GAMIFICATION:
A tool to improve Sustainability Efforts

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Abstract

Gamification is the term for applying game elements to non-game situations with the purpose of fostering engagement and altering behaviours among other outcomes. It has been applied to many industries, such as education, airlines and software development, with successful results.

The motivations of this project are threefold. Firstly, the information on gamification is scarce, scattered and incomplete. Secondly, many gamification projects fail due to organizations diving in without much knowledge because they are driven by the hype of this fairly young technology. Lastly, British Telecom (BT) has expressed an interest in generating a solution to engage their employees in energy saving behaviours around the BT sites.

Therefore, the aims of the project are:

- To synthesize the few and scattered pieces of information on Gamification and fill the literary gaps.
- To help prevent gamification failures by providing an extensive literature review with an all-encompassing, informational guide for organizations wishing to use gamification.
- To provide British Telecom (BT) with a design as a solution for motivating their employees to save energy.

This project provides an extensive background report examining the essence of Gamification: key principles, psychological concepts and game theories. It also synthesises numerous energy saving examples, case studies from various industries and failed cases. Consequently, by analysing the research, three objectives were achieved: a list of tips and common errors of gamification projects, a set of guidelines that are applicable to any type of gamification project and, lastly, a gamification design for BT's energy saving problem.

Overall, this project made significant theoretical and practical contributions. Although, there is existing literature that describes guidelines for gamification, they are not as detailed or complete. Therefore, the findings contribute to the existing literature and serve as a practical contribution to BT and other companies that wish to take on gamification projects.

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I hereby declare that no portion of the work referred to in the dissertation has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

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Chapter 1: Introduction

Whether we are video game players, casual gamers that play Angry Birds, or consumers engaged in game-like loyalty programs, games have affected some part of our lives. Research has shown that "Americans spent over $25 billion on video games in 2010" [1]. And that the video game industry is an extremely successful, on-growing one. A game, as Juul [2] described it, is:

> "A rule-based formal system with a variable and quantifiable outcome, where different outcomes are assigned different values, the player exerts effort in order to influence the outcome, the player feels attached to the outcome and the consequences of the activity are optional and negotiable".

Games serve as "an expression of human nature, just like work, learning and relationships" [3]. They are typically meant for entertainment purposes [1]; however, they can be applied far beyond that into a wide range of fields and features of daily life [1]. The applications of the core premises of games are "nearly infinite" [3] and are able to influence anything from academia, personal health, health care services, government and businesses [3].

By simply looking at the success of the gaming industry, game elements and theories have proven on a daily basis how effective they can be on engagement and motivation ([4], [5]). This brings into question: Why are games so addictive? And "what can we learn from them?" [5]. Games "tap ... into [the player's] best qualities" [5]; users become motivated, persistent when dealing with failure, optimistic and collaborative [5]. Additionally, the players are enthusiastic about learning new skills and taking part in significant social interactions. All of these qualities can be applied to the real world [5]. Games are the only known stimuli that enable people to "take actions against their self-interest, in a predictable way, without using force" [6]. They seem to conjure a degree of involvement that is seldom seen anywhere [7]. So, why not harness the characteristics of games that create this phenomenon and put them to use in situations where engagement is lacking? As Deterding et al. [8] argues: "game elements should be able to make other non-game products and services more enjoyable and engaging as well"; this is exactly what gamification aims to achieve. In an organisation, workers are expected to "excel in [the] work place" [9] without the organization putting efforts, apart from

monetary compensation, into fostering their engagement [9]. On the other hand, game-like strategies, such as Gamification, spark user involvement and motivation to outshine and resolve the problems they are faced with [9]. With this new age and new tools there is a need to "re-think the traditional ways [of] foster[ing] engagement in process improvement" [10]. Gamification is "[an exciting, new] extension of games beyond entertainment in the private home" [8], and a powerful, innovative solution to this need for change [10].

1.1 Project Motivation

How to incentivize users has been, and still is, an area of interest in psychology, business and computer science [11]. Gamification has been created as a tool that combines these three fields of study with the purpose of invoking user motivation. However, there is a lot of hype about gamification and many businesses are diving into it without much knowledge [12]. This makes the risk of failure extremely high, resulting in a waste of "time, money and resources" [13]. Gamification is a fairly young technology, and although proven successful in many cases, numerous questions and uncertainties still remain ([14], [9]). There is a lot of information scattered across the web and many gaps in the literature about the subject. So, it is important to synthesize this knowledge in order to understand how gamification works, when it works best, its limits and key strategies before using it [13].

The contributions of this project could bring together all this information into a comprehensive report and fill the literary gaps. Additionally, it will provide a basis for companies to become informed about gamification before taking on a project. This could potentially help Gamification's big problem of failure due to lack of knowledge.

1.2 Project Objectives and Scope

This project aims to not only provide theoretical implications of gamification but also a practical application. Ultimately, it includes an extensive background research, followed by a review of literature which examines the use of gamification in multiple industries in order to identify best practices for gamifying a process. The project is focused on gamification as a tool for employee behaviour change in a business**.** This was then applied to a practical case: aiding British Telecom (BT) in defining a solution for motivating their employees to decrease their

energy usage. For this, an energy saving gamification design was generated as a suggested solution to BT's problem. This can lead to substantial financial savings for BT and favourable ecological effects.

The research questions that guided this project are the following:

1. *What knowledge is needed prior to commencing a gamification project?*
2. *What elements need to be in place for a successful gamification project?*
3. *What are the steps to completing a gamification project?*
4. *How can gamification be applied to help British Telecom motivate its employees towards increasing sustainability efforts?*

Thus, the scope of the project includes investigating and obtaining an extremely thorough understanding of gamification and all its principles: from how it can be achieved, to its critiques and risk and how it can provide a solution to an organization's motivational problems. Even though the physical implementation of the gamified application is out of the scope of the project, providing British Telecom with a possible solution to their energy saving efforts is one of the main objectives along with creating general gamification guidelines that can be virtually applied to any industry.

1.3 Research Design

The structure of the project's research process was adapted from Berg's [15] method for developing ground theory through case studies. This method was modified to fit the purpose of this project of developing a gamification design for British Telecom through the examination of multiple case studies. The diagram of the customized method can be seen in Appendix A.

This process is split into seven phases: research idea, design, data collection, analysis, reflection, generic guideline formulation and creation of BT solution. During the initial phases the researching strategies that were used in the project were set up. The first phase ('research idea'), served to identifying the main focus of the project. This was discussed with the supervisor and the BT representative in the first few meetings after the project was assigned.

The second step (design) consisted of developing the strategies for obtaining literature and defining what types of cases would be searched for. The design phase included: finding

research databases, establishing key words/phrases for searching and identifying important people or organisations involved in Gamification.

The data-collection and analysis steps consisted of finding literature and developing an organisational strategy for better management of the vast research. These steps also included identifying initial patterns within the literature. Throughout the project there were several iterations of these two steps for as long as more information is needed.

Further on, the reflection phase served the purpose of examining the research in greater depth and drawing meaning from it. The information discovered in this phase was then synthesized during the 'generic guideline formulation' phase. This is where the generic gamification guidelines were composed.

In the final phase ('creation of BT solution'), the case studies that were similar to BT's situation and formulated guidelines were used to create the tailored gamification design for BT.

1.4 Project Overview

This dissertation is composed of 10 chapters. Out of these Chapters, Chapters 2 and 3 comprise the background information needed to begin understanding Gamification. The following three chapters (Chapters 4, 5 and 6) together compose the literature review and description of a wide variety of existing cases where gamification has been applied. Lastly, the final chapters include the results of the analysis and synthesis of gamification literature that I performed to obtain: a composition of possible risks and tips, a set of steps that are involved in the process of a gamification project and the suggested gamification design for British Telecom. The following is a more comprehensive description of the individual chapters.

Chapter 2: Principles of Gamification

This chapter includes an extensive collection of background knowledge about gamification. This consists of gamification definitions, what its purpose is, what it achieves, the reasons to its recent increase in popularity, critiques, and ends with the past, present and future of the gamification trend.

Chapter 3: The Sciences behind Gamification

This chapter contains the second half of the background information on gamification. This includes an exploration of the sciences involved in the successful use of gamification; in other words this chapter is composed of explanations of the psychology and the game theories involved in game-like behaviour and gamified applications. As psychology is an extremely important factor in gamification, the section on psychology contains an in depth description of relevant theories in motivational psychology, psychology of learning and social psychology.

Chapter 4: Applications of Gamification

In this chapter one can find an examination of literature and a large selection of existing cases from various industries in which Gamification has been applied. These areas include: government, education, personal life, telecommunications, airlines, location-based services, software testing and other businesses.

Chapter 5: Gamification of Energy Saving

This is the continuation of the project's literature review. This chapter describes the literature found on gamification applied to sustainability efforts (in particular energy saving) since this field will be most important to this study.

Chapter 6: Failed Gamification Cases

This chapter contains an exploration of three important failed cases: Zappos, Marriott and Kout. It also provides explanations of the most probable causes for their failure to gamify in order to shed light on what should not be done in a gamification project.

Chapter 7: Tips and Risks – Analysis of Findings

This chapter describes possible risks that come with gamification, ways to prevent or fix these problems and tips that will increase the probability of success. This analysis will aid potential organizations that wish to use gamification in creating a superior gamified design.

Chapter 8: Steps to Gamification

Through the analysis and examination of the literature, I identify key steps and best-practices for a successful outcome of a gamification project. These were turned into a set of sequential steps that lead to the establishment of a gamification system applicable to any industry. This chapter is organized into three distinct phases ('Prepare', 'Design' and 'Implement and Maintain') each of which containing three to four steps to be followed in order.

Chapter 9: Suggested British Telecom Design

By taking the gamification guidelines from chapter 6 and the tips from chapter 7, a suggested gamification design was created as a solution for British Telecom's goal of motivating employees to save energy. The same step-wise structure was applied from Chapter 6 to the framework to demonstrate the process by which the design for the application was created and matured. This chapter is concluded with some suggestions for implementation and maintenance since these set of steps are out of the scope of this project.

Chapter 10: Conclusion

With this chapter the dissertation is brought to a close. It provides a summary of the research, descriptions of the project's achievements, an evaluation and conclusions of the work created along with a discussion of limitations and future work.

Chapter 2: Principles of Gamification

This chapter explores the relevant background information necessary to begin understanding gamification. It presents detailed information to introduce the concept of gamification. This includes not just its definition, but also explanations of: what it achieves, how it achieves it, the reasons for its recent increase in popularity, criticisms and details about the past, present and future of the technique.

2.1 What is Gamification?

Gamification is the combination of two worlds: work and play; it allows for the enjoyment of playful interactions while at the same time working to produce quality results. Gamification is defined as the application of game elements and theories to "non-game contexts" with the intention of modifying behaviours, increasing fidelity or motivating and engaging users ([8], [16], [9]). It is a powerful tool that draws from the notion of the changes currently happening in our society in regards to the increasing use of technology and popularity of games [17]. It allows us to understand what is "pleasurable to people" [6]. Gamification takes the "potentially magical power of games" [17] and applies this power to a given problem.

The most important ingredient of gamification is to understand what game elements are. Game elements are the rules, features, dynamics, principles and control mechanisms of games ([1], [13], [10] [13]. As Dorling and McCaffery [10] stated, these elements "govern a behaviour through a system of incentives, feedback [loops] and rewards with a reasonable predictable outcome" and include features such as: points, levels, badges, achievements, progress bars, challenges and competitions, negative or positive feedback, virtual goods and leader boards among others ([13], [18], [10]). In isolation, a game element is not seen as "gameful" [8]; however, when combined, they are able to drive behaviour by potentially "tap[ing] into the full range of human emotions and [sparking the users'] motivat[ion] " [10].

The gradual combination of game elements "to make game play more interesting and engaging" [10] is referred to as 'game dynamics'. Game dynamics are the "desires and

motivations" [13] that appear due to the "compelling, [and] motivational nature of [the] experience" [13] created by game elements. Examples of game dynamics include: progression, self-expression, and altruism [13]. All these elements are usually seen integrated with social networking applications or mobile devices in order to amplify its effectiveness, increase accessibility to users and deliver the full gamified experience.

In theory gamification can be applied to any industry or facet of everyday life [10]. Gamification can be a data-driven motivation strategy that targets user motivation to "shar[e] information with their networks" [19], perform specific behaviours, "mak[e] a social impact or address sustainability factors, such as energy consumption, poverty elimination etc." [5].

Businesses are the most common users of gamification. In a business, gamification "walks the line between an entertaining game and a professional[,] creative solution to a problem" [20]. Gamification has been seen to be used for: "changing behaviours, developing skills or innovation" [21]. It is a "non-monetary incentive" [22] strategy that delivers superior results in terms of quality but with low operating costs [22]. A company may use gamification for marketing by altering customer behaviour to engage them into purchasing or visiting their website [5]. Internally, Gamification is a creative tactic to motivate employees to increase productivity, develop new skills, or increase their loyalty and involvement in the company [21]. Lastly, they may also use gamification for innovation by engaging users and/or employees to submit creative ideas or solutions [21].

While some people may argue that gamification involves playing at work that will consequently lead to distraction and unproductively, experts would argue otherwise [7]. As Stuart Brown stated in 2009, "play is not the opposite of work" [23]. Hennessy et al. [7] (p.3) also argue that:

> "Gamification is a powerful tool for fusing play with work to help organizations teach, persuade, motivate, and develop meaningful brand relationships with partners. Adding an element of play enhances the end-user experience, whether it's a channel representative, employee, or a buyer".

The underlying argument is that playfulness, when harness correctly through gamification, will attract the user to the task at hand and increase their productivity. Overall, the substantial amount of successful gamification cases in business and many other industries prove that, when implemented sensibly, gamification can be very effective.

2.2 What is it not?

Gamified applications are not games and are not to be confused with full-fledged video games either ([10], [6], [18]). The difference is that gamification "is more subtle" [24]. It is implemented by using ideas and elements from games rather than being a fully developed game ([9], [1], [8]). Gamification "ha[s] the game structure, but not the game surface" [22].

Another term that is commonly mistakenly used for gamification is "serious games". Serious games are more closely related to simulation games where the purpose is to "train, investigate and advertise" [1]. They are applicable to several industries including: "defence, education, scientific exploration, health care, emergency management, city planning, engineering, religion, and politics" [1]. Blogger Paul Ranson [20] describes a serious game as "one which uses technology that players of call of duty (a popular combat video game) would be familiar with to train real combat troops". In comparison to gamified applications (which as state previously only incorporate elements of games), the design of serious games meet all "sufficient conditions for being a game" [8] and they encompasses a complete video game ([6], [8]). However, both serious games and gamification relate in the fact that they are both used for purposes other than entertainment ([8], [6]).

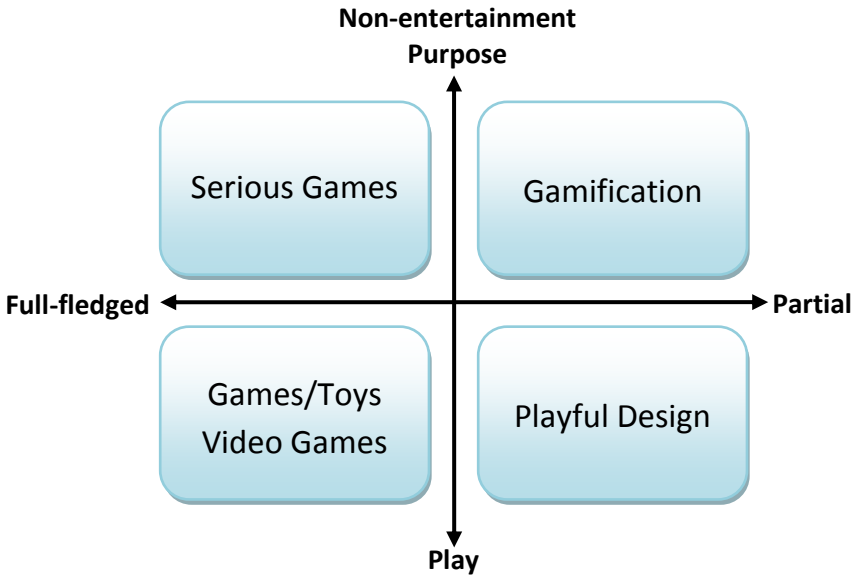

Figure 2.1: Differences in game design: play versus purpose, full-fledged versus partial design. Adapted from: [8]

Figure 2.1 (above) depicts the differences and similarities between the previously mentioned concepts based on their degree of game design and the purpose of the system. It is based on Deterding et al.'s [8] diagram depicting "Gamification between game and play, whole and parts". Figure 2.1 shows how gamification and serious games relate in terms of their purpose (non-entertainment purposes), while they differ in the degree to which the game is implemented (gamification implements parts while serious games implement the whole game). It can also be seen how gamification and video games are opposites as gamification has a non-entertainment purpose and is a partial game while video games are fully-fledged and are meant for entertainment.

To sum up, gamification is about extracting the elements of games that make them entertaining and incorporating them into non-game situations [25]; it is in no way about "an immersive 3D world, for example, to do simulation and training... [or] a virtual environment" [25].

2.3 What does Gamification do?

Gamification, when used properly, can be moulded to achieve a wide range of desired outcomes (summarized on Table 2.1). Some of these possible effects are: fostering engagement, improving motivation and increasing the participation of users towards a target process. Gamification harness the "motivational power of games" [26] and apply it to motivational problems in education, work or aspect of personal life (e.g. personal health or chores). It can succeed in making boring, mundane activities more attractive to the users and at times the engagement may be so great that users will not notice that they are playing ([27], [1], [7]). The motivation that gamification fosters, encourages behaviours of contribution, completion or repetition of tasks to achieve greater user involvement, especially in tasks that may not be compulsory ([28], [29]). In organisations, this can be particularly helpful when collecting information from employees and customers, inducing participatory behaviours in company activities or when establishing new process or enterprise software [29].

Furthermore, through engagement, motivation and participation, gamification can achieve improved loyalty. A company, using gamification on their website can develop brand awareness, improve their marketing effectiveness, and augment customer loyalty to the brand [1]. Additionally, gamification can play a big role in user retention [8].

Productivity and efficiency are additional outcomes that can be reached through the use of a gamified application [17]. This can refer to productivity in one's personal life (e.g. performing chores, getting course work completed [28]) or in a business (e.g. improving the quality and quantity of work). When a task is "repetitive and monotonous ... [it is increasingly] prone to human error" [4]. However, by gamifying these processes, the enjoyment of performing game-like tasks has been shown to decrease the possibility of mistakes and improve the quality of the work done [4]. Additionally, gamification offers "faster feedback of achievement and more visible progress indicators" [10] improving employee morale and, yet again, allowing for a better quality of work [30].

More over, gamification can be used with the goal of fostering behaviour changes in a group of users [17]. Researchers argue that, through the use of "real world data combine[d] with the ability to socialize and receive rewards" [8] gamification strikes emotions and motivation to "foster change and sustain behavior" [31].

All of the previously mentioned results of Gamification bring more value and profit to a business ([25], [3]). Every organisation relies on a customer base engaging in a behaviour, which can include purchasing or subscribing to products [25]. Increasing the frequency of these behaviours drives the value of these organisations. Thus, if the organisation is able to guide and predict their customers' behaviours "then [they] can drive real business value" [25].

Benefits from the use of gamification in organisations can be classified into three categories: external, internal and behavioural change [5]. External benefits encompass improvement in marketing, sales and customer engagement [5]. Gamification can succeed in augmenting customer involvement with the brand, encouraging them to be part of the community, increased brand awareness and enlarge the customer base through the customers talking to their colleagues ([13], [19]). As Bunchball [13] stated "Gamification enables you to turn customers into fans, and fans into evangelists" and this, in turn, increases sales and reputation. In contrast, internal benefits include productivity and collaboration enhancements [5]. By using Gamification, organisations can gain profit through encouraging repetition or changes in behaviour. Gamification can facilitate "identify[ing] top employees and improve training and productivity" [19]. The competitive aspects of a gamified application can also spark employee engagement in solving business problems [4]. Overall, gamification can be tailored to fit a variety of needs in order to foster different behaviours in the users.

Table 2.1: Gamification Outcomes (Generic and Business Oriented).

General Outcomes of Gamification	Business Outcomes of Gamification
• Engagement • Motivation • Loyalty • Participation • Efficiency • Behaviour change	• Improve marketing efficiency • Customer and employee retention • Boost business value and profits • Increase employee morale • Enhance employee productivity and collaboration

2.4 How does Gamification do it?

Gamification combines research and concepts from psychology, computer science, video game industry and even marketing to achieve impressive results ([6], [11]). Psychology is essential to gamification since one must understand how human nature works and how it can be influenced in order to create an effective gamified strategy. Through the use of psychology one can transfer the emotion and eagerness to play into any given situation [10]. Human beings are naturally curious, emotional and instinctive [30]; by using psychological elements a gamified application can be made to spark emotions and "hook [users] by meeting [their] basic human needs for achievement, appreciation, reciprocity and a sense of control over [their] little corner of life" [27].

Motivational psychology is the subfield that plays the biggest part in gamification. Theories of intrinsic and extrinsic motivation can be applied to a gamified application in order create "incentives [that] drive behavior" [19]. Intrinsic motivation is one that "comes from within" [1]; namely, the user pursues "activities that are rewarding in and of themselves" [14]. In comparison, extrinsic motivation is one where an outside incentive stimulates the user to pursue the activity [14]. The principle behind this is that in order to participate in a gamified application a user "must have a reason to contribute to the system" [11].

Social psychology also plays apart in gamification. Social psychology theories are ones that "predict how users can be motivated to participate in collective systems for individual benefit" [29]. Research has come to show that human beings crave social interactions, and these motivate users to participate in game-like systems [11].

Additionally, gamified strategies use data as an effective tool to reach the desired outcome. Rajat Paharia [16], founder of Bunchball "a provider of online gamification solutions" [16], argues that gamification "motivate[s] people through data... [specifically,] user-activity data". Users can be motivated to improve their performance or increase their participation if gamified solutions allow them to visualize and interpret their performance [16]. The users can visualize their progress on their tasks, receive "real-time feedback" [16] or view their achievements compared to others in the community. This sparks competition, productivity and participation [16].

Therefore, through a combination of psychological, business and game theories to understand Gamification, one will be able to produce a wide variety of effective results.

2.5 Why is it Growing in Popularity?

We are currently in the midst of experiencing radical changes in the new generations and our daily customs. The "generational change" [10] combined with the ubiquity of internet, social media and mobile devices, has shifted traditional behaviours [25]. As Dorling and McCaffery [10] stated: "a new approach [is needed] for a new generation...". The times are changing; we are going from "a time when life was all about survival ... [and] efficiency" [6] into a digital and cultural revolution where internet and online games have become "mainstream" [6]. This new era is all about enjoyment and connectivity, and the new generations have been brought up with this behaviour. Industries can no longer continue using "the same [traditional] model[s] developed decades ago... [which will eventually] lack [in] engagement" [7]. Thus, there is a need for new and innovative strategies for inspiring motivation that will match up with this cultural revolution; one of these strategies is Gamification.

The biggest reason yet for the success and increase in popularity of gamification is the Millennials, also known as Generation Y. The Millennials, are those born between 1978 and 1994 [19]. These individuals raised under the influences of technology and video games, are quickly becoming workers and consumers [32]. This generation is known for their acceptance of social media "faster than [any] other [generation], like baby boomers and Generation Xers" [19] and their effortless ability to use and adapt to technology ([10], [19]). Additionally, research has described them to be "family-centric, achievement-oriented, team-oriented, ... attention-craving... confident, [and] ambitious" [10]. They have shown to "crave attention ...

[as] feedback and guidance" [10], and look for "affirmation" [10] from colleagues and place a strong influence on team work [10]. These are all characteristics that gamification can offer.

Soon, the workforce will be comprised of five generations at one time when previously there have been only three or four [33]. Currently, 25 percent of the workforce consists of the Millennial generation; however, according to Christopher Swan [19], by 2015, they will comprise 75 percent of the global workforce. As this new generation of employees enters the workforce, they will bring with them different behaviours and ways of working ([19], [33]). They will expect work to be comprised of "clear goals, trackable progress, shareable status, social visibility, reward schedules" [10] and all-in-all a "social experience" [19]. Since they are very familiar with technology they expect the environment in which they work to integrate the use of these tools [34].

Statistics have also shown that, not only is the entrance of Millennials into the workforce affecting business behaviour, but it is also the "ongoing retirement of the massive baby boomer generation" [7]. Organisations have to keep this flooding entrance of Millennials into the workforce and the retirement of the older generations into consideration for their near-future working behaviours and motivation strategies [32]. Because Millennials have been brought up immersed in a technological atmosphere they are more accepting of a "shift towards a game-like environment at work" [4]. As they gain influence and power they will have the ability to shape new workforce behaviours and the "expectations about user experiences" [10]; thus, "adding Gamification to every day processes [will effectively] drive their engagement" [19].

In addition to the changing generations, some great influences on the success of gamification are: the ubiquity of mobiles, online connectivity and the influence of video games. The rise of social media and mobile devices as a way to be connected anywhere and anytime is a driving force for users to constantly "interact online" [4]. Experts strongly believe that "hyper connectivity, virtualization and the ubiquity of games" [7] have all taken part in the drastic transformation in everyday interaction and workforce behaviour ([7], [8]). Furthermore, video games, online games and casual games are all major entertainment, socialization and communication environments [35]. Therefore, gamification fits right in with these new values as it encompasses socialization and game interactions.

Lastly, while some experts may argue the success of gamification to be a consequence of the change in generation and the ubiquity of online connectivity, others like Rajat Paharia,

believe that the success is due to gamification "satisfying these fundamental human needs and desires we have for reward, status, achievement, competition, self expression, even altruism" [25]. These emotions and innate desires apply to any gender, culture or demographic [25]. They apply to virtually any person because, by human nature, we all are "motivated by some combination of those [elements]" [25].

Specialists call this change a "virtual revolution" [36] which will influence every industry. Ultimately, as "all macro trends point [to it] ..." [16], in the near future gamification will become a significant interaction tool to engage these new hyper-connected, socializing and tech-savvy generations.

2.6 What are the Criticisms of Gamification?

As with any new technology, gamification has been criticised. Some critics believe that gamification involves "manipulation, fake fun, cheating, bad design, [and] useless frivolity" [35]. The most common of these criticisms is the association of gamification to games and playing. In an organisation, one may hear about gamification and what it involves, and turn it down because of the mistaken idea of workers playing video games during work hours. As Palmer et al. [35] accurately describe, "managers fear a distracted workforce doing nothing more than playing games". The problem is that these people are unaware of the underlying behavioural techniques of Gamification and how these can benefit them.

Additionally, many critics argue that gamification does not work and that it bores people. They believe it is "superficial pointification" [6] and simply a hype. It is indeed true that companies are adding points and badges to their services that have no real meaning and believe that they have gamified their service. This fatigues the users to have "all their actions earn them points for separate accounts, badges for menial tasks, and rankings on a leader boards with no implicit meaning" [31]; without significance or objectives it all becomes pointless [31]. Furthermore, "Gamification isn't for everyone" [28]; thus, organisations need to make sure gamification suites their purpose and that they are willing to carry it out properly. Therefore, the real truth is that any tool or technology that is not design properly or whole-heartedly will not be effective.

Lastly, gamification has been criticized due to the fact that the "group of advocates for gamification that try to establish it as a relevant topic of discussion and as a desired buzzword"

[17] are those who profit from marketing gamification and increasing its use. Many of these people include the organisations that create and sell gamification strategies, and the individuals that gain status or profit from selling books, talks and lecturing about the subject [17]. Even though they may be criticized by their clear gain, gamification has still proven a successful tool in many industries and cases.

2.7 What is the Past, Present and Future of Gamification?

The term 'gamification' is a modern, innovative name for an already existing concept. The underlying concepts of gamification were first used in 2008 according to [8] and Google Trends. However, until mid 2010 the term 'Gamification' did not gain extensive popularity and recognition [8]. Other names by which the concept was known for were: "productivity games', "surveillance entertainment", "funware", "playful design", "behavioural games", "game layer" or "applied gaming" [8]. Yet, none of these prevailed and 'Gamification' was the one that "managed to institutionalize itself as the common household term" [8].

Many researchers believe that in the future "elements of games will invade every part of our daily lives" [6] and they will dramatically alter companies' traditional ways of working [6]. Gartner analysts estimate that "by 2014, more than 70 percent of Global 2000 organisations will have at least one "gamified" application" [37]. That is because currently gamification is driven by hype and it will "become a highly significant trend over the next five years" [37].

Gartner's Hype Cycle is an effective tool to visualize the evolution of new technologies over time [38]. It represents visually the stages of "maturity and adoption of technologies and applications" [38] and aids in distinguishing whether or not these new technologies are simply hype or "commercially viable" [38]. Figure 2.2 displays the cycle and the five stages that compose it: technology trigger, peak of inflated expectations, trough of disillusionment, slope of enlightenment and the plateau of productivity [38].

The first stage, 'technology trigger', refers to a "technology breakthrough" [38] and early media interest that introduces this technology to the public. During this stage there is still no proof of "commercial viability" [38].

During the 'peak of inflated expectations' many cases of successful usage begin to appear alongside stories of failed attempts at implementation [38]. At this stage some organisations may be encouraged to use the new technology but many are still discouraged [38].

The following phase is the 'trough of disillusionment'. During this phase, organisations begin to lose interest in the technology and become intimidated by the number of failed cases [38]. This may cause the organisations that profit from selling this technology to possibly fail [38]. This is where, according to Brian Burke (vice President of Gartner Research), "the cracks start to show" [21] after the hype of the technology [21]. This is usually due to poor understanding of the tool and terrible design or implementation [21]. The only way for "investments [to] continues [is] if the surviving providers improve their products to the satisfaction of early adopters" [38].

In the next phase, the 'slope of enlightenment', new success stories appear and the technology "becomes more widely understood" [38] because of the new and improved products. This allows the technology to be further developed and companies begin to experiment with it [38]; however, the more "conservative companies [still] remain cautious" [38]. The final stage is the plateau of productivity in which the technology reaches "mainstream adoption" [38] and establishes itself.

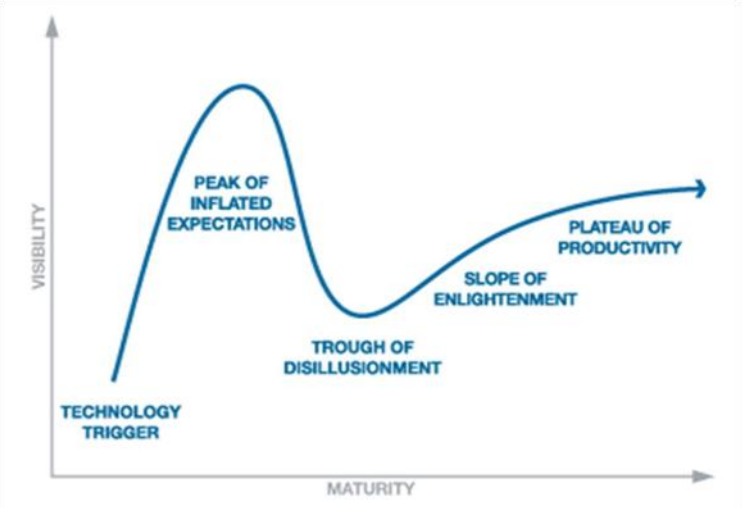

Figure 2.2: Gartner's Hype Cycle (Source: [38])

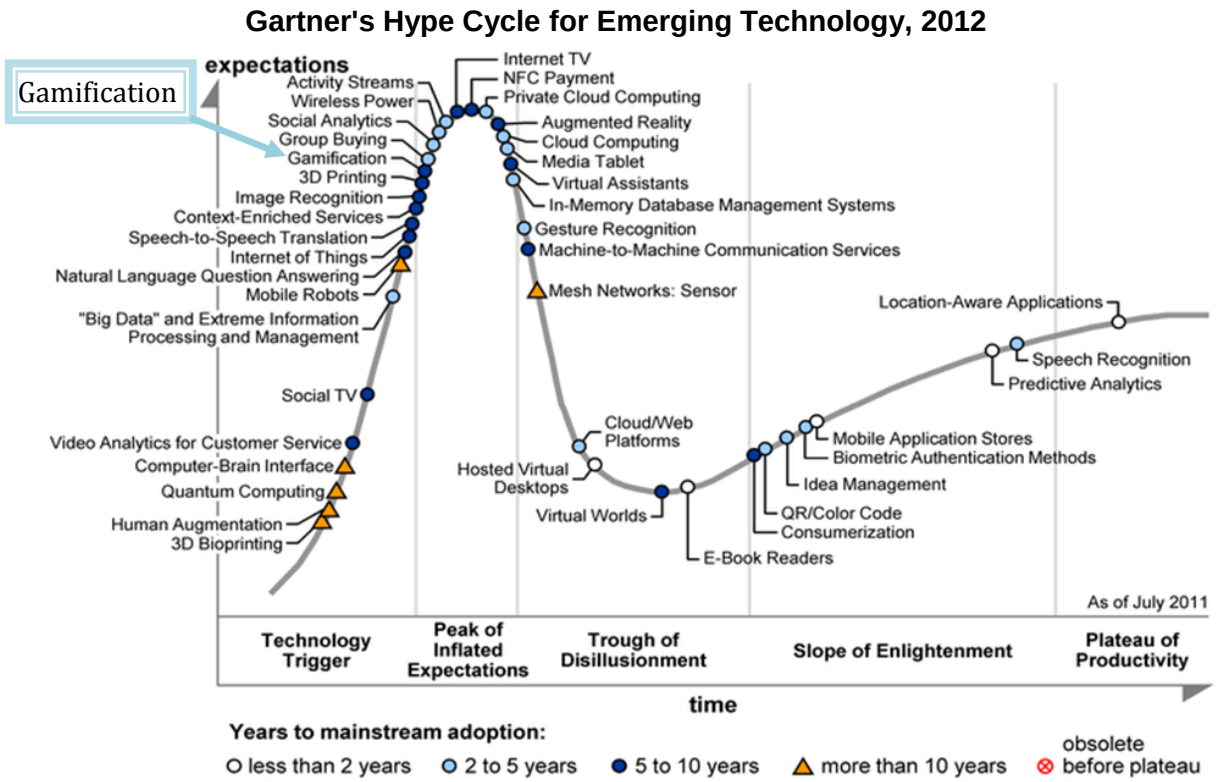

Figure 2.3: Gartner's Hype Cycle for Emerging Technologies for 2012. (Adapted from: [38])

Figure 2.3 displays many of today's technologies plotted on the Gartner's Hype Cycle in 2012, among which is 'Gamification'. As can be seen, Gartner estimates that gamification is approaching the 'peak of inflated expectations' and is close to heading into the 'trough of disillusionment'. This is because, even though there are many success cases, the failed implementations and problems due to poor design are discouraging business from using this technology [31]. Because of these patterns Gartner has approximated that "by 2014, 80 percent of current gamified applications will fail to meet business objectives primarily because of poor design" ([12], [31]).

Gamification is a fairly young and unpredictable tool which may currently be driven by hype ([30], [12]). Much of this novelty has led to the misconception that all that is needed to make gamification work is to "throw [...] badges [and points] for every customer action" [31]. As Rajat Paharia [16] accurately describes:

> "Like anything else, gamification can be done well and it can be done poorly. In any new field…you will see companies, driven by the "novelty and hype", copying what they see others doing, doing it poorly, and failing. And they do

> this without any real understanding of why they're doing it, just with blind faith that if it worked for someone else, it will work for them. Both big companies and small companies are susceptible to this."

Thus, the aim of this study is to synthesis the large amounts of existing literature on the topic into one paper where it can be understood how to gamify a process, the risks, common mistakes and tips on the strategies involved in the process.

Despite this, gamification, as a young technology, has many chances to continue surfacing and increasing in popularity as it matures [12]. Experts in the fields have named gamification as "one of the most important trends in technology" [10] and that in the near future it will have a positive impact in many fields [21].

Chapter 3:
The Sciences behind Gamification

The essential ingredient to an effective gamified process is understanding the players. The key is to learn how to spark their emotions and what their desires are. Knowing this creates an understanding of what pushes people to play game-like systems [7]. This is the main reason for the "game industry's booming success" [7]; they have studied human behaviour and "what makes play fun" [7] and applied it to games. The research done in the game industry is "now being quantified in recent neuroscience and behavioral economic studies" [7]. As Hennessy et al. [7] state: "there is [indeed] a science to fun" [7]. Even in organisations it is believed that business solutions should be produced "around [a] deep understanding of people" [7]. Gamification implementers should know "why games are enjoyable" [7]and, thus, understand the psychology of what is engaging to human beings. This, in combination with game theories, will result in a true understanding of the underlying mechanisms of Gamification.

3.1 The Psychology of Gamification

Gamification can use a plethora of game elements with flashy graphics and newest technologies, but ultimately what makes gamification effective is incorporating our understandings of what engages individuals and what moves them to participate [7]. A game design that does not "tap into people's most basic desires" [39] will not entice users to play. Gamification experts, such as Gabe Zichermann, believe that in a gamified system the ratio is "75% to 25%, psychology to technology" [39]. Gamification must identify and apply everything we know about human behaviour, which is that individuals are driven by ambition, status, recognition, choice, principles, discoveries, developing skills, gain and several other motivators [7]. Individuals are "emotional and rational" [7] and also "individual and social [beings]" [7]; this allows them to creatively express themselves while also establishing meaningful relationships [7]. Thus, a thorough understanding of psychology must be established in order to create the best gamification solution. This subsection will explore three types of psychology

(motivational, learning and social) with the aim of exploring theories relevant to gamification that will eventual aid in its design.

