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**Implementation of a
Gamified, Mobile
Customer Relationship Management Application**

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Institute of Software Technology

AFFIDAVIT

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Abstract

What can be done to motivate employees to perform an important but boring task like entering customer information into an customer relation management (CRM) system? The approach taken in this thesis is to build a CRM application users enjoy entering data into.

Good games manage to provide a captivating experience to its players. Gamification is the utilization of game elements to bring such a gamelike experience to applications other than games.

This thesis describes the concept of gamification, the motivation theories behind it and the current state of research on the topic. Based thereon a gamified, mobile CRM application was developed. The design and implementation process as well as the resulting product are presented and discussed.

Zusammenfassung

Wie kann man Mitarbeiter motivieren wichtige aber langweilige Aufgaben, wie das Eintragen von Kundeninformationen in die Kundensoftware, zu erledigen? Diese Arbeit verfolgt den Ansatz eine Anwendung zu erstellen in die es Spaß macht Daten einzutragen.

Gute Spiele schaffen es die Spieler zu fesseln. Gamifizierung ist die Verwendung von Spielelementen um dieses Spielerlebnis zu anderen Nicht-Spiele-Anwendungen zu bringen.

In dieser Arbeit wird das Konzept von Gamifizierung, die dahinterliegenden Motivationstheorien und der aktuelle Stand der diesbezüglichen Forschung beschrieben. Darauf aufbauend wurde eine gamifizierte, mobile Kundenverwaltungssoftware entwickelt. Sowohl das Design, der Entwicklungsprozess als auch das entstandene Produkt werden beschrieben und diskutiert.

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Part I.
Theoretical Background

1. Introduction

Axtesys OG is a medium sized and fast growing software company. Apart from other challenges the company faces, the selection of the right software tools for daily processes is a recurring issue. Most available software is targeted at more complex company structures, other markets, or simply tries to include every feature possible. Since the company is a software company nobody wanted to adapt an unnecessary complex work flow in order to accommodate a software implementation.

One of the unsatisfactory software tools was the CRM system. CRM software products are applications to manage customer information. This information ranges from basic data, like name and company position of a person, up to detailed meeting notes about business opportunities. This information is critical for the success of sustained sales in a company. On the one hand it supports a sales model based on personal recommendations and customer satisfaction by keeping in touch with the customer and on the other hand it allows to manage year long acquisition processes of strategic partners and customers.

Even after multiple evaluations the perfect tool was not found. On the premises that it is better to have too much functionality than to miss something OnlyOffice¹, a feature reach software system was used.

As a growing company more and more employees became reliant on the information in the CRM system. Over the time it turned out the process of entering customer information, the most crucial part of CRM, was performed with reluctance and was perceived as tedious. The data was entered correctly and mostly complete but the task was delayed or delegated.

¹<https://www.onlyoffice.com/>

1. Introduction

Analyzing the problem employees have with filling out customer information two mayor factors were identified:

- The task of entering the data was more cumbersome than necessary.
- Even though the data was valued, the act of providing the data was not.

In order to approach these problems the idea was to make the task of entering customer data more fun. The use of game like mechanics came to mind and was the starting point for this thesis.

The goal of this thesis is to scientifically approach the application of gamification as a way to increase valuation and motivation based on the design and implementation of a mobile CRM application.

The first part of this thesis explores the theory behind gamification and the current state of research. In the second part the process of the application's practical realization is presented.

2. Gamification

"Playing a game is the voluntary attempt to overcome unnecessary obstacles"
(Suits, 1978, p. 55)

Playing a good game makes fun and is a very enjoyable experience. Players are motivated to spend much effort on playing and feel rewarded for the achieved progress. (Niebuhr and Kerkow, 2007, p. 49). The idea behind gamification is to translate this motivating, enjoyable and rewarding experience to other tasks outside games (Deterding, Björk, et al., 2013, pp. 3263-3264). Ideally working on any task should be as much fun as playing a game.

2.1. What is Gamification

"'Gamification' is the use of game design elements in non-game contexts."
(Deterding, Dixon, et al., 2011, p. 10; Deterding, Khaled, et al., 2011, p. 13)

Gamification does not create a full-fledged game. Instead design element characteristic for games like specific game mechanics, feedback systems or engagement loops are identified and adopted for the use in a non-game application. The look and feel may be similar to a game to create a more playful user experience (Deterding, Dixon, et al., 2011, p. 13; Deterding, Björk, et al., 2013, pp. 3263-3264; Groh, 2012, pp. 40-41).

There are a wide variety of gamified applications. They exist to help to learn, to adapt a healthier lifestyle, to save the environment, to clean the house and perform other tasks (Hamari, Koivisto, and Sarsa, 2014, pp. 3028-3029; McGonigal, 2011, p. 120).

2. Gamification

Although it can be argued that these tasks have their own purpose and benefit and should be done anyway, gamification can provide a more motivating and engaging way to accomplish them. While making the action itself more fun and challenging the reward for successful completion is visible immediately. Clearly defined short and long term goals and rules how to reach these, make it possible to track and reward progress, giving continuous positive feedback and the feeling of achievement (McGonigal, 2011, p. 21).

By voluntarily committing to the game the players commit themselves to play by the rules and to achieve the set goals. (Groh, 2012, p. 43)

A gamified application is mainly focused on the players' needs and goals. The underlying non-game purpose will be achieved in the long term by providing an enjoyable and meaningful interaction (Nicholson, 2012, pp. 228-229).

