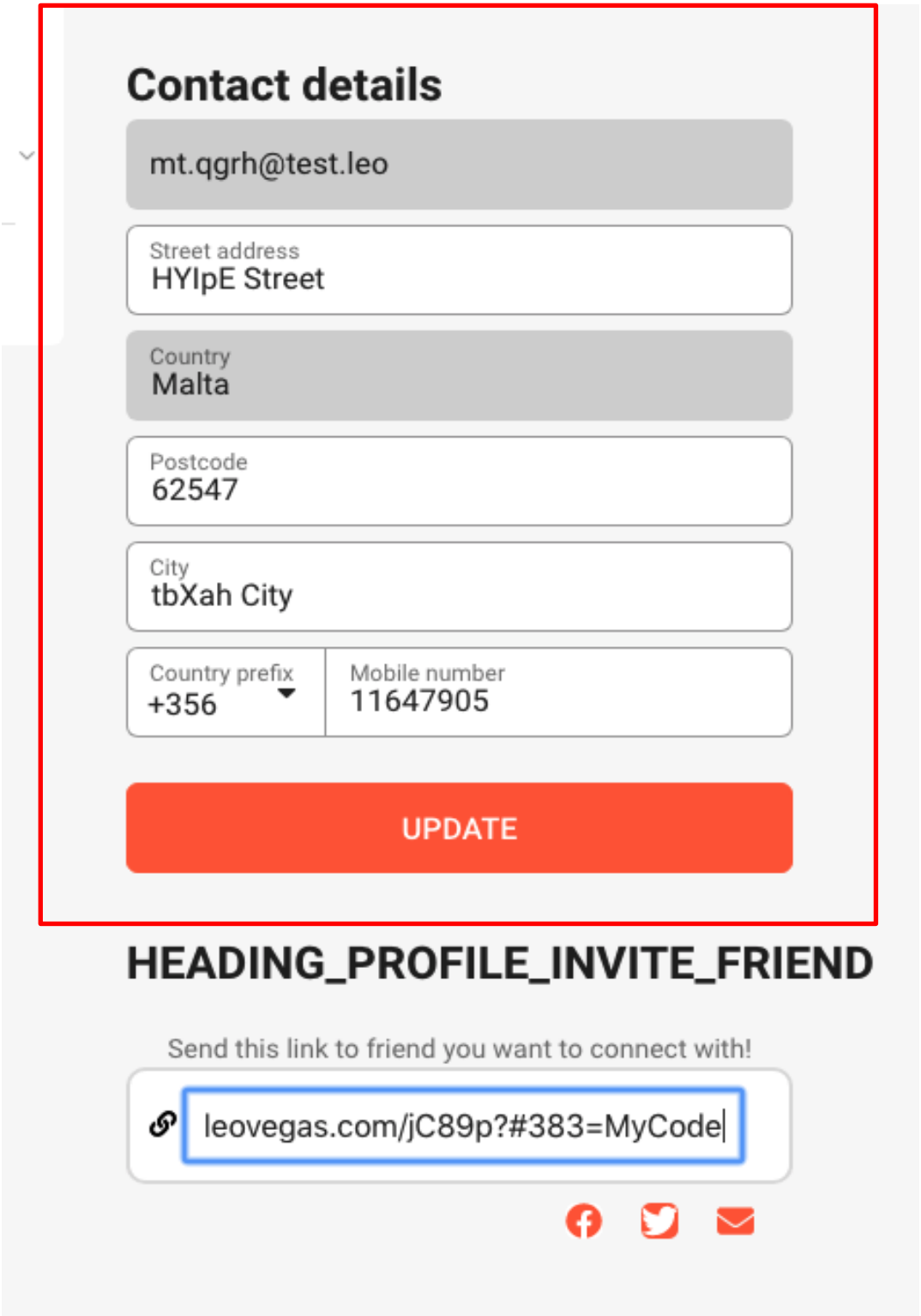

Figure 4.2: Contact Details

4.2.2 Second iteration

After realizing that the new section was growing fast with too many elements, the need for a new tab inside the website became urgent.

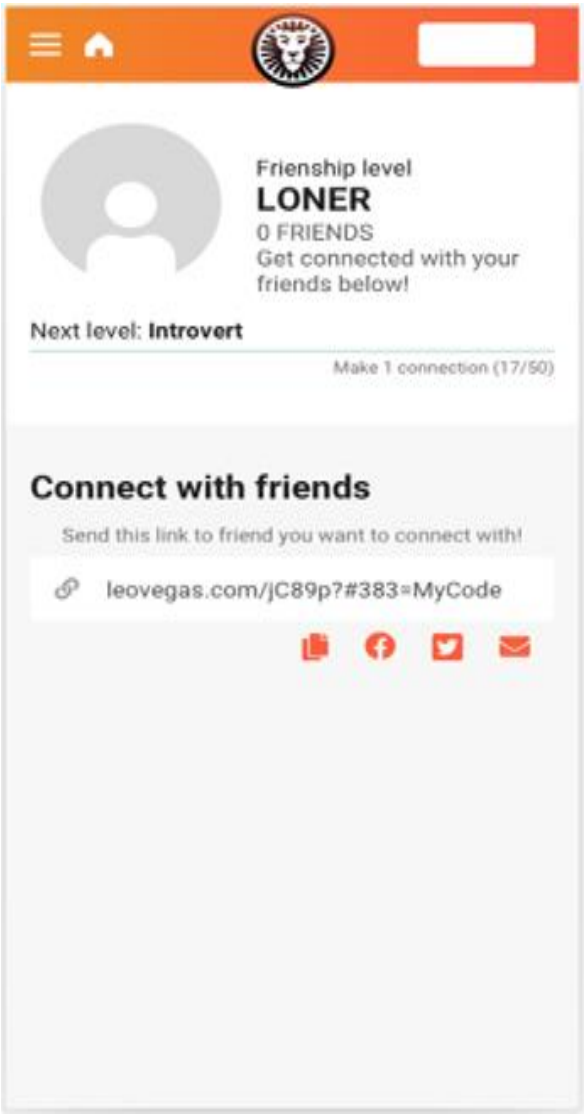

Figure 4.3: Initial State of User

In the second iteration, the main goal was the badges and the progress bar. Figure 4.3 illustrates the initial state of a user. The upper side indicates the badge and the title of the user initially.

Users can get 2 badges according to how many friends they have. Figure 4.4 depicts the available badges.

Figure 4.4: Available badges

One of the biggest challenges in the second iteration was to define the progress bar. Since the idea of the progress, we introduce has infinite boundaries, it was hard to define what 10%, 30%, or any other percentage means. As the goal was not to invite many friends and we do not expect anyone ever to invite more than 50 friends we defined the ultimate upper limit to be 50 friends. However, the decision was based on the experts (mostly UX designers that have conducted many evaluations in the past and know the product very well) from the field with the motivation that they have a more in-depth understanding of the user's behavior. For that reason, more in-depth questions about the progress bar were asked in the evaluation process. The biggest concern was if that limit was too high, it might discourage people initially. Figure 4.5 illustrates different appearances according to the number of friends. As can be seen on the right-hand side of the figure users can press "SHOW ALL" and see the rest of the friends.