3.1.1 Psychology of Motivation

In every interaction between human beings and technology, an intricate relationship of motivational dilemmas and psychological condition are displayed [14]. For many people in organisations dealing with employees or customers (for instance, "product designers, strategists and marketing executive" [14]) these motivational ideas may be instinctive when designing products or processes to invoke users' needs and motivations [14]. However, explicit knowledge of motivational psychology theories reinforces this intuitive knowledge and gives a deeper understanding of gamification to create a better system [14]. This subsection will explore several theories of motivational psychology that are relevant to the understanding of gamification.

Self-determination Theory

The most well-known theory in the field of motivational psychology is the Self-Determination theory (SDT). Self-determination theory is a humanistic theory of motivation that explains human beings' innate psychological needs for personal development and well-being, and the impact of the environment on individual's motivation ([40], [41]). Through the understanding of needs and motivation, SDT is able to "predict goal-oriented behavior" [42]. SDT defines three innate needs that cause individual motivation and when they are fulfilled they invoke great personal growth [41]. These three needs allow us to comprehend "the what (i.e. content) and why (i.e. process) of goal pursuits" [42] and are defined as follows [41]:

1. **Competence:** the need to "experience a sense of ability" [41]. In a game, this is experienced when the player increases their proficiency and skills as they progress.
2. **Relatedness:** the need to obtain social interaction, relationships and connectivity. In a game, this is when the player socializes with other players.
3. **Autonomy:** the need to be able to make one's own choices and have independence. For instance, in a game player are given various paths to choose from. By giving them the freedom to make their own choices, the paths that they freely choose will lead them to their own personal outcomes.

These needs are universal; they transcend gender, age and culture. Individual strive to satisfy these three needs in order to accomplish individual development.

Motivation can be understood as "an internal state, need or desire that energizes and directs behavior" [42]. Motivation is greatly affected by an individual's past experiences, environmental stimuli and personal desires [42]; thus, innate needs such as those defined by the self-determination theory are influences over human motivational behaviour. The SDT divides motivation into two categories: intrinsic and extrinsic motivation ([40], [42]).

Extrinsic motivation is when an individual is moved to perform a behaviour due to external stimuli such as: rewards, threats, punishment, pressure, external regulations or rules ([42], [14], [43]). This motivation "occur[s] when something or someone determines the [individual to act]" [1] with rewards such as financial compensations ([1], [43]). The use of extrinsic motivators is "a highly reliable technique for [durable] behavioral change" [43]; however, when the motivation is halted, the behaviour will also disappear instantly [43].

On the other hand, intrinsic motivation "comes from within" [1] and pushes individuals to act "for the sake of the activity itself" [42]; in other words, it is when the behaviour is in itself rewarding or engaging to the individual [14]. These motivator act on the human predisposition to strive for "novelty and challenges, to extend and exercise one's capacities, to explore and to learn" [44] and may include: "altruism, competition, cooperation, sense of belonging, love or aggression" [1]. This type of motivation offers intense, lasting engagement in the behaviour but it cannot be predicted for every person as it is internalized [43]. Additionally, the three instinctive needs of the SDT are thought to be the foundation of intrinsic motivators ([45], [46]). Related to these three needs are the four main kinds of intrinsic rewards suggested by McGonigal [47]:

1. **Satisfying work**: The recognition of the quality and effort put into ones work [43]. This relates to the need for competence and ability.
2. **Experience of being successful**: This again relates to the need for competence as it is not only about being successful or capable of certain behaviour but also involves continuous learning to accomplish superior outcomes [43].
3. **Social connection**: This expresses the satisfaction of individuals when establishing relationships and sharing of ideas and their performance [43]. This reward relates to the need for relatedness.

4. **Meaning**: this again relates to the need for relatedness as it describes the fulfilling sensation of belonging and "being part of something larger than oneself" [43].

Throughout life there is a constant interaction between intrinsic and extrinsic motivators. This mix of motivations is what "forms the basic structure of our economic, political, religious and social systems" [14]. In an organisation, extrinsic rewards are typically used to motivate the personnel [10]. It has been noted that these extrinsic rewards often deteriorate the individuals feeling of intrinsic motivations, such as pleasure and importance ([10], [14]). Some studies have shown that through non-financial compensations, such as recognition and honours, individuals experience improved intrinsic motivations and sense of fulfilment [14]. Additionally, extrinsic rewards, such as monetary incentives, are not effective in sustaining behavioural changes or engagement [43].

Gamification strives to fix these previously mentioned issues by using a combination of both extrinsic and intrinsic motivations to engage the users. Intrinsic motivators play a trivial role in a work environment since the workers are typically extrinsically motivated [43]; however, games are typically played for intrinsic reasons such as enjoyment [43]. As Zichermann [14] described in his article '*Intrinsic and Extrinsic Motivation in Gamification'*, "the best systems of motivational design speak to the intrinsic motivation of the user while also providing extrinsic rewards that they value…"; thus, through the combination of intrinsic motivators (like completion and cooperation) with extrinsic ones (such as awards and badges), gamification is be able to attain intense, durable engagement and participation [1].

Four –Drive Model

The four-drive model, developed by Lawrence and Nohria [48] based on evolutionary biology, states that motivators that drive human behaviour can be categorized into four general drives:

1. **Acquire:** Gaining anything from "material goods [to] immaterial things like status power and influence" [49].
2. **Bond:** The creation of relationships and communication between individual [49].
3. **Defend:** Protection of property (physical or emotional) from "threats to our safety and security" [49].

4. **Learn:** Acquiring new knowledge and skills through the investigation of life [49]. This satisfies our biological need for curiosity [49].

This model does not only allow for a categorization of human behaviour motivators, but, it also explains the reasons why people act in certain ways. This can be very usefully and applicable to behaviours targeted in gamification for the following reasons [49]:

- **All individuals desire these drives:** the drives "transcend age, status, and culture" [49]. Individuals desired drives at all times but for some the need may be subconscious. However, the drives are a part of "human experience" [49] and are useful for accurately estimating how individuals are behaving and how they will behave.
- **They provide understanding behind human "goals, intentions, purpose and motive[s]"** [49]: drives are known to be formed by emotions which aid in decision making. Human rationality is not always rational since it always has an emotional component that "ensure[s] that our minds are focused on high-priority issues" [49]. Much of this is biologically implanted since these drives push us to "improve our odds of biological and reproductive success" [49].
- **It is embedded in human need to acquire goods and status**: some of these acquisitions are essential for survivor purposes while other may be for rank such as luxuries, influence and power.
- **Humans have a biological need for socialization:** there is always a felt need to connect, form relationships, interact and obtain a "feeling of belonging" [49]. Facebook and Twitter, for example, were created on the bases of forming social relationship, thus, the reason for their extremely quick success.
- **Human innate curiosity drives them to explore and learn:** without continuous "questioning, pushing boundaries … learning, and trying new things, people quickly become restless and bored" [49].
- **An activity becomes more appealing the greater amount of drives the activity contains:** combining drives makes individuals feel more strongly about the event or action. As an example, games such as the "massive-multiplayer" [50] online game World of Warcraft (WoW) invoke all four drives. WoW creates a desire to acquire by creating a "progression element" [49] where in order to progress the player must obtain better gear, weapons and status. Additionally, in order to reach the uppermost levels of the game, the player must join guilds and gain status within

them; thus, invoking the drive to bond. Furthermore, activities in the game that allows players to obtain goods and gain status include exploring maps or dungeons and gaining new skills, which invokes the drive to learn. Lastly, the drive to defend is invoked throughout the entire game where the player has to ensure their character does not receive harm or die.

This model is often used in organisations for employee and customer motivation [51]. This shows that it can be easily applied to systems such as loyalty programs and gamification [7]. The more drives gamification manages to invoke the higher the possibility of appealing to the users and increasing participation.

Fogg's Behaviour Model

Fogg [52] proposed a behaviour model that theorized that, in order for a behaviour to occur, the individual must have a) the motivation, b) the ability, and c) an successful trigger to perform the behaviour. Fogg's three main concepts (motivation, ability and trigger) are defined as follows:

- **Motivation:** the degree to which someone is willing or engaged in performing the behaviour [6].
- **Ability:** the degree to which someone has the skills or tools to carry out the behaviour [6]. Even if the individual has a high motivation to accomplish the task, if he or she does not have the ability to perform it, it will not occur [1]. However, the level of motivation may be enough for the individual to find the means to obtain the necessary skills to perform the behaviour [1].
- **Trigger:** the degree to which someone is provoked to perform the behaviour [6]. Having the ability and motivation alone is not enough to cause a behaviour; thus, people need triggers that push them "to complete the action in a certain moment" [1]. When a user does not have the motivation to perform a behaviour, the trigger "can be a spark" [1] that motivates the individual [1]. On the other hand, when an individual has the motivation and ability, the trigger can serve as a "reminder" [1] to perform the behaviour [1].

Figure 3.1 is a simplified adaptation of Fogg's graph depicting the behaviour model [53]. The model states that all three components must occur concurrently in order for the

target behaviour to take place [52]. In other words, an event or task must be motivating (not boring) and do-able (not too difficult) in order to pass the activation threshold and trigger the behaviour ([39], [52]).

In gamification, game element act as influencers that push users over the activation threshold and trigger them to perform the targeted behaviour [54]. In essence, a successful gamified system must cause all three elements of the behaviour model to occur all at once [54].

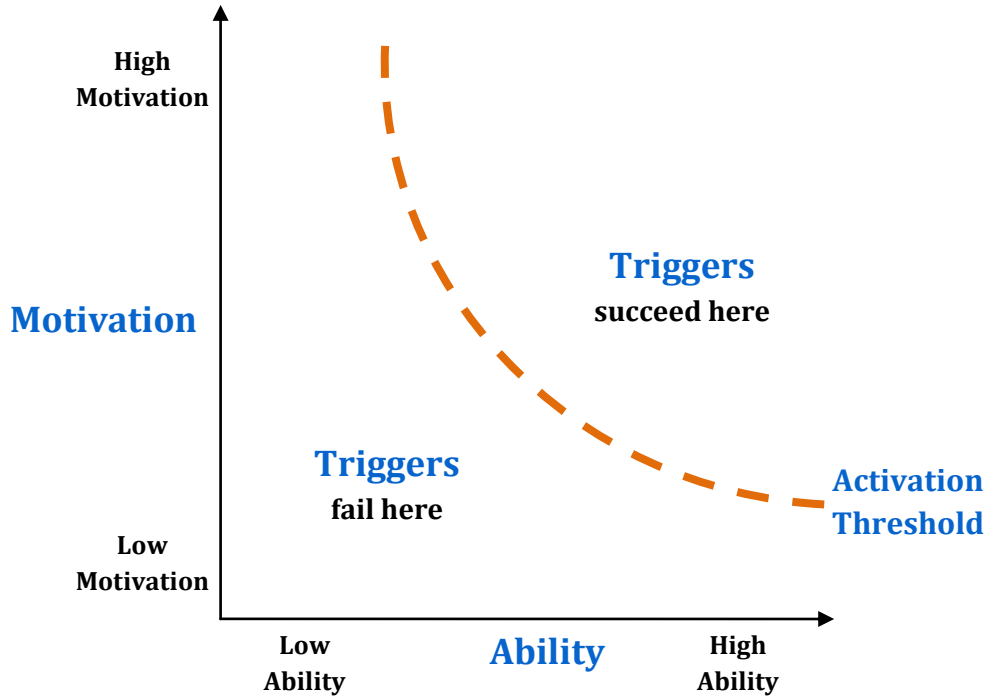

Figure 3.1: Visual depiction of Fogg's Behavior Model (Adapted from: [53])

Csikszentmihalyi's Flow Theory

The flow theory, developed by Hungarian psychologists Mihaly Csikszentmihalyi, states that in order for a task to be fully engaging it must reach 'flow', which is a state of "optimal intrinsic motivation" [54], full concentration, absorption and intense immersion ([6], [54]). In other words, it is "100% engagement" [24]. During the performance of a task, the user feels naturally in control and neither overwhelmed by difficulty nor uninterested. The users also experiences a "loss of self-awareness" [6], that is, forgetting about time, worry, ego and physical symptoms ([54], [55], [56]). Flow causes an "energized focus" [24] where the user feels completely motivated, "capable and rewarded" [24].

Achieving a state flow is not a simple task [54]. In order to reach a state of flow there are three things that must be done, of which the most important is accomplishing and maintaining the right balance between complexity and capability ([24], [6], [39], [55]). There must be enough challenge so that the user will not become bored but not so much that the user will feel frustrated by the complexity [24]. This delicate equilibrium is what has been denominated as a 'flow channel' [6] and is depicted on Figure 3.2 bellow.

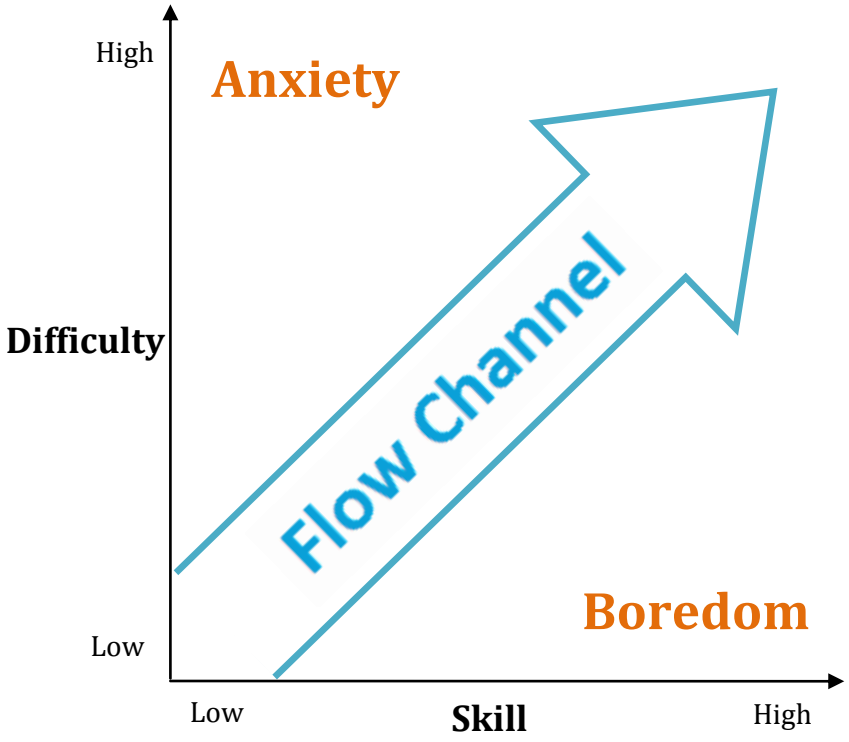

Figure 3.2: Flow Theory Graph (Adapted from: [123])

The second, ingredient for obtaining a state of flow is the availability of instant feedback in order for the user to change their actions according to the "continually changing environment demands" [57].

Lastly, a state of flow needs clearly defined goals. This means that the task at hand must guide the user and give purpose to the behaviour [57].

The ability to create a state of flow in game-like systems, such as gamification, is essential to engagement in these applications [24]. It is typically challenging to create activities that induce the right balance between capability and difficulty that matches all users of an

application [54]. Thus, through personalization and game elements, gamification attempts to create various activities where the users can find at least one which will personally stimulate flow for them.

Motivation in Gamification

Motivation in gamification plays an extremely important role as through motivation and engagement we can create a "closer alignment with the user's intrinsic motivations" [14]. This produces improved pleasure in the users and "higher quality outcomes" [14]. Combining these motivational theories with other psychological and game theories, will undeniably give users an irresistible push towards participation and behavioural change.

3.1.2 Psychology of Learning

Psychology of learning explores theories of learning processes and how experiences or conditioning results change human behaviour [58]. The main theory to be concerned about is operant (Skinnerian) conditioning, which is based on learning as part of the "willful actions of the subject" [59].

Operant conditioning, also known as Skinnerian or Instrumental conditioning, relies on an individual's volition rather than instinctive impulses. This theory was developed by B.F. Skinner a radical behavioural psychologists [54]. The theory revolves around the idea that learning and behavioural changes occur through environmental punishments and reinforcements ([54], [58]). It "disregards innate needs and uses only external conditions/reinforcement" [54] to alter behaviours. Much of this theory can be used to improve engagement and motivation [54].

The main components to operant conditioning are: reinforcements (they increase target behaviour) and punishments (they decrease target behaviour) [60]. Reinforcements are "event[s] that strengthens or increases the behavior it follows" [60] and can be classified into positive and negative reinforcements. Positive reinforcements are those which are "favorable" [60] or pleasant stimuli, while negative reinforcement is the removal of an unpleasant stimulus or event [61].

On the other hand a punishment is "[an adverse] consequence that weakens a behaviour or makes it less likely to be repeated" [61]. Just like the reinforcements, punishment can also be divided into positive and negative punishment. Positive punishment, occasionally known as "punishment by application" [60], is the appearance an unpleasant event after a behaviour in order to weaken it. In contrast, negative punishment is the removal of a pleasant event that occurs after the performance of a behaviour [60].

In operant conditioning, not only are the reinforcements and punishments an important part of the process, but also the schedules of reinforcement on a given behaviour. These schedules specify how often the reinforcement is being applied and when [62]. This has a deep effect "on the strength and rate of the response" [62]. There are two types of schedules: ratio and interval schedules. Interval schedules are where time defines when the reinforcements are given; in other words, a given amount of time must past between reinforcements [62]. However, ratio schedules define when a reinforcement must be given by the number of correct behavioural responses [63].

The most common types of interval schedules are described as follows [62]:

1. **Fixed-Interval:** reinforcement is given after a set amount of time has passed since the desired behaviour occurred.
2. **Variable-Interval:** reinforcement is given after "an unpredictable amount of time has passed" [62] since the desired behaviour occurred.

Similarly, the most common ratio schedules are the following [62]:

1. **Fixed-Ratio:** reinforcement is given after a set amount of correct behavioural responses occur.
2. **Variable-Ratio:** reinforcement is given after an unpredictable amount of correct behavioural responses occur.

In addition to these reinforcement schedules, there is also a continuous reinforcement schedule which simply reinforces the target behaviour after every occurrence [62]. This schedule is typically used in the early learning phases since it allows for the individual to establish an association between the desired behaviour and the reinforcement [62]. After this association has been properly established the schedule is typically changed to a "partial reinforcement schedule" [62] such as the ratio and interval schedules mentioned previously.

Fixed-ratio and fixed-interval schedules are used ideally for initially acquiring new behaviours while variable-interval and variable-ratio schedules are best for maintaining behaviours [54]. Overall, this theory demonstrates B.F. Skinner's belief that "under a proper reinforcement schedule, we can ignore people's innate needs" [54].

In terms of gamification, operant conditioning can be widely applied. Several game dynamics such as point systems have been created on the bases of this theory [54]. In gamification, rewarding points will be more effective if given with a defined reinforcement schedule. Thus, a gamified system should define "when, how many, and at what rate the points are give" [54].

Research has concluded that variable-interval schedules are the culprits of "many forms of game addiction, including gambling" [54]; it accentuates the significance of surprise in a game and sparks user emotions [54]. In Gamification, if we apply Skinner's belief that we can disregard individuals needs, it can be argued that we can "just give [users] points [and rewards] ... people will learn and be motivated " [54], rather than feeling a need to perform the behaviour.

3.1.3 Social Psychology

Humans are social beings; thus, social psychology is a commonly used concept as a non-financial motivation technique to encourage collaboration and participation [22].

There are two concepts to keep in mind in relation to gamification: social facilitation and social loafing. Social facilitation is "tendency of people [to] perform better on simple tasks while under someone else is watching" [22] in comparison to when the task is completed in isolation or when working in a group [22]. In contrast, social loafing refers to "the phenomenon of people making less effort to achieve a goal when they work in a group than when they work alone, since they feel their contributions do not count, are not evaluated or valued" [22]. This supports the commonly noticed trend where individuals working in a group are "less productive than the combined performance of [the] members working alone" [22].

Gamification strives to minimize the negative effects of social loafing while increasing the positive qualities of social facilitation. This can be achieved through combinations of game mechanics such as feedback, enabling competition and rewards which will allow for "individuals' efforts [to] be prominently displayed" [22], allowing them to understand that

their contributions have "unique value" [22], and that they can, at the same time, be evaluated by peers or superiors [22].

3.2 Game Theories of Gamification

The game industry takes research from the previously examined science in order to create successful theories and results. They take various psychological strategies in combination to knowledge about human biology to compose their own game theories, integrating them into their designs. This current section will explore some of these game theories and concepts that are most relevant to gamification.

3.2.1 The Gamer

In order to understand game theories and apply them to gamification approach we must first know what a gamer is and theories about their attitudes and actions. The term 'gamer' is used to describe individuals who play games regardless of the degree of importance these take in their daily lives. However, there are different types of gamers. There are those who refer themselves as serious or "hardcore" [64] gamers, which are individuals who take gaming seriously, they play full-fledged video games on computers or consoles and these games form a significant part of their daily lives [64]. On the other hand, casual gamers are people ranging from occasional game players to those who constantly play 'mini' games (e.g. Farmville, Tetris, Candy Crush and other game applications on mobile devices or social networks) [65]. Gamers typically access games on an assortment of mediums which commonly include: tablets, mobile devices, computers or consoles [17]. They, additionally, tend to be "proficient in the use and consumption of online technologies" [17]. As described by Llagostera [17], gamers are "both active and selective in their use of games". In addition, they form part of a system that subjects them to these games that are designed as "multi-layered machines that act [on their] desires and identit[ies] [as] gamers" [17].

3.2.2 Theories of Game Elements

Now that we have understood the concept of a 'gamer', there are several game theories that are useful to understand concerning game designs. The most important ones to keep in mind are game element theories. The way of using these theories varies between individuals, but, through a combination of game elements, they ultimately achieve an engaging and enjoyable game design. Subsequently, two of these game element theories and points of view will be described.

The Four Elements that Defined a Game

Nahl and James [36] explain McGonigal's four elements that are the "minimal elements that define a game". These four elements are [36]:

1. **Goal/Outcome:** this may be one or more objectives, outcomes or paths that can be taken towards the game's final goal. The players need to be able to visualize an objective, so that they will be directed throughout the game.
2. **Rules:** these are "limitations on how the outcome can be achieved" [36]. They may be at "macro and micro levels" [36] in order to guide the players through the right behaviours to achieve their goals.
3. **Feedback:** this can include anything from an indication of progress, "records of accomplishments" [36] and comments on their manner of achieving goals or how they are doing over all.
4. **Participation:** this should be voluntary since "creativity is encouraged through autonomy" [36]. Additionally, autonomy can set off their intrinsic motivation which makes the progression through the game rewarding.

Gamification corp.'s Game Mechanic Classification

Furthermore, game mechanics are more easily understood if categorized by type. Gamification Corporation does this by categorizing the game mechanics based on their functionality as follows [66]:

- **Behavioural:** these are mechanics that are aimed towards "human behavior and the human psyche" [66].

- **Feedback:** these again can include progress indicators or comments on behaviour, which then create feedback loops feeding back to affect the player's actions.
- **Progression:** these game mechanics are used as a way to "structure and stretch the accumulation of meaningful skills" [66].

Any number of these game element classification techniques can be used to ensure that the elements chosen for the gamified application design cover the whole spectrum of behaviours, serve the correct purpose and target all types of users.

3.2.3 Theories of Player Personalities and Needs

"People behave… [and] are motivated in different ways" [8]. Because of this, it is important to understand how players may use a gamified application. The remainder of this section will explore premises about player behaviour and personality types.

Bartle's Four Player Personality Types

The most popular theory of this sort is Richard Bartle's [67] four player personality types theory. Bartle identified the following four player types by "studying players of the multi-user dungeon (MUD) game" [67]:

1. **Explorers:** these players are driven by "find[ing] out as much as they can about the virtual world" [67]. This may include things such as exploring every corner of a map, finding "interesting feature[s] [such as] bugs" [67] and understanding how everything functions.
2. **Killers:** these are the players that obtain enjoyment from causing anxiety and "imposing themselves on others" [67]. This may include becoming powerful to wreak havoc or obtaining powerful weapons to attack other players with the goal of killing their characters.
3. **Socialisers:** these are communication and relationship driven players. They enjoy using communication tools provided by the game to engage in conversation with others. They are "interested in people and what they have to say" [67].

4. **Achievers:** these are goal-oriented players. Their game play is driven by goals that either explicitly stated by the game (e.g. levelling up or gathering points) or personally created (e.g. accumulating as much money or rare items as possible).

Out of a group of users it has been estimated that explorers compose 9% of the users, while killers represent 1%, socialisers are 80% and achievers compose the last 10% [24]. Each of these types of players are motivated and behave in different ways; thus, an effective gamification solution should accommodate elements that will be appealing to all player types [8].

Bartle's theory can help understand what attitudes may be dealt with when implementing a gamified strategy. Through these definitions one can identify game mechanics that better suite each of the various player types.

Yee's Five Motivational Factors

Nicholas Yee [68] devised an experiment based on Bartle's four player personality types in which he investigated what people desired from a game. He derived five motivational factors that play part in gamers' motivations for playing massive online role-playing games (MMORPGs) described below [68]:

1. **Relationships:** this is the motivation to interact with other player and form significant friendships. In this aspect players tend to have important conversations, are skilful at initiating relationships and use these relationships as emotion support.
2. **Immersion:** this is the desire to "become immersed in a make-believe construct" [68]. They enjoy wandering, investigating and role-playing in this fantasy world. Additionally, they take pleasure in interacting with other "role-players" [68] and are motivated by "being a part of an ongoing story" [68].
3. **Grief:** this is the desire for a player to explicitly or subtly "objectify and use other players for one's own gain" [68]. They may find motivation out of teasing, killing, manipulating or scamming other players.
4. **Achievement:** this is the motivation to score higher, become more powerful and obtain more rewards, gear or trophies than the rest of the players.

5. **Leadership:** this is a measure of the "gregariousness and assertiveness of the player" [68] and the motivation to be the leader of a group rather than playing solo or following.

These motivations are not solely for MMORPGs but they are also applicable to other game-like systems such as gamification. Through the incorporation of these principles a gamified system will induce larger amounts of user engagement.

McGonigal's Four Game Experiences

Lastly, Jane McGonigal describes four attitudes players experience in a game of any sort which a gamification system should aim to achieve [36]. If a gamified application achieves these four experiences it demonstrates its ability to "tap [into] a [user's] personal drive to mastery and to voluntary accomplish goals with others" [36]. These four powerful experiences include [36]:

1. **"Urgent optimism":** this describes the user's motivation to actively search to engage in the next level or activity.
2. **"Blissful Productivity":** this is the user's capability to "persevere in the face of [a] challenge" [36]. This can be achieved through game mechanics, such as feedback, to motivate the user to persist.
3. **"Social Fabric":** this describes the user's sense of belonging to the society of players or the game environment. This includes contributing to the community, sharing work and progress and working in a team.
4. **"Sense of Epic Meaning":** this describes the user's motivation to "work toward purposes larger than the self" [36]. This enables "commitment and cooperation" [36] of players within the game.

3.2.4 Gamification as a Persuasive Technology

According to Fogg [69] a persuasive technology is defined as "an interactive product designed to change attitudes or behaviours or both by making a desired outcome easier to achieve". Additionally, he identified seven common elements contained in persuasive technologies. These are: conditioning, reduction, self-monitoring, suggestion, surveillance,

tailoring and tunnelling [69]. Of those characteristics, the ones of greatest relevance to gamification as a persuasive tool are: tunnelling, tailoring, conditioning, surveillance and self-monitoring [17], which are defined as follows [70]:

- **Tunnelling:** the strategy of taking the users "through a predetermined sequence of events" [70] which will persuade them to follow the determined behaviour [71].
- **Surveillance:** when one party monitors the data and behaviours of the users allowing them to modify these behaviours towards a target behaviour.
- **Conditioning:** the use of "operant conditioning [principles], such as reinforcement and shaping" [70] to alter the user's attitude and reinforce a given behaviour.
- **Tailoring:** the technique that encourages a change in behaviour by providing personal, significant information or feedback.
- **Self-monitoring:** the ability for the users to examine themselves and their own behavioural data in order to modify their attitude towards their goal behaviour.

Llagostera [17] believes that tunnelling is essential in a gamified application since these applications "often operate through very specific courses of action in their connection to the non-game activity being gamified". This means that in order for a gamified application to succeed in altering a behaviour the users have to rigorously follow these step-by-step "milestones set by [the system]" [17].

Secondly, gamification uses surveillance as the means for the administrators to ensure the users are following the correct behaviour and the system is allowing them to do so successfully [17]. The administrators can do this by examining the user performance data provided by the gamified system, which allows them to visualize whether or not the users are engaged and following the correct behaviours.

Thirdly, conditioning can be used in a gamified strategy. As explored in the previous section, psychology theories such as classical conditioning can be used to reinforce a behaviour with elements such as rewards. Gamification can make use of this reinforcement technique to motivate the users to engage in the targeted behaviour [17].

Lastly, tailoring and self-monitoring go hand in hand in a gamified strategy. Tailoring allows for users to view their personal data or statistics. Similarly, self-monitoring lets the users process that personalized data in order to modify their behaviours and achieve better results. These two strategies can be used in gamification with a feedback mechanism, such a leader board, where the users are able monitor their information in comparison to the rest of

the users. This enables them to see how well they are doing within the user group. Additionally, according to Khaled et al. [71] "studies have shown that people tend to pay more attention to information they believe is customized".

In synthesis, through the combination of these various elements, gamification has an extensive capacity as a persuasive technological tool [17]. Through many of these game theories, mechanics and persuasive tools a gamified system can easily foster behavioural change in players.

3.2.5 Game Activity Cycles

When designing the elements that will be included in the gamified system, one must make sure that the application creates activity cycles to keep the stream of motivation going [5]. Any game, works to engage users and push them to progress throughout the game with a series of "loops and branching trees" [72, p. 94]. Even though some features in games, like levels, may seem linear paths, game progression is not linear [72]. All game-like applications should be designed bearing in mind these cycles, since they are the essence of the game [72]. The main idea of these cycles is that actions performed by the users cause events to occur and, as a consequence, those events incite new user behaviours.

Apart from the feedback loop that was explained earlier there are two different cycles that should be incorporated or developed in a gamified design: "engagement loops" [72, p. 94] and "progression stairs" [72, p. 95]. Engagement loops illustrate "what your players do, why they do it, and what the system does in response" [72, p. 94]. It describes the sequence of events after each action has been performed at the "micro level" [72, p. 94] of a gamified system. Figure 3.3 depicts the engagement loop and its generic components. The engagement loop starts off with a user building up motivation and, as a consequence, the user performs a behaviour or action [72]. This action provokes a response from the system, such as, rewarding points/badges or providing feedback [72]. These responses increase the user's motivation which then pushes him or her to act again [72]. As can be seen from the figure, engagement loops can be used to describe any game behaviour and system response.

Although engagement loops are essential to game-like applications, they do not illustrate progression. If used alone, with no inclusion of game advancement, it would mean that the game experience is exactly the same every day, which will eventually cause boredom

[72]. This is why we need a representation of progression to go along with our engagement cycle [72]; these are called "progression stairs" [72, p. 96].

Figure 3.3: Engagement Cycle (Source: [72, p. 96])

Progression stairs, depicted in Figure 3.4, describes the user's transition from the moment they join the system through to the end of the game or their last contribution. In other words, it represents the "macro perspective on the player's journey" [72, p. 94]. The main concept of these stairs is to give an overview of how the players' experiences are modified by a gradual escalation of difficulty [72]. The progression stairs help "map out" [72, p. 96] and design the short-term (quests, challenges and missions) and long-term objectives that will occur during the users voyage [72].

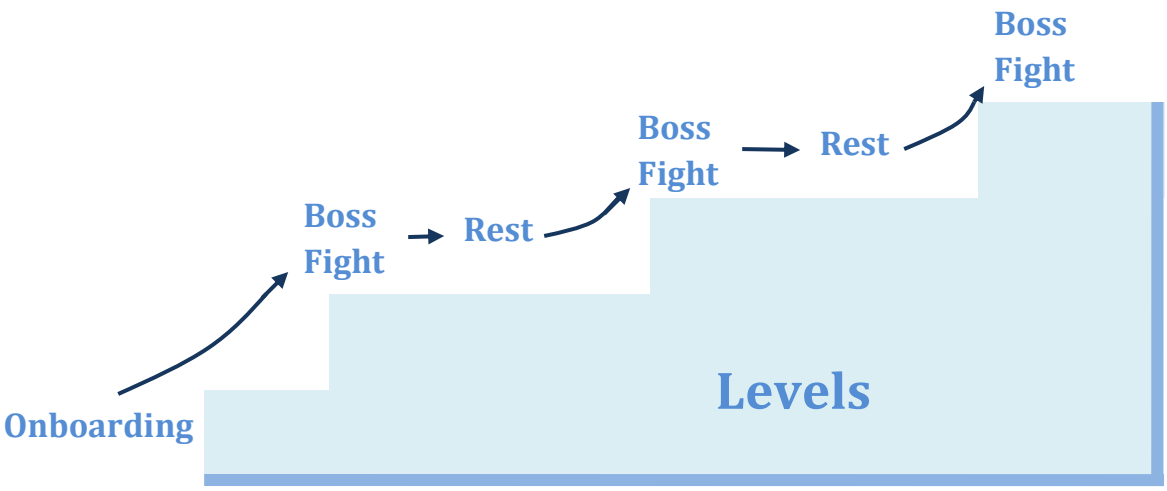

Figure 3.4: Progression Steps (Source: [72, p. 97])

From Figure 3.4 one can see that the initial step to this progress is "onboarding" [72, p. 96], which is the process of spreading awareness of the gamified application and bringing the users to begin using it. In order to retain these users at the start, the commencement of the game should be simple, informative and should guide the users to understand the basic functionality of the application. When the users are on board and understand how to navigate the application, is when the short progression cycles commence, each increasing in difficulty "at variable rates" [72, p. 96]. The 'rest' period or plateau that is seen in the figure at the commencement of each cycle, is included to let the users to "catch their breath" [72, p. 97] after the sudden increase in difficulty. Additionally, this plateau allows the players to "experience the satisfaction of master[y]" [72, p. 97] and giving them time to put the new skills to use [72]. During these rest periods the difficulty increases gradually and subtly, but at the end of these rest periods (i.e. the end of the current level) there is a "final challenge" [72, p. 97], also commonly known as "the boss fight" [72, p. 97] in video games. These are the greatest challenges for every level and require a larger amount of effort to complete it compared to regular missions [72]. However, when completed, these ultimate challenges provide much greater satisfaction and motivation [72]. This completes the end of the cycle or level, and at this point the user continues on to the next rank where the cycle commences again with a higher level of complexity.

3.3 Conclusion about the Sciences

Gamification will not work if it merely "blindly" [54] delivering points and badges to the user since "people [will] get tired and bored rather quickly" [54]. In order for a gamified solution to succeed one has to understand what makes the users tick. It must adapt to the engagement level and skill sets of the users to create an encouraging application. The theories examined help understand human behaviour as an individual and as a gamer. This makes it easier to know what to incorporate in a gamified application to engage the users from all angles. Hence, it is the combination of the psychological and game theories that makes for a successful Gamification approach.

Chapter 4: Applications of Gamification

This chapter is composed of an extensive review of literature and descriptions of cases where gamification has been seen to be applied to a wide variety of industries. The applicability of gamification is extensive as it can be used in businesses to induce innovation, increase performance and engage customers or employees, and at the same time it can be applied in professional training and educational motivation ([12], [7]). Gamification can even be used to alter motivation in one's personal life, profession or helping the environment ([12], [8], [6]). Gamification can be effectively applied to virtually "any application, task, process or context" [1] because of game elements [7]. The areas that are explored in this section include: education, personal life, government, telecommunications, airlines, location-based services, software testing and other businesses.

4.1 Education

Gamification helps motivate individuals in areas of education where engagement is lacking. Gamification has been suggested by many researchers as a great tool for teaching since it will not only motivate students to learn but also make learning more enjoyable for them [11]. Through game-like applications students will be able to have fun while at the same time learning new material, sometimes even without them realizing it. Additionally, students prefer to play educational games instead of sitting in a classroom listening to a dry lecture. Lee and Hammer [26] realized that schools and universities all around the world faced an extreme motivational and engagement problems. The American educational system alone has an incredibly elevated student dropout rate, where about 1.2 million high school students do not manage to graduate every year [26]. Lee and Hammer [26] suggested including game elements into classroom teaching as a possible solution to this problem, since this would theoretically engage students into caring about their education and improve their learning. This section will describe two cases where gamification was applied to an e-learning system in the first case and to university courses in the second case.

4.1.1 Gamified E-Learning

From an educational perspective, e-learning faces one great challenge: the lack of emotional and motivational transmission from teacher to student due to its digital format and lack of face-to-face teaching [1]. Converting traditional learning techniques into online applications becomes a limitation in terms of student stimulation [1]. This lack of teacher-student interaction must be compensated by motivating students through other elements and techniques of online learning [1]. Muntean [1] suggested that a gamified approach would be an effective solution to this problem, especially since an e-learning's linearly designed course structure makes gamifying it simpler. However, Muntean also suggested that gamifying e-learning courses poses the risk that "if the gamification design does not suit the purpose … [it might] teach students that they should learn only when provided by an extrinsic motivation" [1].

Muntean's theoretical ideas were based on applying game elements and concepts of Fogg's behavior model (described in Chapter 3, section 3.2.1) to e-learning environments [1]. She believed that, in order for learning to be effective, students must be motivated, capable and triggered all at the same time. Through the combination of these three concepts occurring simultaneously, a student will reach the activation threshold enabling him or her to "read, learn and solve" [1]. This state, known as flow, implies ultimate concentration. It is in this state that a student's interactions are most successful and when "actual learning takes place" [1].