Although the term gamification was coined in the context of software applications it is not a prerequisite to use software in any way for gamification (Deterding, Dixon, et al., 2011, p. 11). The focus of this work however, will be on the application of gamification in a software application. Therefore the game design elements used are also taken from the computer games genre.

2.2. Play vs. Game

"Games should not be play; but that does not imply that they do not require play." (Walther, 2003)

In order to utilize the dynamics of gaming for gamification the concepts of playing and gaming and the difference between each other and to non-playing have to be understood.

When playing the player is transitioned into a play-mode (see Figure 2.1). The fascination of play lies in the distinction between play and non-play. Play takes place in a make-believe world without external constraints. Actions taken in the play-world have no direct effect on the outside. Playing requires

2.2. Play vs. Game

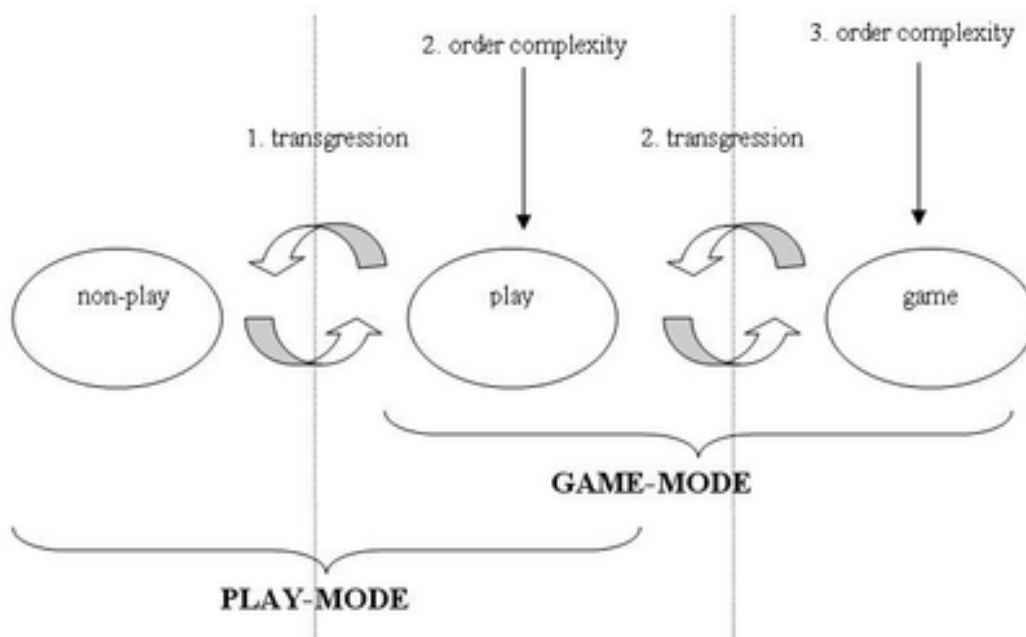


Figure 2.1.: Visualization of the connection between play-mode and game-mode (Walther, 2003)

2. Gamification

a play-mood, a state where the player is fully immersed in playing. In this state the real-world is exchanged for the play-world. While being in the play-mode the goal is to keep prolonging the presence in this open-ended territory and enjoying the experience (Walther, 2003).

Gaming on the other hand is not the same as playing in the sense as games are not the same as toys. Games provide structure, rules and goals. Gaming takes place in a defined time and space outlined by the game. Gaming involves tactics, competition and measurable progress resulting in the feeling of accomplishment and success. The goal of gaming is to achieve progress and uphold structure not present in play. In order to get into the game-mode one has to be in play-mode first (see Figure 2.1). The state of playing is transformed into the more structured state of gaming. Therefore the constraints that apply to getting into play-mode also apply to the act of getting into the game-mode (Deterding, Dixon, et al., 2011, p. 11; Walther, 2003).

It is essential to the attractiveness of playing as well as gaming that they take place in a setting other than non-play or everyday life. To provide an authentic and intriguing experience it is important for a game to stay in this setting and not to mix with the outside world. That challenge is hard to overcome in the case of gamification where by definition the outside world is an inherent part of the gamified application. Even a game or gamified application which succeeds in providing a compelling experience in some cases may not provide it in others. It is very subjective and depends on social factors if something is perceived as a game. Different players of the same gamified application may feel encouraged in one case and controlled in another (Deterding, Dixon, et al., 2011, p. 11; Walther, 2003).

Since the transitions from non-play-mode to game-mode and back take an effort each time, the situations requiring transition have to be minimized. The context and environment in which the gamified application is used are factors for the players' ability to get into the gaming-mode and therefore enjoy and immerse into the game (Walther, 2003).

The challenge for creating a gamified application is therefore to find the perfect way to place the interaction in a game-setting and to be aware of the border between game-mode, play-mode and non-play-mode.

2.3. Goals

As mentioned above the goals of gamification are to utilize the motivating and engaging effects of games in other contexts. The aim of this master thesis is the use of gamification for employee engagement and internal business processes, in particular the CRM.

The concept of motivating employees by the use of games and the gamification of work tasks is not a new idea. Rewards for special work effort, the encouragement of competition between employees and the concept of making tasks more fun were established long before the term gamification was coined. Gamification is a new approach of reaching these goals in a software based environment. Additionally the measurement of work metrics for the purpose of business evaluation are a core feature of gamification, since it is inherit in the game mechanics for providing user feedback.