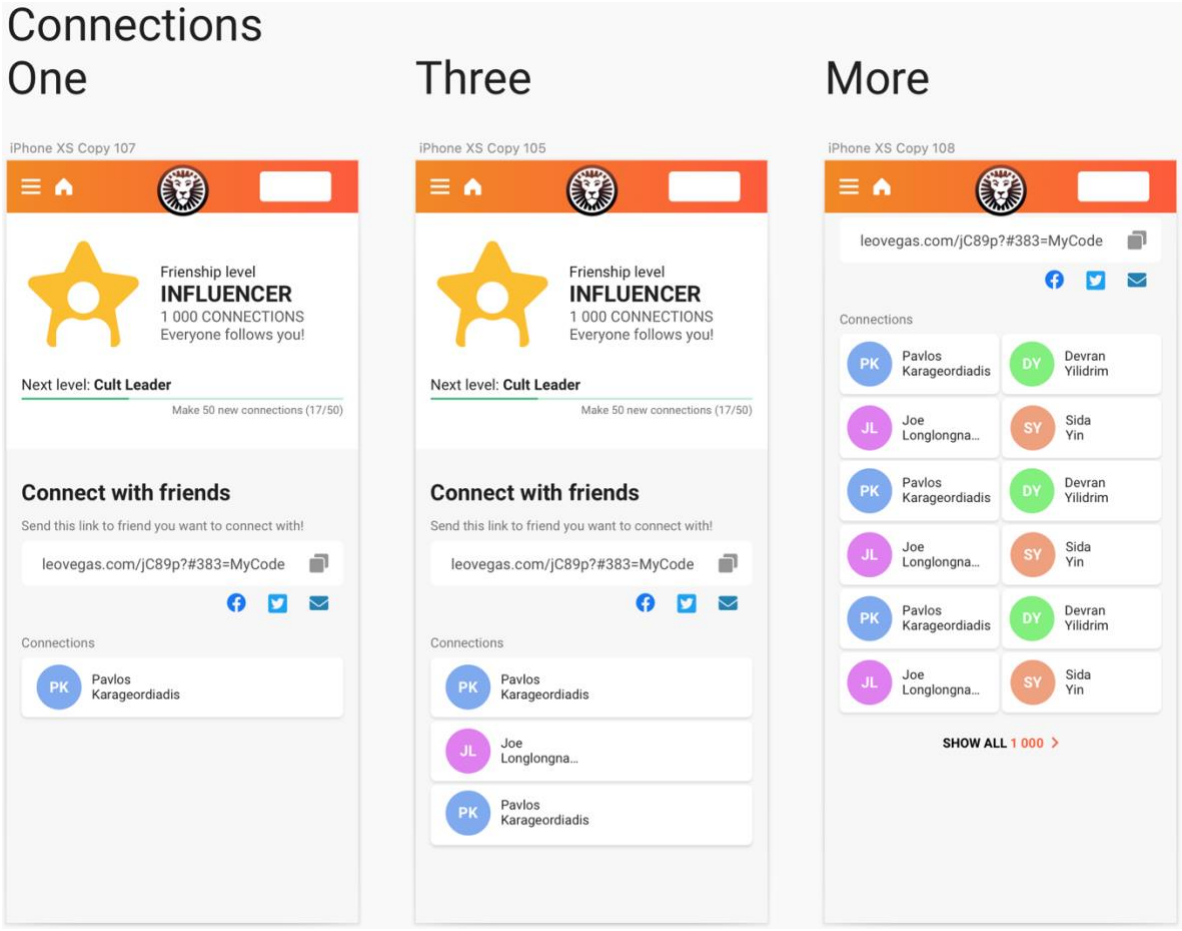

Figure 4.5: Connections

At the end of the second iteration some features to make the UI more interesting were discussed; animations when you click the link (red arrow on the left side of Figure 4.6) and acceptance or rejection when somebody added you as a friend through a link (blue arrow on the right side of Figure 4.6). Figure 4.6 illustrates those ideas.