Muntean [1] suggested several basic concepts that should be used when gamifying an e-learning system. The main idea is to "uncover content progressively" while still including an element of anticipation [1]. Additionally, the system should emphasize the correct completion of the exercises by offering rewards and, at the same time, presenting students with the means to gain the ability to solve those problems [1]. Finally, the environment should offer constant feedback and be social in order to create a classroom community sensation to the best of its abilities [1]. Below is a list of Muntean's specific examples of game-like actions that could be incorporated into a gamified e-learning application [1]:

- **Personalization:** Students should have an account or profile on the application that they are able to personalize. This may include incorporating avatars or features that allow their personal information and preferences to be edited and displayed publically. In addition, in order to foster social interactions and classroom community sensations

students should be allowed to form part of online student groups where they can chat with colleagues, post comments, and be notified on activities, new and updates.

- **Course structure**: classes should be split into chapters based on content and difficulty. The content could offer links to extra helpful information such as images and other explanations. Additionally, all new content or sections should be concluded with exercises and assessments by which students can receive points after completing them. At the conclusion of each chapter, students climb up to a higher level as a way to demonstrate their accomplishments. This will, in turn, affect their status positively. Game mechanics such as leader boards can also be used to display the student's position relative to their peers along with a display of top scores.
- **Feedback and progress:** students should be offered constant feedback along with a display of their progress in the course. For this one could use game elements such as a progress bars to display the current state of their learning development. By showing them feedback, the students will be able to see what they are doing correctly and how they should adjust their performance to obtain better results.
- **Keep them coming back:** Retention is key to e-learning environments. Muntean suggested that the ability to schedule regular meetings (whether face-to-face or online) and deadlines would be a great tool to keep the students returning on a regular basis to the application.
- **Anticipation:** as students move along their course they should learn about the next few tasks they will be faced with in order to know what to expect. As Muntean describes it, "anticipation is a strong motivator which can get users excited and engaged for a longer period of time and maintain the flow of learning" [1].
- **Achievement Rewards:** In order to motivate students they should be compensated for "academic achievement, … proper behavior and social engagement" [1]. This can be achieved by giving points or badges for behaviours such as making significant contributions to the class or aiding colleagues.
- **Bonuses and Exceptional Rewards:** Exceptional rewards should be given for completing challenging, extraordinary or optional tasks, in order to incentivize outstanding behaviours.
- **Exchange of Points for Goods:** Students should be allowed to cash in the points they have obtained for virtual items or discounts on physical goods or fees. This will ensure

incentives for students to actively participate and complete exercises that will give them points so that they will be able to benefit from these exchanges.

Muntean [1] states that in her future work she hopes to apply these theories to e-learning environments to engage students into studying and participating in the e-learning systems. By increasing student participation in e-learning application, Muntean expects an increase in results, speed of learning and performances on assessments and exercises [1]. Gamification should not replace the students' innate intrinsic motivations but provide a mixture of both intrinsic and extrinsic values to create a positive behaviour towards e-learning [1].

4.1.2 Gamification in University Courses

University students now-a-days have the problem of becoming autonomous and motivated learners [36]. In university courses, "engagement remains elusive and inconsistent" [36] even though professors attempt to develop new teaching content and methods to incite student motivation [36]. On the other hand, games manage to consistently motivate players through intrinsic rewards which are results that universities have longed to achieve. We are standing in the middle of a "cultural and behavioral shift" [36] because of technology use and literacy [36]. So for these reasons, universities have recently begun to introduce gaming concepts into courses' syllabi due to "their promise of enabling continuous engagement to enhance learning" [36]. This strategy involves skill learning as a way to increase cooperation, involvement, material retention and efficiency [36].

Nahl and James [36] experimented with the application of game elements into university courses. They incorporated four video game elements and skills into eight university courses (both undergraduate and graduate) over a four years period (from 2008 until 2012). The participants were over 600 university students that took any of the courses involved in the experiment [36]. A variety of coursework was integrated in every course, of which included: "teamwork, choice of activity and team members, role-play, threaded discussion, and live presentations" [36]. Additionally, course designs were aimed at motivating the students to want to obtain the skills or knowledge provided [36]. The courses also included the possibility for optional participation which allowed students to become independent and imaginative [36].

The theories used in the design of these courses included McGonigal's four game experiences (described in chapter 3.2.3). These four player powerful experiences are: urgent optimism, blissful productivity, social fabric and a sense of epic meaning. Course activities were design to fit into each of these categories to provide a fully immersive game-like experience for learning. Urgent optimism was present during team building and collaboration activities when students had to; for instance, arrange exhibitions, lab work or activities [36]. Blissful productivity forced students to consistently learn to overcome obstacles, release stress and adjust to the ever-changing environment [36]. Students experienced blissful productivity when they had to persist through challenges, achieved their objectives by conquering problems and accepting professor or colleague feedback to prevail [36]. To encourage social fabric, or in other words "[a] sense of belonging" [36], the university provided tools such as social networks and online communities that fostered social interactions [36]. Additionally, students were obliged to take part in team projects and collaborations, which pushed them to individually provide substance for the benefit of the larger group [36]. Lastly, students experienced a sense of epic meaning when they realized that, through their actions, they can "contribut[e] to others, to causes, to shared goals" [36]. This motivates them to participate "for the greater good [of the community]" [36]. These four elements were made to strike voluntary motivation and "a personal drive to mastery" [36].

In response to feedback from students and by analyzing their coursework (e.g. "self-reports, lab reports, chat logs, and threaded discussions" [36]), the designers were able to measure the effectiveness of the game elements in the learning process and develop the courses over the four years [36]. Results of assignment and feedback evaluation showed positive responses to the incorporation of game elements into the curricula [36]. In addition, it was seen that student social relations had a noteworthy increase after the addition of gamified strategies. Ultimately, Nahl and James [36], intend to continue evolving these gamified designs in the future courses with the goal of improving student motivation even more.

4.2 Personal life

Gamification can allow individuals to improve many aspects of their daily lives, which includes: work principles, lifestyle habits and even changing from sedentary lives to more physically active and healthier lifestyle. This next section will describe in detail three examples

of how an individual's daily life can be affected by gamification even with minimal use of technology.

4.2.1 Gamified Google Interview Preparation

Jon Guerrera [73] blogged about his personal experience with using gamification as a motivational strategy to prepare for a job interview with Google. In his blog he stated being a big fan of gamification strategies and said to have used it in several other personal and work-related project that require large "bursts of motivation that one might've had trouble finding otherwise" [73]. When the opportunity of an interview with Google presented itself to him he felt panicky and overwhelmed from all that he had to prepare in so little time. Because of this Guerrera decided to design an efficient gamified strategy with minimal technology to obtain his dream of working for Google. To this day he confidently believes that gamification was one of the keys for him obtaining this job. The gamified system he created "hit every motivational trigger" [73] which kept him preparing all night long resulting in him being perfectly prepared for the interview [73].

The key component to his system was a "tracking dashboard" [73]. This tracking system is displayed in Figure 4.1., which is a photograph that Guerrera posted on his blog of the exact system he used during his interview preparation. As show in the figure, the tracking dashboard contains several post-it notes each containing different elements of the gamified system, which include [73]:

- **Milestone rewards and Streak Bonuses:** these are contained in the first post it (starting from the left). On this post-it, Guerrera wrote three different milestones and, at the bottom, a streak bonus. In parenthesis, next to each milestone and streak bonus, Guerrera documented the corresponding reward for each milestone (the larger the milestone the greater the value of the reward). These milestones were reached by dedicating a certain amount of hours to the interview preparation, while the bonus consisted of preparing for 10 days in a row. These continuous rewards and short term goals work as motivation to maintain the momentum.
- **Tracking:** the middle post-it contained documentation about tracking. At the start of every practice session he would start a stopwatch. At the conclusion of his study session he would end the stopwatch and document the time spent on the post-it. At the

same time, he would keep track of how many days in a row he had dedicated time to studying. If this number ever reached 10 he would be able to unlock the special streak bonus mentioned previously.

- **Variable rewards:** the structure of his variable reward technique can be seen on the final post-it (in the far right). Variable rewards, similar to concepts explained in Chapter 3 (Section 3.1.2), are rewards given after an unpredictable outcome. In this case, after every additional hour Guerrera spent on his preparation he was allowed to flip two coins. If both of these coins landed on heads he was able to reward himself with an energy drink, which is a "guilty pleasure" [73] of his. At first he underestimated the effect of this type of reward but, just like the effects of gambling, it motivated him to want to spend extra hours on his preparation just so he enjoy the "thrill of playing the odds to win something" [73]. It is something he eventually looked forward to after hours of preparing.

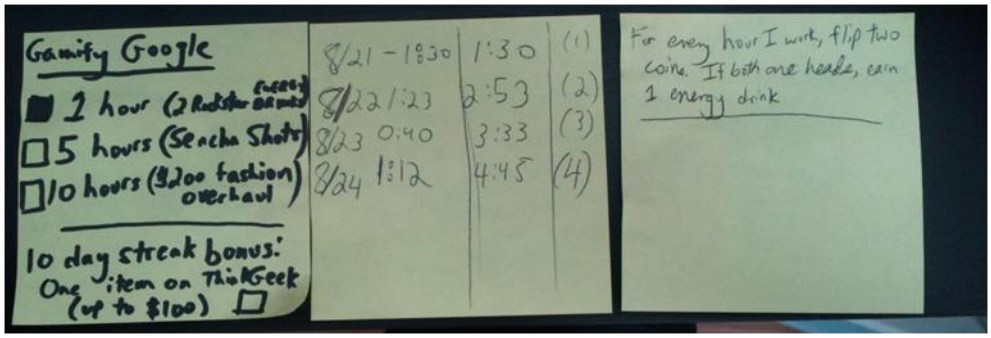

Figure 4.1: A Picture of Guerrera's Tracking Dashboard (Source: [73])

After testing the initial effectiveness of his gamified system and reaching 16 hours of interview preparation in less than a week, Guerrera began to grow tired. Thus, he decided to make alteration to the strategy and add another feature to increase the intensity and keep him motivated. So he added a progress bar to his system (alteration is show in Figure 4.2). He personally described himself to be "incredibly susceptible" [73] and "bugged to death by incomplete progress bar[s]" [73]. Since he knew that progress bar worked as a great motivator for him personally, he included it in his design so that after every batch of interview questions was practiced at least 5 times he would be able to fill in another piece of the progress bar until it was completed. At the same time he was focused on completing the progress bar, he was also completing the rest of his milestones and bonuses.

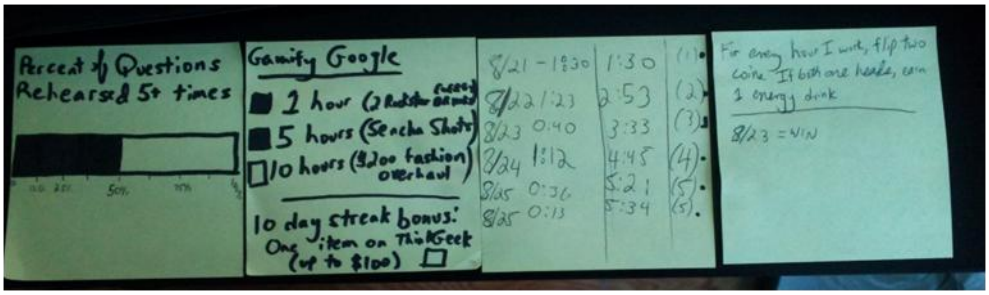

Figure 4.2: A Picture of Guerrera's Altered Tracking Dashboard (Source: [73])

In the end his gamified strategy allow for his successful preparation, outstanding performance in the interview (regardless of his nerves) and obtaining his dream job. Gamification, as Guerrera stated, "makes channeling every ounce of motivation you've got stored inside you much easier" [73]. Gamification aided him in improving his work ethic and seizing a once in a life time opportunity [73].

4.2.2 Gamification for Chores

Blogger Alexander Kalamaroff [28] designed a gamified system with the goal of incentivizing himself to perform chores and tasks that he found tedious. This system worked by filling his life with incentives through "a daily exchange of productivity and reward" [28]. Kalamaroff mentioned that gamification does not work for everybody; however, gamification allowed him to rise above those moments of uncontrollable procrastination, which other strategies that he previously attempted (e.g. to-do lists and self-help books) failed at. His strategy consisted of a three-coloured point system where he: gained points by completing non-desirable tasks, accumulated points and exchanged his points for enjoyable. These three coloured categories included [28]:

- **Red points:** are obtained by performing "general health and life" [28] tasks. For example, 1 red point was obtained per hour at the gym and 15 red points for cleaning the bathroom.
- **Blue points:** are obtained through "tedious obligations" [28] such as calling his aunt which would merit 1 blue point.
- **Green points:** these are obtained through "job-related responsibilities" [28].

Nevertheless, performing pleasurable tasks cost points [28]. As an example, a draft beer costs Kalamaroff a total of 3 red points, meaning he would have to go to the gym for three hours or any other activities that will allow him to obtain 3 red points [28]. Thus, through this system Kalamaroff pushes himself to perform tasks that are unpleasant (but necessary) in order to perform enjoyable ones [28].

Kalamaroff [28] gamified his life through a serious of steps which he describes in his blog. These steps include the following [28]:

1. **Identifying Tasks:** identify and document the tasks that you enjoy or do not enjoy doing.
2. **Create Point-Value System:** assign point values to the tasks identified in step 1. Kalamaroff chose to create a 3-colored category point system and then assigned each task with the number of points it merits based on the degree of unpleasantness. Additionally, he changed up the traditional point system with some tasks to make it more creative. For instance, he did this with the task of taking short showers. He gave this task a value of 8 red points minus the number of minutes he spent in the shower. Consequently, the longer he took in the shower, the less points he would earn. Additionally, if he took more than 8 minutes he would begin to lose points.
3. **Create Reward Prices:** based on the point system, assign reward values to the enjoyable tasks such as buying clothes, having a beer and eating at a restaurant. These values will be the cost of performing the enjoyable tasks and they will be deducted from the total points that have been earned through the performance of unpleasant tasks.
4. **Tracking Progress:** everything that is performed must be tracked on paper, a spreadsheet or other. This will enable the player to view how the process is going and if the gamified system is effective in reaching the ultimate goals. This essentially acts as feedback.
5. **Alteration from Observations:** the point value system may be modified if necessary in order to create a more effective result. This may include adding tasks that had been forgotten, or increasing the point value of an extremely unpleasant chore. As Kalamaroff [28] states, "the key is having a practical balance between the psychological effort required to do a task and the resultant incentive" [28].
6. **Set up Milestone Prizes:** setting up larger prizes for reaching weekly or monthly milestones allows for more effective goal completion. These are long-term points that

ensure the person remains motivated. Even though the main part of Kalamaroff's system was at a daily level, his goal was to eventually develop durable habits. These long term goals and milestones (e.g. "exercising at least 3 times a week for 3 months" [28]) receive larger rewards in order to keep the behaviour going.

The ultimate goal of this gamified lifestyle is for these daily behaviours "to be ingrained and to only pursue important benchmark goals" [28]. Thus, as can be seen an effective gamified system can be achieved through minimal use of technology and can help in creating durable, positive behaviours in everyday lifestyle.

4.2.3 Motivation for Physical Activity

Millions of individuals now-a-days live sedentary lives and in the last decade there has been a drastic increase in world-wide obesity [74]. It is because of these facts that researchers and well known sports brands world-wide are putting effort into creating new strategies to motivate individuals to increase physical activity in their daily lives [74]. Because of the ubiquity of technology, persuasive tools like gamification are excellent candidates as solutions to this problem [74]. 'Everywhere Race!' is one of many new applications that have been created with the purpose of engaging individuals to improve their physical activity customs [74]. It is a game-like smart phone application that allows users to compete with each other in real-time races of a variety of "speed-based sports" [74]. The users can be anywhere in the world and can run anywhere that they desire while the phone tracks the movement, distance and speed of the runner.

The application works just like a real-life race with added social advantages enabled by social networks and smart phone devices [74]. Users can challenge people all over the world but for that they must first choose a race to be part of [74]. The user can: create a new race and invite friends, chose to join an already existing race or check what races friends are going to participate in and join them [74].

Once the users have chosen a race they must wait for the scheduled start time and shortly before the race a countdown will start [74]. This ensures that all runners begin the race that the same time no matter where in the world they may be [74]. The users may choose to run wherever they desire most [74]. Additionally, the application documents the user's race data and displays: the distance covered, average speed, current position in the race [74]. At any

moment in the race the user is able to see the opponents' data, namely, the opponent's position in the race and the distance from the user [74]. At the conclusion of the race the arriving positions of the runners are displayed in a final classification along with the times and speeds, just like in a real race [74].

Research in the area of game element application to real-world problems, has shown that a sport-targeted applications that leverages interactions between fun and social atmospheres will be successful in encouraging sport and increased physical activity in those individuals who often resist it [74]. By testing the effectiveness of the application, the authors Mulas, Pilloni and Carta [74] proved that the key features that contributed to its efficacy were its "fun and social-oriented design" [74]. Through these features they were able to "exploit the complex social dynamics that has been prove[n] to be very important and effective for people engagement, especially in sports" [74]. Overall, their results demonstrated that there was an increase in individuals (who previously led sedentary lives) that got motivated to improve their physical activity [74].

With applications such as 'Everywhere Race!' and other similar ones, Mulas et al. [74] were able to examine the effects of games in "motivational, physical and social factors" [74]. They identified four key features that are believed to aid the effectiveness of such types of application. These features include [74]:

- **Accurate Measurements:** users always wish for measurements of their activities and achievements. Additionally, they wish for these measurements to be as accurate and immediate as possible.
- **Statistical Reports:** the users want to be able to obtain "long-term statistical reports" [74] to be able to use them as feedback to adjust and improve their performance.
- **Social Interactions:** users need powerful social atmospheres and interactions as personal support in their activities.
- **Take into account lifestyle habits:** applications are most effective when they are able to be personalized and are compatible with the individuals' lifestyle behaviours. The application must be able to fit their needs and personal agendas.

Consequently, all efficient work-out/sport applications have three features in common: tracking data from exercise sessions, display statistics of exercises and share the outcomes with colleagues on social networking sites [74].

4.3 Government

James Gardner, former chief of technology officer at the United Kingdom Department of Work and Pensions, found himself in need for a new strategy to instigate public and employee innovation for government process improvement [30]. With the help of Spigit (a company targeted at creating "innovation management solutions" [30]), Gardner created a government gamified platform in 2007 [30]. Through this application and crowd-sourcing initiatives, the public and employees were encouraged to submit innovative ideas for saving money [30]. The participants gained points for "posting comments and help[ing] execute change" [30], and could be rewarded greatly (such as promotions) for outstanding ideas [30]. This resulted in an innovative business processes that allowed the government to save around $41 million in less than 9 months [30]. Gardner explained that the reason for the successful submission and execution of innovative idea that allowed them to save money was due to the employees playing and finding motivation through game elements [30]. He described this phenomenon as "a group of busy individuals wholly resistant to change that made change happen" [30].

4.4 Telecommunications

Very few cases exist of gamification being applied to the telecommunications industry [75]; yet it is believed that gamification is a strategy telecommunications could benefit greatly from. Telecommunication is an industry which thrives from customer relationships and satisfaction because, when a customer chooses a provider, they are expected to enter into a "long-term relationship" [76]. Additionally, it is costly to switch between providers for the customer and the provider [76].This is why provider must focus on investing time and resources on improving customer satisfaction and fidelity rather than on costly marketing [76]. For these reasons telecommunication providers have a great need for gamification to aid them in increasing customer attraction and retention. The telecommunication industry would thrive with the customer loyalty and engagement that gamification strategies can provide.

An example of a telecommunications provider using a gamified strategy is GiffGaff, the British telecommunications company [75]. In GiffGaff customers are able to give support to other GiffGaff users, and based on their degree of customer support or participation in the community they are ranked and compete for the title of 'community leaders' [75]. Customers

are rewarded for these behaviours with free minutes among other things [75]. This also reduces the cost for the providers since they have to rely less on professional customer support and can rely more on the community supporting each other [75]. Additionally, those customers that are ranked as a community leader are able to "moderate discussions[,]support requests" [75] and are invited to meet with the CEO once a year [75]. This creates competition and constructive social pressures among the customers motivating them to participate and provide to the GiffGaff community.

4.5 Airlines

For a very long time, airlines have been using gamification-like behaviours for customer attraction, retention and satisfaction. Airlines are "the ultimate example of gamification" [77]. They have understood the human need for status and achievement and they have used that to their advantage [75]. The large majority of airlines have loyalty programs that use combinations of game mechanics, with the most popular ones being: status levels, progress bars, goal pursuit, rewards and recognition [78]. Customers seek to reach the highest ranked status, and they will fly as many miles as they can to try and collect as many points possible [77]. Airlines know it is not just the benefits these statuses come with but it is the innate need for recognition, competition and winning that drives these loyalty behaviours [77].

An example of a gamified loyalty program is the mobile application for American Airlines. As is displayed in Figure 4.3, the American airlines application visually displays to the customer its points, miles flown and segments, along with how many of each are needed for the next "elite status qualification" [79]. These simple game mechanics, like progress bars, status levels and goal pursuit, that American Airlines uses are very effective in gamified applications to strike competition and instigate the need to reach the next level. This is just one example of the vast amount of airlines that use gamification.

Figure 4.3: Screen Shot of American Airlines Mobile Phone Application (Source: [79])

4.6 Location-Based Services

Location-based services (LBS) make use of geographical location to provide the user with information, entertainment or other [80]. Some of these services may include users publicizing their current locations, looking up information of places or establishments among other activities. The purpose of these services is to understand which locations users do or do not desire to broadcast and why. Theories state that locations have "social value" [11] and this value is correlated with users' willingness to broadcast their presence there [11]. Thus, through analysis of LBS data, researchers can begin to discover "what determines a location's social value and how do we measure this value" [11]. Therefore, even though users participate in these services with the intention of having fun or obtaining valuable information, the cost of using these applications includes delivering personal details and location information to the

public [11]. This is a cost many users may not be willing to pay [11]. On the other hand, businesses and the research community can greatly benefit from the vast amount of social, positional and personal user generated data [11]. Because of this LBS found a need to incentivize users to participate and contribute to the data collection [11].

The question is: how are users more likely to share private information? By examining mobile application, some LBS have found that the solution is to "turn data collection into a game" [11] and some began using gamification to integrate game elements into their services [11]. The goal of using gamification in LBS is to incite users to be more likely to actively participate and volunteer their location information [11].

As mentioned previously, large organizations could benefit from information about their customers' location trends [11]. For example, Starbucks, who join in on one of these services, would reward customers with the largest amount of "check-ins" [11] at their sites [11]. This allowed for location-based services to be used as "commercially driven gamification" [11]. Additionally, many researchers have a lot to gain from an increase in user contribution in LBS. By the users publically generating location information through the application game, researchers are able to study specific travelling and location trend behaviours in the community [11].

Furthermore, the ubiquity of mobile devices also serves as an engagement and data collection method for Location-Based Services [11]. A large amount of LBS have already adopted the use of mobile devices with principles of social interactions to create "a new form of social networking" [11]. Through the combination of these with gamification LBS can create a large incentive for users to participate.

As LBS begin to adopt these mobile and gamification strategies, results begin to show that a growing amount of users are increasingly contributing personal, location and social information [11]. This demonstrated that using these strategies invoke users to be keen in sacrificing "certain levels of privacy that they would otherwise not" [11].

Some examples of LBS applications that use gamification strategies for location specific information sharing are "social location sharing applications" [11], such as Gowalla, Scvngr and, the most popular one, Foursquare [11]. These applications invite users to 'check-in' to their favourite or current locations from their mobile devices to obtain points, badges and, eventually, special acknowledgment and awards for the most 'check-ins' [11]. This creates friendly competition between players which in turn increases motivation to participate [11].

As stated previously, Foursquare, the best know "location-based game-like service [application]" [6], allows users to check-in to their locations to gain points, badges and rewards ([11], [6], [19]). The application uses game elements such as leader boards, point systems and status levels (e.g. "being the mayor" [25] of a location if he or she is the one that checks-in most often) to motivate users to return to previously visited venues (e.g. coffee houses, restaurants, bars/pubs) to gain more points. This improves the users' loyalty to these venues and increase competition between their loyal customers ([25], [6]). Some of these virtual rewards, points and status levels can be exchanged for physical gifts [6]. Starbucks, "the world's biggest coffee chain" [13], in collaboration with Foursquare offers a fun tool to encourage their customers to buy more products and visit their venues frequently by check-in on their mobile devices [13]. Customers can also complete missions, for example, they can check-in to 5 distinct Starbucks locations in order to obtain special rewards, badges or points [13]. Through these relatively simple game elements and strategies, Foursquare has been able to incentivize around 30 million users (as of January 2013) to participate in the application [81].

4.7 Software Testing

With this tremendous shift in culture because of the predominance of technology, software has become intertwined and indispensable in our daily lives [82]. These shifting times also bring along innovative technologies, which carry with them inevitable failures [82]. With the large role these technologies play in our lives, comes "an even greater opportunity for them to cause harm" [82]. Therefore, good quality and accurate testing is essential to discover and fix many of these errors [82].

On the other hand, no matter how important software testing may be it is very challenging to involve people in testing [9]. When it comes to testing phases, developers can react in several ways. One of these ways is for developers to relay the tedious testing tasks to automated tools, other developers or third-party organizations [82]. This weakens the quality of the testing and "threatens the value of the product" [82] because these individuals that perform the testing do not care or know as much about the product as its developers do [82]. The second possible scenario is for the developers to be obliged or chose to perform the testing themselves. In this case, if the developer is unwilling or displays low enthusiasm it could cause

more harm than good as errors could be over looked through careless testing and lack of motivation.

Because of these reasons, there is a strong need for a strategy to provoke the developers' motivation towards software testing. Jonathan Kohl ([9], [82]), technical consultant, asked himself "why can't effective testing be fun?" [9] and, thus, he decided to attempt to incorporate gamification into software testing practices. Kohl, along with his Aaron West, created a "Session-Based testing" [9] tool to aid testers [9]. This tool incorporated game-like elements in order to increase the testers' enjoyment and engagement in the process ([82], [9]). Gamification provided the tool with a method for "a structured analysis" [82] of the testing being completed. It provided enjoyable ways of testing and added a new perspective to the testing process [9]. This is advantageous since, with regularly used testing perspectives errors and mistakes are easily overlooked, while fresh perspectives can "highlight observations that might otherwise missed" [82].

The following are descriptions of the "game-like concepts" [82] that were used by Kohl in his testing tool, along with some suggestions for improvement [9]:

1. **Guidelines and behaviours (goals, rules and context):** the tool guides the testers through the basic processes of session-based testing. It serves also as a learning tool for those with little or no previous experiences with this type of testing. The tool enforced minimum specific information to be filled in a sheet for each session; thus, giving the testers an idea of the behaviours they should perform and what information is important to extract, but at the same time the tool values the testers ability to "modify and adapt" [9]. For improving the tool Kohl suggested that instead of creating it for testers to adapt the tool to their specific styles, they should have begun the tool with an emphasis on uniformity and enforcement of universal rules of session testing. It was also suggested that it should only be after those rules where established that the testers would be allowed to adapt and modify the tool to their styles.
2. **Strategies and tasks:** some items in the tool (e.g. cheat sheets) were provided to help testers reflect and develop strategies to aid their creation of ideas for tests. One of the most popular tools was the "Prime Me! Button" [9] which when pressed it would give suggestions allowing testers to end creative blocks and help them come up with new test ideas.

3. **Risks and Rewards:** Kohl incorporated risks to not having a productive or adequate testing session as a motivator by creating a game of 'beating the clock'. To do this the tool included a timer for each session which resulted as an effective motivator since the tester risked not finishing the session in time. The testers were forced to be focused, productive and time efficient. Furthermore, rewards consisted of finishing the sessions, completing them with good enough quality to share it proudly with colleagues. As Kohl mentioned, when time has run out, seeing a complete progress bar sparks the testers' "reward of completion" [9]. However, all of these rewards are primarily intrinsic. In addition, testers were also able to use the Prime Me! Button as a reward. Kohl admits that they could have incorporated more rewards for more specific behaviours (e.g. references from peers or rewards for superior quality testing).
4. **Skill and chance events:** The Prime Me! Button again served as an element of chance that testers reported as enjoyable and very useful in times of a creativity block. Testers that were very experienced or skilled at session-based testing were extremely proud of their variety of strategies and approaches for testing. Yet, these behaviours were not extrinsically rewarded by the tool and were only intrinsically rewarded as a sense of completion and strong pride. Kohl admits that the tool could have benefited from scoring session sheet (by evaluating quality, variety or amount of tags used and other characteristics). This would have enabled testers to understand the weakness of their sessions and how they can improve.
5. **Cheating and Compliance:** With this tool, cheating in session-based testing compared to other testing approaches was not as simple since sessions required testers to display descriptions of the tests they ran. Yet, there was no feature implemented for the tool to prevent testers from saving empty session sheets or other forms of cheating. It was suggested by Kohl that they could have implemented a feature that identifies blank or incomplete session sheets which will force the testers to do a complete job for each of the sessions they perform.

In the end, even though the use of the application was suspended after sometime, testers reported enjoying the process of testing much more with the use of the tool [9]. This tool created such engagement in the process that, as Kohl stated "sometimes, it [was] difficult to get the coders to code, the designers to design and the managers to manage, because everyone want[ed] to test" [9]. Kohl believes that using a gamified structure created a better tool that "provide[d] a more thorough structure" [9] because of the game-like elements such as

rules, goals and guided behaviour through rewards. Thus, a larger investment should be made into using game elements in software testing processes to make testing more appealing, enjoyable, imaginative and more productive [82].

4.8 Other Businesses

Businesses are the most common users of gamification. Theoretically, any area of business could be gamified to produce advantageous outcomes, especially those areas that would benefit from an improvement in user motivation ([12], [32]). Gamification is used in organizations "to solve organizational problems in attaining goals effectively through user engagement" [32]. A Gamified process could benefit: employees, customers and internal or external processes [32]. These benefits could be applied to departments such as: human resources (e.g. for "recruitment, training … performance evaluation and welfare activities" [32]), research/innovation, marketing (e.g. for market research, sales, product awareness, customer attraction and retention) and design of products or services [32]. Additionally, research shows that by the end of 2013, 60% of companies intend to incorporate gamification as a "health initiatives [solution] for employees" [32].

Overall, there are three main aims for business uses of gamification [12]. These are described as follows:

1. **Altering Behaviours:** this involves motivating the users to changing their attitudes and activities towards a desired behaviour. The users will become more inclined to alter their behaviour if the process of change is converted into a game. This gamification approach could be used for both employees and customers in the following ways:
    - *Customers:* this could improve marketing efforts by altering customer behaviours so that they will actively seek to "understand [the company's] products" [12], keep coming back and become a loyal customer. Ultimately, this would improve customer attraction and retention. This can work for both Business-to-Business (B2B) and Business-to-Customer (B2C) organizations, since their general business objective is "to pull together and engage a group of people with a common passion or interest, and then to 'activate' them to purchase" [13].

- *Employees:* through alteration of employee behaviour the company can improve their performance, engage them to regularly perform healthy or environmentally friendly behaviours and encourage them to accept "new business processes" [12].

2. **Skill development:** the outcome of this would be to increase user motivation for learning and adopting new skills which can be later applied to other beneficial activities or processes. This can be done in two ways. Firstly, "a game layer [can be built] on top of the lesson material" [12]. This means that, through game elements that foster participation, challenge and competition, the users will be to learn new skills or lessons. The second way is to transform "the lesson into a game" [12], meaning that the game provides users with the means to work on their newly acquired skills and obtain feedback on their performance. An example where gamification could be applied for the development of new skills is in corporate training. Corporate training is an area where employees lack motivation to participate since attending means losing valuable time from their work and in some case may even include "high travel expenses" [83]. Therefore, training courses must be "quick and easy" [83] to complete with no need for travelling so as to minimize employee loss. An example of this is Deloitte Digital, part of Deloitte that focuses on digital strategy consulting [84]. They created a gamified online "course portal" [83] which they gamified in order to increase employee participation. Through the completion of training courses, employees could: earn points and badges, be ranked on leader boards, and the top ranked would receive special rewards [83]. This online game-like method meant that courses could be access online without the need to travel and material could be downloaded for moments when online access was not available. In addition, the incorporation of game elements made the training courses appealing and enjoyable for the employees.
3. **Provoking Innovation:** the goal for this is to encourage users (whether it is employees or customers) to participate in games to "explore, experiment and collaborate … [to] solving problems through crowed sourcing" [12]. These types of game allow organizations to pull together the creative powers of its users to come up with innovating solutions to problems or obtain feedback on product design.

Many companies such as Deloitte, Eloqua, Bluewolf and Zamzee among others have incorporated gamification into their process with great results. Deloitte Digital's project mentioned earlier saw an increase of 47% in employee participation in their gamified online

platform just 9 months after its launch [83]. Secondly, after gamifying to attract users to their website, Bluewolf, a consulting company that helps organizations improve their technology and processes [85], saw an increase of 68% visits on their site [16]. Similarly, a marketing automation firm called Eloqua experienced an increase of user participation in their community of about 55% [16]. Additionally, Zamzee, which developed "a game that gets kids moving" [86], saw an increase in exercise by 59% [16]. Lastly, a fortune 500 company used a gamified solution to push "sales partners to engage in their loyalty program and educate them on their newly redesigned website" [7], that resulted in: a triplication of visitors to the site and the amount of time users spent on it, an increase of about 1,000 in the number of users that returned and, finally, twice the amount of sales claims from October to March of 2011 [7].

4.8.1 Uses of Gamification in Businesses

This section provides a variety of examples detailing gamification experiments. These experiments show how gamification can be used in businesses. The cases detail how gamification can be applied to fostering innovation in online idea competitions, improving the use of ERP systems and the effect of removing game elements from an enterprise social network service.

Online Idea Competitions

Online idea competitions are a great way for companies to foster customers' or employees' creativity and incorporate their ideas into the companies "innovation process" [55]. The traditional process is for an organization to encourage individuals to submit inventive ideas on a selected subject [55]. When the competition has concluded, a group of specialists assess the entries to select a winner which is then announced [55]. For many years European automotive companies, such as "BMW, Daimler, Peugeot, Renault and Volkswagen"[55], were at a creative blockage because of "innovative pressure" [55]. They resorted to online idea competitions in order to incorporate ideas from clients and other "external sources" [55]. Other companies that have used this strategy are: "Adidas, Henkel, IBM, Cisco, Dell, 3M, Google, Lego, Toyota, … Microsoft, Starbucks, [and] Samsung" [55] among others.

Yet, motivation is again an important factor that is lacking in online idea competitions. So the most important questions are: "how can more … users be encouraged to participate [?]" [55] and "how can creativity … be inspired[?]" [55] and "the quality of ideas be enhanced?" [55]. Gamification is the answer to these questions since it has proven to be "a sophisticated approach" (G16) that boosts contributions and guarantees that the ideas are of "high quality" [55]. Because of this Witt, Scheiner and Robra-Bissantz [55] decided to perform an explorative study in which the objective was to understand how game elements foster enjoyment and flow, and how these affect online idea competition [55]. To do so, three game elements were added to the competition design, more specifically: "game points, social points and leader boards" [55]. The game points were obtained by users who performed actions such as submitting imaginative ideas, writing messages or comments to other users, assessing other's ideas, or when adding a profile picture for the first time [55]. Social points were given to users by their peers and the community [55]. For instance, users would obtain social points after other players would evaluate their ideas positively [55]. Leader boards with various ranking criteria were also used as a way for the users to compare their progress and achievements with their peers. This allowed for the players to obtain feedback on their actions and allow for them to change their behaviours for improved results [55].

In order to analyze the effect of the game elements, the users were asked to take part in an online questionnaire resulting in 30 questionnaires that were completed and suitable for analysis [55]. The surveys were composed of three parts: personal/demographic information (e.g. "gender, age, country and level of education" [55]), prior experience (with online idea completion, programming and design abilities) and, lastly, their assessment of the competition (i.e. their degree of enjoyment and motives for participation) [55]. The last part of the questionnaire allows the users to evaluate their experience with the competition on a 5-point Likert Scale (strongly disagree, disagree, do not know, agree, strongly agree) [55]. The analysis measured four constructs (motives for participation, enjoyment, task involvement and flow) and their correlations with game elements [55].

The results showed several trends for each of the constructs measures and their overall interaction with game mechanics. The results for the individual constructs are described below [55]:

- **Motives for participation:** results showed that the top five motivations for participating were (in order): 1) usage of knowledge, 2) curiosity, 3) reward driven, 4)

to compete with others, and 5) fun. As can be seen, the only extrinsic incentive (reward driven) was ranked as the third most significant. Reward driven motivators not only included the point reward system but also "monetary or self-promotional" incentives [55]. However, it was determined that intrinsic incentives were the ultimate motivators for users' participate.

- **Flow:** results demonstrated that after the inclusion of game elements to the competition, the users began to: "be immersed" [55], "feel that time passed quickly" [55], "not [be] easily distracted" [55] and "felt content when developing ideas" [55].
- **Enjoyment:** the greater part of the users responded positively towards the new competition design. All questionnaire items about enjoyment "surpassed an approval rating of more than 50%" with the mode being agree and strongly agree.
- **Task Involvement:** it was clear from the analysis that the degree of enjoyment had a great effect on user task involvement. The examination of the questionnaire's 'task involvement' items showed that the most common response on average was "medium to full agreement" [55]. The users agreed that "the generation, development and evaluation of novel ideas were enjoyable, interesting, stimulating, respectively exciting" [55].