As a benefit for the employees tools that are fun to use are provided, to make the work situation more comfortable and more focused on the rewarding parts. This should be accomplished by giving the work meaning and value, thereby supporting the intrinsic motivation, giving the employee the visible feedback of increased competence and accomplishment and minimizing the boredom of tedious tasks (Niebuhr and Kerkow, 2007, p. 49).

The addition of game elements to an application cannot be the only measure taken. In a company environment that does not support the above mentioned values, a new tool does not make any difference and can quite quickly be seen as another external reward system to exploit employees. In an environment where employees are intrinsically motivated the gamification of tools can increase the motivation for tasks that have to be done but are not rewarding as such.

In the case examined the CRM-software is identified as a suitable tool. After each engagement with a customer the managers and employees have to enter information about this engagement in the CRM-tool. This information can include time and place of the meeting, persons present, topics discussed and agreements made, etc. This data is most valuable for the company and for every employee communicating with the customer, but this importance was not illustrated at the time entering it. There is no immediate feedback

2. Gamification

for the entry and when someone finds the information useful there is no direct connection to the task of entering it in the first place. Besides being tedious and boring the task of entering customer information is not valued despite of its importance.

The goal of gamifying the CRM-tool is not only to visualize the personal use of the entered data but most importantly to visualize the value it has for other users. Visualizing increases the motivation of the individual to share the information with others although it requires some additional effort.

The idea is to create a system where added value is made visible. One way of doing this is by applying virtual rewards to the tasks as a metric of created value. This reward system should not be competitive but collaborative since all employees should benefit from a great team effort.

2.4. Criteria for Successful Gamification Implementation

“The mere addition of game elements does not necessarily guarantee successful gamification” (Hamari, 2013, p. 237)

The success of a gamified application does not solely lie in the applied game elements. Many criteria lie outside of the gamification aspect. The most important being the underlying application itself. A good application may be enhanced by gamification. Gamification does not turn an application into a good application. The game aspect does not replace the need for a well-designed, thought through and useful application. Although short term interaction can be provoked by game elements alone, for a sustained user interest there has to be an appropriate application to gamify.

Playing a game is voluntary. Otherwise it is not a game. The player has to always have the free choice whether to play with the gamified application or not. If the application is a necessary tool e.g. in a business context there has to be a way to use it without engaging in the game and therefore requiring the user to be in a gaming mood. The game aspect is supposed to support intrinsic motivation and make the use of the application a more enjoyable

2.5. Limitations and Criticism

experience. A gamified application can only be seen as successful when the players freely decide to play with it.

The game elements used have to be well designed and be appropriate for the intended purpose. Game elements or mechanics should be chosen depending on the individual need and not on how often they are represented in games or how popular they are in other gamified applications. Implementing a list of game elements needed for a gamified system¹ may be counterproductive to successfully creating a unique experience. The expertise of game designers is highly recommended when designing a gamified application.

2.5. Limitations and Criticism

The criticism of gamification targets gamification as a concept as well as the realization process. The concept is criticized for manipulating people into working without a real reward.

As with other implementations of motivation concepts for employees, gamification's success highly depends on the way it is utilized. When it is used as an extrinsic reward system it is nothing more than a leaderboard increasing competition among employees including negative effects like not supporting each other or gaming the system. Neither should it be a system to exploit customers, employees or others, for which gamification is criticized and dubbed "exploitationware" (Bogost, 2011). The reward per measurable outcome of an employee is the essence of an external reward system and can pressure people into working at their limits for as long as they can (Deterding, 2011b, p. 3; Nicholson, 2012, p. 225).

The vision of introducing gamification for every aspect of life, from brushing ones teeth to advertisement games, dubbed gamepocalypse by Schell (2010), paints a daily routine completely driven by exploiting gamification, showing the potential danger in an exaggerated scenario.

¹as used by Herzig, Ameling, and Schill (2012, p. 220) to design a generic gamification platform

2. Gamification

The implementation of gamification is criticized for making a poor job in terms of game design and user experience. Some advocates of gamification promise results for just adding some common game elements. Not only do professional game designers criticize this approach as falling way short in providing a game like experience. It is also argued that game elements like points and achievements are the visual parts of profound game concepts, not their essence (Deterding, Björk, et al., 2013, p. 3265).

The term "pointsification" was introduced by Robertson (2010) for the mere addition of points to a system in an attempt to gamify (Nicholson, 2012, p. 1). Technically solely adding points is considered gamification² but to provide a game like experience points have to be embedded in a broader concept. Also points often reward quantity over quality resulting in a minimalistic completion of tasks (Mekler et al., 2013, p. 1140; Halan et al., 2010, p. 488).

An often criticized practice is that, rather than designing a gameful application from scratch, existing applications are gamified by adding a game layer which is promoted by industry practitioners³ (Deterding, Björk, et al., 2013, p. 3265). In addition to not providing a gameful experience on their own, they only act as extrinsic motivators with the benefits and drawbacks discussed in Section 3.1.1.

To avoid the criticized shortcomings in a gamified application a profound gamification concept needs to be implemented. It is important to look at the mechanics between the player and the game elements in a broad context. Gamification is not a quick solution automatically resulting in the desired actions performed by the users. When implemented poorly it may even result in the contrary.