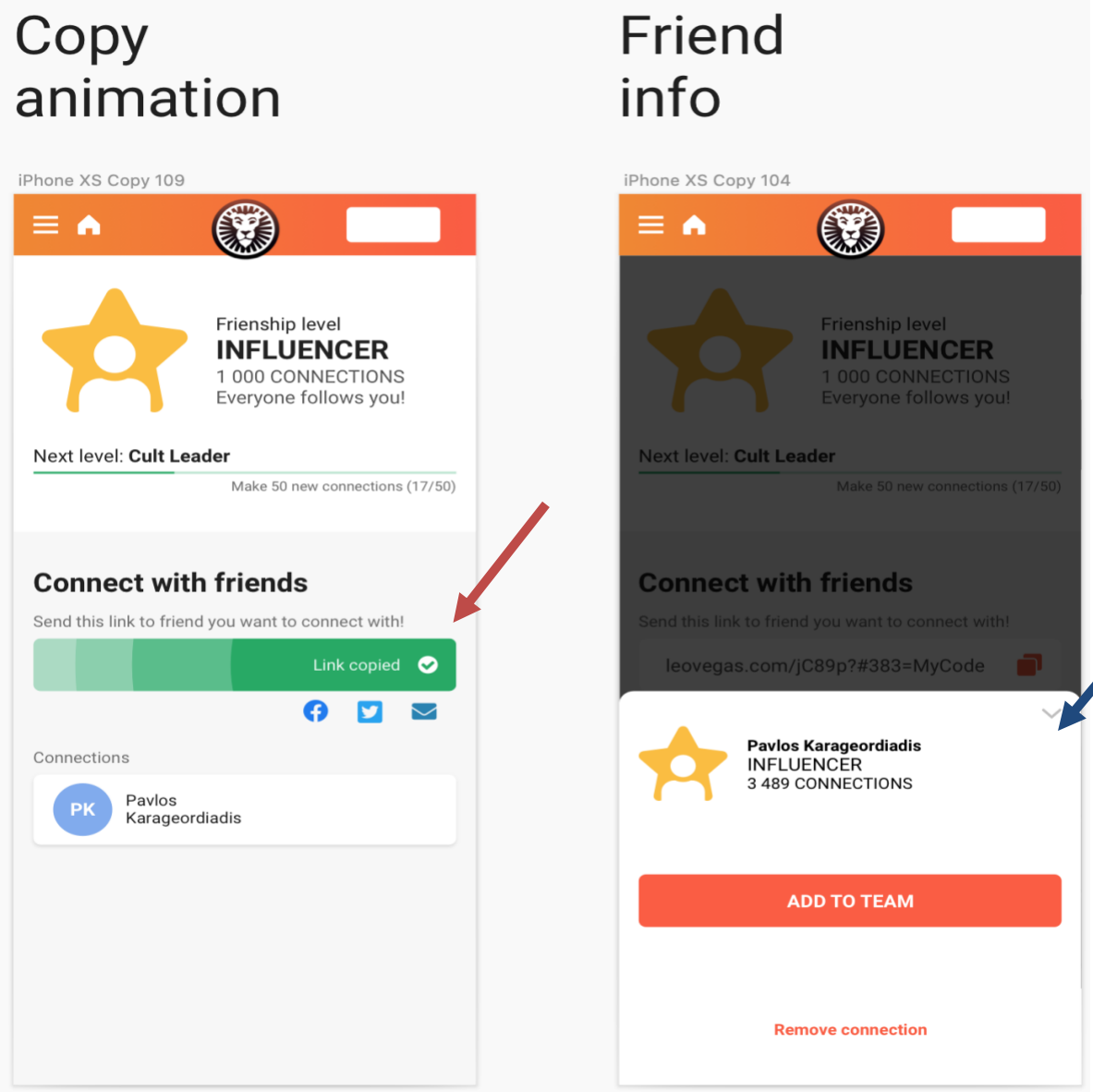

Figure 4.6: UI Improvements

4.2.3 Third iteration

The third phase was also the last one. During this phase the focus was to try something new and innovated and outside of the regular gamification mechanisms. The development team involved decided to recommend games according to the latest played games among friends. The designs of that are presented in Figure 4.7**.** More details regarding the insight of this mechanism are presented in chapter 5.

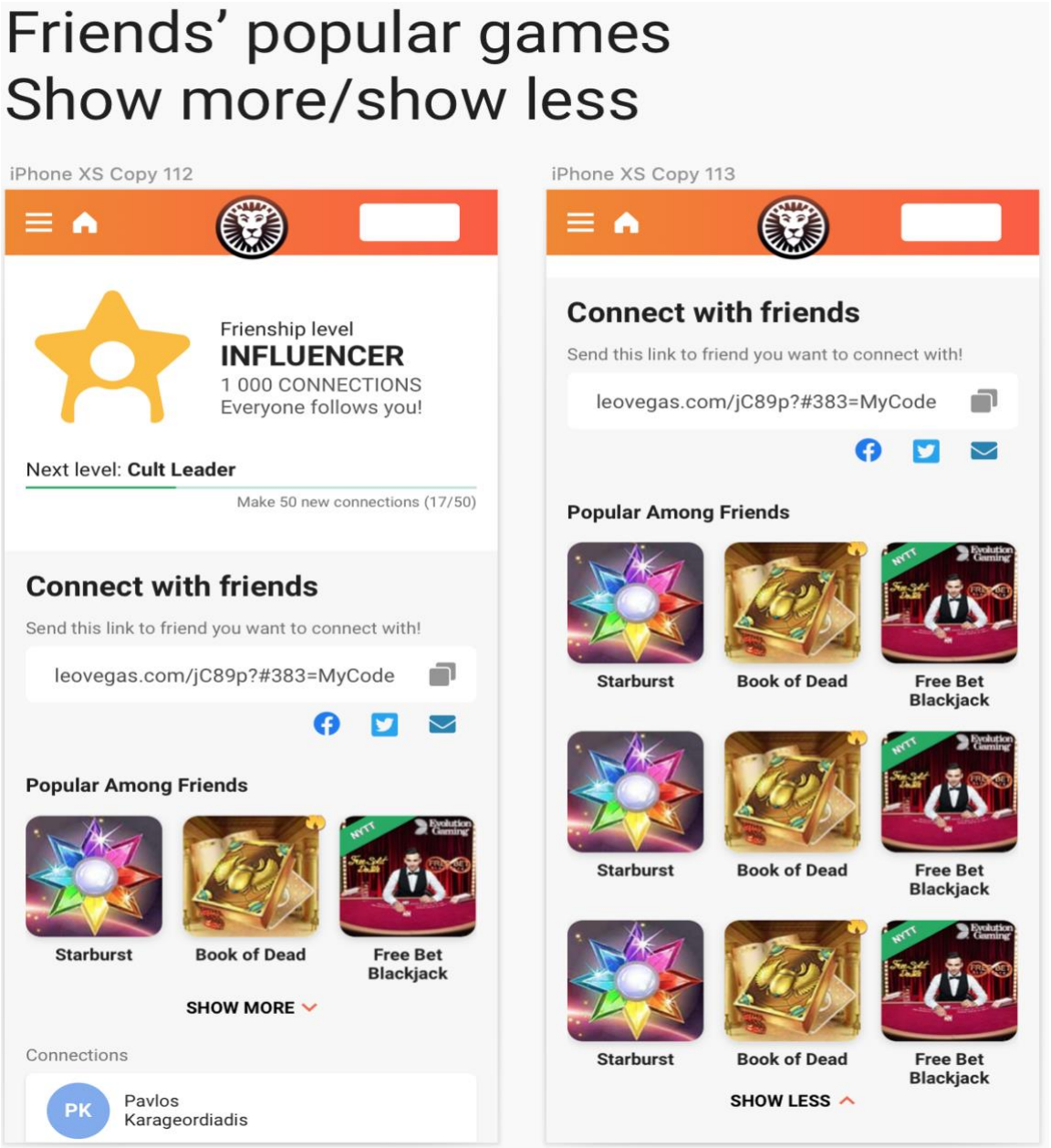

Figure 4.7: Last Iteration

5 System Implementation

This chapter is an overview of the system, in respect to its software architecture and implementation. The general technologies used through the project are described, and more-information is provided for each part of the implementation.

5.1 Technologies Used

The technologies explained in the following section were already selected by LeoVegas. It focuses mostly on reusable code and trying to decrease the response time.

The system was developed in different Frontend, Backend and database technologies. JavaScript and CSS was used to enhance the appearance. More specifically the React framework was used, as it supports the creation of interactive UIs. Npm is the world's largest Software Registry. The registry contains over 800.000 code packages and one of them is also React. GraphQL is a query language for APIs and data runtime for creating queries. GraphQL provides a complete and understandable description of the data.

As an asynchronous event-driven JavaScript runtime, Node.js[52] is designed to build scalable network applications. Node.js is used to call all the methods exposed by the Backend layer asynchronously. The Backend of the system uses Java and mostly Kotlin[53] and Spring[54] as frameworks.

The application data were stored in a database implemented with MySQL Server which is a relational database management system.

To develop the application, Visual Studio Code was used. In addition to this GIT was used for version control on GitHub. Figure 5.1 depicts the technologies used in a schematic.