Overall, results demonstrated that participants acknowledged that flow was indeed encouraged through this new idea competition design. Lastly, Witt et al. [55] admitted to having flaws in their design (e.g. their leader board was said to be confusing to find and read) and in their analysis since they had a very small sample of questionnaires [55]. However, all of these results served as "hints" [55] about the game elements' positive effects and that they could potentially be a solution for online idea competitions to foster motivation and creativity, as long as they are used an adequate and refined manner [55].

Gamification Removal from an Enterprise Social Network Service

Previous to this experiment performed by Thom, Millen and DiMicco [29], a large, globally spread IT company (with its head office in the northeast of the United States of America), gamified their enterprise social network system (SNS) with a "point-based system" [29]. The objective of establishing this system was to "encourage content contribution" [29]. To achieve this, the users were able to obtain points by performing specific actions, such as: providing the network with "lists, photos and comments" [29].

After the implementation of the gamified system, a 6 month experiment was run in order to measure the effectiveness of the point system [29]. In order to do so, half of the users were able to view and use the point system while the other half were oblivious to the existence of the game elements [29]. Within the first three weeks the organization already saw a drastic improvement in the amount of contribution [29]. Analysis results also revealed that the point system was effective in "reward[ing] commenting behavior" [29] since it was seen that the comment feature motivated users to return to the SNS [29]. The overall analysis of the 6 month experiment demonstrated, not only an improvement in the amount of users that signed up for the SNS, but also that the users who were able to use the point system "added more content over time, both short and long-term" [29]. However, there was no difference in the percentage of users from each group ('point group' or 'no point group') that provided content [29].

Following this experiment, Thom et al. [29] performed a study to examine the effect of completely removing gamification from an enterprise SNS on user activity. This occurred 10 months after the implementation of the point system discussed previously [29]. This involved removing any incentivizing feature of the system, which included: interface features, badges, points, leader boards among others [29]. Prior to the removal of the game feature, the users where notified through the intranet forums [29].

The data used in the study's analysis consisted of "usage logs" [29] from a 4 week period (two weeks before the removal of game elements and two weeks after) [29]. The users in this study consisted of 3486 individuals who had provided content to the SNS at least one time in the four weeks of data collection [29]. Results of the data analysis revealed a significant negative effect on user activity, content (e.g. photo/comment/list) contribution to the site [29]. Overall, there was a decline in participation after the removal of the game elements.

Thom et al. [29] suggested that these results implied that intrinsic motivation to contribute to the system is inconsistent throughout the users and this is why the removal of the extrinsic motivators did not eradicate the contributing behaviours [29]; however, the extrinsic motivators were a large influence on the majority of users (if not all) to "participate more intensely while the point system was in place [29]. Ultimately, Thom et al. [29] concluded that it is unwise to disregard the effect gamification discontinuation can have on user motivation to participate [29].

Enterprise Resource Planning System

Many researchers believe that the gamification of dry business applications is "a promising trend to improve the user's participation and engagement with the software in question and on the job" [87]. Herzig, Strahringer and Ameling [87] designed a gamified SAP (a German-multinational enterprise software development organization [88]) enterprise resource planning (ERP) software prototype. They performed an experiment comparing the prototype to a traditional SAP ERP to see what effects the gamified prototype had on: "ease of use, usefulness, efficiency, productivity, motivation [and] enjoyment" [87]. The gamified prototype provides 5 game-style elements described below [87]:

1. **Visualization:** it provided an elaborate graphical interface that allowed the users to view the information concerned and the overall process.
2. **Goals and Rules:** it provided challenges and presented the users with explicit goals and rules that had to be followed.
3. **Levels:** it allowed user to continuously level up as they completed tasks and gained achievements.
4. **Rewards:** the users were rewarded with stars for the correct completion of tasks and challenges.
5. **Feedback:** as a second form of reward, the users were provided with feedback on their progress in real-time.

The effectiveness of the prototype was evaluated through surveys, user observations and "qualitative feedback" [87]. When using the prototype users were seen to return to the game repeatedly in order to obtain all stars possible for each mission [87]. Furthermore, once the user had obtained every star possible, some were seen to start the game over repeatedly "to get the most cash in the game" [87]. Additionally, statistical results demonstrated the following [87]:

- Telepresence (the degree to which technology makes the user feel that they are present, whether it is a virtual environment, a video conference or similar) increased by 29.75%
- Satisfaction with the interface improved 23.4%.
- Flow saw a 30.35% increase.
- Overall enjoyment rose by 53.41%.
- "Perceived ease of use" [87] experienced an improvement of 36.12%

- The users' desire to use the ERP software after they used the prototype improved by 12.12%

The only negative result that was seen was a drop of 3.03% in the "perceived usefulness" [87] of the prototype. Herzig et al. [87] admitted to having a big limitation in this area since many of the users did not feel that this need approach would improve their productivity because the experiment's evaluation time frame was fairly short [87]. Furthermore, users from finance or accounting who particularly enjoyed the traditional spreadsheet interface were not satisfied with the new graphical façade. Yet, the authors distinctively demonstrated that a gamified ERP system can improve user activity significantly in a variety of different ways. This prototype "provide[d] a good start" [87] to showing gamification's advantages in this area of study [87].

4.8.2 Examples of Gamified Applications in Businesses

This section provides a variety of examples of brands that have created gamified application. These brands include: Nike, Omnicare, Adobe and Campusfood.com.

Omnicare

Omnicare, a pharmaceutical firm, decided to gamify its "IT management cloud service [called] ServiceNow" [30] to motivate IT help desk employees to improve customer attention [30]. Before improving the "IT service desk operating model" [30], customers phoning in experienced hold times of around 20 minutes and there was a 25-30% call drop rate [30]. Overall, customers were dissatisfied [30].

The new gamified model added features such as rewarding the customer service team employees with points and goods (e.g. Amazon gift cards and free cinema tickets) for their successful performances [30]. Following this, they designed a game on their ServiceNow platform called OmniQuest which used game elements such as rewards, badges, achievements, competition and instant feedback to motivate the employees to follow specifically targeted behaviours [30]. This game enhanced employee "morale and excitement around tasks, projects and even job roles" [30] and managed to get all service team employees to partake [30].

Adobe

Adobe was in need for a new strategy to "enhance user experiences and improve audience engagement" [89] in their software suite. Their desire was to motivate users of Photoshop trial (Adobe's "most popular software-application" [32]) to convert to "paid licensees" [30]. Additionally, for some users software learning anxiety was a barrier for using these products [30]. Because of this, adobe needed a solution that would interest the users and help them learn the many advantages of Photoshop. Thus, Adobe teamed up with Bunchball, a leading "gamification platform provider" [30], to create, 'LevelUp', a gamified solution for Adobe Photoshop [30]. The objective of the gamified platform was to ease the users into learning how to use Photoshop [3].

With LevelUp users were able to earn rewards as they learned about all different features that the product provides [3]. In comparison to traditional training methods such as manuals, tutorial articles or videos, this game provided an entertaining training tool [30]. The users where set on missions or asked to complete tasks, such as "master object removal" [30], "remove red eye" [30] and "touch up this photo" [30]. Through the completion of these tasks and missions the users obtained points, increased "progress score" [30], earned rewards and were given a opportunity to win the "Adobe Creative Suite 5.5 Master Collection software" [30].

Nike

Nike, the "largest manufacturer of athletic footwear and apparel worldwide" [13], created a social gamified application for running. This application, called Nike+, was started in 2008 and at this time has more than 1.8 million users [13]. Nike, targeting both "casual and hardcore [runners]" [6], and used game elements to solve motivational problems associated with fitness and health [6].

The goal of the application was to transform running into an enjoyable and motivating activity [6]. To do so, Nike+ compatible shoes contain an accelerometer either embedded or attached to the shoe that allows the users to track their run information, such as "distance, pace, and calories burned" [13], through their iPod ([25], [13]). The users are able to upload their data onto the Nike website in order to "track their statistics [and] set [new] goals" [13] once their run is complete ([6], [25]). In addition, through social networks and the Nike

website, Nike+ allows the users to participate in challenges, "track and see leader boards" [25] and compete against friends ([25], [6], [13]). Through the Nike+ iPod software users can set milestones and are rewarded upon completion [13]. In the end, the Nike+ application built "a huge and active fan base" [13] for the Nike company and it was able to increase the motivation of many runners all over the world, making it greatly advantageous for all [13].

Campusfood.com

Campusfood.com is an e-commerce website dedicated to providing "online menu[s] and food delivery" [90] intended to attract the American university population [90]. The website attempts to obtain new users and retain already existing ones by offering them "exclusive discounts" and points for every purchase [90]. It also encourages buyers to try a variety of cuisines, order more frequently and increase food quantity per order [90]. Additionally, they allow users to participate in challenges in order to receive rewards, badges, points, levels or status [90]. For example, users can compete against each other to place the largest amount of orders from a specific restaurant in order to be named "head of the table" [90].

4.9 Conclusion

As can be seen by the wide variety of examples and studies, gamification is very customizable and serves a plethora of purposes. Virtually any industry or type of process can use gamification to foster engagement, change behaviours or inspire innovation among other purposes.

Chapter 5: Gamification of Saving Energy

Energy saving and green behaviours are areas that typically lack motivation. It is extremely challenging to motivate house owners and consumers to be excited about saving energy, recycling and other green initiatives, let alone sustaining those behaviours. The most important questions to consider are: how do we get people to "care about their energy consumption" [91] and how do we get them to "do something about it?" [91]. Gamification is a solution that has seen effective results in this field by incentivizing individuals to join this cause and "green their behaviour" [27]. Gamification, alongside 'big data', can provide users with the motivation to perform and sustain these behaviours. It is imperative to motivated individuals to "go green" [27] for the sake of fun and personal gain rather than because of feelings of "guilt and shame" [27] over spending too much money, energy or not caring enough about the environment [27]. The goal of these solutions is to increase the amount of people that go green, sustain these behaviours in the long run, increase economic savings and improve individual feels of satisfaction over their actions ([92], [93]).

This chapter will provide information that is essential to understand how gamification can be best used for providing long lasting energy saving attitudes. It includes descriptions of the motivational challenges that energy saving (or other green behaviours) bring, what customers want out of a gamified system for energy saving and, lastly, examples of existing cases and devices that are typically used.

5.1 Challenges of Energy Saving

Driving green behaviours has consistently been challenging to achieve because of the lack of enthusiasm and motivation [94]. Green behaviours have "low-involvement" and requesting people to join these initiatives is extremely difficult [93]. Even though individuals may state that "they care about saving energy" [94], on economic, social or ecological grounds, they still do not perform these behaviours; thus, it has been demonstrated that "caring is often an insufficient motivator" [94].

This lack of interest can be correlated with ineffective communication between the clients and the energy providers, in addition to the clients being poorly informed about performances or how they can improve. Research has demonstrated that helpful communication is crucial to obtaining a stimulated user base [92]. However, customers continuously complain that they do not understanding "utility speak" [93] and that their bills and utility information is incomprehensible [93]. Furthermore, what bothers customers incredibly is that a very small amount of the population actually has "access to enough information to shift their behavior[s]" [94]. Pegroraro [95] accurately states that "we live in the dark" [95] since electric bills and domestic devices provide no meaningful information about how the electricity is being used [95]. It is aggravating to users to deal with the "monthly mystery bill" [93] that provides no meaningful information, just a seemingly random total number for the entire month. Additionally, users are inconvenienced because of three reasons: 1) they do not know how much energy they are using at an exact moment, 2) they do not receive feedback on their energy saving efforts and 3) they are not able to relate their daily energy consumption customs to the number on their monthly bills ([93], [95]).

5.2 What to Provide the Users

The ultimate goal of gamified energy saving is to "reprogram" [95] the way people thinking and boost their enthusiasm about saving energy to create an increase in "voluntary interest" in devoting time towards green behaviours [95]. On the other hand, customers desire to save money on their monthly bills by being aware of their energy use and how they can improve it ([93], [95]). From these ideas a few elements were derived that are key to an effective gamification system for of energy saving. These include: feedback, social features, challenges with rewards, the three C's (context, comparison and competition), and providing resources or information to ease behaviour improvement.

The foremost important feature of an energy saving gamified application is effective feedback. Feedback is any information that is provided to the user about their actions that will help them understand and improve their performance. It is imperative that this information is visible to the user, in addition to being meaningful, consistent and accurate [93]. Without this information the users will not be able to understand how to adjust their behaviours to achieve better results [95].

Additionally, feedback should be adjusted to the proper granularity of appliance data. This implies that users should be able to observe how their energy usage changes as they turn on and off lights or other devices [95]. The users need information they can make sense of and from it be able to "identify the culprit" [92] of energy usage spikes. The vast majority of monthly electric bills "are great at telling you what you owe" [95]; however, they are not informational in terms of understanding what behaviours have caused these costs. That is why the granularity should be smaller to understand what behavioural patterns translate to electric and financial savings. Lastly, feedback should also be provided to the user with the correct timing. Typically this preferably means providing feedback in real-time [92]. This allows the users to not have to wait until the end of the month to "understand their savings" [92]. People should know: how much energy they are using at any given moment, where they are using it (what appliances or devices) and what they can do to reduce their energy use. Ultimately, the users should be provided with a way to track their consumption, whether it is a website, application or other [92].

Moreover, research has shown that adding social elements, challenges and rewards are effective ways to increase user engagement ([95], [93]). It has been seen that "adoption rates" [94] of green behaviours increase when combined with social media or social gaming. Energy saving applications have shown that social components drive users to achieve an average of a 20% decrease in bill costs and up to 50% increase in savings for the most efficient users [92]. Some of these social platforms could include websites, mobile applications, social media or messaging applications [93]. These social dynamics facilitate social interactions with friends, receiving or sending energy saving tips and competitions with other players. Lastly, energy saving behaviours are very successfully enforced through user participation in challenges and providing them with rewards [93].

The third most important feature to include in a gamified energy saving systems is presenting the user not only with their own performance information but also allowing them to examine the performance of other users. Providing this information allows the application to integrate the three C's: context, comparison and competition. Firstly, it allows the users to view other player's performance data, which provides them with context about: what they can aim for, what the average or normal energy saving amounts are, and what the other users have achieved [93]. This allows the users to set reachable, realistic goals for their energy saving performance. Secondly, it allows for users to compare their own performance to the rest of the players to see if they should be improving and by how much ([94], [93]). These elements give

them a sense of how they are doing in comparison to their colleagues, neighbours and others [95]. Lastly, by keeping score and allowing the performance data to be public to other users, one can create some friendly competition or constructive social pressure. This has proven to be extremely successful in fostering drastic improvement in behaviour patterns and engagement ([95], [96]).

Lastly, it would be very helpful for the users if the gamified application provides resources or information about how to improve their energy savings. Some users may not be aware of the different strategies that can be used to lower energy consumption or what devices are the ones that consume most electricity. This is why the users should be able to easily access this information if they require it, from the most obvious tips (e.g. turning off the lights when they are not needed) to the lesser apparent ones (e.g. improving insulation in a house to need less heating) [95].

5.3 Energy Saving Devices

There are several devices or energy saving initiatives that have been created for of energy saving applications or to increase awareness of personal electric usage. This section will explore power meters and similar devices in addition to the 'green button' initiative and the United State's smart grid.

5.3.1 Power Meters

Power meters are devices that can be plugged into each domestic appliances or outlets to measure their individual energy use [95]. These provide real-time reports that allow the users to become familiar with the amount of kilowatts that each appliance uses [95]. The most common of these include: Smart Meters and 'modlet' by ThinkEco ([95], [6]). Additionally, some modern household appliances are now able to be link to the internet (e.g. some of LG's washers, oven and fridges) and report information about their energy consumption [95]. With some of these devices, like smart meters, homeowners have come to realize that appliances' such as their television used up to 8 kilowatts even when switched off [95]. An example of how these devices can be used in a gamified system is 'Power House'. 'Power House' is an online multi-player game that takes information from the smart meters of homeowners and engages

them in a game that ultimately motivates them to improve their "home energy behaviour" [6]. This game interprets the data from the smart meters and returns it to the homeowners as meaningful feedback on their performance [6]. This allows the users to make sense of their energy consumption and use it to improve their actions [6]. Lastly, this game provides the users with a platform for friendly competition with friends and neighbours, and rewards them for energy efficient behaviours [6].

5.3.2 Green Button

'Green Button' is an industry led project that was initiated by Aneesh Chopra, the United State's former chief technology officer ([95], [97]). The motivation for this project was the fact that energy users typically have little to no understanding of their personal energy use, while utility organizations contain information that would be useful to their customers on their website but inaccessible or incomprehensible [95]. Therefore, the objective was to develop a way for user to be able to obtain this information in a "customer friendly" manner and be able to retain or share this information when desired ([95], [92], [97]). As a consequence, 'Green Button' was developed to allow users to download the data in a standardized format and allow application developers to use, interpret and manage the data for their systems ([95], [93]). Green Button facilitates understanding energy usage for anybody "regardless of age or maturity level" [92] and allows them to enjoy while saving energy [92]. Eventually, Green Button's focus on "granular data" [95] helped in creating a positive result on peoples' energy saving lifestyles ([92], [95]).

5.3.3 Smart Grid

Smart grid is a United States government initiative which created a two-way feedback system between individuals' households and power plants where information (about household usage) and electricity (from the power plants) is exchanged in order to manage energy efficiently [98]. Customer households are provided with displays, and "direct load controls" for monitoring and managing their energy usage [93]. Through tools such as smart meters, households are able to accurately measure their energy consumption for better management [93]. Through these monitoring devices, power plants are also able to understand individual household usage better and provide them with the electricity they need [93].

5.4 Cases of Gamified Sustainability Efforts

5.4.1 OPower

OPower Inc. created a social gamified application partnered with Facebook to encourage energy consumers to save money and electricity by changing their habits ([91], [27]). To do this, OPower's application uses intrinsic motivators to provoke the users' "competitive instincts and their desire to save money" [27]. The customers are provided with "personalized reports" [27] about their energy expenses [27]. They are also given the possibility of comparing their performance to their neighbours' and friends' on Facebook ([27], [91]). In addition to the competitive techniques, OPower also uses point systems, badges, team collaboration and challenges to appeal to the users' intrinsic motivation [91]. The results so far have shown that the application has helped the users increase their energy savings by 2% [91].

5.4.2 Simple Energy

Simple Energy, established in August 2011, is similar to OPower's gamified system as they are both social gamified applications that aim to motivate consumers to engage in saving energy [99]. Through extrinsic motivators, competitions, comparisons and social elements, Simple Energy motivates users to change their lifestyles and habits to reduce the energy they consume ([99], [94]). The application provides users with relevant and comprehensible data on their energy consumption along with tips for reducing their usage [100]. Additionally, all comparisons between users are normalized by keeping in mind certain characteristics that may influence the amount of energy consumed such as: household size, number of individuals living in the same house, location and climate [99]. Users can access Simple Energy through mobile or desktop applications allowing for flexibility of use [92].

In the application the users can challenge other players and monitor their own performance against the rest of the users ([99], [100]). It provides users with rankings by households based on their energy saving [99]. By surpassing or beating other players, the users are able to obtain points, as well as appearing more socially and environmentally

conscious ([99], [92]). Furthermore, this application has an important interaction with social media, which promotes social interactions among the users [99].

It is important to note that users are not only rewards for been the most effective energy savers, but also the most improved even though they might not have been the top users [99]. This further promotes energy saving behaviours as the competitions do not pick single winner but as long as the user's efforts are effective they will be rewarded [99].

Eventually, users can collect large amounts of points and obtain rewards but performing relatively simple behaviours such as turning off lights, "unplugging electronics" [99], lowering the thermostat, and "switching to energy efficient light bulbs" [99]. Users are awarded with badges, gift cards, iPads and other prizes when they accomplish milestones, giving them bragging rights for their environmentally friendly accomplishments ([99], [100], [92]).

5.4.3 RecycleBank

RecycleBank uses gamification to inspire users to understand and perform green behaviours. It provides the users with a number of "green Challenges" [6] which drive them to perform green activities in exchange for obtaining points which can be cashed in for prizes ([6], [27]). These actions include: saving energy, recycling, and increase their awareness about sustainability. All of these enable the users to improve the sustainability of their everyday lives ([6], [27]). RecycleBank reported that around 49 thousand users took part in the "Green your Home Challenges". From the users' reports after the conclusion of the challenge found that [6]:

- **Games can increase sustainability consciousness:** 97% of users confirmed that their understanding of environmentally friendly behaviours increased after their participation.
- **Gamification successfully motivates people to perform green behaviours:** the large majority of users reported to be increasingly prone to 'being green' after taking part in the challenges.
- **Gamification is a valuable instrument for education:** 86% of users agreed that games are an excellent tool for education in their opinion.

5.4.4 Volkswagen's 'The Fun Theory'

Volkswagen began a contest called 'The Fun Theory' that engaged the population of Stockholm, Sweden to devise a number of witty ideas for using games to improve healthy, safer and greener lifestyles [96]. In a sense, this could be considered a gamification of gamification since they gamified a contest for individuals to provide gamified ideas. The top three ideas that were selected out of the numerous suggestions where gamified solutions for: fighting "escalator laziness" [96], decreasing highway speeding and reducing littering [96].

The first idea consisted of motivating people to stop using the escalators and increase their use of the stairs in order to improve health habits [96]. To achieve this, each stair on a staircase at a subway station was transformed into a piano key, which all together created a giant piano keyboard [96]. As people climbed up the stairs, each key that was stepped on would sounds with the corresponding piano note [96]. Initially, only some people used the stairs; some "even attempted to play a song" [96]. Yet, in the end, this change resulted in an increase in stair use of 66% ([96], [101]).

The second suggestion was aimed at motivating drivers to decrease highways speeding [96]. For this idea, speed signals on the freeway were substituted for cameras called "Speed Camera Lottery" [96]. The purpose of these cameras where to give tickets to those drivers that were speeding but at the same time rewarding those drivers going bellow the speed limit [96]. To do so, the cameras entered the license plate number of those driving at the legal velocity into a lottery where the winning prize was financed by the money obtained from the speeding drivers [96]. This idea was tested for 3 days, during which 24,857 cars passed the camera and the average driving speed dropped 22% ([96], [101]); prior to the gamification solution the camera the average speed was 32 kilometres per hours and after it dropped to 25 kmh ([96], [101]).

The last winning idea was to motivate individuals to reduce their littering [96]. In order to achieve this, a special rubbish bin was installed on a street [96]. This bin played a variety of amusing sounds every time rubbish was thrown into it ([96], [101]). Some of these included noises such as cartoon-like sounds "of something dropping an absurdly long distance" [96]. Eventually, this idea resulted in "more than twice as much trash" being thrown into the bin [96].

Chapter 6: Failed Gamification Cases

This chapter describes a few selected cases of failed gamification implementations and the possible reasons for their failure. As with any new tool or technology, there are a numerous failed cases because of a lack of knowledge about the subject and poor design or use. Yet, these failed cases should not discourage gamification use and serve as the means to learn from others mistakes. It is examples such as these that help increase the gamification knowledge base and understand what should or should not be done. The following are cases about three companies (Zappos, Marriott and Klout) and how or why their gamification project failed.

6.1 Zappos

Zappos is an online retailer, bought by Amazon, which sells clothing and footwear ([18], [102]). They had "brilliant marketing" [18] and were "a leader in social media" [18]. Customers and experts even stated that Zappos has "taken customer experience to new height" [18]. This was before they gamified wrongly. To gamify the shopping experience, Zappos created a rewards programme for their VIP customers. This programme allowed customers to obtain "badges, points and levels" [18] as a reward for their purchases and other activity on their website [18]. However, their immense mistake was that their game mechanics were pointless. The customers had no idea what these badges and points meant, what value they had or why they would want them [18]. These badges provided no foreseeable benefits (e.g. cashing in for rewards or purchases), and no changes to their social status or reputation ([18], [103]). Additionally, they did not understand what they stood for or what behaviours they had performed to achieve them [18]. Figure 6.1 shows a snap of what a customer's public profile displayed. As can see from the image, the badges do not provide any deducible information as to what they mean or what behaviours they might be rewarding. To the customers, these were random icons that would arbitrarily appear on their profile [17].

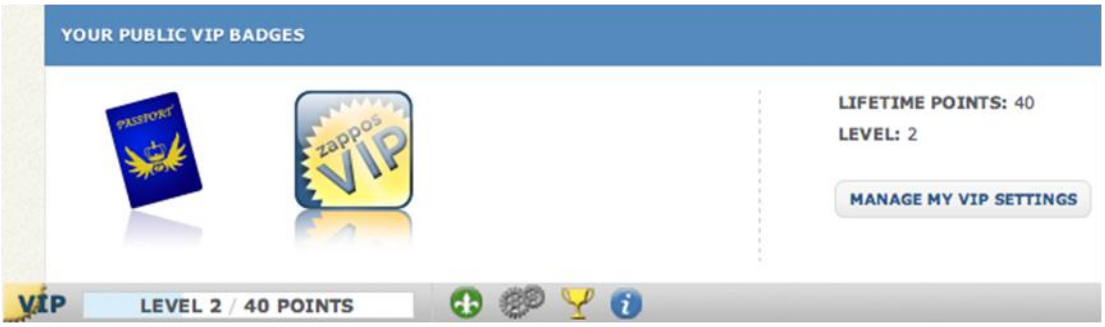

Figure 6.1: Snapshot of Zappos' Customer Public Profile (Source: [124])

In addition to this, Zappos created a pointless virtual world which allowed users to discover exactly the same links that could be found through the traditional navigation interface of the site. However, this new navigation structure was much more confusing and time consuming [18]. Eventually, this meaningless pointification and arbitrary addition of game mechanics without meaning or explanation became damaging to Zappos "brand image" [18]. So the moral of this story is "think before you gamify" [18] and always make meaning and context explicit to the users ([18], [103]).

6.2 Marriott

Marriott recently created a game called "My Marriot Hotel" [18] for Facebook. The goal of this application was to take on users as employees for their "management program" [18]. The game included initiating one's own Marriott and managing all aspects of it (similar to Facebook's renowned Farmville) [18]. However, Marriott only manage to deliver the first chapter of its game where the users had to manage the budget, kitchen staff and order food in the Marriott Kitchen [18].

The reason for its failure is Marriotts big error of "creating a game no one wants to play" [18]. It was a poor investment in a game that had an extremely restricted potential user group and does not appeal to them or the large majority of the general population [18]. Marriott essentially had "a case of Shiny Object Syndrome" [18]; that is, they felt the need to gamify because everyone else is doing it. So the lesson to learn is threefold: 1) in order to succeed one must pick the correct audience, 2) make a game that is appealing to them, 3) gamify because it is the best solution to your problem not because of the hype [18].

6.3 Klout

Klout's main objective was to reward the user based on social interactions and their ability to influence others [18]. Klout realized early on that rewards are essential for motivating people and used that as the focus of their gamification strategy [18]. They offered extremely attractive prizes (e.g. "free Pop Chips" [18], a "Chevy Volt" [18] for a weekend, and a "free $10 lunch" [18]) in exchange for simple behaviours that can be easily and regularly achieved [18].

These benefits are extremely addictive and appealing to any user, yet, the setback was that the users did not know how to play the game [18]. Kleinberg admitted to be "hooked on [these] perks" [18] and that he would continuously examine his score but he was never shore how or why his score would change. Kleinberg, similarly to many of the Klout customers, could not fathom what behaviours they had performed or what had been done to earn points and prizes [18]. Klout's score is defined on their site as "the Klout score measure influence based on your ability to drive action every time you create content or engage you influence others" [18]. This definition does not help the user understand what actions may merit or demerit points, let alone help the players understand how they can improve their performance. This indisputably results in player attempting to "game the system" [18] since they do not understand "how Klout intended for the game to be played" [18]. For example, Kleinberg discovered that being social on Twitter and Facebook would provide him with points while connecting to his Google+ account would decrease his score [18]. However, at the same time, giving "+K" to other users (similar to 'likes' on Facebook and '+1' in Google+) as a measure of their influences, does not affect the user's Klout score at all [18]. All of these were counter intuitive or made no sense. Therefore, it confused the users and caused them to perform behaviours that may not have been intended by the game. Hence, the lesson to take from this case is "don’t confuse your users" [18] or "obscure game play" [18].

Chapter 7: Tips and Risks – Analysis of Findings

Through the analysis of several failed cases to figure out the probable causes of failure and the comparison of these cases to successful ones, I was able to compile a list of tips and another of risks. The first lists described tips that will help increase the probability of success in a Gamification solution, while the second list details possible risks of failure along with suggested solutions or prevention methods.

7.1 Tips to Prevent Gamification Failure

This section provides tips and ideas to keep in mind during the design and implementation of the gamified system. The following list provides tips to help minimize risk and avoid common problems that may arise:

- **Have a well designed system and interface:** There are many instances of gamified application where the interface is neither clear, user friendly nor intuitive [55]. This will eventually lead to user disengagement and typically an end to their participation [55]. For example, in the online idea competition system developed by [55], users reported that "Leaderboards were difficult to find, they were confusingly presented, the calculation was unclearly described and that the presentation was not adjusted to the individual participants on the website" [55]. This was related to a lowered engagement from the users [55]. In order to prevent this and ensure that the interface is user-friendly, the application should be tested with individuals that have not seen the application previously and have not been involved in its design or implementation. Doing this will shed light on how intuitive or informational the system is and if an individual that is new to the system can navigate it without problems.
- **The project team must include individuals of a variety of expertises and at least one gamification expert:** in order to prevent poor gamification design, it is imperative to have a gamification expert on the project team [16]. These individuals will help since they have experienced what gamification strategies work and which ones do not [16].

From their experience they know how to make motivating systems [16]. Additionally, they have seen mistakes being made, they have learned from them and know how to reduce gamification specific risks [16]. This gamification expert may be someone from the organization that has had gamification experience, or an individual that has been hired from a gamification service provider. Lastly, the gamification project team should contain individuals in a variety of disciplines since a gamification project needs to be able to "address the overall organizational goals, measurements and analytic needs, design incentives and information technology considerations" [35] among other things. It is imperative that the team is "multi-disciplinary" [35] in order to have all grounds covered. Some of these individuals could include: "business-line strategies and managers, along with social scientists, marketers, ... programmers and data analytics expertise" [35].

- **It is essential to have top level Management support:** top level management should always support the entire process of the project [104]. Without the support there is a higher risk for rejection of the technology and significant increased risk of failure [104]. This is because the main responsibility of management in these projects is "to motivate the work force" [10]. Therefore, it is essential to "establish management commitment" [10]. However, it is very important to note that Gamification, with its ability to engage and motivate users, should not be used to replace "good management" [35]. It can simply help improve managerial efforts and foster long-term motivation.
- **Deal with resistance to new technology:** as with any new technology there may always be some user resistance to using it. There are two things that can be done to prevent this: 1) informing the players how to use the system to familiarize them with it, and 2) increase their "perceived usefulness" [87]. Familiarizing the players with the idea of the gamified system even before they get a chance to interact with it is a very successful strategy. It allows the users to get accustomed to the idea and know how the system will work before it is in place. Informing the user about the progress through the length of the project and explaining to them the various features of the system helps decreases possible concern over new technology. Additionally, once the system is in place, making it very easy for the users to understand how to navigate and use the system also helps decrease that possible anxiety or rejection of the new technology. Lastly, it is imperative that the users are also aware of the usefulness of this new technology and how it will benefit them [87]. The users will not desire to engage and

will eventually reject the application if they do not understand: the importance of the system, its applicability to their jobs, how the system can improve their actions and how they (or the organization) can gain from it [87].

- **Don't hire a game designer:** a big mistake that can cause problems is thinking that gamification is a "game design problem" [16] and they believe that the solution is to employ a game designer [16]. This is a huge mistake since game designers "make games" [16] not gamification. A game designer begins "with a blank sheet of paper and they create something out of nothing ... whose sole purpose is to entertain" [16], whereas gamification builds on already existing processes or problems and its objective is to engage users to participate [16]. From this alone one can see that gamification has nothing to do with game design [16]. As [16] described it, "Gamification is an 'interaction design' problem". Interaction design involves designing systems such as "interactive digital products, environments, systems, and services" [16]. Similar to many interaction design projects, gamification emphasizes behaviour and "satisfying the needs and desires of the people who will use the product" [16]. So do not hire a game designer, hire a gamification expert.
- **Consider demographic and cultural differences:** it is important to keep in mind that the target users are all of different gender, age, religion, culture etc. These differences can be great influences over what type of game elements appeal to the user and what their preferred playing style is [30]. For example, the study by [87] showed that a correlation between participants age and the amount of "experience with strategy games" [87] (i.e. older participants had less experience) [87]. Additionally, men typically had more experience than women and consequently obtained more achievements and rewards [87]. When it comes to game play, designing appealing games for a wide variety of generations can be challenging as playing styles vary between them [30]. Large differences in appeal to games have been seen between the different generations of workers, namely Baby Boomers, Generation X and Generation Y [30]. In addition to age and gender differences, culture plays a very influential role in game play, whether it is organizational culture, local culture or the individual's culture (created by their family, country, media and way they were brought up) [29]. Each individuals has different values and features such as competitiveness may or may not be in sync with these values (it may even be offensive or uncomforting for some) [29]. In some cases, individuals working in organizational cultures that value and enforce

"public competition" [29] may results to be very motivated to participate in competitive elements of the application [29].

- **Be aware of potential legal issues:** In very extreme situations Gamification solutions can come across legal issues such as: privacy, intellectual property, deceptive practices/marketing and false advertising ([5], [35], [72]). It imperative that the gamified system does not aim to monitor or manipulate the users', or even allow the users to feel this way [35]. Either way, it is important to hire a lawyer that will help the project team understand what can or cannot be done in terms of legality [72]. They will also aid the team in understanding how much risk the gamified system may pose and give advice on how to handle such risk [72]. Lastly, the way to deal with most of these possible issues is by creating a 'terms of service' for the system [72]. 'Terms of service' is a digital contract that a user must sign before being able to interact with the system. These can be seen when downloading software or signing up for accounts on social media, emails or other. These contracts inform the user in detail about the "legal obligations [they] undertake" [72, p. 108] and are legally binding. The users are allowed to read or download the full copy of the contract and typically click a check box or button to acknowledge that they have read, understood and agreed to the contract [72].This allows the provider "a great deal of leeway to anticipate potential legal complications" [72, p. 109]. However, for further legal advice it is imperative to discuss it with a legal expert.

7.2 Pitfalls of Gamification

Every new technology has its risks and dangers that are likely to occur [24]. However, knowing about them before hand can be useful when preventing them or figuring out how to solve them in case they arise. The culprit of the majority of these problems is bad gamification design. Gartner estimates that around 80% of gamification projects fail due to bad design [12]. This section will begin with description of design specific pitfalls and continues with user behavioural problems that may occur. Many of these pitfalls are related or have a cause-and-effect relationship but it is important to understand every piece.

7.2.1 Game Design Errors

Many problems in gamification projects arise because of bad game design such as wrongly designing intrinsic and extrinsic motivators, using game mechanics incorrectly and not understanding the users. The following list describes the most common of these dangers:

- **Deteriorating intrinsic motivations through the over use or wrong use of game mechanics** [24]**:** As [24] states it, "certain tasks are better left untouched by game mechanics". For example, adding too many aspects of competition or having it be the central focus may "undermine the core purpose of the task or community" [24]. Furthermore, over use of rules on behaviours that are typically performed without these limitations can very likely "interfere with implicit social norms and meanings already in place" [24]. Lastly, giving a specific worth to something indefinable or invaluable may create conflict with the users [24]. An instance of a gamified application that does this is Akoha's "online service" [24]. This service allows users to get rewarded for performing "acts of kindness in the real world" [24]. Rewarding users with an extrinsic reward for a behaviour that has always be intrinsic and altruistic, undermines the performance of behaviours itself [24]; it is no longer special or noteworthy to perform these behaviours.
- **Attempting to gamify a "flawed product or process"** [35]**:** gamification should never be used to strengthen something faulty [35]. Essentially, "Gamification cannot fix something that is already broken" [35] and attempting to do so will simply result in a bigger disaster and more enhanced flaws [35]. As an example, users will not be more motivated to buy and eat food from a brand whose products taste terrible just because they can obtain points and badges for doing so [35].
- **Gamification design is not just 'pointification' it is more intricate and includes many aspects to consider** [35]**:** 'Pointification' refers to randomly adding point systems to a process with no further meaning or dynamics and calling it Gamification [6]. However, it is important to always keep in mind that designing a gamification project "includes hundreds of considerations, mechanics and theories" [35]. If one uses simple elements such as points or badges with no further consideration it will eventually "leave your efforts lacking" [35]. Game mechanics and elements will never achieve the ultimate objective or reach their full potential if used "inadequately and unsophisticatedly" [17].