²to an extent that research on the success of gamification is done on such implementations (Mekler et al., 2013, p. 1139)

³i.e. by providing an achievement layer like <https://badgeville.com> or a leaderboard system like <https://www.hoopla.net/>

2.6. Related Terms

There are several other forms in which game elements are used outside the game context that are not categorized as gamification. A brief overview over the other terms used in this area should provide a clear understanding of what represents gamification and what does not. Figure 2.2 by Deterding, Dixon, et al. (2011, p. 13) provides a good guideline.

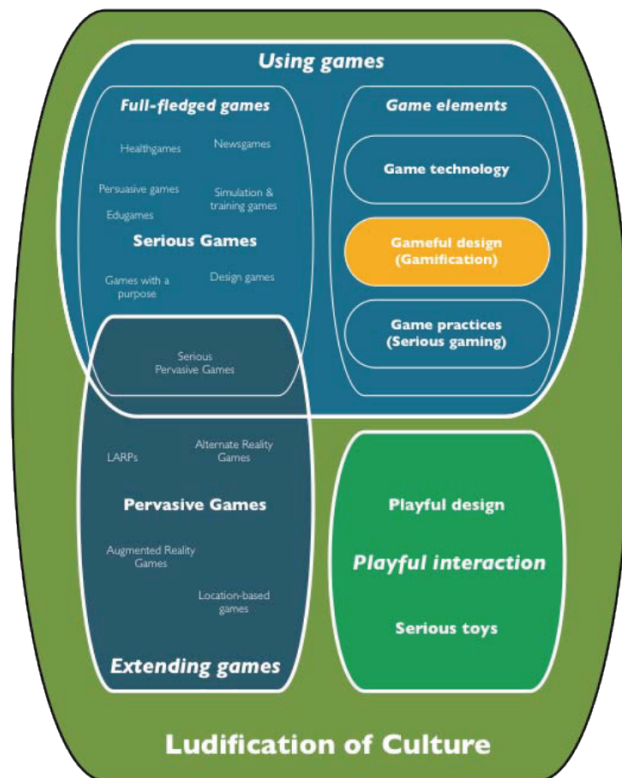


Figure 2.2.: Gamification in relation to other terms in the field of ludification (Deterding, Dixon, et al., 2011, p. 13)

2.6.1. Game Elements Outside of Games

The term *gameful design* describes the most similar usage of game design elements. The term is often used instead of gamification (as seen in Fig-

2. Gamification

ure 2.2) to avoid the negative connotation the term gamification received due to its usage by service vendors as a simple marketing tool. Gameful design describes a stronger focus towards designing for gamefulness than the usage of game design elements (Deterding, Dixon, et al., 2011, p. 11).

In this thesis gameful design practices are integrated into the strategy for creating the gamified application since the approaches are so similar and a gameful as well as a playful behavior and mindset are desired (Groh, 2012, p. 39).

2.6.2. Full-fledged Games

Serious games do not only use game elements but are full-fledged games. Serious games are developed with the intention of being more than entertainment. They aim to provide the motivational and engaging experience of a game and additionally fulfill an outside goal like educating, training or marketing. The players do not necessarily need to be aware of the additional intention. Being a full-fledged game the motivation to play can primarily be entertainment and not the additional goal.

Fields of application where serious games are extensively studied have developed specialized terms like *edugames* or *edutainment applications* for teaching knowledge and skills to the player, *health games* providing health education and promoting a healthier lifestyle or *exergames* helping to do more exercise.

The term *games with a purpose* (GWAP) is used for full-fledged games that use the player to perform tasks like tagging images⁴. Such human information tasks, that cannot be performed automatically, are transformed into a game and solved by the players. The observation of how players are solving the problem can additionally help in the development of algorithms or can train machine learning algorithms. The player's knowledge to participate in something meaningful can provide further motivation (McGonigal, 2011, p. 240; Von Ahn and Dabbish, 2008, p. 61).

⁴ESP Game by Luis von Ahn <http://www.espgame.org>

2.6. Related Terms

Persuasive technology or *persuasive games* are used to motivate a specific behavior in the players outside the game⁵. Persuasive games may be used for marketing or to encourage to make self-beneficial decisions like eating healthier or performing exercises (Deterding, Sicart, et al., 2011, p. 2426; Lee, Kiesler, and Forlizzi, 2011, p. 325; Bogost, 2007, p. 48).

2.6.3. Playification

As discussed in Section 2.2 play is a less restricted and more experimental form of interaction than gaming. *Playification* is therefore the use of play elements in non-play contexts. The term *playfulness* describes the ability of free interaction provided by the design of an application and the mindset with which such application is approached (Deterding, Dixon, et al., 2011, p. 11; Nicholson, 2012, p. 229).

Although playful interaction can prolong the engagement with an application it is not the tool for targeted task motivation. Playful design influences in which way and which mindset an application is approached. This can have positive or negative effects depending on the willingness of the user to adapt a playful mind-set. In one case a playful application will be annoying and reducing motivation for a person not in play-mood. In the other case playful design may encourage people to engage in an otherwise boring task by making it fun. The study on how to make things fun is also referred to as *funology* (Montola et al., 2009, p. 94; Deterding, Dixon, et al., 2011, p. 11; Deterding, Sicart, et al., 2011, p. 2426).

2.6.4. Pervasive Gaming

Pervasive Games are games that expand into the world outside the game. This can be done spatially where location based interaction is part of the game, temporally by having a game world that works in real time and can be accessed at any time, and/or socially where alternate realities are created that overlap with everyday actions (Deterding, Dixon, et al., 2011, p. 10).