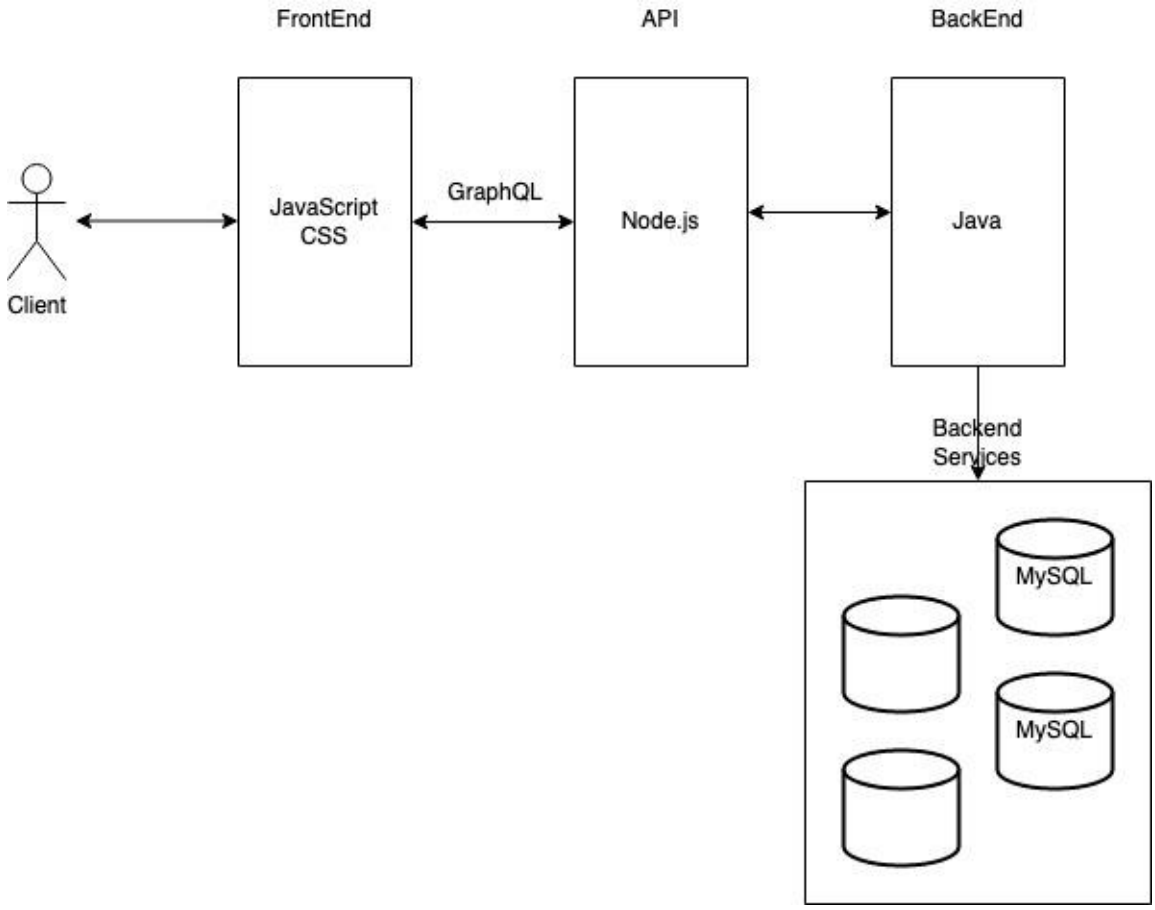

Figure 5.1: Technologies Used

5.2 System Design

This section is divided into two separated smaller parts. The first part includes everything that is related to creating the social network of each user. The second part includes everything related to the gamification mechanisms between friends.

5.2.1 Invite Friend

Any user of the website can interact with the system by adding, removing, showing friends or generating a unique link as shown in Figure 5.2, the figure illustrates how the users interact with the system and in higher level what is happening in the background. The user must create an account in order to perform the mentioned actions.

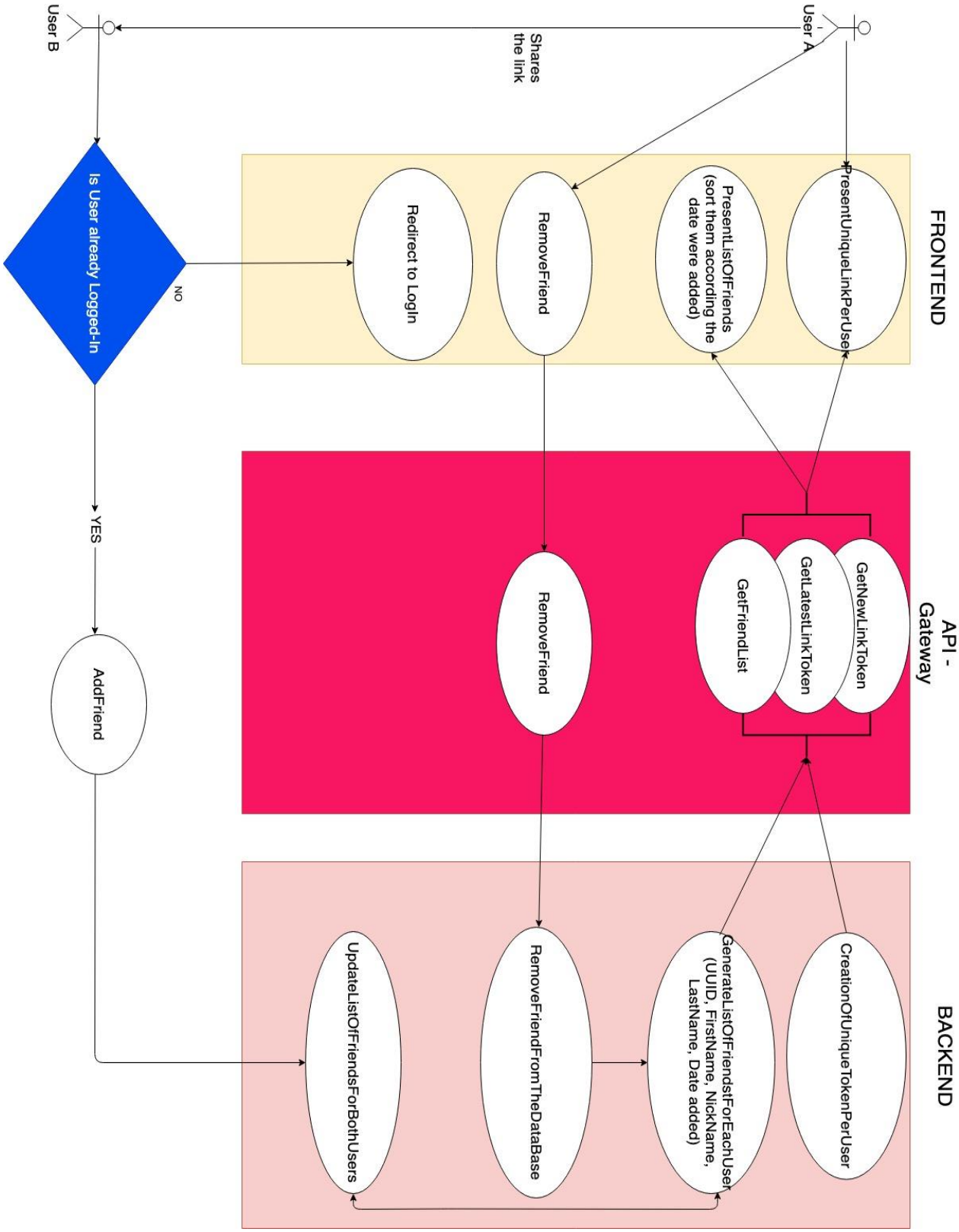

Figure 5.2: Invite Friends

Since the user is a member of the website a unique token is generated by default that matches the social network of the player. Every time that the token is used, or the page is reloaded a new token is generated. However, in the implementation the tokens cannot expire, to make easier simulations of adding members. The token is a suffix in a link that can be shared with friends. Once a user is logged in and uses the link, they become part of the social network and this action is bidirectional. An example of the generated URL is presented here, the link can be used only once and then a new one is getting generated:

```
https://leovegas/profile/social-network/?id=e571c4aeab941a667a72f9ea
```

By using the link as mentioned already a user can be added into the social network. Each user has also the option to remove people from the social network, by simple pressing the bin icon as depicted in Figure 5.3. In practice, once the user has pressed the bin icon a method “removeFriend” is called which modifies the database in the back end.