- **Incorporating into a game the assumption that games are only for 'gamers'** [35]**:** this is a problem caused by a lack of understanding and knowledge about gamification or games. Gamification is about "new ways to elicit feedback, pose challenges and drive experiences" [35] to improve user motivation and reach business objectives [35]. From that perspective, gamification has nothing to do with whether the users enjoy or do not enjoy games. It is set in human nature to be attracted by these feedback processes and challenges, and although they are mainly used in games, these are items that human beings instinctively seek regardless of age, gender or taste in games [30].
- **Mistaking rewards for achievements (** [24]**,** [35]**):** This is also due to a lack of knowledge about gamification. Many organizations taking on gamification project mistakenly believe that games are meant for "mindless fun" [24] and they simply reward the users continuously with no meaning behind it [24]. This eventually will cause the players to grow tired of the game [24]. A good gamification design means provoking intrinsic motivation in the users to allow them to experience "competence, self-efficacy and mastery" [24]. It is a mistake to only rely on extrinsic motivators since extrinsic rewards "are not equivalent to achievement" [24].
- **Confusing the users** [18]**:** As was seen in the failed cases of Zappos and Klout, described in the previous chapter (Chapter 6), confusing the users can be a fatal error for a gamification project. In these two cases, users were confused about what they did to deserve certain rewards (the Zappos case) and what behaviours they had to perform to actually receive rewards (the Klout Cases) [18]. The Zappos case made the terrible mistake of using game mechanics and elements wrongly [18]. In fact, they created confusing, pointless and incomprehensible badges and points [18]. This caused the users to not understand which of all the behaviours they performed was the one that was rewarded or what the badges stood for [18]. The way to prevent this is by: giving explicit meaning to the rewards, avoid rewarding randomly and ensuring that the users are able to clearly understand what those rewards represent (e.g. explicit text or description on badges). On the other hand, Kout's users became confused because they simply did not know how to play the game [18]. The users observed as their points increased and decreased but had no idea why or what they had done to elicit such responses [18]. Thus, to prevent this one must make sure the users understand how to play the game. This can be done by providing the users with a set of rules, a list of behaviours (with their equivalent rewards) and, most importantly, an introductory

guide when the user first signs up. It is also important that these are available at any time for the user to access. This will allow the users to know: how to navigate the application, what actions will be rewarded and what the game intends the users to do.

7.2.2 User Behaviour Problems

User behaviour pitfalls are generally caused by bad or unintentionally flawed gamification design. The most important thing is to be aware of possible unintended consequences. These may be many in number and appearing in many facets of the game. Yet, many of them can be prevented or fixed. In addition to this, one must keep in mind how difficult it is to make the gamified system appeal to all users and that many of them may get bored as a result of poor game design. The following list described the four previously mentioned ideas in more detail:

- **Unintended consequences:** it is important to always be aware of "the law of unintended consequences" ([25], [105], [24]). The risk of these unintended consequences varies greatly depending on who the targeted users are. The risk is lower when the users are external to the organization (i.e. customers) and the objective is increase participation or purchases on the providers' website [21]. This is because the behaviours the users have to perform are "fairly simple" [21] and the focus is the "quantity of results" [21]; all that the users have to do is "buy, come back, to review, and share" [21]. However, the risk may increase when dealing with employees or "internal enterprise deployments" [21] which involve long-term behaviours and quality improvements. These are more challenging to obtain [21]. There are two unintended consequences that occur most frequently: rewarding or driving the wrong behaviours and the appearance of cheating behaviours ([24], [35], [21], [25], [4]).
    - *Driving wrong behaviours:* there are many stories out there of gamified systems that reward incorrect behaviours which eventually led to driving these wrong actions instead of the intended ones [25]. For example, an application that rewards users for posting in forums will cause the users to simply type "garbage" [25] in order to create a large number of posts [25]; this is obviously not rewarding the correct behaviours. Instead, the system should have been rewarding the quality of the posts. This could be measured by features such as the amount of thumbs up, peer reviews or reviews by experts [25]. In the end, it

is vital to think extremely well about the design of the system, what should be enforced and what behaviours should not be driven by rewards [25].

- *Cheating:* this is when users attempt to manipulate the game so that they win, someone else loses or to obtain the maximum profit ([4], [24]). This is also referred to as "gaming the system" [24]. However, it is important to understand that all games are vulnerable to cheating [35]. There are three things that can be done to eliminate cheating. First of all, in order to prevent it the gamification designers should "think like a player who would do anything to win" [35]. This way, possibilities for cheating can be eliminated in the initial design phase. Secondly, if cheating behaviours arise despite the preventive measures, these behaviours should be identified and the application should be modified to restrict and remedy these cheating behaviours [35]. Lastly, the rules of the game should be explicit, unalterable and clear because without these qualities the users will take activities into their own hands and cheating will increase [35].

- **It is challenging to get the gamified system to appeal to all users** [24]**:** in many cases game elements are used without "relevance or appropriateness" to the users [24]. Personality, age, gender, "playing style ... and attitude toward risk" [24] vary drastically between users. This makes the engagement of all users very difficult to achieve an activity may be extremely appealing to some users, while disengaging others [24]. Competitions are an example of this, since some users find them exhilarating, while others feel too much pressure and disengagement when participating. Ultimately, a high-quality gamification design should appeal to the vast variety of "personalities, interests and moods" [24]. For this it is crucial to investigate demographics, personality characteristics and other information about the target users before beginning any gamification designs [24].
- **Users may get bored with poor game design:** there is a high risk that the users will get bored of gamified interactions if they experience them too often [35]. When people go through the same poor design, 'pointification', or 'badgification' experience on every website or advantage program they sign up for, they will become uninterested and disengage [5]. It is imperative that a gamification design provides more than points or badges. This will allow users to draw meaning from their participation and have a different experience from other 'pointified' websites.

Chapter 8: Steps to Gamification

Through the synthesis and analysis of the gamification cases and literature found during the research phases, I derived a set of steps that are applicable to any type of gamification project. The objective is to provide general guidelines that allow those who are interested in a gamification project, to know what the process is and what will be required of them.

The steps to gamification that were derived are separated into three phases: 1) prepare, 2) design and 3) implement and maintain. Each of these phases contains a set of steps that are necessary for its completion. Figure 8.1, depicts the three stages and the corresponding steps for each stage.

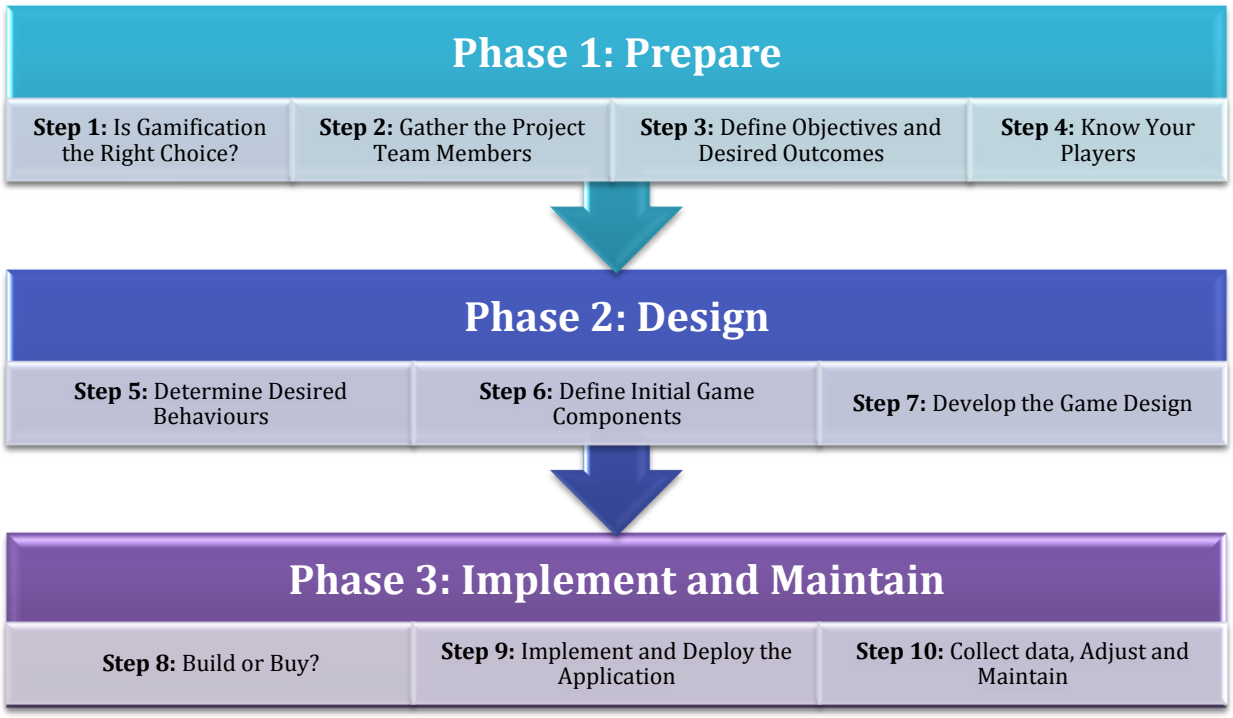

Figure 8.1: Phases and Steps for a Successful Gamification Project

This chapter will explore these phases in order to: clearly define the business objectives, know what behaviours to spark, create a motivational reward system to promote these actions, strongly consider hiring a Gamification platform vendor, track user activity, analyze the data and continuously adjust the system to obtain maximum effectiveness ([106], [30]). Gamification does not require "fancy coding and an onslaught of engineering and developer talent" [107]; it can be created on post-its, spreadsheets or even in blog posts [107]. The most important matter is creating an effective design that will encourage participation.

Phase 1: Prepare

The preparation stage is the moment to set up the organizations business goals. It is vital that at the commencement of this stage, the organization has gained some knowledge about Gamification and what a project of this sort may involve or require. In addition, the organization should have already carefully chosen what problem they wish to gamify and reflect about why it is important to find a solution to it [105]. In this phase one will aim to answer the following questions: "Why are you doing this?" [35], Who do you need on your team?, "What are your goals?" [35], and "Who is your audience?" [35]. Like any major business project the first few steps are: deciding if a gamified strategy is the correct solution, gather the team members, derive business objectives and understand the target users.

Step 1: Is Gamification the Right Choice?

This first step is of vital important since it will determine if to continue with gamification or not. As with any project, a company "must clearly define a need for [it]" [30]. For that reason, one should first attempt to answer the following questions:

- *How and from where did you get the idea of using gamification?*
- *Why do you want to use gamification?*
- *Will solving your problem be beneficial to your target audience? Or will they not care for it?* [18]
- *Why and how will gamification resolve your problem?* [18]
- *Is Gamification the best solution to your problem* [4] *? Or are there better solutions?*

- *Are you willing to perform data collection, management and analysis of the gamified solution once it is running?* [30]
- *Does it fit your budget? Or can I adjust it to fit?* [30]

The responses to these questions will lead to discovering if gamification is for you [4]. It will be advisable to use gamification if the organizations motivation for using it is the proper one; in order words, it should be beneficial to the users, solve the target problem and be the best possible solution to use.

As it has been stated in previously, gamification is a solution to tasks where motivation or engagement lack, and these missing qualities are important to effectively perform tasks [4]. The key is to align the gamification objectives with the specific process or performance metrics that the organization wishes to improve instead of attempting to gamify all processes [4]. Furthermore, it is of great value to examine cases of organizations that have used gamification to solve similar problem in order to see how it has been done, what problems were faced and what did not work [35].

Gamification is not simply creating a solution by turning it into a game. It also involves collection large amounts of data, measuring activity and analyzing results to figure out if the gamified solution is indeed effective. Therefore, the company has to see if the budget fits and they are willing to perform the data analysis, maintenance and other long term commitments [31].

Moreover, the organization must carefully consider if the problem or process they wish to gamify has, at its core, something "that people [will] really want to do" [25]. No matter how many engagement strategies are used, if the users do not desire to perform the activity or see no value in it, the gamified system will have no future. One should always keep in mind that a meaningless activity or problem will be meaningless no matter how adorned it is.

Yet, the most important question of all is if gamification is the best fit to the problem. The company must verify that a gamified solution "can contribute to core processes or strategy" [35] rather than just adding to existing tactics. Lastly, other non-gamified plans should be explored in order to decide if gamification will be the best strategy to use or if the companies "resources [would] be better spent on [other solutions]" [105].

Lastly, do not gamify for the sake of gamifying [3]. The current hype about gamification has become a huge influence on organizations that decide to incorporate gamification just

because "it's a sexy buzzword" [18]. It is a great mistake to use innovative strategies or technology just because others are doing it and without having a true need for it. Gamification should be used only if "you have a problem to solve and gamification is an appropriate solution" [18]. So, think wisely about the motives for its use and if it is the best fit.

Step 2: Gather the Project Team Members

This step consists or carefully picking out the individuals that will form part of this gamification project team. The main questions to think about during this step are:

- *What types of knowledge do you need on your team?*
- *What individuals have the needed expertise?*
- *Do you have the resources to assemble the correct team of individuals for your gamification project or will you be hire external service providers?*

First of all, it is important that the gamification project team consists of individuals with a variety of skills and expertise [72]. This may include, and is not limited to:

- **Business objectives experts:** without individuals who are focused and understand the overall business aims, the software could be great but will not produce results that the organization desires [72].
- **Experts on the targeted user group:** this may be psychologists or other individuals who have been put in charge of getting to know the user group or retrieve data about them [72].
- **Analytics specialists:** these individuals will be a great asset when the testing of the application begins in the later stages. They should understand, analyze and interpret the activity data for a better understanding of the application's performance [72].
- **Game/Gamification designers:** these should not be game programmers or designers, but should be individuals who will be able to help improve the design of the application [72]. However, it is imperative to have at least one gamification expert on the team whether the individual is from the organization itself or hired from a gamification service provider.
- **Technologists/Programmers:** these individuals will be the ones that implement the software and bring all the design ideas to life [72].

- **Domain Experts:** these include individuals with knowledge in the domain that the problem is in. For example, if the aim of the gamified project is to increase sales by improving customer interest in a given product, the domain may be marketing and, thus, an expert in that field would be required.

This wide variety of skills will ease the process of designing and implementation, and may be advantageous as each can bring diverse points of view and innovative ideas to the project.

Step 3: Define Objectives and Desired Outcomes

The next step is to clearly define all business objectives and the outcomes that are desired to occur after deploying the gamified solution. It is extremely important to have "[a] well-defined problem and target goal[s]" [25] in order to build a gamified system that will produce these results. Brian Bruke, "Gartner research Vice Presidents" [21], believes that in order for any goal to be achieved, the precise objectives should be examined and recorded [21]. One must know "what constitutes a win" [96] and establish the ultimate achievements that are wanted from the project [3]. These objectives should be discussed in terms of the behaviours that this gamified solution will ultimately accomplish. These may include: "increasing customer, retention, building brand loyalty, or improving employee productivity" [72, p. 87]. Below are a couple questions to provoke the thought process towards defining the business objectives:

- *What is your foremost motivation for using gamification?* [90]
- *What specific process or problem do you want to gamify?* [5]
- *What goals or results do you desire to achieve through gamification?* [5]
- *Do your goals involve behaviour change, inspiring innovation, developing skills or other?*
- *How do these goals translate into instant or long-term profits?* [43]

The key is specificity. According to Werbach and Hunter [72], "it's critical to have a well-developed understanding of goals" [72, p. 87] and if this step is not performed the gamified solution "will probably fail eventually" [72, p. 87]. Vagueness when defining business objectives is a very common and costly mistake. For example, defining a goal as "I want more engagement" [90] is similar to say to a doctor "I'm sick" [90] with no any further explanations

of symptoms [90]; it is unhelpful information. Therefore, there must be great clarity when defining goals in order for them to be helpful in solving the problem ([96], [35]).

Werbach and Hunter [72] devised a simple set of instructions to help devise this set of objectives. Firstly, they suggested starting off with compiling a list of all possible aims. The goals should be as detailed as possible and the list can be extensive since it will be narrowed down in the subsequent steps. For example, depending on the problem to be gamified, some of the items in the list could include: "attract high school dropout from low-income communities to use your personal finance education tool" [72, p. 88] or "[get] employees to suggest out-of-the-box ideas for new business opportunities" [72, p. 88]. The next step is to organize the list in order of most significance to the organization to least significance, in order to be able to "trade off lesser goals for more signification ones" [72, p. 88]. The last step consists of eliminating elements of the list that are "a means rather than an end" [72, p. 88] or "a stepping-stone to a more important goal" [72, p. 88]. Keep only those goals that are valuable outcomes to the organization. As an example, imagine an organization that is attempting to improve customer retention through engaging them in their website. An item on their extensive list may include "getting users to accumulate points and badges" [72, p. 88]; however, this is a means of achieving their goals and it "isn't a reason to implement a gamified system" [72, p. 88]. On the other hand, an item that stated "having large numbers of players visit your website" [72, p. 88] could be considered an end or valuable goal for what this company wishes to achieve [72]. The key is to think, for every element, if this were the sole outcome from this project would it be considered a successful result [72]? If the answer is yes, keep it.

This final refined list of business objectives is crucial to the rest of the project and must be continuously revisited throughout the project [72]. It will become a point of reference to stay focused on the ultimate goals [72].

Step 4: Know your Players

It is essential to the success of gamification to understand the targeted audience and know what motivates them. It is an extremely frequent mistake to not take into account the users' desires and use a "one size fits all" [105] strategy to designing the application ([105], [90]); this will aggravate the players whose needs are not met [105]. This is a vital step that

should be completed before designing any aspect of the application [32]. In order to know the users one should attempt to answer some of the following questions:

- *Who are the individuals that will be using the gamified application?* [5]
- *How are they related to you?* [5]
- *What are their ages, genders, line of profession (demographics)?* [5]
- *Can you describe their "psychographics"* [5] *for example their personality characteristics and personal values?* [5]
- *What activities do these individuals enjoy or detest?* [43]
- *What rewards are appealing to them?* [43]
- *What motivates them or disengages them?* [43]
- *Do they enjoy games? If so, what characteristics of games do they find most appealing?*

It is crucial to be able to answer these questions as accurately as possible. Knowing what motivates the users and incorporating this into the application will make it more attractive to the users; it is of no use to "creat[e] a game no one wants to play" [18]. Lining up the users' desires with the application design, makes the experience more enjoyable and turns tasks that tend to be mundane into meaningful ones ([96], [5], [7]).

Getting to know the target audience can be done in several different ways depending on preference. An organization can use a combination of various measures to obtain user data such as: surveys, interviews, research and the organization's employee records. Additionally, several game player personality theories can be used in combination with the previously mentioned data collection strategies or in cases the data is unavailable. These theories can include Bartle's four player personality types (described in Chapter 3 Section 3.2.3) or similar theories.

Werbach and Hunter [72] suggested a short procedure to aid with the distinction between user types in a company's specific user group. This process later eases the process of choosing the game mechanics and dynamics for the application that will suite the variety of user types. The first step is to divide up the users into subgroups depending on needs, personality types, professional interests or demographics [72]. The reason for this is so the project team knows what different needs to target and make it appropriate for as many users as possible [72]. This is particularly useful in game-like systems since the application presents players with several activity choices and it can use a combination of different game elements so that all users have at least one activity that appeals to them [72].

The second step is to create a fictitious character for each one of the subgroups that will be representative of the typical individual in the group [72]. For example," Bob is a baby boomer, recently retired who likes to play golf four days a week" [72, p. 91] and "Lucy is a graduate form Ivy League School who came to work at your firm straight out of college and plans to eventually go back and get her MBA" [72, p. 91]. Bob and Lucy each represent what the typical individual in each of their respective groups desires and enjoys. These characters are now much easier to match up with player personality theories compared to matching each individual in the user group.

It is important always remember that not all groups of players are the same; this is why it is still essential to gather as much knowledge as possible about one's targeted audience in order to tailor the application to their personal needs. Eventually, knowing the players will enable the project team to discover what rewards or activities to implement and how to design the application in a way that will be most effective with the particular group of users [30].

Phase 2: Design

At this stage the main objective is to determine that basic design and elements of the future application. At this stage there is still no physical application being created but it is the point where the user's target behaviours are determined along with the game components, mechanics and dynamics that will be incorporated into the gamified system. Bear in mind, that the ideas forged in this stage can be altered throughout the project. It is recommended to return to these steps (steps 5 through 7) throughout the implementation, deployment and maintenance stage as new ideas may surge.

Step 5: Determine Desired Behaviours

From the previously established business objectives, the organization must establish what behaviours they wish to increase or set off in their users ([90], [43], [35]). These wanted behaviours should tie in with the business objectives (whether directly or indirectly). Additionally, not only does this step involve compiling a list of wanted behaviours, but also determining how to measure or quantify them ([43], [5]). Answering the following questions can be used as a starting point to completing this step:

- *What behaviours do you want to see your users to perform? (* [5], [96], [35]*)*
- *Are the behaviours measurable and how can you measure them? (* [5], [43], [72]*)*
- *Do these behaviours encourage any of the previously determined business goals? Directly or indirectly? (* [5], [90]*)*

In this step, the keys are to: 1) never forget your business objectives, 2) ensure the behaviours are specific, and 3) guarantee that they can be measured; one should always "consider behaviours and metrics together" [72, p. 89]. These are some examples of possible desired behaviours that Werbach and Hunter [72] stated in their book *For the Win*: signing up for an account, posting comments, work out for a minimum of half an hour, tweet information about brand, visit locations or venues and buy a specific product.

The nature of the behaviours chosen is entirely dependent upon the project and its intentions. However, it is critical, as mentioned earlier, that the behaviours that are chosen should "promote the ultimate business objectives ... though the relationship may be indirect" [72, p. 90]. For example, encouraging the audience to "spend more time on your site or talk about your products on Facebook" [72, p. 90] does not have a direct relationship with obtaining profit, yet "it may still be desirable" [72, p. 90] since it increase loyalty and brand awareness [72].

The first part of this step is to develop a list of as many possible target behaviours as one can think of [72]. These are at much smaller granularity than the business objectives determined earlier. As an example, if the objective of the project is to increase customer loyalty to a brand, some of the targeted behaviours could include: signing up for an account on their website, buying a product, spending an hour a week on their website, "like" the brand's social networking page, positively tweet about the brand or their products, use the brand's 'hashtag' on twitter etc. Through this range of behaviours users can choose what task they prefer to perform.

Secondly, once the list of desired behaviours has been recorded, one must determine if the behaviours can be measured or enumerated [72]. Werbach and Hunter [72] describe this as a way to "translate behaviours into quantifiable results" [72, p. 90]. The reason for doing this is that gamification "runs on software algorithms" [72, p. 90]; it transforms activity data into quantifiable data which can be used to provide rewards and feedback to the players [72]. The players may only end up seeing that they have won a badge, unlocked a new mission or climbed up a level in some sort of graphical representation. However, behind all of this the

application must have a precise system in place to determine how to calculate and determine a successful achievement [72].

Step 6: Define Initial Game Components

This is the step where the previously defined behaviours are transformed into the initial layer of basic components that will form the shallow layer of the gamified application. The main ideas it to take the list of desired behaviours and derive what game components are best for rewarding the successful completion of each of these actions. This again may be subject to change as the application design evolves.

Firstly, take the behaviours on the list one by one and pick which game component matches it best. Game components are the most basic and specific elements of a game [72]. These elements will make up the "most obvious surface-level gamification features" [72, p. 70]. The most commonly used game components are the "points, badges and leader boards (PBLs)" [72, p. 70]. Points can be used as game currency to be exchanged for goods or rewards and can be obtained by successfully completing missions or tasks [72]. On the other hand, badges are given to the players for special achievements [72]. Lastly, with these points and badges the players are ranked on Leader boards to be able to examine their performance in comparison to other players [72].

Even though PBLs are the most frequently seen in game-like application there are many more game components that can be used. These components are "powerful, practical and relevant" [72, p. 71] and they are the ideal stage from where to begin creating the gamified application [72]. Following, the game components will be described in detail.

Points

Certain tasks, missions or specific behaviours are assigned precise point values and, upon correct completion, the players are rewarded with these points ([5], [72]). In other words, points are a way of quantifying a player's progress and performance through the game's activities ([43], [72]). Using a point systems can spark individual's collecting instinct and provoke continuous participation in activities that award points [72]. Points can also strike

competition between players by using them as measures of achievements and player rankings [72]. Subsequently, Werbach and Hunter's six main functions of points are described [72]:

1. **Tracking progress and score:** points represent the player's progress throughout the game and allow users to compare their performance to others. They also serve as a way to distinguish levels and achievements.
2. **Defining win states:** points are able to define when a player has won or successfully completed an activity (a reward for the winning state).
3. **Association between achievements and rewards:** sometimes points may be used as a currency for the game, where players are able to redeem their points for physical or virtual goods. This may be used for marketing and as a strategy for promoting products.
4. **Feedback:** Points offer the smallest granularity of feedback in a game, as each point that the user obtains demonstrates that they have done something well and are advancing. Real-time, continuous feedback is an extremely important component of games, which engage users to keep on playing.
5. **Exhibit progress to other players:** points can be displayed and seen by other users in order to compare their progress or as an indicator of the player's status and expertise.
6. **Present game designers with insight on game effectiveness:** Because the points users earn can be tracked and recorded effortlessly, designers can use this information to analyze the systems effectiveness. Points can shed light on characteristics, such as the degree of difficulty of a game activity (i.e. is it too challenging or easy to complete) based on the speed at which the average player obtains the points for the activity.

No matter how many functions points can serve, it is important to keep in mind that points have many limitations. Points offer little meaning or explanation as to why they were obtained apart from the meaning the players may intuitively suspect [72]. Therefore, because of this limitation many point systems are used simultaneously with badges, which offer more meaning [72].

Badges

Badges are "visual representations" [72, pp. 74, 80] of precise "merits" [43] or achievements. In a way, they are similar to trophies, and just like point systems, they provoke "the drive of collecting" [43]. However, they offer more meaning and insightful feedback than

points. In addition, the flexibility of badges is an extremely significant characteristic since badges can be designed to award a plethora of activities or behaviours [72]. Their only limitation is in "the imagination of the gamification designer and the needs of the business" [72, p. 75]. Unlike points, badges allow for individuals with extremely diverse interests and motivations to be engaged in the gamified application since each badge will be designed for different types of players. This way they can chose which ones they wish to aim for [72].

Furthermore, badges can indicate two types of behaviours. The first behaviour they indicate is the collection of specific amounts of points [72]. For example, in a gamified application that track's the user's walks or runs some collection badges could include completing: "50 miles in a week or 10,000 steps in a day" [72, p. 74]. The second types of badges indicate successful completion of activities [72]. An instance of this can be found in Foursquare, where users are able to obtain badges such as the 'adventurer' badge which is obtained after 10 check in's, or the 'crunked' badge which is obtained after 4 check-in's to distinct bars in one night [72].

The following are 6 characteristics of badges that provide motivation to users, which are adapted from Werbach and Hunter's explanation of badges [72, p. 75]:

1. **Present goals:** badges, and the criteria for obtaining them, serve as goals that the users can strive for. It has been shown that once users have identified what badges they wish to obtain and understand how to obtain them, their motivation for playing increases.
2. **Guide the users through the game:** badges work as a way for users to understand what can and cannot be accomplished in the game. They allow the users to see "what the system is supposed to do" [72, p. 75].
3. **Describe users' preference:** a display of a user's badges is a good representation of what type of activities the user enjoys performing or what challenges they prefer to engage in.
4. **Display users' credentials:** the display of a user's badges can also be an accurate depiction of the users' credentials, expertise and knowledge acquired. Users are motivated to obtain badges in order to "show others what they are capable off" [72, p. 75]. Badges can be used by the employees as a way "to demonstrate certain skills" [72, p. 75] and can act similar to a resume ([83], [72]).

5. **Indicate of status:** through the use of badges to display a user's credentials and preference, badges are ultimately a way for users to shape and attractively represent their status and reputation.
6. **Belonging to a community:** users are able to identify with other users or a community that may have the same badges (i.e. same interests). Badges are able to connect users and create a sense of "group identification" [72, p. 75].

Leader boards

Leader boards also serve as a way for players to visualize their progress and accomplishments throughout competitions or the overall game [72]. Yet, leader boards differ from points and badges, since their main objective is to display a user's progression in comparison to other players [5]; thus, they "give context to progression" [72, p. 76].

However, leader boards may cause problematic behaviours among the users depending on how they are set up [72]. Leader boards make performance information available for all users to see; this brings either positive or negative results. If properly used, leader boards can serve as extremely effective motivation for the users [72]. For example, users experience a powerful drive to keep playing if they see that they are a few points away from surpassing the next player or reaching the top rankings. Users tend to want to know where they are in comparison to other players unless the result of that shows that they are not doing well; no one wants to be ranked last. Thus, the alternative outcome is a strong disengagement [72]. The players may decide to cease playing if they discover that they are very far away from the top ranked users or last on the ranking [72].

There are several ways this limitation can be counteracted. First of all, it is highly suggested that if an organization wishes to use leader boards that they use more than one board or make them dynamic [72]. Various leader boards can track several features or activities simultaneously [72]. The application can contain several leader boards all measuring and displaying rankings for different attributes and even leader boards "that aren't universal for all participants" [72, p. 77]. One can make leader boards scalable to rankings among friends or players in the area rather than the general population. Additionally, the score board could display the user with five other users above or below him or her to display what players are at the same level. Lastly, so that users are not discouraged by being ranked among the last participants, the leader boards could display only the top ten players and inform the user of

their ranking number with stating what the number of total players is. Any combination of these strategies could help in lowering the risk of leader boards resulting in disengagement.

Other game components

Descriptions of other game components that should be considered can be found bellow:

- **Achievements:** they give users "positive reinforcement for high-value ... behaviours" [5]. They are similar to badges and are sometimes used interchangeably [72].
- **Collections:** certain types of virtual items can be gathered and collected [72]. This can be badges and other items that users can buy or get rewarded with, that belong to a collectable set.
- **Levels:** explicit "steps" [72, p. 80] that define where the player is in the game. Levels serve the purpose of displaying the user's expertise and progress ([5], [43]).
- **Notifications:** when players carry out desired actions notifications promote a motivation in response [5]. This is similar to notifications in social networks where one user's actions leads to an unveiling of many desired actions. For example, on Facebook if a user tags friends in a picture, the friends will receive notifications. This will incite them to comment on the picture.
- **Progress bars:** a graphical representation of the players progress. It may indicate the progress completed in a mission, a level, to obtain the new achievement or in the overall game. Examples of this can be seen in Chapter 4 in the description of the gamified Google interview preparation [73] or airline applications such as British Airways' gamified application [78].
- **Quest or missions:** these are challenges that the user may perform and complete in return for a reward [72]. Through their predefined goals and rules, these challenges "create a set of behaviors for users to perform" [5].
- **Status:** it is similar to levels since it displays the user's expertise; however, statuses serve the purpose of providing the user with a reputable title. This title is recognized by all players and represents a higher level of proficiency. An example of this can be seen in the Foursqure application where users are given the title of being 'the mayor' of a venue if they are the user with the most checked-in's to that venue ([25], [6]).
- **Teams:** predefined or user-defined groups of players that must collaborate to surpass challenges and reach a common objective [72].

- **Virtual Goods:** items that only exist in the game (and not physically) that have a defined value of game currency, points or physical money [72].

All these game components and more can be used in combination with each other to enhance the users' motivation to continue participating and perform the targeted behaviours.

Tips for their use

The first tip for using these components is to continuously consider the business objectives and implement the components sensibly. As was explained earlier, some of the components bring risks of demotivation that can be reduced through a well-thought out design. Additionally, these game components should be carefully chosen. It should be ensured that they "match the particular demands of [the business] situation" [72, p. 82] and always "align with [the] overall ... business goals" [3].

The next tips are words of caution about using PBLs and how to get a proper effect from them. First of all, it is important to realize that PBLs are not correct for all applications [72]. The project team may realize that PBLs do not serve the purpose of the project or do not align with business objectives; this is perfectly fine. Always remember that using PBLs when they do not fit the purpose of the project may be damaging [72]. Therefore, it is highly recommended to not use PBLs for the sake of it or incorporate them without meaning or purpose since the user may get bored or annoyed ([18], [3], [12]).

Lastly, the design of the application should go beyond the obvious game components to create a wholesome experience. Even though these components are the most obvious, frequent used elements and "hallmarks" [12] of gamification, it is important to know that "they're not the whole story" [72, p. 70]. They can "create an empty experience with empty relationships" [7] and cause serious negative engagement effects on the users if used alone or implemented incorrectly ([7], [72], [31]). The game components described in this section are meant as the simplest layer of gamification upon which everything else is built [12]. Most individuals believe that the design stage of the project is complete after this step and they will move on to implementation. However, to obtain the utmost engagement from the users through the gamified application, it is vital "to move beyond PBLs" [72, p. 77]. That is why here we establish the base of the application or "the 'skin-deep' ... features" [72, p. 70], and the following step focuses on designing on a deeper and more advanced level.

Step 7: Develop the Game Design

One of the biggest causes of failing gamification systems is poor game design or lack of knowledge on how to properly design an engaging system [12]. A large number of organizations simply add points, badges, leader boards and call it a day; this is a mistake. Game components "should never be considered in isolation" [35] and should always be accompanied by elements such as game dynamics or mechanics to create a wholesome, engaging experience [108]. Thus, the ultimate design goal is to "align an organization's objectives with a player's intrinsic motivation" [32] in order to bring meaning and create game experiences (i.e. game dynamics or mechanics) such as socialization, collaboration, mastery, progression, relationships and emotion [31].

Therefore, during this step we will go beyond the game components to incorporate the ultimate engagement experiences into the application design. To do so firstly, we must understand the game dynamics – the ultimate "level of abstraction" [72, p. 78]. Dynamics are achieved through combinations of game mechanics; therefore these should be kept in mind throughout the design process since the objective is to create them. Lastly, the main focus of this step is to create game mechanics through interactions of a variety of game components. During the current step, new game components may be added and the design structure may change completely. However, always keep in mind that the goal is to effectively create the experiences represented by the game dynamics. Figure 8.2 displays the hierarchy of game elements (i.e. dynamics, mechanics and components) along with a short definition of each. Additionally, Table 8.1 summarizes the most important examples for each type of game element. Nevertheless, all aspects of game dynamics and mechanics will be explained in detail in the subsequent sections.

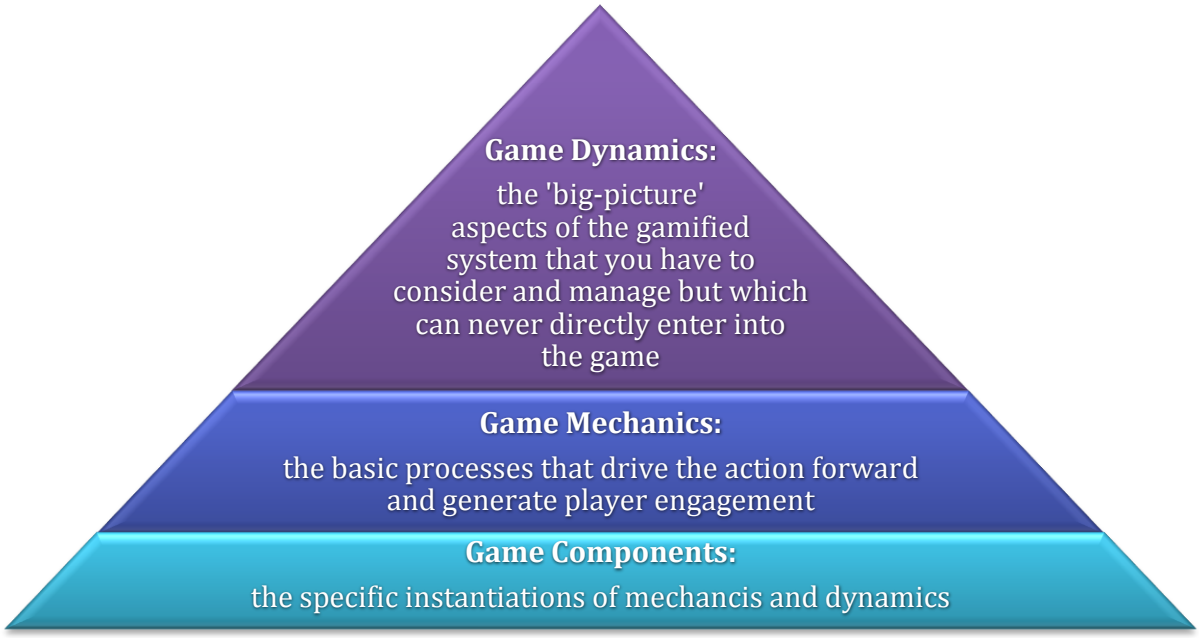

Figure 8.2: Hierarchy of Game Dynamics, Mechanics and Components (Adapted from: [72, p. 82])

Table 8.1: Summary of Important Examples of Game Dynamics, Mechanics and Components (Adapted from: [72, pp. 78-80])

Game Dynamics	Game Mechanics	Game Components
•Constraints	•Challenges	•Achievements
•Emotions	•Chance	•Badges
•Narrative	•Competition	•Collections
•Progression	•Cooperation	•Leader Boards
•Relationships	•Feedback	•Levels
•Personalization	•Resource Acquisition	•Notifications
	•Rewards	•Points
	•Transactions	•Progress Bars
	•Turns	•Quests or Missions
	•Win States	•Status
	•Profiles	•Teams
		•Virtual Goods

Step 7.1 Game Dynamic

Game dynamics, as mentioned previously, are game elements with the "highest level of abstraction" [72, p. 78] which cannot be explicitly incorporated into the application but can be indirectly "consider[ed] and manage[d]" [72, p. 78]. These aspects form "the big-picture" [72, p. 78] of the gamified experience [72]. Game dynamics include, but are not limited to, the following [72]:

- **Constraints:** these include limitations that restrict the actions of the users. These may include rules "that are explicit and enforced" [6] or elements such as "anti-gaming mechanics" [5] which are restrictions to how frequently users are awarded for their behaviours. An example of an anti-gaming mechanic is when users can only receive rewards three times a week for the same behaviour [5].
- **Emotions:** a gamified application should not be design with the thought of human rationality in mind, but it should with the thought of human emotion [96]. This is because during game play (e.g. in situations of pressure or quick thinking), individuals base their decisions on intuition and emotion, not rational thinking [96]. Gamification should strive to provoke a range of emotions from joy and curiosity, to frustration, concern and competitiveness ([72], [55]). Human emotion is one of the most powerful intrinsic motivators as it can lead to a state of flow and complete immersion [55].
- **Narrative:** a sequence of story elements (forming a continuous storyline) which provide the users with the context and information about how the elements of the game will "unfold" [5] and the objectives they must reach ([72], [5]). The storyline can either be "pre-scripted" [5], where all the information is unveiled at the commencement of the game, or it can be "emergent" [5], which is when the story's information is revealed as the user progresses [5].
- **Progression:** elements that allow for user growth as they travel through the various steps of the game in an incremental manner ([72], [5]). Similar to the narrative, a progress path contains a series of clearly defined challenges, levels or steps [35]. This may include elements such as: unlocking content, levelling-up, completing sequential missions, moving through the storyline or slowly completing progress bars.
- **Relationships:** individuals continuously strive for social relationships and interactions. Technology now-a-days provides individuals with increased amounts of social interactions, social support, constant communication and contact with friends or

family [35]. Therefore, a gamified application should strive to provide: a "communication system" for the users [6], "enhance[d] conversations and dialogs" [35], "increase the level of interactions" [35], team activities and social atmospheres ([35], [6], [74]). Fulfilling these desires will give the users a sense of socialization, companionship, support and selflessness, which will increase engagement ([35], [72]).