⁵e.g. The Howard Dean for Iowa Game <http://www.deanforamericagame.com/> promoting an U.S. presidential candidate (Bogost, 2007, p. 48)

2. Gamification

As previously outlined there are many methods how to use games and game elements for something other than pure gaming. The borders between different types of gaming and non-gaming are often blurred. Aspects of various concepts may be combined but it is advisable to be aware of the mechanics behind the tools and follow a consistent intention within the game. The various forms of gameful interactions have different ways of influencing the player's actions. Depending on the goals in mind the game concept has to be designed accordingly.

2.7. Learnings

Gamification goes much deeper than adding some points and badges to an application. When applied correctly gamification can make a task fun and interesting and can have a positive influence on the player's experience. In order to successfully create an engaging and motivating gamified application a good understanding of game mechanics and concepts and their influence on the player's motivation is needed.

3. Motivation Theory

As outlined in the chapter Section 2.3 the aim of this work is to use gamification to increase the player's motivation while performing specific tasks. In order to explain how gamification can accomplish this, a deeper look into the workings of motivation is needed.

In this chapter motivation and its factors are discussed, based on the Self-Determination Theory (SDT) introduced by Deci and Ryan and further research based thereon. SDT is referenced in most of the literature used about gamification as underlying framework for the explanation of gamifications' influence on the player's motivation (Aparicio et al., 2012; Deterding, 2011b; Deterding, Sicart, et al., 2011; Gears and Braun, 2013; Groh, 2012; Hamari and Eranti, 2011; Hamari, Koivisto, and Sarsa, 2014; McGonigal, 2011; Mekler et al., 2013; Nicholson, 2012; Rigby and Ryan, 2011)

3.1. Intrinsic and Extrinsic Motivation

Motivation can be categorized based on the reasons that move the person to do something. The two types of motivation are intrinsic and extrinsic. A person acts out of intrinsic motivation because the action is inherently interesting or enjoyable. The act itself is valued and benefits the acting. When the reason for doing something lies outside of the task itself a person acts out of extrinsic motivation. The reason is then separable from the task. As seen in Figure 3.1 extrinsic motivation can be further differentiated. Even if the same task may be performed there are significant differences in both cases, especially in the perception of the person acting. This also means that a task as such is not inherently interesting but interest depends on the

3. Motivation Theory

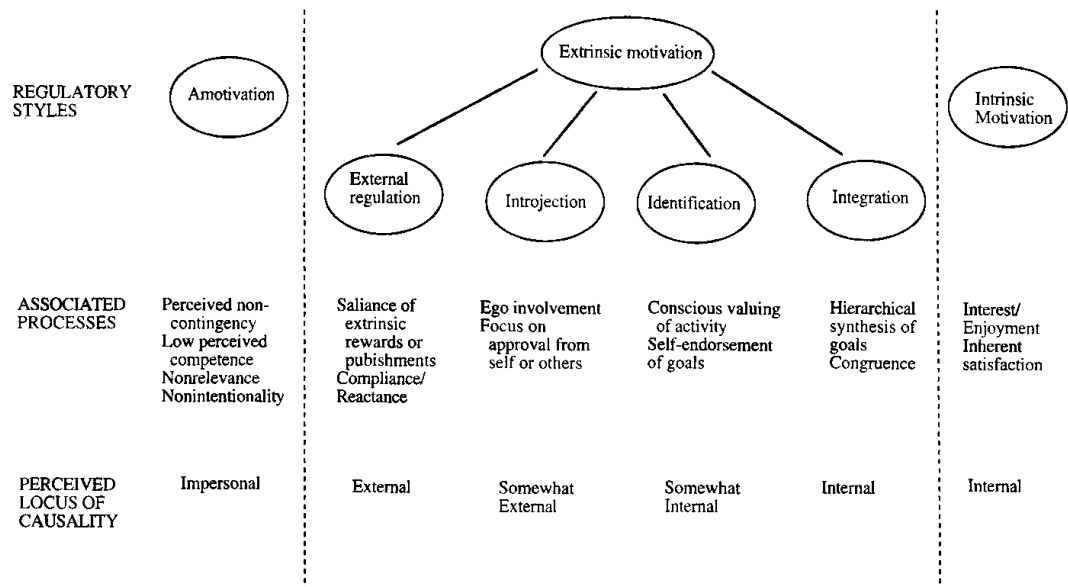


Figure 3.1.: Taxonomy of human motivation (Ryan and Deci, 2000, p. 61)

perception of the acting person (Ryan and Deci, 2000, p. 57; Aparicio et al., 2012, p. 1).

3.1.1. Comparison

The form of extrinsic motivation often used in contrast to intrinsic motivation is the external regulation (see Figure 3.1). Even though other forms of extrinsic motivation can describe a continuous transition from external regulation to intrinsic motivation, most arguments are based on the extremes (Ryan and Deci, 2000, p. 62).

In this comparison intrinsic motivation is widely preferred in theory as the more lasting and enjoyable way of engaging in activities. But even if intrinsic motivation is supported not all tasks can be made inherently interesting, especially not for everyone. Besides sometimes being the only feasible way of motivation, extrinsic motivation can have its benefits as argued by Zichermann and Cunningham, promoting gamification (Zichermann and Cunningham, 2011, p. 28).