Every time that the database is modified a re-render of the social-network page is triggered and the 10 most recent friends added are presented in descending order. An example with mocked list of friends and how it looks for the end user is depicted in Figure 5.3. The users can choose to use either full name or a nickname, in the figure we show both cases.

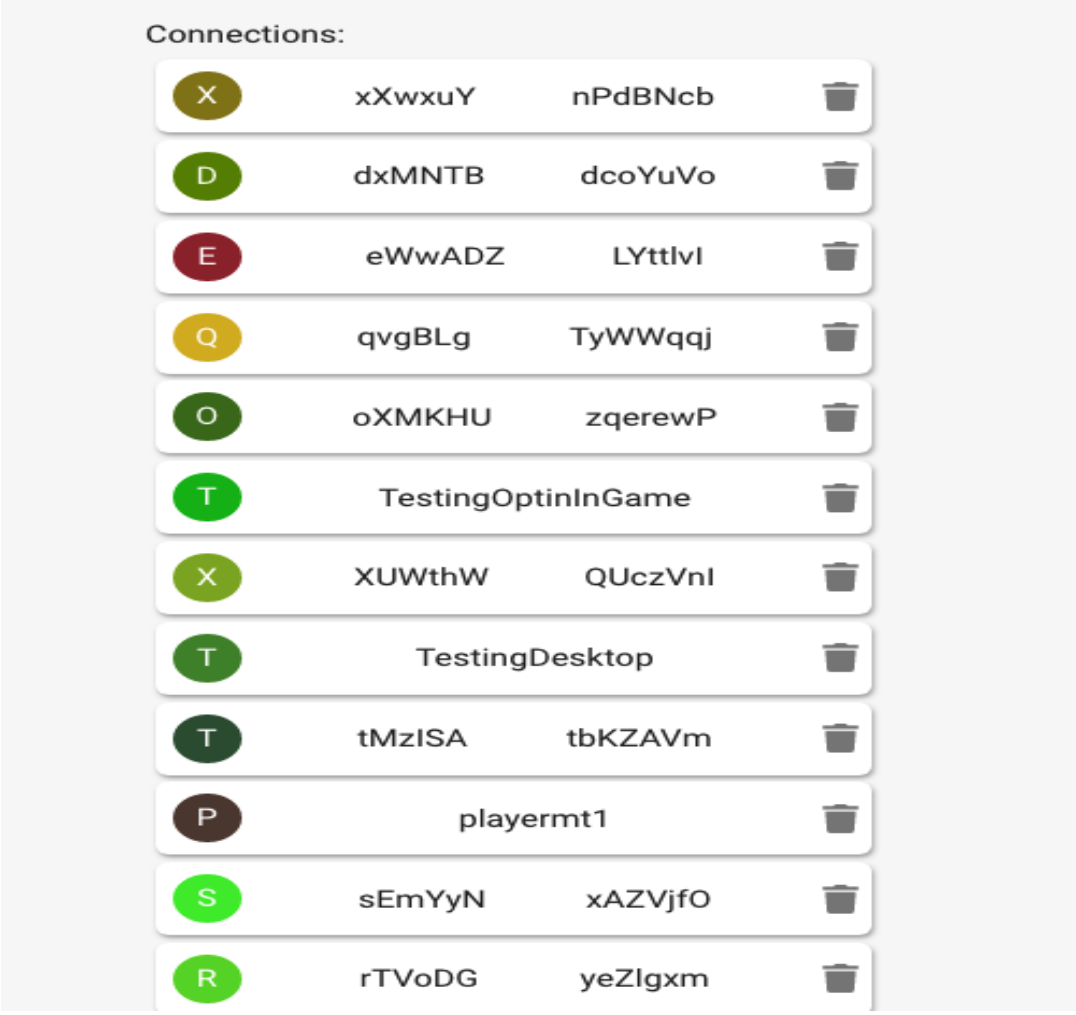

Figure 5.3: List of Friends

5.2.2 Gamification elements

Badges are highly correlated with the progress bar. Users earn badges according to the percentage on their progress bar. In this implementation, only two badges can be earned. One that reflects having reached 10% of the progress bar and another one that reflects having reached 50% of the progress bar.

Popular games among friends can also be shown. However, this leads to another problem, the problem of the depth to be explored. Querying a game is considering a high load query, showing just the game requires the id, slug, icon, source, source of theme, provider's name, provider's Id. The goal is to make those queries as few as possible and avoid any overload on the website. Imagine the scenario that someone has 40 friends, and the system must query the 3 latest games of each friend. This leads to retrieving the details (the appropriate thumbnail, the link, and much more info) of 40 x 3 = 120 games. That is the case of one single user. Overloading the system with those demanding queries should be avoided for scalability reasons, most likely it will make the whole backend service slow or even break. Of course, someone can argue that there are other approaches to tackle this issue, like calculating everything in advance once per day and storing those details in a database and eventually eliminating the number of games to show. That might be a solution to the problem, however, this will need creating new databases, deciding where the developers should place that, what time the calculation will happen, what is happening if you delete a friend in a meanwhile, does the new database break regulations (each country has different regulations for databases), and many more questions. However, finding a solution for the scalability issue was completely out of the scope of this work.

For performance reasons, the development team decided to eliminate the number of games to be queried and the depth of the query. Those limitation forced me to query only for the 3 latest friends the user added into the network and explore only the latest played game for each friend. This led to only 3 recommended games per user at the end. The number 3 was an arbitrary number to make sure to avoid scalability issues. In the end, the system showed only 9 games as recommended to the user (3 games for the last 3 friends).

5.3 Final implementation

An example of the final implementation is presented in Figure 5.4. The yellow rectangle presents the level, title, and badge earned by the user. The blue rectangle depicts the sharable link. The rectangle with the green color presents the recommended games according to your friends. Finally, the purple rectangle presents the current friends in the network.