- **Personalization:** this includes providing users with elements that allow autonomy, adaptation to their persona, flexibility of choice and self-representation ([6], [74], [5]). The most important of which are described subsequently:
    - *Self-representation:* the system should provide users with the ability to personalize their application, whether it is with personal information on a profile, creating an avatar or uploading a picture. This enables users to express themselves and "increases ownership in the experience" [7].
    - *Flexibility:* the application should be designed for flexibility in activity preference, behaviour alterations or adaptation to the player's rhythms and habits ([43], [105], [74]). It is extremely important to allow flexibility of choice by giving the users options on: which activities they wish to perform, what personal information they wish to publicly display etc. Take into account that some players may not desired to be the centre of attention or wish to have their information be viewable to all other players [105]. One should consider including features that will allow players to participate in activities and challenges without having to "reveal their identities" [105] if they wish for it. Lastly, the application must consider carefully a flexible design to accommodate the user's lifestyle, habits, personal needs and schedules [74].
    - *Autonomy:* It has been proven that "autonomy fuels intrinsic motivation" [5]. The users should have the freedom and independence to choose what objectives they wish to strive for [5]. Additionally, users also desire to be distinguished as an individual rather than yet another participant in the user group [5]. Special recognition is one of the most effective rewards and strongest motivator that can be used. Lastly, it is of high importance that the gamified application is not used as "a tool for monitoring and dehumanizing the workers" [72, p. 68]; it must allow user creativity and independence rather than standardizing.

Step 7.2 Game Mechanics

Now that we understand the different game dynamics it is time to discover some important game mechanics that when used in combination with each other may foster many of these common dynamics. Following is a list that contains short descriptions of the most important game mechanics:

- **Challenges:** these are activities "that require effort to solve" [72, p. 79]. This may include timed activities to induce time pressure, or tasks that involve serious thought to complete like puzzles ([6], [72]). This mechanic can be combined with missions or quests in order to create activities where users may obtain achievement awards or badges.
- **Chance:** gambling-like experiences and "elements of randomness" [72, p. 79]. This includes activities that involve some degree of probability (rather than performance of behaviours) to obtain rewards or its successful completion. An example of this is Guerrera's gamified Google interview preparation, where he included a variable reward that consisted of flipping two coins, which would reward him with his favourite energy drink if both landed on heads (Chapter 4 Section 4.2.1).
- **Competition:** activities in which a player or a group of players as team go up against each other resulting in one or more winners [72].
- **Cooperation:** several users collaborate in a team to reach a common goal [72].
- **Feedback:** this mechanic is used to provide knowledge to the users about their performances [72]. This is one of the most important game mechanics since the users must understand how well they are doing in order to improve their actions [35]. This must be done at a constant, real-time pace in order to be most effective [35].
- **Rewards:** prizes or compensation for performing some action successfully or completing a task [72]. This is also one of the most important game mechanics since all users desire recognition and compensation for their efforts and achievements [35]. However, it is important to consider that even though all users desire rewards, not all are motivated by the same types of prizes [35]. While some may be motivated by rewards such as status or special recognition, others may wish for virtual goods or even monetary compensations.
- **Resource acquisition:** this feature allows for collecting behaviours, whether it may be for obtaining virtual or physical items that may have use, or are collectables ([72], [7]).

In some cases these acquisition behaviours may be rewarded. As an example, users may obtain badges or special compensation for completing an entire collection of items [7].

- **Transactions:** this involves exchanges among the users [72]. This may be done directly or indirectly, and may include sending users feedback, aid, badges, virtual gifts and commenting on each others' profiles.
- **Turns:** Werbach and Hunter [72] define this as a "sequential participation by alternating players". This may be included in elements such as mini games or quests to induce competition between players or even collaboration to solve puzzles or complete the mission.
- **Win, Draw and Loss states:** these are states that indicate the level of completion of an objective [72]. These are usually used along with competitions to determine the winning, losing or tying players [72].
- **Profiles:** these are personal pages or areas of an application that display the user's information and public achievements. It is a way for other players to know more about a specific user.

Subsequently, the most frequently used game mechanics (namely, competitions, cooperation and, most importantly, feedback and rewards) are explained in depth.

Competition

The creation of contests to provoke competition between users is a powerful motivator. Contests can be sets of tasks that all competing individuals perform and they are rewarded based on who completed the tasks first or most successfully [5]. Some of these types of competitions may include: physical or intellectual competitions, competitions for innovative ideas, creative skills, persistence, luck or even patience [5]. A competition's ability to incite a "roller coaster" [5] of emotions (e.g. excitement, drama, "anticipation, relation, anxiety[,] ... fear" [5]), makes it an extremely influential tool for engagement [5].

However, some users may find rivalry and competitive environments intimidating, uncomfortable, unappealing or, all-in-all, demotivating [105]. This demotivation may not be isolated to competition, and may also apply to hierarchies, such as leader boards, or other "celebration[s] of inequality" [105]. Therefore, a gamified system should allow users the freedom of choice when it comes to participating in competitions or other win-or-lose

situations. These users may choose to participate in other features of the system that focus on personal achievements and progress. Lastly, it is important to consider not offering physical or monetary rewards to the participants of these optional activities as it may be unfair and considered discriminatory towards those who did not feel comfortable participating [105].

Cooperation

The cooperation game mechanic involves incorporating activities into the application that revolve around team collaboration [31]. This may include working as a team to gather resources to complete missions, tasks or solve puzzles. One may also consider including cooperative competitions. For example, if an organization is gamifying innovative idea competition for employees, the workers could team up by floor or department in order to compete for the most innovative idea. Cooperation will help foster engagement as it satisfies the users' needs for socialization, relationships, social support and gives users a sense of belonging. Additionally, including a collaborative competition feature may make contests more appealing to those who may not enjoy individual competitions. The reason for this is that, in collaborative competitions individuals may not feel as much intimidation or solitude since the team dynamics brings support, whereas in individual competitions the players only experience rivalry with no support through the contest.

Rewards

Rewards are extremely important in gamified system because rewarding correct behaviours will encourage the users to repeat them with great frequency, feel satisfaction, and continue participating in the application [10]. However, it is important that the right rewards are chosen since a prize that has no value to the user will cause no motivation or excitement [105]. This is when knowing the players is useful. The most effective rewards are those that are significant to the each player type; this might include creating a variety of rewards that will appeal to different types of users, since not all user are motivated by the same rewards [107].

All rewards, however, should follow three key characteristics. Firstly, all rewards should be meaningful and scalable [96]. As stated previously, if a user does not understand or perceive any value from a reward, this reward will have no motivational effect. In fact, it has been proven that if a reward is "a superfluous source of motivation" [55] or the value is "not

immediately obvious" [55] the reward will have damaging effects on user motivation [55]. Secondly, it is crucial to ensure that the system is rewarding the correct behaviours ([25], [105]). Like the example described in Chapter 7 (Section 7.2.2), rewarding wrong behaviours may have unintended consequences that are damaging to the users' engagement. Thirdly, all rewards should be awarded at the correct granularity and be "achievable in a good time" [5]. This means that the tasks to be rewarded should not be too challenging or too effortless to achieve so that the user will not get frustrated or bored [5].

Furthermore, the most effective rewards in a gamification system tend to be very low in cost for the designers but extremely high in value to the users, namely intrinsic rewards [24]. Ultimately, "the best rewards are the ones in the minds of your players" [24]. While solely using extrinsic motivators in a gamified system has shown to be "profoundly demotivating" [72, p. 60], the best results are always achieved by combining both [96].

Extrinsic rewards such as monetary compensations, physical goods or valuable real-world rewards are the most straightforward, frequently used incentives by organizations ([22], [105]). These types of rewards have been seen to work, but research has proven that, even though economic rewards may continue the same quantity of work, the quality of the work produced suffers ([22], [105], [30]). This may be due to workers attempting to "cheat the system" [22] in order to increase the amount of rewards they receive [22]. Additionally, studies in social psychology have shown that these types of rewards decrease drive and inventiveness [55]. That is why gamification centres its attention on lowering the use of extrinsic motivators such as financial compensation and focusing on intrinsic motivators which are the most effective and lasting incentives. It is important to note that extrinsic motivators are not eliminated completely, since the most effective motivation is a combination of both extrinsic and intrinsic incentives.

Overall, there are four types of rewards that have been seen to be most effective towards user motivation: recognition, social standing, VIP treatment and "stuff" [24]. Following, are detailed descriptions of these reward types arranged from most effective to least effective [24]:

- **Recognition:** this involves giving the users individual or special recognition, which involves appraisal for their efforts, actions, success and achievements. As human beings, recognition and appraisal is something of high desire. Recognizing user achievements creates in the users a "sense of belonging, esteem and self-actualization"

[105], all of which serve to foster engagement. Furthermore, users continuously want to be acknowledged for their "skills and knowledge" [83]. One of the motivations for users participating in training is to build on their skills; however, if nobody is aware of their new and improved skills, "[there is] less of a point" [83] and consequently less motivation to take part. Therefore, these rewards and recognition should "last and be visible to the public" [105] as it is important to broadcast their talents and acknowledge "individuality and diversity" [105]. Lastly, it is vital to recognize users not just for their successes but also for their efforts [10]. This will motivate them to continue attempting to master the skills and succeed.

- **Social Standing:** this entails things such as status, ranks and reputation within a community ([24], [6]). Since social "desires" [35] are common among users and these rewards spark "social natures" [24], and become of great value for the users ([35], [24]). In addition, these rewards are seen as efficient because, apart from their higher social value, they are virtually costless to the gamification designers [24]. Moreover, "subtle social pressure" [95] to improve their reputation can become a very important incentive to users [95]. Lastly, reputation can provide users with "bragging rights" [30], which is another powerful motivator. Finally, to most users, "the more social an experience becomes, the more valuable [it is]" [30].
- **VIP Treatment:** this includes allowing users exclusive power and access. To give user access means to allow them admittance to restricted or elite activities, features or rewards [24]. Power is another strong motivator since people truly desire to be able to, for example, have their vote count more than others in a poll, or being "community moderator" where they can "ban users, remove status or shift points" [24].
- **"Stuff"** [24]**:** this can comprise either virtual or material goods. Including material goods, such as economic incentives or give-away items, in a gamification system can result in large expenses, whereas virtual items (e.g. new background images for your profile, a lamp for your virtual bedroom in the application, or weapons and armour in a combat style game) may be free of cost and just as incentivizing [24].

Feedback

The most important of all these mechanics is feedback. It comprises any element that provides users with information about how they are performing [72]. In addition, when

feedback is used correctly, it motivates users to alter their actions and guides them to perform the targeted behaviours [72]. Creating feedback loops and providing feedback in the way the users desire, will help increase their drive. It is important to understand what people want out of feedback and how they want it in order to understand how feedback should be presented. In order to be valued by the users, feedback should have the following four features:

1. **Real-time and Accurate:** the users should be provided with continuous, real-time, accurate feedback. For example, a user does not have to wait until the end of the month to receive their electricity bills and discover if they have saved money or not [92]. With real-time or frequent feedback users can understand within the week or even the same day, how they are consuming energy [92]. Homeowners, for example, should be able to increase the heating in their house and be given immediate feedback showing its short and long term effects [72]. This could be very valuable, since the users are able to view the effects of their actions and can immediately alter their behaviour to improve the results.
2. **Provides Meaning:** feedback should provide users with meaningful information about their behaviours ([25], [95]). In other words, feedback should be interpreted and understandable to the user. If after the users perform activities they are provided with raw numbers or data, they will derive little to no meaning about how successful their performance was. If feedback does not provide meaningful performance information, the players will not understand how they are performing and there will be no opportunity for improvement. Feedback should always be activity data that has been interpreted and provides valuable information.
3. **Facilitates Improvement:** tying in with the previous characteristics, providing meaningful feedback facilitates the users with accurate measures for understanding how to improve or regulate their actions [72]. Users desire to be provided with data about their actions, such as basic statistical reports and visual aids [74]. These reports should be continued long-term in order to allow the players to use the feedback to improve [74].
4. **Reinforce correct behaviours:** feedback may also act as type of reward as it should reinforce the correct behaviours a user performs. Feedback should not only be provided about their current actions but also about their progress towards objectives in the game [72]. This may be displayed in writing, a statistical report or in a graphical representation (e.g. badges or graphs plotting their progress and successes) [72]. It is

universal that human beings desire to be rewarded for their effort and labour in addition being able to "see visible measures of their personal growth" [31].

Lastly, it is important for a gamified system to create what is called a 'feedback loop' in order to encourage users to continuously repeat the correct actions or work to improve their behaviours. Figure 8.3 depicts the feedback cycle and its various phases: collect information, understand its relevance, devise behaviour changes and take action.

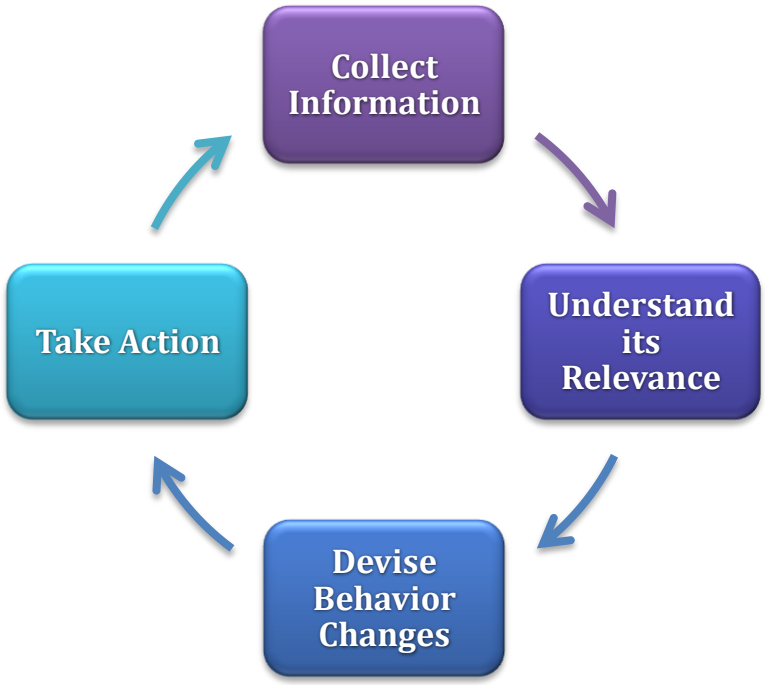

Figure 8.3: Gamified System Feedback Cycle (Adapted from: [39], [110], [109])

The first step to start a feedback cycle is for a user to perform a behaviour or activity. Secondly, the user collects information about their performance (i.e. when they receive feedback from the system) ([39], [109]). In this step, it is crucial that the user receive their feedback continuously and in real-time [39]. The subsequent step, 'understand its relevance', is when the user must make sense of the feedback provided [39]. For example, if the users are told their score, they must understand details (e.g. out of how much the score is) and generally derive meaning about what the score illustrates in terms of their performance [39]. The third step consists of the users analyzing the feedback in order to derive the consequences of continuing or altering their behaviours [39]. This involves understanding: what behaviours to alter, how to alter them, what will be the results of this change, what is at stake and what will

the user benefit from regulating their actions. Lastly, the users must perform internal changes and take action ([39], [110]). Ultimately, they must put into practice the behaviour alterations. With this step the users' complete one feedback cycle and they wait for the next set of feedback ([39], [110], [109]).

Ultimately, this is the most important and thought provoking step. Choosing or designing the right components and mechanics facilitates the establishment of the game dynamics and activity cycles in the application. It is critical that this step is followed carefully, with much reflection and a great deal of attention, as a correct design will give users what they desire and eventually result in a successful gamified application.

Phase 3: Implement and Maintain

This stage consists of constructing the physical system and put it into play. In this phase the organization must make the choice between building the application or hiring a gamification platform vendor to implement the application and to assist throughout the process. The system should then be implemented and deployed, which will lead to measuring activity on the system and collecting data. The final step is to analyze the data collected and use it to examine the effectiveness of the application. With this, adjustments can be made to the system to increase its efficiency. Lastly, maintenance should be preformed for as long as the system is run.

Step 8: Buy or Build?

This is the point where the organization must make a choice: build the application themselves, or hire a gamification platform vender. This depends on the organizations preference, budget and available staff expertise. The first option, building a custom application without outside help, should be chosen if the organization has the proper skilled employees, the budget and resources for doing so. The other option requires an outside gamification provider to be hired to assist in the development of the application. Thus, the questions to ask oneself throughout this step are:

- *Do you have the resources within your organization to implement the application without outside help?*

- *Will you be instead implementing the application with the available company staff and expertise?*
- *Will you be willing to hire a gamification platform vendor or consultant firm?*
- *If you choose a gamification vender, which vender provides the services that best match your needs?*

If you chose to hire a gamification vendor, there are many companies that offer a wide variety of gamification platforms and services to companies who wish to use gamification [8]. These organizations may provide standard or customizable software solution packages [72]. It is highly recommended to contract one of these Gamification vendors in order to complete the project successfully since the individuals in these companies are experts and have been in the business of gamification for many years [96]. Not taking advantage of that expertise would be unwise. They can provide input and new ideas that may not have been thought of. The value added by these companies is vast and their collaboration will allow for creating an optimal gamified system [72]. Additionally, it is of great importance to not hire a game designer instead of a company solely dedicated to business gamification [16]; remember video games are not the same a gamification.

There are several organizations dedicated to providing gamification services and platforms, of which the three most renowned ones are: Badgeville, Bunchball and BigDoor. Table 8.2 summarizes the differences and similarities between five gamification providers including the three mentioned previously.

Table 8.2: Summary of Gamification Providers (Source: [6])

Platform	License	Game Mechanics	Analytics	Games
Badgeville	Commercial	Yes	Yes	No
BigDoor	Commercial	Yes	Yes	No
Bunchball	Commercial	Yes	Yes	Yes
Open Badges	Open Source	Yes (only badges)	No	No
Userinfuser	Open sources	Yes	Yes	no

Badgeville, founded in 2010, is a "global leader in gamification" [111]. They have over 250 customers (from a large variety of industries) which include: "Deloitte, Samsung, EMC, CA, NBC, The Active Network, [and] Appirio" [111] among others [6]. In their product collection of "Behavior Lifecycle Management Solutions" [111], Badgeville combined established strategies from "social gaming, traditional loyalty programs and social networking" [111]. Each of their products are targeted to diverse individuals (e.g. customers or employees) and a variety of behaviours (e.g. socializing, collaboration, competition or other behaviours). Badgeville provides many products among which are their 'Dynamic Game Engine' and their 'Social Fabric' [6]. The 'Dynamic Game Engine' is a platform that influences behaviour through rewards and tasks, and provides a customizable set of gamification "widgets" [6]. On the other hand, 'Social Fabric' is a platform geared towards improving social interaction, which offers socially targeted visuals such as graphs, notifications and streams of user activities [6]. Furthermore, it is possible to integrate their platforms into a variety of systems such as: Adobe Marketing cloud, Microsoft SharePoint and Yammer [112].

Bunchball, another leader in gamification, was founded in 2005 and created the first gamification platform in 2007 ([32], [113]). Bunchball has work with some major B2C and B2B companies, including: Eloqua, NBC Universal, Intel, ESPN, Comcast, Compasfood.com, Warner Bros., Toyota, T-Mobile, Ford, Marriott, Soutwest Airlines and yahoo to name a few ([114], [113]). Their main product is the 'Nitro' Platform which not only provides a large amount of game mechanics but also includes the ability to use "points… badges levels … Actions, Groups, Virtual goods, Social networks, Trivia, Poker, Comments etc." [6]. Another product of theirs, the 'Integrated Nitro solutions', is a "pre-built" [115], straightforward gamified system that makes it simple to use and deploy to their customers [115]. Lastly, their 'Nitro Connectors' are simple, independent elements, created with the objective of rapid implementation, flexibility and customization ([6], [115]). Through any of these three products, Bunchball can effectively offer "a comprehensive gamification software suite" [115] that is simple to implement, highly customizable and allows for viewing of instant outcomes [115]. Their products also offer data analytics solutions for "monitoring and measuring integration status and activity" [115]. Their products offer solutions for: engagement, "loyalty and commerce [to] increase sales" [116] and "employee motivation [to] increase productivity" ([116], [115]). They integrate their solutions into a wide variety of systems including websites, mobile platforms and social networking sites [113].

Lastly, BigDoor, established in 2009, is the leader in "using game mechanics to revolutionize loyalty rewards programs" [117]. They have worked with companies such as: Adobe, Dell, Big Brother, Yamaha, Nickelodeon and Major League Baseball ([117], [118]). Their platform provides customers with customization as they are allowed to add game mechanics, such as "points, badges, achievements and leader boards" [6] to social networks or websites ([6], [117]). Ultimately, they facilitate the addition of a "game layer" [6] to the customer's existing system [6].

The large majority of gamification providers tend to include built-in aspects that provide data collection analysis and metrics to examine the effectiveness of the gamified solution [6]. Overall, BigDoor facilitates a wide range of game mechanics to chose from for an "easy non-technical integration to existing website[s]" [6], while Badgeville stresses social interactions and Bunchball gives "a comprehensive solution" [6].

Step 9: Implement and Deploy the Application

The specifics of how to create the software for the gamified application and the details of the implementation process are out of the scope of this project since these are extremely dependable on the implementation team. However, this step will provide information about different strategies and ideas for implementation that may help along the way. So, the questions to keep in mind, which will be explained in detail during this step, are:

- *What platforms are you considering building the application on? Company website, intranet, social networks, mobile or desktop applications?*
- *How will you raise awareness about your gamified system to your target users?*
- *How do you plan on getting the users onboard (signed-up and participating) with the application?*

The organization should carefully discuss what platform(s) the application will be accessed from. Firstly, one should consider if to use only one or more than one platforms and, secondly, what those platforms should be (e.g. company website, intranet site, social networks, mobile devices, desktop application) ([5], [35], [3]). The number of platforms will depend on the budget and adaptability of the application; however, it is highly recommended that the application should " be available wherever, however, and whenever people have the time and interest" [3] to make it more accessible. In the end, the more platforms the application is on,

the greater the opportunity will be for the users to access it participate increasingly often ([3], [35]). Additionally, certain platforms provide more flexibility of use for the users. For example, an application on a mobile phone will allow the users to access it at any time of the day, in comparison to having the application on the company's intranet, which may promote its use only during working hours. Thus, this must be considered carefully as the accessibility of the application may have a great effect on its use.

Moreover, when implementing the application it is important to take into consideration what are the first features, activities, or images that the player will see on his or her first time interacting with the application. This first impression is extremely important as it decides whether the user will give the application a chance and continue engaging, or if they chose to never engage with it again [5]. In order for the users to choose to continue participating, the user's first activities should be intuitive, simple and informative [18]. The application should begin with "introductory tasks" [5] which explains how to use the application along with describing its rules and features ([18], [5]). Ultimately, it should allow the user to become familiar with the application without having to spend an excessive amount of time.

Once the application is integrated and fully functioning, the most important task to face is how to get the targeted audience to begin using the application. This process is typically referred to as "on boarding" [5]. For a system with current or potential customers as users the way to do this is by advertising to attract the user to sign up. On the other hand, a system targeted at employees is more flexible and a couple approaches that can be used. Firstly, it is important to know that "if an employee doesn’t want to take part, that should be fine" [105]. Therefore, there are two things that can be done. The first one is to attract the employees to voluntarily sign up for the application. For example, a company could set up a "pass way tunnel" [5] at the entrance to the building where employees would have to pass through to enter [5]. This tunnel could play calming music and state a message to encourage employees to sign up [5]. The second strategy could be to sign up all employees to the application, but informing them that they can unsubscribe if they desired to do so.

Ultimately, whether the target users are employees or customers, awareness must be raised about the gamified application in order for it to function [3]. It must be promoted and advertised, for example, on websites or social networks [3]. For employees, it could be advertised on emails or the company intranet. The organization must ensure that all targeted users are "involved and informed" [3]. This will involve informing the users about: the

application, its purpose or objectives and the benefits the users will obtain by participation. It is very common for games or application to "go viral" [3], but for that to happen the users must "be made aware of the game and its incentive" [3].

Step 10: Collect Data, Adjust and Maintain

Once the application is in place comes the big data. This last step involves collecting and measuring data, analyzing it and, then, using that information to adjust and maintain the gamified system. Once again, the questions that should be asked during this step are the following:

- *Do you have tools within the organization to track user activity data?*
- *Do you have the resources to analyze this data? Or will you be contracting external individuals to provide you with these resources?*
- *Do you have experts that will be able to adjust and maintain the system after it is in place?*

Measuring and Data collection

At the initiation of a gamification project, the objectives were determined; now it's time to evaluate them [3]. This is the phase where one tracks the development "towards achieving [the] business goals in real-time" [3]. As [28] stated, everything must be tracked. Gamification is "very data driven" [25]; metrics are just as significant as using game mechanics and an effective game design [6]. Throughout the use of the gamified application the organization must continuously monitor the users' activities, performance, what they access and their behaviours in real-time [25]. By carefully examining these actions the organization is able to conclude if the actions performed are correct and game mechanics are accurately provoking the wanted outcomes [35].

Analysis

It is not sufficient to simply obtain activity data [35]. After collecting the data, an analysis using metrics or formulas is crucial to understand the meaning behind the data and to

understand the value the engagement will bring to the business [35]. Using game metrics allows the company to conclude what the users enjoy or dislike about the application and what activities performed are the most effective in achieving the business objectives [6]. Gamification uses a quantitative perspective as it is driven by statistics in order to improve the [13].

The organization should use several aspects of user participation in order to obtain ideas for adjustments and improvements of the systems [55]. Some of these aspects that should be explored or measured are: motives for participating, social activity, flow, enjoyment and task involvement ([55], [3]). This can not only be done through user activity data but also through surveys or questionnaires that the users can complete about their experience using the system.

Gabe Zichermann established a way to evaluate the effectiveness of the gamified application called 'E-score' (engagement score) ([6], [119]). The following are the metrics that compose the score [6]:

- **Recency:** measurement of how much time has passed since the users' last visit.
- **Frequency:** measurement of how frequently the users re-visit the application.
- **Duration:** measurement of how long the users stay on the application for every time they access it.
- **Virality:** measurement of how fast and far has the awareness of this application spread. How many other individuals have the users told about this application?
- **Rating:** measurement of what the users say about the application (expressing good or bad experiences).

There are many other types of metrics that can be used to examine the effectiveness of gamification such as general business metrics, marketing metrics etc. These can be used to shed light on strengths and weaknesses of the application in order to perform adjustments to improve its success.

Adjust and Maintain

For the software development and video game industries, work is not over once the software has been deployed [35]. After the release there is still a lot of work to be put into learning how to improve the software and go through continuous adjustments and

maintenance [35]. Constant improvement is essential to maintain the "momentum" [108] and ensure that the players are engaged longer ([35], [108]). Gamification should be developed using an agile techniques as it is "a process[,] not a destination" [108]. A way to approach it is by beginning with "a minimum viable product" [108] that is able to engage the target audience and, through the results of data analysis, alter the software to improve its effectiveness [108].

Furthermore, small experiments can be performed on the application to see how alterations affect user engagement. This is highly recommended since gamification is a new field and not everything has been discovered or proven [25]. It is important to investigate how one's specific users react to a variety of features since all users are different and their actions are not entirely predictable; this will help discover what works best in one's specific situation. Gamification is all about experimentation to achieve the best outcomes [25]. Therefore, once the application has been deployed and players have had time to use it, small experiments should be performed, such as altering: wording, addition/subtraction of mechanics, aesthetics of features and imagery of the application design ([24], [25]). Once the features have been changed, data should once again be gathered and analysed in order to compare various versions of the system [3]. For example, changing the aesthetics or placement of elements such as, a leader board, can help determine if the change alters how frequently the users access the feature [25]. Additionally, changing wording (or converting words into images) in descriptions or instructions could shed light on, if the users are more likely to read or follow the descriptions [25]. Lastly, it can be tested how user activity changes depending on the application's platform. Organizations can explore if user activity decreases or increases if the application is on social networks compared to the company's intranet site or on mobile devices [3]. Ultimately, through these experiments, an organization can determine what changes alter the users' behaviours positively and use this knowledge to adapt their gamified application to produce significantly better results.

Conclusion

This concludes the process of a gamification project. This detailed guide can be used by a wide variety of industries to understand and follow the procedure of a gamification project. As was seen, this guide is applicable to any type of gamification solution since it can be used to create gamified applications that alter behaviours, inspired innovation, improve loyalty and other results that gamification has been seen to produce.

Chapter 9: Suggested British Telecom Design

This chapter takes the 'steps to Gamification' guidelines from Chapter 8 and completes them tailored specifically to British Telecom's (BT) energy saving situation. The steps will be completed through the use of the information provided by the BT representative in this project, in addition to theories from games and psychology to fill in gaps of information. Similarly to Chapter 8, this chapter will be split into three sections (i.e. the three phases) and these will be split into subsections (i.e. each step in the phase).

9.1 Preparation

As stated in Chapter 8, it is important to start of this phase with a clear idea of what problem the organization wishes to gamify and for what purpose. After speaking to the BT representative, he clarified that BT's aim is to engage their employee's in participating in energy saving behaviours throughout the BT campus. After that has being clearly defined, it is important to deduce if gamification is the correct course of action for this case or not. Following that, a suggestion on the composition of the project team will be made along with a discussion of the business objectives and desired outcomes.

9.1.1 Is Gamification the Right Choice?

The objective of this step is to understand if gamification is the right choice for your target problem or if BT's resources are better spent on a different kind of solution. To do this, some of the questions provided in chapter 8 for this step will be answered to deduce whether or not gamification is the correct solution to BT's situation.

First of all, one must be answer the following questions: '*How and from where did you get the idea of using gamification?*' and '*Why do you want to use gamification?*'. These questions serve to gain some insight on the purpose and motivation for using gamification; will BT use it

just for the hype? Or is there a real need for it? During an interview with the BT representative, these questions were asked. First, he said he found the idea when doing general internet searches about employee engagement as it is part of his work to discover "what makes organizations more effective" [120]. Yet, he mentioned that he had not always been aware of the term itself but he "was always aware of the idea" [120]. When asked why he personally wanted to use gamification, he responded that he has "always wondered how to make work more interesting" [120]. He concluded that "if [he] can really make work [more] interesting rather than when people come to work and are looking at their watch all the time, ... [we can] make the business a better place" [120]. Therefore, his desire is "to make the work place more interesting" [120] by using gamification.

It is also important to understand how the gamified solution will solve the problem and if it will be in any way beneficial to the target users or if they will not care for it. Firstly, solving BT's problem of lack of engagement in energy saving efforts will be beneficial to the employee's in many ways. Throughout the game the employees will be rewarded (either physical or virtual) and recognized by peers or superiors for their efforts towards helping the community. Moreover, as the employees participate in the application, they will begin to feel part of the community and get a sense of loyalty towards helping BT reach their energy saving goals. Lastly, even though the energy saving efforts are geared towards the BT offices, the employees will be learning valuable knowledge about energy saving that they can then transfer to their own homes and lower their own energy consumption expenses.

Additionally, the BT representative was asked several enquiry that lead to answering the question: *'Why and how will gamification resolve your problem?'.* As described in Chapter 8, Gamification has a focus on feedback and rewards. This, the BT representative agreed was crucial to fostering participation in energy saving behaviours. He stated that, "what people are looking for is feedback" [120]; however, employees in organizations are not given feedback often and they "feel as if they are being ignored" [120]. He went on to explain:

> "In a business we ignore our employees. Whether someone does a really good job or someone just does a bad job, we don't differentiate between the two. So … getting that recognition and feedback is what it is all about" [120]

This is especially important when saving energy as the employees must understand how they are consuming electricity to be able to know how to improve their results.

The last question to be answered is: '*Is Gamification the best solution to your problem?* [4]. As observed from other gamification cases about energy saving, Gamification is a very effective and correct strategy to use in these situations. This is because gamification, as mentioned earlier, can focus on feedback which is an extremely important feature that is lacking in everyday energy consumption information. Other solutions to this problem could involve allowing users to see their energy consumption at smaller granularity, without including a game-like element. However, this would not be as effective since it eliminated the element of fun and enjoyment which is important for fostering engagement. This is why Gamification has all the elements that are needed for a successful engagement in energy saving behaviours.

By being able to answer all the previous questions effectively and giving a significant reason for using gamification, the question *'Is gamification for you?'* has successfully been answered. It can be concluded, that Gamification will be beneficial for BT's situation since Gamification will provide results that few other solutions could.

9.1.2 Team Project Members

This step consists of defining the project team. It will describe the individuals that would be ideal to gather to form a team with a variety of expertises. This team should ideally be able to cover any aspect or questions throughout the processes of designing and implementing the application. It is out of the scope of this project to select specific individuals since that knowledge is not available. However, it will describe what knowledge is needed on the team and what variety of experts should be included. The following table includes some skills that should be included in the Gamification project team. Table 9.1 describes the experts needed for the project team, similar to those of Chapter 8 (Phase 1 Step 2) but tailored more specifically to BT's situation.

Table 9.1: Experts that should form part of the BT Gamification Project Team

Expertise	Description	Examples
Business Objectives Expert	Understands BT's goals for the project: what do they wish to achieve and what the purpose of this project is	This can be, for example, higher level management or similar.

User Group Specialist	Knows about the target user group. They are in charge of knowing the demographics, personality characteristics and types of users among the BT employees.	It can be someone from Human resources, a psychologist or individuals that are in charge of investigating or survey the BT employees.
Gamification Specialists	Are knowledgeable on all aspects of gamification and should have previous Gamification experience. This is an essential member to the team as the risk of failure is very high if the organization heads into a gamification project blindly.	This can be anyone internal or external to the organization. For example, the organization could hire an expert from a Gamification Service Provider.
Energy Saving Specialist	In charge of understanding the best practices or typical mistakes of energy saving and to determine behaviours that will help reach the organization's goals. Their knowledge may be incorporated into the application, for example, by including features that gives tips on the best ways to saving energy.	This can be an individual from an environmental organization that is knowledgeable in how to help the environment.
Electrical Specialists	Expert in electrical matters. E.g. measuring energy consumption, retrieving electrical consumption data, and install power meters.	This can be electricians or others that have knowledge in this area.
Programmers	These individuals are vital as they will be the ones creating the physical application that the users will participate in.	They can be internal to the organization or individuals hired from Gamification providers to put the application together
Analytics Expert	Performs user activity data analysis and other analytical parts of the testing and adjustment stages of the project. They should be able to analyze and interpret the data to be used in improving the system.	They can be external to the organization, or if the software is bought from a Gamification provider, someone that knows how to use the analytics features that

		these services tend to provide.
IT Maintenance/ IT customer support Specialists	In charge of fixing errors, helping users with problems and maintaining the system for as long as it will be running. Their role will come in once the system has gone through the appropriate adjustments and has reached its desired performance.	This can be any individual within the organization with an IT background and experience with customer service.

It should be noted that these skills do not map one-to-one with individuals on the team. It could perfectly be that one individual may have experience in more than one of the previously mentioned areas. Additionally, this list of specialties can be subject to change as circumstances may create the need for adding other experts.

Lastly, it is highly recommended that BT hires an external Gamification expert since they have had previous experience with Gamification projects and can provide a great deal of knowledge.

9.1.3 Desired Objectives and Outcomes

During this step the overall goals that the company is aiming for will be decided and recorded. The most important idea of this step is to capture the essence of what BT wants to see happen as a result of the employees' behaviours.

First of all, the main problem that BT wishes to gamify is the lack of motivation the employee's have towards saving energy. Their goal is mainly targeted at behaviour change, even though this behaviour changes may indirectly result in the employee's developing new skills and possibly inspiring innovative ways of lowering energy consumption. Their main motivation is to: reduction in energy cost for BT, have a greener environment in the organization, getting the "employees more involved with the business" [120] and getting them want to work together to help BT succeed. Below is the list of objectives (including the previously mentioned goals):

- Decrease energy consumption in the BT buildings and sites.

- Decrease energy consumption costs for BT.
- Improve BT's environmental/green actions as a company.
- Get the employees involved with the business.
- Improve the employees' loyalty towards BT.
- Motivate the employees to work together to help BT.
- Motivate the employees to want this project and the business to succeed in this project
- Get employees to intrinsically want to convert to energy friendly behaviours.
- Change the culture of an organization to one where people are united to help the business and the environment.