3.1. Intrinsic and Extrinsic Motivation

Typical extrinsic rewards, like money, increase the performance of completing simple tasks but can even be counterproductive for complex tasks and lateral-thinking. An extrinsically motivated person is more goal-oriented with a narrow focus of attention. In such a state of mind the completion of clear and simple tasks is faster. Tasks that require even the smallest amount of outside-the-box-thinking take longer if the person is in such a focused state. (Pink, 2009; Zichermann and Cunningham, 2011, p. 26)

3.1.2. Transition From Intrinsic to Extrinsic Motivation

While in place, an external reward system is easier to control and more predictable than the outcome of supporting intrinsic motivation. The most important factor is that this reward system has to stay in use because all external rewards (except for non-controlling verbal rewards) reduce the existing intrinsic motivation. If the external reward system is removed, previously present intrinsic motivation is often lost. The replacement of intrinsic motivation by extrinsic motivation is called overjustification or replacement bias. An intrinsically motivated activity can thereby be transformed into a purely extrinsically motivated one (Groh, 2012, p. 41; Zichermann and Cunningham, 2011, p. 27; Deterding, 2011b, p. 2; Deci, Koestner, and Ryan, 2001, pp. 3-4; Nicholson, 2012, p. 223).

3.1.3. Extrinsic Leading to Intrinsic Motivation

A transition from extrinsic to intrinsic motivation can also take place but is less common than the replacement of intrinsic motivation by extrinsic motivation. Extrinsic motivators can be used in the following three ways which can lead to intrinsic motivation.

3.1.3.1. Closing the Motivation Gap

External motivation can support intrinsic motivation if the internal desire is disconnected from the process of fulfilling the desire. This is for example the case when a healthier lifestyle is desired. The results of losing weight or

3. Motivation Theory

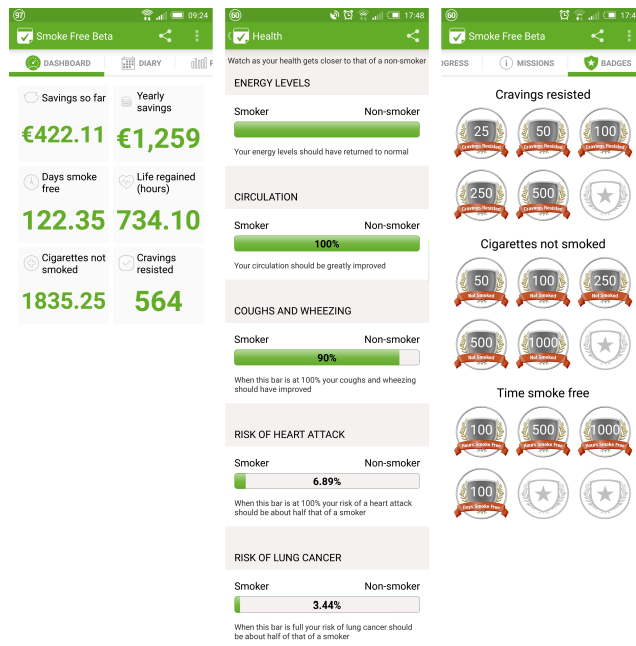


Figure 3.2.: Smoke Free Beta screen shots of reward system

getting fit are only visible after an extended period of effort. The desire to live more environmentally friendly may never show any direct result. An external reward system can support the intrinsic motivation by providing short term goals and by visualizing progress.

The screen shots in Figure 3.2 show the gamified application Smoke Free Beta¹ using a points and badges reward system supporting the desire to stop smoking by rewarding the otherwise not immediately visible effects. It shows the progress that has already been achieved on the way to a smoke free lifestyle. A moment of craving for a cigarette is transformed from a moment of unfulfilled desire into an event of continued, successful withstanding. Even ten year goals like reducing the risk of lung cancer are tracked, making the long term commitment tangible (McGonigal, 2011, pp. 70,156-157,262; Zichermann and Cunningham, 2011, p. 28; Nicholson, 2012, p. 226; Deterding, 2011a).

¹<https://play.google.com/store/apps/details?id=com.portablepixels.smokefree>

3.2. Self Determination Theory

3.1.3.2. Internalization of Behavior

An other way of reaching internal motivation for an external motivated task is described by Ryan and Deci as the process of internalization and integration of behavior regulations and values called Organismic Integration Theory (OIT). It describes the fact that a person naturally tends to incorporate the demand, regulations and values of the social groups they feel related to. The criteria for intrinsic motivation as outlined by the SDT in Section 3.2 have to be met for successful internalization. In particular relatedness to the task and the social group has to be established by providing a meaningful framing and purpose as described in Section 3.2.3. Too much external pressure and control hinders the internalization, the person must be free to grasp the meaning or rationale behind the regulation (Ryan and Deci, 2000, p. 60; Deci and Ryan, 2000, pp. 238-239; Nicholson, 2012, p. 224).

3.1.3.3. Discovery of Intrinsic Task

Zichermann and Cunningham argue that extrinsic motivation can also lead to intrinsic motivation when a person discovers something new and intrinsic to the player, due to an external motivator (Zichermann and Cunningham, 2011, p. 26). This argument is not pursued further in this thesis since the task is already known to existing users and it also holds true for unintentional and accidental reasons that result in trying a new activity.

3.2. Self Determination Theory

According to SDT intrinsic motivation is gained and maintained when the individual's psychological and social needs for autonomy, competence and relatedness are satisfied. Sometimes competence is referred to as mastery and relatedness as purpose, but has no other significant distinction (Aparicio et al., 2012, p. 1; Pink, 2009; Deterding, 2011a; Gears and Braun, 2013, p. 2).