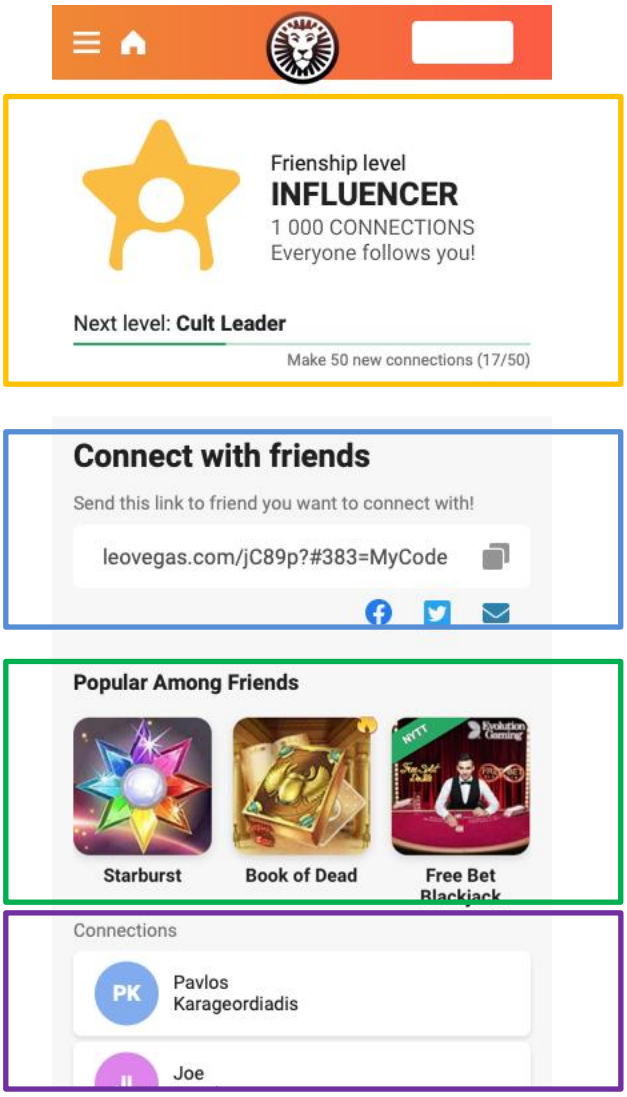

Figure 5.4: Final Implementation

6 Results and Analysis

This chapter, presents and analyzes the results of the evaluation process.

6.1 User Testing

The user testing section is divided into two parts. The first part in section 6.1.1 presents the results from the user engagement and the second part presents the heuristic evaluation results section 6.1.2. Appendix A presents all the questions asked to the users.

Fifteen participants were recruited for this research, half of them had prior experience with online casinos and some did not. In particular, seven of the participants were employees in LeoVegas that knew the product very-well. Every session with each participant, lasted from 20 to 30 minutes, took place through video conference and each participant was tested individually.

The evaluation process started by letting each participant go through the feature and understand the environment. After answering any questions from the participant, questions were asked to the participants. The questions were separated into two rounds. In the first round of questions the participant was asked to specify their level of agreement to statements in five points (from 1 – strongly disagree to 5 – strongly agree). The second round of questions were open and invited the participant to reply by expressing themselves freely with words and reveal feelings about what they believed.

6.1.1 User Engagement

User engagement is the first round of the user testing. Participants specified their level of agreement to a statement in five points: (1) strongly disagree; (2) disagree; (3) Neither agree nor disagree; (4) Agree; (5) Strongly agree. The total results can be found in Table 6.1. Perceived Usability has been conducted through negative questions, as a result the values have been reverted. Table 6.1 depicts the average score from all the users after conducting User Engagement Evaluation. Each element includes one or two questions, all the questions can be found in Appendix A. Section 3.5.2 explains all the elements appearing in Table 6.1 and how they contribute.

Table 6.1 presents in the first column the average score of each element. The second column presents the standard deviation. As can be seen the standard deviation values are pretty low. A low standard deviation indicates that the values tend to be close to the mean values of the set, while high standard deviation indicates that the values are spread out over a wider range.

Standard deviation formula: $$s = \sqrt{\frac{\sum(x_i - \bar{x})^2}{n-1}}$$

According to Bessel's correction, dividing by n-1 instead of by n gives a better estimation of the standard deviation, since n is a random sample from a bigger number of users. In general, a small standard deviation indicates that the numbers are clustered together and that the values are closed to the mean value. Increasing n cannot guarantee that the std will become even lower, obviously it increases the confidence that measurements were accurate but not the reliability of the result.

As can been seen from *Table 6.1,* average scores varied between 2.76 and 4.3. This indicates that some attributes had better influence than others for instance Novelty and Perceived Usability got scores over 4. According to the above table and correlating the two attributes with the highest and lowest average scores (Novelty and Perceived Usability and Endurability) we can say that Perceived Usability and Endurability can be 35.81% more efficient than some Novelty gamification element.

The last column in *Table 6.1* expresses the error of the mean value for each gamification attribute. SDOM is a good indicator of the precision of our measurements. The true value has 2/3 of probability to lie within the +/- SDOM of the mean value, and about an 95% probability that the true value will lie within twice the distance from the mean value. Taking as an example the endurability we can see that only approximately 50% lies inside the +/- of SDOM.

Element	**Score (Average)**	**Min**	**Max**	**Standard Deviation (STD)**	**Standard Error of the mean (SDOM)**
Aesthetics	3.86	3	5	0.63	0.164
Endurability	2.76	1	5	0.95	0.245
Novelty	4.04	2	5	0.86	0.222
Perceived Usability	4.3	3	5	0.88	0.228
Felt Involvement	3.53	1	5	1.05	0.271
Focused Attention	3.02	1	5	1.13	0.291
Total UES	3.59				