Even through all of the previously mentioned goals are interrelated, it is important to consider them in isolation in order to have the clearest idea of what the gamified application aims to perform.

9.1.4 Getting User Information

This section is dedicated to getting to know the target audience in order to create a gamified application tailored to them. Because of the limited amount of knowledge about the BT employees that was accessible, this step will describe the information that will be used during the application's design, and what should actually be done in the case of having access to the employee information.

This step involves gather a wide range of information from the target users in order to understand them better. Some of this information includes, but is not limited to:

- Demographics and cultural information: age, generation, gender, ethnicity, education level, social/economic class, knowledge of languages, employment, religion location etc.
- How much are they currently involved in energy saving?
- Do games appeal to them? Do they enjoy playing games? How much?
- What types of games do they enjoy play?
- How much do games form part of their daily lives?
- What features or characteristics of games do they enjoy the most?
- What motivates them? What disengages them?

- What rewards do they value?
- Do they enjoy or dislike individual competitions? Or group competitions?
- What activities do they enjoy?

To obtain this information it is suggested not only to obtain the demographics and quantitative data from the organizations database or employee registries, but also to send out a survey for the employees to complete. This survey could include the above questions and others, such as: 'if a game-like application was put in place in BT for saving energy, would you consider participating?'. This will help understand which employees would activity cooperate and which ones would not engaged in this sort of project.

Since I have no access to information about the BT employees, I will use game theories of player personalities, more specifically Bartle's four player personalities described in chapter 3.2.3. In summary, Bartle's four player personalities include: explorers (they enjoy exploring maps and finding interesting features), killers (they find joy in causing anxiety and wreaking havoc), socialisers (they thrive from relationships with other players) and achievers (they are guided by their goals). According to [24], a typical group of users are split up: 9% explorers, 1% killers, 80% socialisers and 10% achievers.

With this I will also assume that, even though many players may have similar interests and may be grouped together, the users are all psychologically distinct. Therefore, the design will be targeted to appeal to as many different types of users as possible.

9.2 Designing Phase

This phase is the most important one since it is where the initial design is create for the application. During this step a list of behaviours is composed and then translated into the initial game components that will form the basic layer of the application design. Lastly, the rest of the design will be created by compiling a list of features that will bring about the establishment of the game mechanics and dynamics.

9.2.1 Compose the List of Desired Behaviours

The objective of this step is to create a list that encompasses the most important behaviours the company wants to see the users perform. These behaviours should be small in

granularity, specific in nature and bring about the organizations objectives. These behaviours should also be measurable or in some way quantifiable and should encourage the business goals to be achieved.

Through assumptions and the information provided by the BT representative, a detailed group of energy saving behaviours were recorded. The behaviours are categorized into three lists: behaviours for specific devices/areas, maintaining energy saving efforts and collaborative behaviours. The first of these lists, 'Behaviours for Specific Devices/Areas', highlights the actions that should be performed in office areas, communal areas and for personal devices. The list 'Maintaining Energy Saving Efforts' contains long-term and continuous improvement behaviours. The last list contains the behaviours that are geared towards collaboration between the employees. The following are the three lists:

Behaviours for Specific Devices/Areas

- **Turning off devices (at the outlets):**
    - **Office lights:** this can include desk lamps, room lights or other illumination devices. This should be done when they are not needed (e.g. when enough light comes in through the window) or when the employee leaves the office.
    - **Air-conditioning:** it should be turned off when it is not needed or can be substituted for opening a window.
    - **Desktop computers**: Desktop computer, televisions, monitors or other similar devices use up large amounts of energy when they are not completely turned off (i.e. they are on standby rather than unplugged). It was estimated that in the UK, televisions left on standby consume £116 million per year of electricity [121].
    - **Wall outlets**: some outlets have switches to turn their current off.
    - **Other devices that use electric current**: this may any chargers or other devices that plug into outlets. It has been estimated that in the UK phone chargers that are left plugged in consume more than £60 million worth of electricity per year [121].
- **Turn off (or lower) heating:** during cold weather the heat can be lowered to the minimum comfortable level and during hot weather it should not be used at all. Additionally, the employees could close the curtains on their windows at sunset to prevent the heat from leaving the room [121].

- **Common Areas:**
    - **Coffee Area:** coffee machines and other appliances in this area can be unplugged and/or the outlets on the wall may be turned off while the appliance is not being used.
    - **Printer/Supply Rooms:** turn off lights when the room is not in use and switch off any device that may be used sporadically.
    - **Toilets:** the lights and water from the sinks should not be running unless they are in use.
    - **Hallways:** if extra illumination from the hallway lights is not necessary they should be turned off.
    - **Conference rooms:** turn off all devices, wall plugs and lights when the room is not in use.

Maintaining Energy Saving Efforts

- **Improvement compared to the previous day:** the employee should have saved more energy at the end of the current work day than the previous work day. This would involve keeping track of the amount of energy the user has consumed from day to day.
- **Improvement compared to the previous week:** Similarly to the previous point, one must compare the total amount of energy consumed for the entire week to the results of the previous week.
- **Improvement compared to the previous month:** this is similar to the previous two points, except one must compare the total amount of energy consumed for the entire current month to the results from the previous month.
- **Continuous improvement over 2 or more weeks:** this constitutes the user having improved their energy consumption every week for 2 or more weeks in a row.
- **Continuous improvement over 2 or more months:** this constitutes the user having improved their energy consumption every month for 2 or more months in a row.

Collaborative Behaviours

- **Share tips on energy saving:** it is important that the employees help each other through the process and share their knowledge or tips so that everyone can be as energy efficient as possible.

- **Collaborating to save energy:** employees should also join together to save energy in communal areas of their floors, departments and in the overall BT sites.
- **Help each other:** employees should want to help each other save energy. For instance, if an employee walks by an empty office with the lights on, they should turn them off to help their colleagues and the organization reach their goals.

It is important to note that the desired behaviours of this gamified system do not have to be limited to the previously stated ones. It is very possible that as the project matures, new behaviours may be added and others altered.

9.2.2 Translate desired behaviours into Game Components

During this step, some of the desired behaviours specified previously are translated into game components such as points, badges and leader boards among others. First, it is important to establish a few specifications that will be important for the application's design at this point. These specifications are the following:

- **Every employee will be associated to an office:** this office should be the room the employee typically uses to work in while on the BT site. The energy consumption measured in this room will be the data that counts towards the employee's performance in the application.
- **Establish a basis for comparison:** it is important to have a basis or average number with which to compare the employee's performance. This will help detect whether their performance improves, worsens or remains the same. This can be done by taking energy consumption measurements of the offices and devices previous to the initiation of the application and finding the average consumption. The project team can also consider creating a 'calibration day', as the employee's initiation into the application. During this calibration day the energy consumption data will be measured for each employee and then used to compare with the employee's performance data.
- **Declaring days where the employee worked at home:** it is extremely important that the employees make it known when they are working at home, or when the employee arrives or leaves the office. This is important so that the system knows when it should be recording their energy saving behaviours. This is so that the absence of activity in

the office is not considered to be energy saving actions. This will avoid employees cheating to gain points by working at home or leaving early so that they will not consuming as much energy in the office. Additionally, it removes unfairness between employees that work more often at home (consuming less energy at the office) and those that must work at the office.

The rest of this section will be dedicated to translating the desired behaviours into points, badges and leader boards and will be split into subsections by game components.

Point System

The point system is created by translating the list of 'specific energy saving behaviours' that was established in the previous section. The following list details the specifications of this point system:

- **Obtain points for turning off devices:** the essence is that for every device turned off in their office, the user receives 1 point (the amount of points is an example and can be subject to change). These devices include: office lights, air-conditioning, desktop computers, laptop computers, wall outlets, chargers (e.g. mobile phones or laptop chargers) etc. It is important to have restrictions on this so as to avoid abuse or cheating, such as having the employees switching on and off the lights 20 times in a minute just to obtain more points. Some of the restrictions include the following:
    - *The device must remain off for a minimum of 45-60 minutes depending on the device:* For example, air-conditioning, office lights and wall outlets must remain turned off for 60 minutes, while computers will be set to 45 minutes since these devices may be needed more often. Every 45 or 60 minutes that the device remains off, they will get another point. However, if the device is turned on and back off the count will go back to 0 minutes.
    - *The employees will only be able to get a maximum number of points per device per day:* For example, the employee will only be able to obtain 5 points per device so that way they will not feel the need to be in the dark or in uncomfortable heat just to gain points, but rather it will encourage them to save energy consciously but still thinking about their needs.
- **Obtaining points in common areas:** common areas are conflicting as it is extremely challenging to associate a specific action to a single individual. Thus, if one desires to

include common areas into the energy saving game at a daily point level it can be done similar to earning points for turning off individual devices. For common areas, however, the restrictions vary slightly from the ones mentioned above:

- *Award points to all:* the points obtained in a common area will be given to all employees working in that floor.
- *Amount of points awarded:* the points awarded through these behaviours should be less than for individual devices. For example, each device or light turned off will be worth 0.5 or 0.25 points in common areas compared to individual offices where were worth 1 point.
- *Maximum points per day:* the maximum amount of points the employees can obtain from energy saving behaviours in common areas should be less than for individual offices (e.g. 3 points in total per day).
- *Devices/lights should remain off for a minimum amount of time:* the devices or lights of each common area or room should be turned off for a minimum of 45-60 minutes depending on the area. For example, areas that are used more frequently (e.g. hallways, conference rooms etc.) are given a minimum of 45 minutes while areas used less frequently (e.g. supply rooms) will have a minimum of 60 minutes in order to obtain the points for that action.

- **Earning points for reducing heating and air conditioning usage:** employees can earn 5 points for not using personal office heating in winter or air conditioning in summer. There should also be an average degree of heat or air conditioning established for all employees in a building (this should vary depending on the season or climate). Using this established standard, employees can earn 1 point for each degree of heat or air conditioning that they lower in their office.
- **Obtaining points for improvement in consumption:** if at the end of the day an employee has consumed less energy compared to the previous day they will earn points proportional to their improvement. Employees will also receive 1 point for obtaining the same consumption amount compared to the previous day.

Badges and Achievements

It is important to have badges or graphical displays of the employees' achievements. This subsection will describe two series of badges (based on the 'Maintain Energy Saving

Efforts' list of desired behaviours) to create that will allow employees to representation their achievements on their public profile.

1. **Badges for energy saving improvements:** The employees will be able to earn a series of badges that represent their improvements compared to the previous day, week or month. These will be meaningful images that will be displayed on their profile to show their colleagues that they have improved their energy saving results. These will be given at the end of each day, week and month to all employees that have shown improvement. The badges will each be unique and will be given in combination with points and virtual rewards in proportion to the achievement. In other words, the badges for improving compared to the previous month will earn more points or more valuable virtual rewards than the achievement for improving compared to the previous weeks.
2. **Badges for continuous improvement:** There will also be a series of badges that represent the employees' continuous improvement for 2 or more weeks/months in a row. There will be a badge representing consecutive improvements over two, three, four and five weeks in a row. The same should be done for improvements over two, three, four and five months in a row. If it is observed that there is a need to extend this series of badges for more than five weeks it should be done. This series of badges will have a status system that displays the increasing importance and value of the achievement. For example, the first badge of this series should be a normal or standard badge, while the next badge could be bronze to show the increase in status or level. These badges could then be followed by silver, gold, diamond and platinum badges. Also, once an employee has a week or month without improvements the employee will start again from the '2 week in a row' badge. Because of this, it should be possible for the employees to earn more than one of each type of badge.

Leader boards

It is important to include leader boards in the application so the players can get a sense of how they are performing and be motivated to improve their ranking along with their energy saving actions.

The leader board that is essential to the application is one that sorts the employees by points. In this board, the employees with the most points (i.e. the ones that have performed the

most or best energy saving behaviours) will be at the top. Here are some specifications of this leader board:

- **Display top players:** It is important to limit the display to the top 5 or 10 players since the users that are at the bottom of the ranking may take offence or feel ashamed if their colleagues or superiors can see unimpressive ranking.
- **The players can see their rank number:** each player is privately shown their personal ranking number. The player should not be able to see out of how many this ranking is since it is never pleasant to know one is last.
- **Players can choose to see who ranks similar to them:** players should have the option to see a leader board that displays their ranking along with the two people directly above and the two people directly below him or her. This leader board option is private and personalized to each player. This option serves the purpose of allowing the users to view other players that are at their level. This can help them see how many more points they must achieve to rank up and who is having the same difficulties as them.

BT should consider including a variety of leader boards each offering classifications based on diverse characteristics. For example, one could include a leader boards by department, building or floors which would display the classification of only the employees in one's own department, building or floor, respectively. As it will be explained in the next section, it is also important to have separate leader boards for competitions or other game features that may include a ranking characteristic.

Lastly, it is vital that all results are normalized in order to offer a non biased ranking. The main aspect to consider when normalizing is how the season, climate and weather of a location may affect the energy consumption. For example, an employee working in a location with a cold and harsh climate may end up consuming more energy than one that lives in a mild or warm climate, simply out of necessity. Therefore, the energy saving must be normalized to take into consideration the energy consumption necessities of the location.

Other game components

One may consider adding other game components that may serve to enhance some of the desired behaviours. Here are a couple that may benefit the purpose of this application:

- **Quests or missions:** a list of missions could be provided to the users which states various goals and how many points they can be awarded for completing them. These should be optional and can further emphasizing the performance of targeted behaviours. These can include 'use your light for a maximum of 4 hours in a day (5 points)' or 'join and participate in a group competition (2 points)'. When the user completes these missions it will be shown on their list of missions as 'completed', in addition to being awarded the corresponding points and badge that will display their achievement.
- **Status/levels:** similar to the series of badges, each employee can have levels representing their expertise in energy saving and giving them status. The employees will increase in levels in relation to the amount of points they earn. The amount of points needed to reach the next level or status will be greater with each increasing level. To represent this status or levels, one can use a hierarchy of precious substances (bronze, silver, gold etc.) or a creative status scale such as: 'baby saver', 'enthusiastic saver', 'expert saver', 'king or queen saver' and 'master of energy saving'.
- **Progress bars:** these game components are an excellent way to visually depict the employee's progress and show how much the employee has left to reach the next level. In addition to progress bars, one should also explicitly state how many point the user has obtained and how many they need to reach the next level, since a visual representation is not always fully informative.

9.2.3 Creating the Design

During this section the remainder of the application's design will be described. It is important to note that the final design of the application includes the game components described in the previous section together with the game mechanics and dynamics that will be explained subsequently. This section contains two parts: one subsection detailing game mechanics in terms of features and the second subsection explains other specifications that are important for the design but do not fall under the category of game elements.

9.2.3.1 Game Mechanics and Features

This subsection will describe the pieces need to create feedback loops and game dynamics that will drive the employee's towards performing and maintaining the desired behaviours. This subsection will be divided by game mechanic, which it will include a description of the features that create each game mechanic and other specification.

Competitions

There are two different types of competitions that will serve the purpose of this application: individual and group competitions. The following are a few general specifications that must be applied to any competition created:

- **Optional Participation:** there are some individuals that do not enjoy or feel attracted by competitions. Thus, forcing all players to participate in these competitions may result in negative or disengaging results from some of players.
- **Limit the duration:** the duration of the competitions can be anything from weekly to biweekly or even monthly. It is desirable to limit the duration of the competitions to avoid boredom and disengagement. However, starting new competitions on a regular basis will motivate those players that enjoy competitive behaviours.
- **Leader boards:** each competition should have its own leader board to allow the employees to check their position in the competition. These, as mentioned previously, should be normalized so that the ranking is unbiased due to climate, location or working hours. For instance, some employees may work more hours due to their type of job and are, thus, at a disadvantaged compared to those who work less or the minimum amount of hours. To fix this problem, the ranking could be normalized by using the average consumption per hour rather than a total number for a given day.
- **Rewards at the conclusion of the competition:** rewards should be given to the top employees, whether it is top 3, 5, 10 or more. However, there are a couple specification that should be followed when rewarding the winners:
    - The rewards cannot be physical or exchangeable for real life prizes. They should be virtual rewards such as: points, badges or virtual collectable items.
    - More than one player should be rewarded but there should still be a hierarchy to the rewards (e.g. 10 points for the 1st player, 8 points for the 2nd, 6 points for the 3rd and so on).

Individual competitions involve employee's competing against each other. These competitions have the following characteristics:

- The competition will compare the consumption data only from the employees' personal offices (no common areas).
- If an employee is working at home on a competition day, the employee is required to notify it and the energy consumption data of that day will not be counted in the competition (i.e. it will neither harm nor help the employee's score).
- The competition should encourage people to work at office especially during competition days since if they are not home their competitors will be gaining points while they will get none.

Secondly, group or collaborative competitions provoke the 'emotions' game dynamic in addition to the 'relationship' game dynamic. They are similar to the previously explained competitions expect for the follow specifications:

- The competition will compare the consumption data from a group of employees.
- Groups can be formed by employee's requesting to team up, being randomly assigned or through themed competitions such as competitions between floors, departments or buildings.
- Competitions between floors will compare the consumption of the common areas on each floor (e.g. hallways, bathrooms, printing/supply rooms) as well as personal office spaces. Departmental and building competitions will function similarly but comparing the consumption of the common areas and offices of the department or building, respectively.

Table 9.2 below shows the suggested competition types, the game dynamic(s) (Chapter 8, Step 7.1) they create and which Bartle's Player Personalities (Chapter 3.2.3) are most attracted to these features.

Table 9.2: Competition Features: Corresponding dynamics and player personality types

Suggested Features	Game Dynamic	For which player personality type?
Individual Competitions	Emotion	Achievers, Killers
Collaborative Competitions	Emotion Relationship	Socialisers, Achievers, Killers

Win States and Rules

It is imperative that the rules, restrictions and ways of 'winning' (obtaining points) are explicit to the user. This is because, if the users do not understand how to play the game, they will not play it correctly.

The first suggested feature is that the application must contain a page or section that can inform the user about the rules of the game. Below are some of the restrictions and specifications that should be explicitly described in this informational area of the application:

- Description of behaviours that can be performed in offices and their point/reward values (e.g. the amount of points that are awarded for turning off the light or unplugging a computer monitor).
- The maximum amount of points an employee can receive per day.
- Specification about the behaviours that can be performed in common areas and their point values.
- Which are the common areas are monitored in the application.
- The minimum amount of time each device must remain off in order to receive the points.
- Tips on lowering energy consumption.
- Other rules or restrictions of the application's features (e.g. rules of competitions).

Secondly, it is important to consider creating an introductory guide or walkthrough on the first day an employee interacts with the system. These introductory steps should show them how to win points, where to find different features, show them the rules and where they can find a written version of the specifications for personal reference. Additionally, the employees should be rewarded and motivated for taking part in this introductory tutorial. The tutorial should:

- **Display a progress bar:** this will depict their progress towards the completion of the tutorial.
- **Introduce the employees to the essentials:** it should not go into much detail, but instead give the users a general understanding of how to navigate the application. They can later explore to become more familiar with it. If this introduction is too long the users will get bored and will not desire to complete it.

- **Award points:** points should be awarded for each step that is completed. The employee's should also be informed at the beginning of the tutorial that they will be rewarded for completing it.

Table 9.3 states the two suggestions made for this game mechanic, the game dynamic(s) they each invoke and what player personality types are most attracted to these features.

Table 9.3: Win states and Rule Features: Corresponding dynamics and player personality types

Suggested Features	Game Dynamic	For which player personality type?
Explicitly Stated Rules	Constraints	Explorers, Achievers
Introductory Tutorial	Constraints Narrative Progression	Explorers, Achievers

Profiles

Profiles are an important mechanic which allows the users to display and contain their personal information and achievements on a page or area of the system. The three features are described in detail below:

1. **Personal editable profile:** the users should have a place in the application to personalize, display their achievements and express themselves. Profiles should have the follow features among others that may be found necessary in later development stages:
    - An avatar or a picture the users can upload to represent them.
    - The profile's privacy settings should be editable since some user may not want some private information to be public. It is extremely vital that the employees can choose the parts of their profile that they wish to be public.
    - The employees can chose if they want to display their achievements and badges.
    - They can describe their personal information, hobbies and aspirations if they desire to.
2. **Private Energy Saving profile:** this is a an area of the application that displays the player's personal office energy saving performance statistics, energy usage per device, their missions (complete and incomplete), their status/level progress bar and ranking

among other elements that are of interest to the users. These should remain private and for personal use. This area will serve as feedback for the user by giving them information about their performance so that they can understand how their actions lead to the results they observe. It is important to provide this feedback because individuals looking at traditional electric bills tend to not understand what some of the numbers mean or how their actions have resulted in these numbers. It is a known fact that "homeowners turn their thermostats down when given real-time feedback on what happens when they turn it up." [72, p. 65]. Therefore, displaying their results at small granularity and real-time on this private profile, will provide the users with understandable feedback that can be used to improve their results. The following list gives specifications about the private profiles, in order to deliver the best possible feedback to the users:

- *Real Time Feedback:* the users should see how many and what devices they have plugged in to the power meters, in addition to how turning on or off the devices affects the energy consumption in real time.
- *Visual Aid:* this could include graphs, tables and other visual aids displaying their consumption in their office overall and per device. One could also create a red-orange-green scale that will display the consumption data with the colour corresponding to how well they are saving energy (e.g. red means terrible energy saving, orange is regular energy consumption and green is great energy saving results).
- *Comparisons:* Be able to compare the current consumption to the consumption from the past days/weeks/months.

3. **Notifications:** These notifications are of a private nature and serve to inform the user of any event that may occur. These events can inform the users that they have: obtained achievements, received rewards or have been given feedback. This can also include notifications about receiving comments or gifts from other players. Additionally, the users may receive news from the administration about alterations, improvements or other events related to the application.

Table 9.4 displays the three main suggested features that will bring about this mechanic, their corresponding game dynamic(s) and the player personality types that may be attracted to these features the most.

Table 9.4: Profile Features: Corresponding dynamics and player personality types

Suggested Feature	Game Dynamic	For which player personality type?
Personal Editable Profile	Personalization	Socialisers
Private Energy Saving Profile	Personalization Progression	(All) Achievers, Explorers, Socialisers, Killers
Notifications	Personalization Narrative	Socialisers, Achievers

Cooperation

This section is based off of the list of 'Collaborative Behaviours' that was defined in section 9.2.1 when recording the desired behaviours for the application. Table 9.5 summarizes the three features that will be suggested to create the collaboration game mechanic, in addition to their corresponding game dynamics and the player personality types they appeal to. The three main suggestions are described on the list below:

1. **Sending Items to Players:** this may include sending other players virtual items, prizes or even tips for better energy saving. This induces the players to collaborate and help each other reach BT's energy saving objectives.
2. **Energy Saving Forums:** these are meant for employees to ask and answer questions about energy saving. In these forums the players may discussing how to improve results, give each other tips or express queries or interesting topic they may have in mind. BT should consider giving rewards or points for answering colleagues' questions meaningfully or for posting an interesting query or discussion subject.
3. **Commenting on profiles:** user should be able to comment on other player's profiles to: give recognition, help, create new friendships or give a friendly remark or greeting.

Table 9.5: Collaboration Features: Corresponding dynamics and player personality types

Suggested Features	Game Dynamic	For which player personality type?
Sending items to other players	Relationships	Socialisers, Explorers
Participating in Forums	Relationships Progression	Socialisers, Explorers
Commenting on Profiles	Relationships Personalization	Socialisers, Explorers

Progression

The progression element of the application can be composed through some of the already discussed PBL's (points, badges and leader boards) and components, along with some new suggested features. These features allow the users to go through the game and becoming increasingly more proficient in the game. Table 9.6 summarizes these features, their corresponding dynamics and the types of players they appeal to. The following is a list that explains the various elements that will bring about the progression component of the application:

- **Levels and Status:** as explained in the previous steps, the users will be able to move up a level after they have acquired a pre-defined amount of points. Each higher level requires increasingly more points in order to reach the next level.
- **Quests/Missions:** provide users with a way to measure their abilities. The missions should become more challenging as the user becomes more experienced. For example, a beginning player could be given a mission such as 'join a competition', while more experienced players that have already completed this mission might be as asked to 'finish a competition in the top 20'.
- **Challenges and Badges representing milestones:** employees will be awarded with badges that represent important achievements (e.g. completed challenges or milestones). As the users progress, these badges will not only increase in number, but will also serve as a way to demonstrate their expertise in the game.
- **Unlocking tips:** with every level and milestone that the players reach, they will unlock tips that were previously hidden. This will serve as a type of reward for their

achievements and progression. These can be tips about energy saving, understand the application, fun facts, feedback on their performance or any other type of information that may be valuable to the employee.

Table 9.6: Progression Features: Corresponding dynamics and player personality types

Suggested Features	Game Dynamic	For which player personality type?
Status/Levels	Emotions Progression	(All) Socialisers, Achievers, Killers, Explorers
Quests/Missions	Narrative Emotions Progression	Explorers, Achievers, Killers
Badges representing Milestones	Narrative Progression	Achievers, Explorers, Killers
Unlocking Tips	Progression Emotion	Achievers, Explorers

9.2.3.2 Other specifications

There are three other main specifications that are important to include in the design in order to achieve successful results:

- **Tools to use:** the company should use devices to measure the energy consumption for each appliance or lights in the offices and common areas. These could be any type of power meter such as the ones described in Chapter 5 (section 3). This is imperative, since the more detailed the feedback is that the employees receive, the more they will be able to understand their energy consumption behaviours and improve them.
- **Normalization:** As mentioned previously, when ranking the employees, the data should be normalized to keep in consideration necessities of the location where the employees are working. One of these necessities could be due to temperature and climate (e.g. cold and warm weather affect greatly the use of air-conditioning and heating) which can be normalized by establishing an average or basis for comparison from which to award points. In other words, a country with hotter climate will have a lower heating average, while the heating consumption of users in colder climates will

be compared to higher heating averages. Other characteristics that may affect consumption are the amount of hours the employee works in the office or the amount of members in a group competition. All of these factors, and others, can be normalized.

- **Make the offices energy efficient:** before the application is initiated, it is important that buildings that will be participating switch all their light bulbs to energy efficient ones. This may not have an impact on the employees' behaviours or the application but it will help British Telecom reach their energy saving objectives since these light bulbs "last up to 12 times longer than ordinary light bulbs" and significantly reduce consumption costs [121].

9.3 Implementing, Adjusting and Maintaining the System

The previous phases are as far as the scope of this project reaches. However, for the next three sections I will provide some suggestions as to how to handle these steps or what options BT has. This phase covers: deciding if to implement the application or hire external Gamification services, the implementation and deployment strategies, and how to analyze data, adjust and maintain the system.

9.3.1 Buy or Build?

During this step BT should decide whether to implement the application themselves with their available resources, or hire a gamification service provider. For this it is important to assess: whether or not the organization has the resources (staff and expertise) to implement the application, if they have the budget to hire a gamification platform vendor and, in the case of choosing to hire external aid, what service provider will be the best suited for the organization's needs.

I highly recommend hiring a Gamification service provider or someone that may act as a Gamification expert and consultant, if the budget allows. The reason for this is that the individuals working in these organizations are extremely experienced in this field. They have seen successes and failures, and know what should or should not be done. Knowing how to deal with possible problems is extremely useful for an organization commencing a Gamification project. Even though, BT has had some experience with similar ideas to

Gamification-like project, such as idea competition, they are first time users in creating a fully-fledged Gamification project. Therefore, it is imperative, especially for a first time user, that they have aid from an organization that is experienced in Gamification.

Lastly, out of the gamification providers mentioned in Chapter 8, it is suggested to choose between Bunchball and Badgeville as they are the most renowned, the ones with the best reputation and the most experienced. They both provide commercial software, game mechanics and analytics features. Additionally, both are highly customizable depending on the software package or service chosen. Both companies supply components or 'widgets' (as Badgeville calls them) that can be used to create customized software to suite the organization's purposes. Furthermore, both companies provide solutions that can be integrated into many systems or platforms. For instance, Bunchball states they can incorporate the gamified solutions to websites, mobiles, social networks etc, while Badgeville states they can integrate it to SharePoint, Yammer, Adobe Marketing and others.

Table 9.7 bellow summarizes the information extracted from each of their websites about the solutions they each provide. These include both solutions for employee and customer engagement. From this table one can observe that Bunchball seems more suitable than Badgeville as they have more solutions for employee engagement that match more similarly to the solutions BT needs. However, it is still recommended to consult with both organizations directly once the project is in motion to get a firsthand account of what they can provide to BT.

Table 9.7: Solutions provided by Bunchball versus Badgeville

	Bunchball [116]	Badgeville [122]
Engagement of Community and Customers	• Grow your audience • Increase customer loyalty & sales • Activate your online community	• Social Loyalty • Community Management • Omni-Channel Commerce • Lead Generation
Engagement of Employees and Partners	• Motivate Sales Team • Boost Employee Collaboration • Engage services & Support Teams • Employee Development • Evolve your channel strategy	• Human Resources and Training • Collaboration • Sales Performance • Support Excellence

9.3.2 Implement and Deploy the Application

This section provides suggestion that may help decide implementation and deployment strategies. It discusses what platform(s) are best for the application to be on and methods to get the application started. Table 9.8 summarizes the suggestions made.

Firstly, carefully choosing what platform the application will be working on is extremely significant. This choice will affect the success of the application. It is important that the application is incorporated to either "social, mobile, online and offline campaigns to amplify results and boost participation" [3]. The recommendation is that it should be on one or more platforms that users are accustomed to accessing or interacting with on a daily basis. The more platforms it can be accessed through, the more BT will insure its accessibility and increase user participation. Therefore, the chosen platform(s) should "be available wherever, however, and whenever people have the time and interest" [3]. For example, the application should be accessible from the office computers and through the employee intranet site such as the BT Web Portal. This web portal, which is only accessible to employees, is where they can access a variety of feature, such as: viewing information about different business units, booking rooms and receiving daily information about BT (e.g. current share price and highlighted business news). As described by the BT representative, accessing this web portal forms part of the employees' daily routine and would be an ideal platform for the employees to easily access the application.

In terms of deployment and the initiation of the application, there are two things to consider. First of all, in order for the employees to accept the application and use it, they must be aware of why the application is in place and how they will benefit from participating. This should take place not only once the application is deployed but also throughout the process of the project. BT should inform the users about the motivation behind the project and its progress since its commencement. Once again, if the employees do not know how it will be beneficial to them and they do not feel involved they will experience no need to participate and the application may fail.

Secondly, it is important to advertise the application to the employees in order to raise their awareness about how, when and where to participate in the application. After the discussion with the BT representative, it was concluded that one of the places that would be effective to advertise the application would be through the previously mentioned BT Web portal. Since this Web Portal seems to form part of the employees' daily routine, it would be an

ideal place to inform employees throughout the project's process and advertise the gamified application once it is complete.

Table 9.8: Suggestions for implementation and deployment of the application

	Suggestion	Explanation	Reasons
Platforms	Use more than one platform	The application should be accessible from more than one platform	• More platforms will increase the accessibility • Higher accessibility will result in an increase in participation
Platforms	Use BT Web Portal and office computers	The application should be accessible on the BT web portal, office computers or platforms that the employees' access easily on a daily basis	• For the ease and frequency of access • These platforms are familiar to the employees (no need for learning new)
Deployment	Advertise the application	To inform the employees about the final application: how to access it and use it. This can be done through emails, web portal or other platforms	• The users need to be aware of the gamified application in order to use it • They need information about how to access it or use it.
Deployment	Raise awareness of benefits	Let users know: why their participation is important, how the project is progressing and what they will gain from participating	• Without understanding the importance of the project the users will not participate • The users need to understand how it benefits them to feel the need to cooperate • To make them feel involved and informed

9.3.3 Collect Data, Adjust and Maintain

This section seeks to provide advice on data collection, adjustments and maintenance of the application. BT should asses if they have the proper resources for analyzing user activity data, adjusting the system and maintaining it after it is in place, or if they should again contract external help.

First of all, many Gamification platform vendors also provide analytics features. Therefore it is recommended, once again, to hire external Gamification services as they provide a fully-encompassing service that will help throughout the entire project.

Secondly, one must understand that after the system has been implement and deployed, the project does not end. This step is as crucial as all the others because if the implemented application results are not as effective as desired, it is imperative to make adjustments that will improve the system. Additionally, if the application will function long-term, one should consider creating feature updates and changes (i.e. adding new competitions or new mini games) while still keeping the essence of the game intact. This is so that the players do not get bored by using the same features every day. New features or any changes to the existing ones will be refreshing and keep the users interested. Additionally, experimenting with altering features or addition/subtraction of features on the application may be something to consider, since it helps investigate how such actions affect engagement and could shed light on alterations that can improve participation.

9.4 Conclusion

So, it is with this that the suggested design for BT's gamified application concludes. One should understand that culture of an organization is an extremely important characteristic that should be taken into account when creating a gamified design. It should also be considered that his project had to be completed with a limited knowledge on the BT culture and the characteristics of the BT employees.

It is also important to note that the suggestions design is based off of information provided by the BT representation, the research that has been found and the ideas that have been seen to be effective in the literature.

Theoretically this design should be applicable to any audience since it accommodates the needs of a wide variety of individuals. However, it was concluded that, in order to improve the effectiveness of this design, it should be created with greater knowledge of BT's culture in order to tailor it to what the employees truly desire.

Chapter 10: Conclusion

This project is composed of several chapters each detailing various aspects of Gamification including: background research, the sciences behind it, a large number of cases that apply it to a variety of industries, tips and risks that may of gamification projects, a guide through these types of projects and, finally, a suggested Gamification design for British Telecom's efforts to engage employees in energy saving. This chapter condenses the most significant information of this project to provide a summary. Additionally, it will provide reflections and evaluations of the project by describing achievements, conclusions, limitations and future work.

10.1 Summary of Research

Gamification is a tactic that is particularly effective as it takes game elements and incorporates them into non-game situations [8]. This sparks the users' internal motivators to engage them and increase their enjoyment towards a process or context that may not have previously incited emotions. Gamification can be used in a myriad of contexts and to achieve a great variety of results such as: changing behaviour, increasing loyalty, improving productivity, enhancing quality of work and engagement towards task or processes.

Gamification should, however, not be confused with games, fully-fledged video games or 'serious games' such as simulators ([10], [6], [18]). The greatest difference is that video games and serious games tend to be fully constructed while a gamified system only incorporates selected elements and in some cases, it may not even seem like a game ([8], [9], [1]).

The Gamification trend began approximately in mid-to-late 2010. Prior to this, other terms, such as 'funware' and 'behavioral games', had been used to describe the same concept but none lasted except the term 'Gamification' [8]. Currently, Gamification is still rising in popularity. According to Garnter's Hype Cycle for new technologies, Gamification is currently at "the peak of inflated expectations" [38] where many successful cases appear but some conservative organizations are still discouraged from using it because of failed cases [38].

Gartner also estimates that soon Gamification will reach a drastic drop in interest because many people begin using it without proper knowledge about it due to sudden popularity [38]. This causes gamification fail because it is used incorrectly and ends up discouraging most people from using the tool [38]. However, after this drop, Gartner predicts a slow and steady increase in the use Gamification because the technology will have been refined and perfected by those that sell [38].

The reason for Gamification's current increase in popularity is due to the present alteration in popular culture and the ubiquity of mobile devices, internet, social media and technology [25]. These changes have caused Gamification to be an ideal tool to suit this cultural revolution ([10], [25]). The most important influence in these changing times is the new generation, known as the Millennials or Generation Y, which have been raised under the influences of video games, technology and rewarded behaviours [32]. Because of this, traditional strategies for motivation are no longer effective and this shifted has created a need for new techniques, like Gamification, that will be better suited to this every changing era [10].

The successful outcomes achieved by gamified strategies are a result of intelligently combining concepts from psychology, video game theories, business strategies and computer science ideas. The most important of these is psychology, since it is the basis for understanding people and how they can be motivated [30]. Gamification applies many theories and models from psychological schools of thought, which include: motivational psychology, psychology of learning and social psychology.

Additionally, since not all individuals are the same and are not motivated the same way, it is important to know what game elements would be appropriate to include in one's gamified system to successfully engage all users. This is where game theories bring great insight into understanding user playing styles and player personalities.

Moreover, a myriad of gamification cases have been discovered throughout this project. Businesses have been seen to be the most common users of gamification, whether it is for marketing purposes (e.g. increasing customer loyalty or increasing in purchases) or for internal purposes (e.g. motivating employees to participate in activities or tasks, increasing loyalty and improving the quality of work) (Chapter 4.8). Yet, many other industries have also been seen to successfully apply gamification. These industries include: education (e.g. improving e-learning, university courses) in Chapter 4.1, personal life (e.g. increasing motivation to perform everyday chores, prepare for technical interviews and staying healthy

or active in Chapter 4.2), government (Chapter 4.3), telecommunications (Chapter 4.4), airline industry (Chapter 4.5), location-based services (Chapter 4.6) and software testing (Chapter 4.7). Additionally, in this project several cases on energy saving and sustainability efforts were founds and examined (Chapter 5). This included literature on: devices for measuring energy consumption at fine granulation (i.e. measures the consumption of each appliance), and the users' needs for feedback to understand consumption and how they can improve it.

Lastly, a few failed cases where explored of projects from the organizations: Zappos, Marriott and Klout (Chapter 6). It was discovered that the most probable cause of failure for each of these varied; however, the main causes included: pointless or incomprehensible use of game mechanics, confusing the users and the "Shiny Object Syndrome" [18] which is when organizations gamify just because it is a popular trend [18].

By analyzing and applying the knowledge achieved from this wide range of literature and cases, several things were achieved and produced. All of these achievements are described in the subsequent section.