3. Motivation Theory

3.2.1. Autonomy

Autonomy is the need to decide for one self what to do and how to do it. Choosing personal goals and controlling the process of achieving them grants autonomy. The personal interest in the activity, leading to the will to perform it, may result in intrinsic motivation. To perceive autonomy it is important that the action is performed voluntarily and is valued. Rewarding actions can lead to devaluing them, since usually valuable actions do not need promotion (Aparicio et al., 2012, p. 1; Groh, 2012, p. 43; Deterding, 2011a; Nicholson, 2012, p. 226; McGonigal, 2011, p. 120; Rigby and Ryan, 2011, p. 39).

Positive and informative feedback supports the individual while controlling feedback and extrinsic motivators thwart the experience of autonomy (Deterding, 2011b, p. 2; Groh, 2012, p. 43; Aparicio et al., 2012, p. 1).

Autonomy can be preserved when setting shared goals and and if these goals can be pursued individually. (Groh, 2012, p. 43).

3.2.2. Competence

Competence is the desire for accomplishment and the ability to solve a problem. The feeling of getting better at a specific task, to acquire new knowledge and skills, to successfully achieve a challenging goal can be a very powerful motivator. For a person to be able to experience competence, the resulting progress and success have to be directly visible. Short and structured tasks with clearly defined, challenging but achievable goals support a steady loop of motivation (Aparicio et al., 2012, p. 1; Groh, 2012, pp. 42–43; Rigby and Ryan, 2011, p. 39).

The continuous, perfect state of competence is called flow. Flow is introduced by Csikszentmihalyi as "the satisfying, exhilarating feeling of creative accomplishment and heightened functioning." (Csikszentmihalyi, 1975; McGonigal, 2011, p. 35). People "within the flow" are neither overchallenged nor underchallenged and are operating at a high skill level as seen in Figure 3.3. The degree of challenge and required skill usually fluctuate but are higher than average and therefore stay in the flow area at all times.

3.2. Self Determination Theory

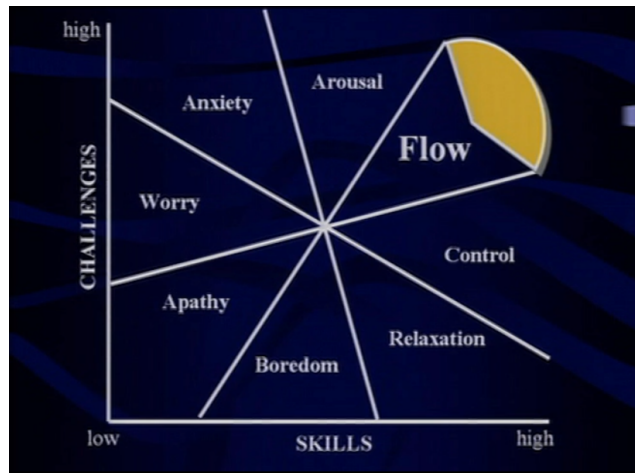


Figure 3.3.: State of Flow depending on used skill and experienced challenge (Csikszentmihalyi, 2004)

In this state a person can still experience failure at a task, resulting in an even greater accomplishment or, perform a similar task repeatedly granting the feeling of mastery. In the state of flow there is a constant feeling of excitement and lingering success, an oscillation between ecstasy and goal-orientation (Csikszentmihalyi, 2004; McGonigal, 2011, pp. 35,67; Walther, 2003; Deterding, 2011a).

3.2.3. Relatedness

Humans inherently want to experience the feeling of connection to others. The naturally occurring and internally motivated need for meaningful interaction is a central factor in everybody's life. The feeling of relatedness exists, when one is acknowledged and supported by others and has some sort of impact on them. In order to feel relatedness by doing something it has to be personally meaningful and rewards for the work are important when they are recognized by a meaningful community (Rigby and Ryan, 2011, pp. 65-68; Groh, 2012, p. 42; Aparicio et al., 2012, p. 1).

A boring task can become exciting when done for a personally meaningful purpose. A framing of purpose and meaning, the person can relate to,

3. Motivation Theory

enhances voluntary productivity and supports intrinsic motivation (Mekler et al., 2013, p. 1139).

The social context shapes values and actions. The received social recognition alters the behavior. The fact that others are doing something is a strong social validation of the action. Desired conformity is shown by participation (Hamari, 2013, p. 238).

3.3. Motivation Theory in the Context of Gamification

The motivation in games comes from satisfying the needs described in the SDT shown by Rigby and Ryan (2011) (Groh, 2012, p. 42). To design gamified applications that spark the same devotion as games, these criteria should be but are not always utilized.

The most widely implemented form of gamification represents an external reward system. As promoted by service vendors² virtual rewards like points and badges are used to guide the player's behavior and thereby clearly rewarding desired actions (Hugos, 2012, p. 49; Deterding, 2011a).

For this simplified approach gamification is also often criticized as described in Section 2.5. Despite sometimes lacking core features of games like voluntary participation, these systems can work as well as other external reward systems with the benefits and drawbacks discussed in Section 3.1.1.

Gamified applications supporting intrinsic motivation have generally a more creative and task specific approach. As explained in Section 3.2 in order to attain intrinsic motivation autonomy, competence and relatedness are needed.