Table 6.1: UES results

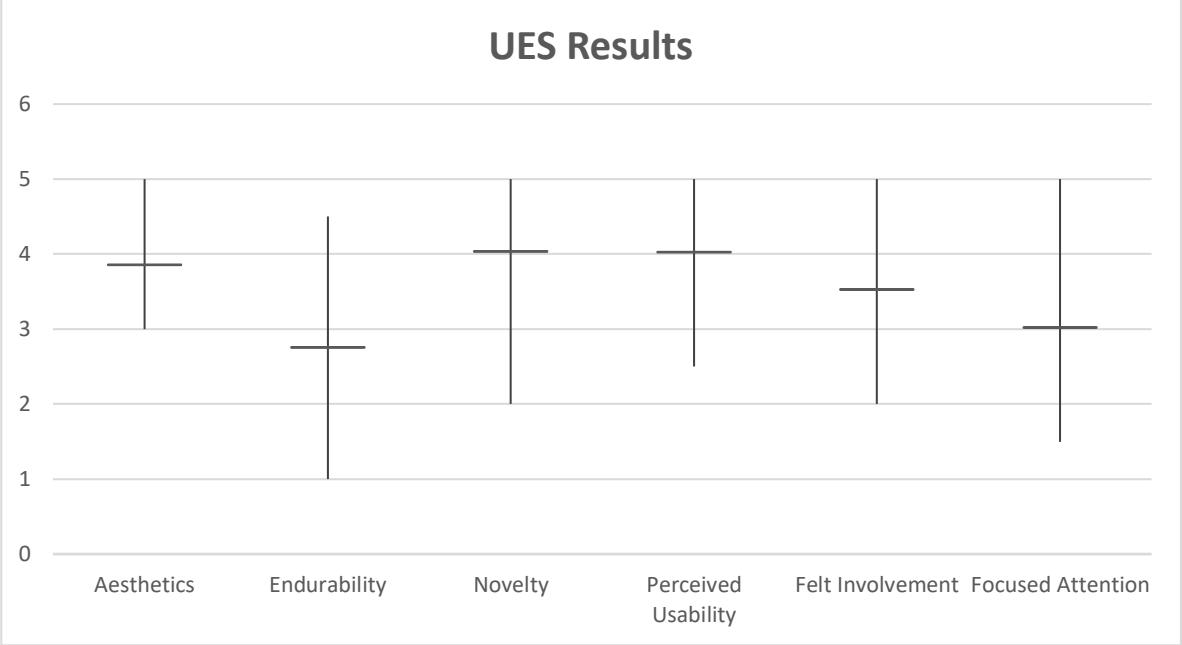

Figure 6.1: User Engagement Evaluation of average

Perceived Usability, Aesthetics and Novelty have gotten high values compare it with the other 3 categories. None of the users felt that the newly introduced elements had a negative effect. Instead, the users felt that the gamification elements produced an appealing interface and created curiosity. However, Endurability has the lowest value, people believed that they do not have enough motivation to get back to this feature, after they have explored it in the beginning.

Increasing the sample of 15 would have produced a better result on this step and more reliable in the User Engagement evaliation. As explained already by increasing that number we could have improved the reliability of our results, by decreasing the distance from the average score. Fifteen people as a sample could have led us into wrong interpretation. Due to Covid and time constraints it was hard to recruit even more people to achieve better results and the time to have the feature online was limited.

6.1.2 Heuristic evaluation

Heuristic evaluation was the second round, and it was conducted with 8 interview questions. Those questions had as a target a general understanding and grasp of issues that had not been identified so far. Through this process I did try to be objective and avoid leading the participant to specific answers. In some cases, participants were not able to give direct answers to questions, which lead to give more details and clarifications that could have been biased. In fact, users expressed that the question was too general, and I had to follow up with another question, this could have narrow down the scope, which might have introduced somehow my personal aspect. However, this is a possibility and not something that I can be certain that happened. The ideal expectation is to make the User Interface to speak for itself. If there is a need for more detailed explanations, this could mean that the UI is not achieving its goal. Giving hints to the user could hide potential issues that the development team did not spot so far. The replies from the participants can be found in Appendix B.

Questions 1 and 2 tried to reveal the biggest advantage and disadvantage of the feature. The first question "*What did you like the most about the new feature in the system?"* was trying to reveal the first impression about the implementation, expecting to understand the outstanding feature introduced. On the other hand, the second question "What did you like the least about the feature?" was trying to expose the biggest downside of the implementation.

Question 3 tried to identify any UX/UI difficulty. The question *"Did you find any difficulties on the feature experience?"* was investigating if the flows of the designs were unclear to participants or if the participants could identify any improvements on the flows and designs.

Question 4 explores if someone is a regular user. The question *"How often do you play online casinos?"* tried to investigate if the participant was a regular player or not.

Question 5 and question 8 tried to extract new ideas from the participants. Question 5 *"Would you like to see something more in this section?"* tried to elicit new ideas, ideas that might have been raised through the brainstorming process or not and were discarded it wrongly. And question 8 *"Do you want something else as a reward? If yes, what?"*, tried to provide new ideas regarding the rewards and what would motivate the users more.

Question 6 *"Do you feel that the features encourage you to use the games more?"* investigated the willingness to play more and finally question 7 *"Progress bar with upper limit 50 or 20?"* tried to investigate if the choice of 50 friends in the progress bar was perceived as reasonable.

Several issues were revealed during these questions. More than 80% of the participants thought that badges might not bring enough motivation for someone to use the feature. Instead, they would like to see a more valuable reward, that they can use on the website, for instance bonus money or free spins in games. They also revealed that the upper limit of the progress bar should be 20 instead of 50, since 50 seems to be too much according to the participants. However, the introduction of the social aspect and the potential of interacting with others (recommend games) was met with a clear positive response. Thirteen out of fifteen participants answered that the interaction between friends, was the most outstanding element of the implementation.

No participant had difficulties using the feature and they did not report anything significant from the user experience. Someone pointed out that the "Show More" button should be clickable and expand the section, however this part was not functional as explained in the end of section 4.2. 2.. Someone else pointed out that the social media icons should be removed (Figure 5.4) since they did not produce any significant functionality. Unfortunately, this was included in the designs but in the test situation it only directed the user to the social media page, which seemed to confuse the users.

Participants had also the chance to propose new features. They proposed the following ideas: the possibility to play with friends, chat functionality, online status, increase of the progress bar according to the interaction, search bar for friends, and finally tournaments that can be played within the social network.

6.2 Reliability and Validity Analysis

The whole work relies on designs, creativity, and gamification elements. Since all those factors are relying on the user's perspective, it is hard to identify if the result is ideal. Because of this, the results

and the scores of this work should not diverge. High scores and similar answers from the users, should indicate that the results are reliable.

The question to be answered regarding the validity is, if surveys and UES (user engagement evaluation) where the best tools to measure the engagement. As mentioned earlier the only parameter that was not taken into consideration was biometrics. However, even if we could have used biometrics it would have been difficult because of the COVID-19 situation. In addition to that, convincing people to participate would have been harder, the surveys would have been more time consuming, and participants might have shown concerns about the usage of their biometrics. Current research in the academic community proposes as the best methods surveys and user engagement evaluations and relying on that, this approach was used to evaluate this work. No prior thesis was done to examine something similar into the online casino sector according to my research.

6.3 Discussion

This work overall concludes that the gamified version would benefit the online casinos. The results though, reveal that there are gamification elements that receives less interest from users compared with other elements and more in-depth research should be done to investigate the reasons. Elements that include a more valuable reward for the player seems to be more attractive than other gamification techniques. As indicated in *Figure 6.1* some elements that fit into specific categories (for instance Aesthetics and Perceived Usability) attract users more.

Regarding the user experience the feedback was highly positive, and the issues pointed out were minor. Something that probably should have been avoided from the beginning are the social media icons. In this implementation they did not have a significant functionality as explained in the previous *section 6.1*. The biggest downside on the implementation was the lack of a valuable reward, users believed that badges were not big enough a motivation to invite friends. Instead, they would like to have something more in exchange. However, the idea of recommending games through the social network, elevated the interest of the users again. In general, an iterative approach in the evaluation could have prevented some of those minor issues that appeared and could have put more value on the gamified version. Adding more participants in the evaluation process could bring even more reliability into the results. However, the main purpose was to examine if it had a positive effect, therefore even with those minor issues, the results obtained indicate that gamification might have a positive effect on online casinos, but further evaluation with more gamification elements and other evaluation methods should be conducted. The first findings from this thesis are highly positive that there might be a positive correlation between online casinos and gamification elements.

In addition to the above, user engagement evaluation should have been done with a bigger sample to avoid noise into the sample and to minimize the risk of having unreliable results.