10.2 Achievements

Throughout the evolution of this project several objectives were achieved, of which included the acquisition of an extensive knowledge base (both in breadth and depth) of gamification. Additionally, through the analysis and examination of the research that was obtained, three main tasks were achieved:

1. **A list of tips and risks of gamification projects**

Through the examination of failed cases and their comparison to successful ones, I was able to derive two check lists: one contains tips to increase chances of success (Chapter 7.1) and the second details possible risks that may occur in gamification projects (Chapter 7.2).

For the first of these lists, several tips where suggested of which included: having a well defined design/interface, having a variety of experts in the project team, having top level management support, dealing with resistance to new technologies, not hiring a game designer, taking into consideration the demographics and cultures of the users, and protecting oneself from possible legal issues.

The second list, which detailed possible gamification risks, not only listed these risks but also possible solutions or tips for preventing them. The risks that were discovered included: wrong or over use of game elements, gamifying an already defective process, only use point based systems with no other game elements, thinking that games are only for gamers, mistaking rewards for achievements, confusing the users, unintended behavioural consequences (e.g. driving wrong behaviours or allowing cheating), not appealing to all users, and getting users bored with poor game design. Overall, these tips and explanations of risks increase awareness and will eventually help in creating a better gamified design.

2. Generic guidelines for gamification projects

These guidelines are meant to be applicable to virtually any gamification project. The set of steps are mainly targeted towards use in businesses but can be modified to fit other situations. Additionally, these guidelines (Chapter 6) are divided up into three phases: 'Prepare', 'Design' and 'Implement and Maintain'.

The first phase ('Prepare') ensures the proper set up of the project prior to diving in to its design. It includes four steps of which the first is to decide if Gamification is the correct course of action for one's particular situation or if another strategy would serve as a better solution. The remaining steps of this phase include: gathering the best team, defining the project objectives and obtaining knowledge about the target users.

The second phases ('Design') is a phase the involves acquiring great knowledge about the mechanisms and dynamics behind game-like systems in order to create the best gamification design. This phase involves quite a bit of reflection as the design is what makes or breaks the systems. The design phase is split into three steps of which include: determining the behaviours that one desires to see in the users, defining the initial game components based on the desired behaviours and developing the game design by selecting game mechanics and creating dynamics.

Lastly, the final phase ('Implement and Maintain') encompasses what is needed to implement, deploy, adjust and maintain the system. This phase is also divided into three steps which are: deciding if to build the system or hire a gamification provider, implementing and deploying the application, and, lastly, collecting user behaviour data to make adjustments and maintain the system.

This 10-step guide encompasses the generic procedure that any industry taking on a gamification project may go through.

3. A theoretical Gamification design for British Telecom

By applying the previously described guidelines for a gamification project, a theoretical design was created for British Telecom (BT) as a solution to improve their employee's energy saving behaviours. The same steps-wise structure was used to show the process and maturity of the design and all the elements that were involved.

In the first section, the initial information that was needed for the project was set up. This was done by using the knowledge obtained through the research and the information provided by the BT representative, Stephen Brewis. During this first section three actions were taken:

1. It was concluded that gamification was a correct solution to BT's situation.
2. The variety of expertise needed from the individuals composing the project team was decided. These included experts in: business objectives, the user group, Gamification, energy saving behaviours, electricity, programming, analytics and IT maintenance or customer support.
3. The business objectives were examined and recorded. It was decided that the main business goal is to improve the motivation of BT's employees towards saving energy behaviours on the BT sites.
4. It was explained how to gather information about the target user group.
5. It was concluded that this project would use psychological and game theories as ways to understand the user group because of the lack of access to knowledge about the BT employees.

The second section comprises the design. First, a list was composed of the behaviours that BT would like their employees to perform so that they can reach their final objectives. This was divided into three sub lists: 'Behaviours for Specific Devices/Areas', 'Maintaining Energy Saving Efforts' and 'Collaborative Behaviours'. Secondly, this section translates the previously mentioned behaviours into game components which include point systems, badges and leader boards among others. Lastly, the rest of the application is designed by creating game

mechanics and dynamics through suggested features that will give the application excitement, enjoyment and purpose.

Furthermore, although the final section concerning implementing and maintaining the system is out of the scope of this project, recommendations were still provided. The aim of this section is to aid BT through this part of the process and provide a base for them in these areas as well.

10.3 Conclusions and Reflection

This section discusses the contributions of this project to the Gamification literature and practices. In addition, it will answer the research questions of the project that were stated in Chapter 1.

10.3.1 Contributions

It can be concluded that this project has provided several contributions, both theoretical and practical, to the existing knowledge on Gamification. Table 10.1 below summarizes the theoretical and practical contributions of this project. Ultimately, this project contributed by bringing together many of the scattered literature on Gamification. It gathered many theories and case studies to attempt to fill in literary gaps and complete this puzzle that is Gamification. By assembling these bits and pieces, the project provides a comprehensive guide to understanding gamification. Additionally, even though there are some books and other literature that explains some processes of how to gamify, they appear to be lacking in detail, or incomplete. The theoretical contributions of this project could help provide the next step to defining the process of gamification. In practical applications, the results of this project could help businesses begin reducing the number of gamification failures caused by poor design and other mistakes.

Table 10.1: The Theoretical and Practical Contributions of the Project

Theoretical Contributions	Practical Contributions
List of tips for increasing the success of gamification projects.	Provide British Telecom (and companies in similar situations) with a basis for a solution that could later be adapted.
A list of common errors and gamification risks with advice on how to prevent of fix them.	Potential results after BT builds the suggested design: *reduce electrical cost *increase green behaviours *improve the employees' feelings of belonging and loyalty to the community.
Guidelines that synthesize the vast amount of scattered and incomplete literature on the web and in print.	Employees can potentially reduce their electrical consumption at home by transferring the energy saving knowledge from work to their homes.
The guidelines provide a start to defining universal instructions for gamification projects.	A set of gamification guidelines that are applicable to any industry, organization or type of gamification project.

10.3.2 Answering Research Questions

This project can be considered to be very successful since all of the four research questions were fully answered through the knowledge acquired and the conclusions that were derived through the investigations of this project. Subsequently, the research questions that guided this project will be restated along with a summarized answer based on the research and knowledge obtained.

1. What knowledge is needed prior to commencing a gamification project?

The more knowledge acquired about gamification prior to the commencement of a gamification project, the better the outcome of the project will be. Ultimately, all the information included in this dissertation would be ideal to thoroughly understand what is required of a gamification project. It is extremely important to thoroughly understand the

game mechanics, dynamics and components along with the underlying sciences and theories to understand how Gamification functions. Once that knowledge is obtained, it is highly recommended to investigate existing cases of gamification projects, both failed and successful, to know what has been proven to work or not work. In addition to this, it is suggested to talk directly to individuals or organizations that have had plenty of experience with gamification to obtain recommendations. All-in-all, it is crucial not to dive into a gamification project blindly as that has been seen to be the most common cause of failure for projects with tools as young as gamification.

2. What elements need to be in place for a successful gamification project?

The main element of a successful gamification project is a well thought-out and effective design. Poor designs have been and will continue to be one of the biggest reasons for failure of gamification project. This is in line with Gartner's prediction where 80% of Gamification project will be unsuccessful "due to poor design" [12] by 2014. However, this risk of poor design can be prevented by acquiring the sufficient knowledge about gamification. Aside from a correct gamification design other elements that when involve reduce risk and improve the probability for success are: having top level management support, having a wide range of disciplines in the project team, not hiring a game designer, considering cultural differences and have protection against possible legal issues. All this information is covered throughout the project, but is especially emphasized in the chapter explaining risks and tips (chapter 7), the guidelines detailing the process of a gamification project (chapter 8), the background information chapter (Chapters 2 and 3) and the research concerning unsuccessful cases (Chapter 6).

3. What are the steps to completing a gamification project?

The steps to completing a gamification project are detailed in chapter 8 and were derived through the analysis of the vast amount of research found. These steps, as described earlier, a sectioned into three distinct phases: 'prepare', 'design' and 'implement and maintain'. Each of these phases has their own set of steps to be followed for that phase to be considered completed. In the preparation phase is where the knowledge is gathered pertaining the project along with defining the basic project ideas and objectives. The subsequent phase is the

theoretical and initial design of the application. This phase is particularly important since it where the system must be designed smartly and effectively. The final phase involves implementing the actual application and gather data to adjust and maintain the system at maximum efficiency.

4. How can gamification be applied to help British Telecom motivate its employees towards increasing sustainability efforts?

By creating a well design and motivating application, gamification can successfully be used to provide a solution for British Telecom. Chapter 9 describes in detail the gamification design that was tailored to BT and the process by which this design was created. Additionally, the designed was created by using the vast collection of research obtained and the information provided by the BT representative. This chapter provides the basis for BT to bring a gamification system to life. Through a combination of game elements, the gamification design will create a motivating energy saving experience for the BT employees. Gamification allows BT to incorporate competitions, feedback, rewards and reinforcements for lowering electrical consumption, which will cause enjoyment in the workforce and eventually lead to long term energy saving.

10.4 Limitations and Challenges

There were three main challenges and limitations that affected this project. These are described below:

1. **Limited Accessible Information:** First of all, the most important of these was the limitation on the amount of information from British Telecom that was accessible to me. Throughout the project the accessibility to the BT representative and BT knowledge was extremely restricted and, even though, the BT representative was extremely helpful and willing to provide all the information possible, there were still many areas that he was unable to help in. This created a limitation on how personalized this framework could be. For example, the step in the generalized guidelines where one must know the target users was an area that was extremely challenging to tailor to BT as there was no accessible information about the BT employees. However, to counter act this limitation as best as possible several of the

areas that lacked information or knowledge were completed on the basis of assumptions, creativity or generalized psychological or game theories.

2. **Limited Variety of Expertise:** Secondly, this project also suffered a limitation since an organizational level Gamification project is meant as a team effort, not for a single individual. The problem with this is that in order to maximize the effectiveness of a gamification project the team should have individuals of a wide range of disciplines which may include: business objective experts, analytics specialists, gamification designers, technologists and experts on the targeted users among others. A team in a large company working on a gamification project would have a wide set of skills and knowledge, whereas I am limited to my own knowledge which is restricted to my fields of study.
3. **Unable to physically test guidelines or design:** The final limitation is that the effectiveness of the guidelines and suggested gamified solution could not be physically tested as the implementation (and, thus, the testing of the application) was out of the scope of this project. Because of this it is hard to robustly prove its efficacy and, consequently, the only proof that it works is through the literature that was used to create the generalized guidelines.

Despite these limitations and challenges, the project was able to successfully be executed. Moreover, the challenges were overcome as best as possible to present the most effective results considering these restrictions.

10.5 Future work

As mentioned in the introductory chapter, the project involved thorough research, analysis, the production of theoretical guidelines and a suggested gamified solution for British Telecom (BT), while the physical implementation of the application was out of the scope. Because of this there are four main areas to further this work.

Firstly, it is suggested to follow the 'steps to gamification' with an actual project team from British Telecom to come up with a more accurately tailored gamification design. As stated in the previous section, I was restricted in the amount of BT specific information I had access to and my knowledge about BT or their employees was extremely limited. Thus, in many occasions the project's design was based on assumptions and generalized theories, such as

Bartle's Player Personality theory, rather than being tailored specifically to the BT employee's personality and culture. This is why it is imperative that the first step to furthering this work is to gather a project team of specialists from BT and follow the guidelines once more since they have the knowledge about the users and BT's culture that is necessary to effectively bring this application to life.

The second area where this work could be furthered is by physically implementing the suggested (or improved) gamified application. Ideally, this would be done by following the third phase of the gamification guidelines, 'Implement and Adjust', where the application will be created and deployed either by the BT team or a hired Gamification service provider so that the BT employees could begin using it.

Thirdly, once the application is created and deployed it could be interesting to test out its effectiveness to see if the generic gamification guidelines work practically and not just theoretically. This will involve data collection and possibly surveying employees (e.g. getting their opinion on the application, if they enjoy it and how useful it was).

Lastly, by taking the results from these tests many improvements can be made. The results of the test can determine where the application fails or thrives, allowing t adjustments to be made. This could involve adding, eliminate or alter features to improve the user's engagement in the application. The results from the tests could also serve to improve the generalized gamification guidelines of this project. The tests could aid in detecting what steps or elements of the guidelines are not particularly accurate and alter them to be as theoretically and practically successful as possible.

Ultimately, this future work could also be performed not just by BT but by other companies that are interested in implementing Gamification or wish to use the guidelines to testing their effectiveness.

10.6 Final Remarks

As Gamification is a fairly new technology there are no full-proof rules about how to make it succeed. It is ultimately about trial and error; it is a process of creating and improving. It was the aim of this project to gather information and create a suggested design as a starting point for British Telecom's desire to use Gamification. Significant results were achieved as the

project provides an extensive and all-encompassing background report and literature review for those who wish to gain knowledge on the subject. Also, by providing guidelines for a gamification project and applying these to BT's situation, I believe a strong base has been provided for.

At the end, the success of Gamification comes from the culture of the organization, the users, the management, the project team and designers among others. It is how the application is designed and how the users accept or reject the application that will make it thrive or fail. Because of this, the lack on the knowledge about BT's culture in this project was a limitation but this is an area where this project can be furthered by BT or others who have a larger understanding of this culture. Eventually, it is the collective effort of all individuals involved that creates the success of Gamification.

References

[1] C. I. Muntean, "Raising engagement in e-learning through gamification," in *Proc. 6th International Conference on Virtual Learning ICVL*, 2011.

[2] J. Juul, Half-real: video games between real rules and fictional worlds, Cambridge, MA: The MIT Press, 2005.

[3] "Slide Show: 5 Ways To Get Started With Gamification," 12 January 2012. [Online]. Available: http://www.cmo.com/content/cmo-com/home/slide-shows/slide-show-5-ways-to-get-started-with-gamification.html. [Accessed 17 February 2013].

[4] R. Roy, "'Gamification' New Tool for CFO to Improve Performance," 20 December 2012. [Online]. Available: http://www.cfo-insight.com/risk-management-it/it/gamification-new-tool-for-cfo-to-improve-performance/.[Accessed 19 March 2013].

[5] M. Sridharan, A. Hrishikesh and L. S. Raj, "An Academic Analysis of Gamification," n.d. [Online]. Available: http://www.scribd.com/doc/144954754/An-Academic-Analysis-of-Gamification. [Accessed 10 February 2013].

[6] Y. Xu, "Literature Review on Web Application Gamification and Analytics," Honolulu, HI, 2011. [Online]. Available: https://csdl-techreports.googlecode.com/svn/trunk/techreports/2011/11-05/11-05.pdf. [Accessed 20 February 2013].

[7] B. Hennessy, N. Powers and B. Kirk, "The Power Of Play: How Gamification Will Drive the Evolution of Channel Loyalty," 2012. [Online]. Available: http://www.maritz.com/~/media/Files/MaritzDotCom/White%20Papers/Motivation/The-Power-of-Play_How-Gamification-Will-Drive-the-Evolution-of-Channel-Loyalty.pdf.

[8] S. Deterding, D. Dixon, R. Khaled and L. Nacke, "From Game Design Elements to Gamefulness: Defining "Gamification", in *MindTrek '11*, Tampere, Findland, 2011.

[9] J. Kohl, "Applying Gamification to Software Testing," 30 January 2013. [Online]. Available: http://www.kohl.ca/2013/APPLYING-GAMIFICATION-IN-SOFTWARE-TESTING/. [Accessed 9 February 2013].

[10] A. Dorling and F. McCaffery, "The Gamification of SPICE," in *12th International Conference, SPICE 2012*, 2012.

[11] G. McKenzie, "Gamification and Location-based Services," in *Workshop on Cognitive Engineering for Mobile GIS*, 2011.

[12] Gartner, "Gartner Says by 2014, 80 Percent of Current Gamified Applications Will Fail to Meet Business Objectives Primarily Due to Poor Design," Stamford, 2012.

[13] Bunchball, "Gamification 101: An Introduction to the Use of Game Dynamics to Influence Behavior," October 2010. [Online]. Available: http://www.bunchball.com/sites/default/files/downloads/gamification101.pdf. [Accessed 28 February 2013]

[14] G. Zichermann, "Intrinsic and Extrinsic Motivation in Gamification," 27 October 2011b. [Online]. Available: http://www.gamification.co/2011/10/27/intrinsic-and-extrinsic-motivation-in-gamification/. [Accesed 1 March 2013].

[15] B. L. Berg, "Chapter 10: Case Studies," in *Qualitative Research Methods for the Social Sciences*, 7 ed., Boston, Pearson Education, 2009, pp. 317-337.

[16] R. Paharia, "Gamification Can Work - Just don't Hire a Game Designer," 2012. [Online]. Available: http://techcrunch.com/2012/12/08/bad-gamification-design-leads-to-failure/. [Accessed 5 March 2013].

[17] E. Llagostera, "On Gamification and Persuasion," in *SBGames 2012*, Brazil, 2012. [Online]. Available: http://sbgames.org/sbgames2012/proceedings/papers/gamesforchange/g4c-02.pdf. [Accessed 20 April 2013].

[18] A. Kleinberg, "Brands that failed with Gamification," 23 July 2012. [Online]. Available: http://www.imediaconnection.com/article_full.aspx?id=32280. [Accessed 8 February 2013].

[19] C. Swan, "Gamification: A new way to shape behavior," *Communication World,* vol. 29, no. 3, pp. 13-14, 2012.

[20] P. Ranson, "What can we learn from Gamification?," December 2012. [Online]. Available: http://www.developer-tech.com/news/2012/dec/18/what-can-we-learn-gamification/. [Accessed 10 March 2013].

[21] K. Liyakasa, "Is Gamification Overhyped?," 1 February 2013. [Online]. Available: http://www.destinationcrm.com/Articles/Columns-Departments/Insight/Is-Gamification-Overhyped-87193.aspx. [Accessed 11 April 2013].

[22] Y. Liu, T. Alexandrova and T. Nakajima, "Gamifying intelligent environments," in *Proceedings of the 2011 international ACM workshop on Ubiquitous meta user interfaces*, 2011.

[23] S. Brown, "Why Play is Vital, No Matter Your Age," Technology, Entertainment and Design (TED Talks), 2009.

[24] K. Findlay, "Gamification: Future or Fail?," 8 June 2011. [Online]. Available: http://www.slideshare.net/ervler/gamification-future-or-fail. [Accessed 3 March 2013].

[25] K. Werbach, R. Paharia and D. Debow, Interviewees, *Rewards, Motivation, Competition: How Businesses Can Benefit from the Rise of Gamification.* [Interview]. 2011.

[26] J. J. Lee and J. Hammer, "Gamification in Education: What, How, Why Bother?," *Academic Exchange Quarterly,* vol. 15, no. 2, p. 146, 2011.

[27] V. Hommes, "Using green gamification for fun and fame," 3 May 2012. [Online]. Available: http://www.greenbiz.com/green-gamification. [Acccessed 23 February 2013].

[28] A. Kalamaroff, "Gamify Your Life: A Guide to Incentivizing Everything," 14 January 2013. [Online]. Available: http://lifehacker.com/5975824/gamify-your-life-a-guide-to-incentivizing-everything. [Accessed 14 March 2013].

[29] J. Thom, D. Millen and J. DiMicco, "Removing Gamification from an Enterprise SNS," in *Computer*

Supported Cooperative Work '12, New York, NY, 2012.

[30] K. Liyakasa, "Game On: Gamification Strategies Motivate Customer and Employee Behaviors," May 2012. [Online]. Available: http://www.destinationcrm.com/Articles/Editorial/Magazine-Features/Game-On-Gamification-Strategies-Motivate-Customer-and-Employee-Behaviors-81866.aspx. [Accessed 15 March 2013].

[31] S. Gopaladesikan, "Following Gamification Through Gartner's Hype Cycle," 11 December 2012. [Online]. Available: http://www.gamification.co/2012/12/11/following-gamification-through-gartners-hype-cycle/.

[32] S. P. Singh, "Gamification: A Strategic Tool for Organizational Effectiveness," *International Journal of Management,* vol. 1, no. 1, pp. 108-114, June 2012.

[33] R. Shah, "Working With Five Generations In The Workplace," 20 April 2011. [Online]. Available: http://www.forbes.com/sites/rawnshah/2011/04/20/working-with-five-generations-in-the-workplace/2/.

[34] G. Zichermann, "Gartner Adds Gamification to its Hype Cycle," 12 August 2011a. [Online]. Available: http://www.gamification.co/2011/08/12/gartner-adds-gamification-to-its-hype-cycle/. [Accessed 16 February 2013].

[35] D. Palmer, S. Lunceford and A. J. Patton, "The Engagement Economy: How Gamification is Reshaping Businesses," *Deloitte Review,* no. 11, pp. 51-69, 2012.

[36] D. Nahl and L. James, "Technology Integration and Gamification in University Courses," in *SLACTIONS 2012 International Conference*, 2012.

[37] Gartner, "Gartner Predicts Over 70 Percent of Global 2000 Organisations Will Have at Least One Gamified Application by 2014," 9 November 2011. [Online]. Available: http://www.gartner.com/newsroom/id/1844115. [Accessed 2 March 2013].

[38] Gartner, "Interpreting Technology Hype," n.d. [Online]. Available: http://www.gartner.com/technology/research/methodologies/hype-cycle.jsp. [Accessed 15 February 2013].

[39] Bloomberg Business Week, "Management 101: Motivation Matters," 07 June 1998. [Online]. Available: http://www.businessweek.com/stories/1998-06-07/management-101-motivation-matters. [Accessed 16 February 2013].

[40] E. L. Deci and R. M. Ryan, "Self-Determination Theory: A Macrotheory of Human Motivation, Development, and Health," *Canadian Psychology,* vol. 49, no. 3, pp. 182-185, August 2008.

[41] A. P. Hill, "A Brief Guide to Self-Determination Theory," September 2011. [Online]. Available: http://www.heacademy.ac.uk/assets/hlst/documents/projects/round_11/r11_hill_guide.pdf. [Accessed 10 April 2013].

[42] D. A. Gears, "Corporate Wiki Conduct: A Study of Organizational Influences, Emotion, and Motivation," *Journal of Leadership, Accountability and Ethics,* vol. 9, no. 3, pp. 75-85, 2012.

[43] B. Gnauk, L. Dannecker and M. Hahmann, "Leveraging Gamification in Demand Dispatch Systems," in *EDBT-ICDT '12*, New York, NY, 2012.

[44] R. Ryan and E. L. Deci, "Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being," *American Psychologist,* vol. 55, no. 1, pp. 68-78, January 2000.

[45] R. W. White, "Motivation reconsidered: The concept of competence.," *Psychological Review,* vol. 66, no. 5, pp. 297-333, 1959.

[46] R. DeCharms, Personal Causation: the internal affective determinants of behavior, Michigan: Academic Press, 1968.

[47] J. McGonigal, Reality is Broken: Why Games Make Us Better and How They Can Change the World, Random House, 2011.

[48] P. R. Lawrence and N. Nohria, Driven: How Human Nature Shapes Our Choices, 1 ed., Jossey-Bass, 2002.

[49] J. Kaufman, "Driven," 12 April 2011. [Online]. Available: http://personalmba.com/driven/. [Accessed 29 March 2013].

[50] The Personal MBA, "Everything I Know About Business I Learned from World of Warcraft," 16 April 2008. [Online]. Available: http://personalmba.com/everything-i-know-about-business-i-learned-from-world-of-warcraft/. [Accessed 1 April 2013].

[51] Lantern Group, "Overview of the Four Drive Model of Employee Motivation," 2013. [Online]. Available: http://www.lanterngroup.com/four_drive.html. [Accessed 1 May 2013].

[52] B. J. Fogg, "A behavior model for persuasive design," in *Proceedings of the 4th international conference on persuasive technology*, 2009.

[53] B. J. Fogg, "BJ Fogg's Behavior Model: What Causes Behavior Change?," n.d.. [Online]. Available: http://www.behaviormodel.org/. [Accessed 28 April 2013].

[54] M. Wu, "Gamification 101: The Psychology of Motivation," 1 March 2011. [Online]. Available: http://lithosphere.lithium.com/t5/science-of-social-blog/Gamification-101-The-Psychology-of-Motivation/ba-p/21864. [Accessed 20 March 2013].

[55] M. Witt, C. Scheiner and S. Robra-Bissantz, "Gamification of online idea competitions: Insights from an explorative case," *Informatik schafft Communities,* p. 192, 2011.

[56] M. Csikszentmihalyi, FLOW: The Psychology of Optimal Experience, New York: Harper & Row, 1990.

[57] M. Csikszentmihalyi, S. Abuhamdeh and J. Nakamura, "Chapter 32: Flow," in *Handbook of Competence and Motivation*, New York, The Guilford Press, 2005, pp. 598-608.

[58] K. Cherry, "Lesson Five: The Psychology of Learning," n.d.. [Online]. Available: http://psychology.about.com/od/introtopsychology/a/the-psychology-of-learning.htm. [Accessed 20 April 2013].

[59] Encyclopedia Britannica, "Pavlovian conditioning," n.d.. [Online]. Available: http://www.britannica.com/EBchecked/topic/120182/Pavlovian-conditioning. [Accessed 1 March 2013].

[60] K. Cherry, "Introduction to Operant Conditioning," n.d.. [Online]. Available: http://psychology.about.com/od/behavioralpsychology/a/introopcond.htm. [Accessed 1 March 2013].

[61] A. Sammons, "The Behaviourist Perspective 3: Operant Conditioning," n.d.. [Online]. Available: http://www.psychlotron.org.uk/resources/perspectives/behaviourist/ANY_behaviourism_skinner.pdf. [Accesssed 2 March 2013].

[62] K. Cherry, "Schedules of Reinforcement," n.d.. [Online]. Available: http://psychology.about.com/od/behavioralpsychology/a/schedules.htm. [Accessed 20 April 2013].

[63] J. Staddon and D. Cerutti, "Operant Conditioning," *Annual Review of Psychology,* vol. 54, pp. 115-144, 2003.

[64] Urban Dictionary, "Hardcore Gamer," 2008. [Online]. Available: http://www.urbandictionary.com/define.php?term=hardcore%20gamer.

[65] Urban Dictionary, "Casual Gamer," 2007. [Online]. Available: http://www.urbandictionary.com/define.php?term=Casual%20gamer. [Accessed 29 April 2013].

[66] Gamification Corp, "Game Mechanics Types," n.d.. [Online]. Available: http://gamification.org/wiki/Game_Mechanics/Types. [Accessed 20 April 2013].

[67] R. Bartle, "Hearts, clubs, diamonds, spades: Players who suit MUDs," *Journal of MUD Research,* vol. 1, no. 1, p. 19, 1996.

[68] N. Yee, "5 Motivation Factor for Why People Play MMORPG's," 2002. [Online]. Available: http://www.nickyee.com/facets/facets.PDF. [Accessed 29 April 2013].

[69] B. J. Fogg, Persuasive Technology: Using Computers to Change What we Think and Do, Morgan Kaufmann Publishers, 2003a.

[70] B. J. Fogg, "How to Motivate & Persuade Users," in *CHI 2003: New Horizons*, Fort Lauderdale, FL, 2003b.

[71] R. Khaled, J. Noble and R. Biddle, "An analysis of persuasive technology tool strategies," in *International Workshop on Internationalisation of Products and Systems (IWIPS), Amsterdam*, 2005.

[72] K. Werbach and D. Hunter, For the Win: How Game Thinking Can Revolutionize Your Business, Wharton Digital Press, 2012.

[73] J. Guerrera, "How I Gamified the Google Interview (And How You Can Too)," 29 November 2012. [Online]. Available: http://www.livingforimprovement.com/how-i-gamified-the-google-interview-and-how-you-can-too/. [Accessed 15 February 2013].

[74] F. Mulas, P. Pilloni and S. Carta, "Everywhere Race!: A Social Mobile Platform for Sport Engagement and Motivation," in *The Second International Conference on Social Eco-Informatics*, 2012.

[75] M. Ectors, "Gamification in Telecom," 29 September 2011. [Online]. Available: http://telruptive.com/2011/09/29/gamification-in-telecom/. [Accessed 23 May 2013].

[76] Playbasis, "Gamification and Telecommunications," 2013. [Online]. Available: http://playbasis.com/enterprise/gamification-and-telecommunications. [Accessed 23 May 2013].

[77] J. Brooks, "Airlines: The Ultimate Example of Gamification," 30 January 2013. [Online]. Available: http://www.brooksgroup.com/blog/index.php/2013/01/30/airlines-the-ultimate-example-of-gamification/. [Accessed 22 May 2013].

[78] Fora TV, "United Airlines: Free Bonus Miles with Gamification," 21 June 2012. [Online]. Available: http://www.dailymotion.com/video/xrnmfx_united-airlines-free-bonus-miles-with-gamification_news#.UauB2ECLDjH. [Accessed 2 June 2013].

[79] J. Coghlan, "Gamification: A New Way of Marketing," 21 May 2012. [Online]. Available: http://fr.slideshare.net/Matmi/gamification-a-new-way-of-marketing.

[80] F. Zahradnik, "Location-based Service," About.com, n.d. [Online]. Available: http://gps.about.com/od/glossary/g/location_based_service.htm. [Accessed 2 June 2013].

[81] M. Buchanan, "The Number: $41 Million," 11 April 2013. [Online]. Available: http://www.newyorker.com/online/blogs/newsdesk/2013/04/the-number-41-million.html. [Accessed 1 June 2013].

[82] J. Kohl, "Software Testing Is a Game," *Better Software,* pp. 7-8, January 2013. [Online]. Available: http://www.kohl.ca/articles/Software_Testing_Is_a_Game.pdf. [Accessed 5 June 2013].

[83] L. Brousell, "How Gamification Reshapes Corporate Training," 5 February 2013. [Online]. Available: http://www.cio.com/article/728268/How_Gamification_Reshapes_Corporate_Training. [Accessed 20 May 2013].

[84] Deloitte Digital, "About Us," 2013. [Online]. Available: http://www.deloittedigital.com/eu/about-us. [Accessed 5 June 2013].

[85] Bluewolf, "Who we are," n.d. [Online]. Available: http://www.bluewolfconsulting.co.uk/about. [Accessed 5 June 2013].

[86] Zamzee, "Zamzee," n.d.. [Online]. Available: https://www.zamzee.com/. [Accessed 1 June 2013].

[87] P. Herzig, S. Strahringer and M. Ameling, "Gamification of ERP Systems - Exploring Gamification Effects on User Acceptance Constructs," in *Multikonferenz Wirtschaftsinformatik*, 2012.

[88] SAP, "About SAP," n.d. [Online]. Available: http://www.sap.com/about-sap/about-sap.epx. [Accessed 10 June 2013].

[89] D. Takahashi, "Bunchball brings gamification to Adobe's digital marketing suite," 16 November 2011. [Online]. Available: http://venturebeat.com/2011/11/16/bunchball-brings-gamification-to-adobes-digital-marketing-suite/. [Accessed 5 June 2013].

[90] O. Gillin, "Gamification Cases," July 2012. [Online]. Available: http://www.slideshare.net/ogillin/gamification-cases. [Accessed 2 March 2013].

[91] C. B. Llewellyn, "Gamification and Energy Consumption," 30 August 2012. [Online]. Available: http://blog.opower.com/2012/08/gamification-and-energy-consumption/. [Accessed 19 May 2013].

[92] R. Cernansky, "Power Play: Can utilities turn energy efficiency into fun and games?," 18 July 2012. [Online]. Available: http://grist.org/climate-energy/power-play-can-utilities-make-energy-efficiency-fun/. [Accessed 5 June 2013].

[93] P. Shaw, "Smart Energy Behavior," in *GSummit*, San Francisco, 2012.

[94] B. Holland, "Gamifying Energy Use: Oberserved Trends From South By Southwest Interactive," 29 March 2012. [Online]. Available: http://thinkprogress.org/climate/2012/03/29/452499/gamifying-energy-use-trends-south-by-southwest-interactive/?mobile=nc. [Accessed 5 June 2013].

[95] R. Pegoraro, "Gamification: Green tech makes energy use a game - and we all win," 29 February 2012. [Online]. Available: http://arstechnica.com/features/2012/02/gamification-green-tech-makes-energy-use-a-gameand-we-all-win/. [Accessed 19 May 2013].

[96] A. Fahey, "Don't hate the player: How fun and games can encourage sustainable choices," 13 February 2012. [Online]. Available: http://grist.org/living/dont-hate-the-player-how-fun-and-games-can-encourage-sustainable-choices/. [Accessed 19 May 2013].

[97] Green Button, "About," Green Button, n.d. [Online]. Available: http://www.greenbuttondata.org/greenabout.html. [Accessed 20 June 2013].

[98] Smart Grid, "About SmartGrid.gov," [Online]. Available: http://www.smartgrid.gov/about_smartgridgov. [Accessed 22 May 2013].

[99] M. Smith, "Simple Energy: How Gamification Might Just Save The World," 27 September 2011. [Online]. Available: http://www.ecomagination.com/simple-energy-how-gamification-might-just-save-the-world. [Accessed 7 June 2013].

[100] K. M. Newman, "Techstars Graduate Simple Energy Gamifies Energy Saving," 1 November 2011. [Online]. Available: http://tech.co/SIMPLE-ENERGY-2011-11. [Accesssed 7 June 2013].

[101] Volkswagen, "The Fun Theory," 2009. [Online]. Available: http://www.thefuntheory.com/. [Accessed 5 June 2013].

[102] R. Wauters, "Amazon Closes Zappos Deal, Ends Up Paying $1.2 Billion," 2 November 2009. [Online]. Available: http://techcrunch.com/2009/11/02/amazon-closes-zappos-deal-ends-up-paying-1-2-billion/. [Accessed 26 June 2013].

[103] P. Eckert, "Gamification: What if the Game is Over?," E-commerce Times, 5 January 2013. [Online]. Available: http://www.ecommercetimes.com/story/76952.html. [Accessed 11 June 2013].

[104] M. Newman. Class Lecture, Topic: "The Process of ERP Implementation and BRP". Manchester, 2012.

[105] J. Phillips, "Gamify Your Intranet, or Just be Better at Recognising Your Employee?," 13 December 2012. [Online]. Available: http://www.business2community.com/strategy/gamify-your-intranet-or-just-be-better-at-recognising-your-employees-0350071.

[106] E. Ryan, "Gamification to Encourage Sustainable Behavior," 17 February 2012. [Online]. Available: http://ebscosustainability.com/2012/02/17/gamification-to-encourage-sustainable-behavior/. [Accessed 15 June 2013].

[107] C. Eridon, "How Real Businesses Are Using Gamification to Spice Up Their Marketing," 20 September 2012. [Online]. Available: http://www.cmo.com/articles/2012/9/20/how-real-businesses-are-using-gamification-to-spice-up-their-marketing.frame.html. [Accessed 1 March 2013].

[108] G. Zichermann, "Take Gartner's Advice: Make Great Gamification," 3 December 2012. [Online]. Available: http://www.gamification.co/2012/12/03/take-gartners-advice-make-great-gamification/. [Accessed 5 March 2013].

[109] Mind Tools, "Managing Complaints and Feedback: Improving the Way That You Do Things," [Online]. Available: http://www.mindtools.com/pages/article/managing-complaints.htm. [Accessed 20 April 2013].

[110] P. Tompkins and J. Lawley, "What is a Feedback Loop?," 4 June 2005. [Online]. Available: http://www.cleanlanguage.co.uk/articles/articles/227/2/Feedback-loops/Page2.html. [Accessed 10 April 2013].

[111] Badgeville, "Our Story," 2013. [Online]. Available: http://badgeville.com/our-story. [Accessed 10 June 2013].

[112] Badgeville, "Our Products," 2013. [Online]. Available: http://badgeville.com/products. [Accessed 20 June 2013].

[113] Bunchball, "About Bunchball," n.d. [Online]. Available: http://www.bunchball.com/about. [Accessed 20 June 2013].

[114] Bunchball, "Customers," n.d. [Online]. Available: http://www.bunchball.com/customers. [Accessed 20 June 2013].

[115] Bunchball, "Products & Services," n.d. [Online]. Available: http://www.bunchball.com/products. [Accessed 20 June 2013].

[116] Bunchball, "Gamification Solutions," n.d. [Online]. Available: http://www.bunchball.com/solutions. [Accessed 20 June 2013].

[117] BigDoor, "BigDoor Company," 2013. [Online]. Available: http://www.bigdoor.com/company/. [Accessed 20 June 2013].

[118] BigDoor, "BigDoor Case Studies," 2013. [Online]. Available: http://www.bigdoor.com/case-studies/. [Accessed 20 June 2013].

[119] G. Zichermann, "Gamification: Design For Engagement," 6 April 2011. [Online]. Available: http://www.slideshare.net/gzicherm/gamification-designing-for-engagement. [Accessed 19 May 2013].

[120] S. Brewis, Interviewee, *Interview With Stephen Brewis.* [Interview]. 17 June 2013.

[121] NPower, "Simple Energy Saving Tips," 2007. [Online]. Available: http://www.npower.com/Home/energy-efficiency/saving-energy/appliances/. [Accessed 29 June 2013].

[122] Badgeville, "Solutions," 2013. [Online]. Available: http://badgeville.com/solutions. [Accessed 1

July 2013].

[123] M. Csikszentmihalyi, "Flow and Education," 16 June 2007. [Online]. Available: http://www.ppc.sas.upenn.edu/csikszentmihalyipowerpoint.pdf. [Accessed 27 March 2013].

[124] Gamification Corp., "Zappos1," 8 March 2011. [Online]. Available: http://gamification.co/wp-content/uploads/2011/02/Picture-12.png. [Accessed 20 July 2013].

Appendix A: Research Design Model

Figure A.1: Research process to develop Gamification design through case studies (Adapted from: [15]