At this point, it would be helpful to point out that half of the participants were already familiar with the product and the gamified version. Which on the one hand can be considered as a bias but on the other hand, may have provided more reliable results since the participants had more time with the product and the functionality.

7 Conclusions and Future work

This chapter discusses the critical parts of this work. The overall result of this thesis is presented.

7.1 Conclusions

This thesis has attempted to fill a gap between online casinos and gamification. It took an existing product and introduced gamification elements. The result has produced a new implementation that consists of two well-known general gamification elements and one more that relies on the creativity process.

The results of the evaluation showed an overall positive effect; recommended games received impressively positive feedback, people were interested in this feature and the potential it has. On the other hand, even though badges and progress bar have a positive effect on other genres, in online casinos this seems to be not enough motivation for the players.

It can be concluded that gamification is an effective tool to use on online casino for LeoVegas.

7.2 Limitations

Unfortunately, this project was greatly affected by the COVID-19 outbreak at the beginning of March 2020. Since that was my starting point for this thesis it took a bit longer to adjust and elaborate in the beginning. However, I must admit that the company showed quick reflexes on how fast everyone got adjust to the new conditions.

Also, there were some issues regarding the scalability of the social network, this is mostly because of the last iteration where the popular games among friends were introduced, these queries were producing huge load in the backend. However, some workarounds on avoiding those huge loads were implemented, they were still concerns, the implementation was not released in the real production. Instead, an artificial environment was used for the whole project, which included all the actual functionalities of the real website.

7.3 Future work

There seems to be an enormous growth for research on this domain in collaboration with online casinos. An interesting future work around gamification would be to examine more gamification elements and combine that with physiological data (heartbeat or blood pressure). However, there is a gap on research from the ethical aspect too, new ethical frameworks should be introduced. Lastly, to monitor the long-term effect. The long-term usage of a system, where gamification is applied should examined. In addition to that more participants in the evaluation could be consider as an improvement to achieve better reliability.

There is no doubt that in-depth research is in need for understanding which elements should be used. Future researchers should focus on a broader list of gamification elements or other gamification frameworks to conclude on what would produce even better results.

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Appendix A:

User questions – **Heuristic Evaluation**:

- What did you like the most about the new feature in the system?

-What did you like the least about the feature?

-Did you find any difficulties on the feature experience?

-How often do you play online casinos?

-Would you like to see something more in this section?

-Do you feel that the features encourage you to use the games more?

-Progress bar with upper limit 50 or 20?

- Do you want something else as a reward? If yes, what?

Scalable questions from 1-5 points – **User Engagement Evaluation**:

Aesthetics:

1. From 1 to 5 how much did you like the badges and the progress bar?
2. From 1 to 5 how much you liked the layout?

Endurability:

3. Do you feel that it worth your time?
4. Were the badges enough as reward?

Novelty:

5. Would it motivate you to use it more than once?
6. Did you feel that the feature brought something new – more interesting?

Perceived Usability:

7. From 1 to 5 did you have any difficulty on using the feature?
8. From 1 to 5 did you get confused on using the feature?

Felt Involvement:

9. From 1 to 5 Did you enjoy more by using the feature?

Focused Attention:

10. From 1 to 5 did you feel that you spend more time than before?
11. From 1 to 5 did you feel that the feature could drain your time?

Appendix B:

User Engagment

Standar Deviation on the same category	0,6361980027		0,9503446959		0,8631958816		0,8846013097		1,050030525	1,130065456	
Standar Deviation	0,63245553	0,63994047	0,99043040	0,91025898	0,83380938	0,89258237	0,82807867	0,94112394	1,050030525	1,01418510	1,24594580
Average contribute on the same category	3,866666667		2,766666667		4,04047619		4,3		3,538461538	3,033333333	
AVERAGE	3,6	4,13333	3,13333	2,4	3,86666	4,21428	4,4	4,2	3,538461538	3,2	2,86666
Fl	3	4	3	2	3	4	5	5	4	3	2
Sp	3	4	3	3	3	4	4	4	2	3	4
Ge	4	5	3	3	4	4	5	3	4	4	4
Ko	4	3	4	3	4	-	5	5	-	4	2
Ry	4	4	2	2	5	5	3	4	4	3	2
A	3	4	3	2	4	5	3	3	4	5	4
Ri	3	4	4	3	4	4	5	5	4	3	2
Di	3	4	1	1	3	2	5	4	1	3	3
Ka	4	5	4	4	5	5	3	2	4	4	4
Pan	3	4	5	3	5	5	4	4	5	5	5
Si	4	3	3	1	4	5	4	4	3	2	1
Ig	5	4	3	3	4	5	5	5	4	2	2
Ge	4	5	3	2	4	4	5	5	4	3	4
Jo	3	4	2	1	2	3	5	5	3	2	3
Sp	4	5	4	3	4	4	5	5	-	2	1
	1	2	3	4	5	6	7	8	9	10	11
	Aesthetics		Endurability		Novelty		Perceived Usability		Felt Involvement	Focused Attention	

Heuristic Evaluation									
	Fl	the social network	the recommend	No	rarely	tournament s with	Neutral	50 seems to be too big, i	monetary value
	Sp	The progress	It will consume	No	rarely.	I do not know	Yes	Maybe some	
	Ge	The social aspect, that	Most popular	No	i do not	Aggregation of popular	Yes, the social	Instead i would like to	i would like some kind of
	Ko	The games that my	That i cannot see	No	Never	Yes, it will be	Yes,	50 seems to be fine.	Definetely badges are
	Ry	The social network	Nothing	No	Never	I would like to see firstly	yes it has the potential	50 seems ok. Or	Loyalty points that would
	A	Connecting with other	Not enough motivation	No	Not playing at all	I would like to see if	Yes, for sure	50 is good	I do not want something
	Ri	The invitation	I cannot find something	0	twice a week	More badges	Yes	Definetely upper limit	showing your name in a
	Di	I can see what my	That i have to copy and	No	never	search for friends	it might help me to	50 is ok	free spins.
	Ka	I can see recommend	Social network	Since i had to ask	only for testing	Big wins of my friends	To show to my friends	20 would be better.	Free spins.
	Pan	I like the motivation	The number	No	im not playing in	I would like to see	Sure i really	I believe 20	free spins is a good idea.
	Si	Brings social	Badges do not bring	Is not really finished,	No	Increased Friendship	No that much.	50 is a high number.	I would like money and
	Ig	keep you more	The reward is too	NO	i do not play.	Yes, it should have	It does, but i would like to	I think that 20 is better	Free spins would be nice
	Ge	Introduces the social	low value - few rewards	not at all	once per month	Social level of my	for sure not more, but	20 seems more	yes, free spins or
	Jo	The possibility	Lack of real options to	No, i think the feature	Never, just for work	Yes, if friends are	Yeah, if i see games	20, as 50 friends in a	Yes, i would like to see
	Sp	the rewards are engaging and	the amount of players to reach the new status	no everything is easy to use	during the weekends	possible integration on live casino with play with	it is a plus, but not really	20	possible freee spins
		1	2	3	4	5	6	7	8

TRITA - EECS-EX-2022: 196