Autonomy can be reached by letting the players set or even design their own goals. The players feel empowered and supported in fulfilling their desires. A fun and overall appealing application makes it more likely for the player

²BadgeVille (<http://badgeville.com/>), Bunchball (<http://www.bunchball.com/>), Gamify (<http://gamify.com/>), Achievers (<http://www.achievers.com/>), Igloo Software (<http://www.igloosoftware.com/>)

3.4. Learnings

to voluntarily engage. By having multiple game aspects and mechanics each player can decide which form of interaction fits her/him best and is also free in the way of participation. Gamified applications which let the playes set their own goals are Chore Wars³ and mint.com⁴ (McGonigal, 2011, p. 119; Nicholson, 2012, p. 226; Deterding, 2011a).

The feeling of *competence* can be strengthened by making a specific task more interesting and keep it challenging. Unnecessary restrictions in how to accomplish the task can turn something boring into a fun experience. The ability to monitor one's progress and achievements makes the result of accomplished work visible.

The *relatedness* to the action is supported by explaining the value of the task. The meaning of a task is often lost in daily work. The goal of a gamified application can be to reestablish the connection to the purpose and created value of the performed action in a gamelike setting. The meaning of a task can also be shown by the recognition of a meaningful social group. If people show their appreciation for one's achievements or a group works together in accomplishing a shared goal the social connection supports the personal engagement. The social connection to other players in the game is the strongest motivator to keep playing (McGonigal, 2011, p. 90; Mekler et al., 2013, p. 1140).

The use of a gamification system in a company is embedded in the given corporate culture and set of values. When a high score in the gamified application is considered as a valuable achievement, the gained social status may fulfill a personal desire of the employee (Nicholson, 2012, pp. 224-225).

3.4. Learnings

Taking the above established mechanics of motivation into consideration, the following approach for the CRM-tool, that is to be implemented, is deduced.

³<http://www.chorewars.com>

⁴<http://www.mint.com>

3. Motivation Theory

1. In general intrinsic motivation should be preferred to extrinsic motivation since the job as a whole requires creativity and engagement even if some specific tasks do not. Tasks that require lateral thinking or communication with customers and colleagues should not be reduced to their quantifiable characteristics by external rewards. Instead autonomy, competence and relatedness should be provided for the player.
2. Tasks that are deemed important and meaningful to the player, but which lack the feedback necessary for continued intrinsic motivation should be tracked and visualized. By playfully rewarding small goals and achievements the connection between the player and the task can be strengthened.
3. Tasks that are simple and tedious and do not require any form of creativity should be made as simple as possible. The purpose of those tasks should be clear for the user. If the users are still not motivated to do them, they can be rewarded by extrinsic motivators.
4. Any motivation system in a company is embedded in the company's social structure. In a corporate culture where the delivered work is valued by colleagues and seen as a productive and meaningful action intrinsic motivation is generated. The affective tone of the application can reflect those values. The general framing in which the gamified application is promoted in the company will have a big influence on how it is perceived and defined and if the rewards it provides are considered desirable.

The challenge is to embed these motivation strategies in an overall fun and playful application capable of supporting the desired tasks. Game design elements have to be well-considered for their impact on the player's motivation and integrated seamlessly into an engaging package.

4. Game Design Elements in the Context of Gamification

The main challenge in designing a gamified application lies in the combination of a non-game application with game elements to create a game-like tool which is enjoyable like a game and has a practical use like a non-game application.

Most of the time an existing non-game application is given and game design elements are added to make it fun. Choosing the right combination from the vast amount of game design elements is key for a successful application¹.

This chapter deals with the application of game design concepts for gamification and gives an overview of the different game elements widely used in practice.

4.1. Definition of Game Design Elements

So what constitutes a game design element? A game design element is not easily defined. There is no clear definition if a design element is game specific, since each one is used outside the game context as well. On the other hand there is no game design element which on its own defines a game. So the context in which a design element is used is crucial for its perception as being gameful². This difficulty of distinction applies in pure games and even more so in gamification. The game elements used are

¹As shown in Section 2.5 the mere addition of game elements alone does not make a motivating game or gamified application.

4. Game Design Elements in the Context of Gamification

Level	Description	Example
<i>Game interface design patterns</i>	Common, successful interaction design components and design solutions for a known problem in a context, including prototypical implementations	Badge, leaderbord, level
<i>Game design patterns and mechanics</i>	Commonly reoccurring parts of the design of a game that concern gameplay	Time constraint, limited resources, turns
<i>Game design principles and heuristics</i>	Evaluative guidelines to approach a design problem or analyze a given design solution	Enduring play, clear goals, variety of game styles
<i>Game models</i>	Conceptual models of the components of games or game experience	MDA; challenge, fantasy, curiosity; game design atoms; CEGE
<i>Game design methods</i>	Game design-specific practices and processes	Playtesting, playcentric design, value conscious game design

Table 4.1.: Levels of game design elements (Deterding, Dixon, et al., 2011, p. 12)

therefore described as characteristic for games (Deterding, Dixon, et al., 2011, pp. 11-13).

Deterding, Dixon, et al. (2011) have provided a list of game design elements compiled from literature on games and gamification ordered from concrete to abstract levels seen in Table 4.1.

²The context of perception is so important that even full-fledged games can be seen as work when used outside of the gaming context. For game testers and e-sports players, a game can very easily be reduced to its work related aspect. (Deterding, Dixon, et al., 2011, p. 11; Bartle, 2012)

4.2. Player Typologies

In order to select the right game design element for the gamification implementation, multiple aspects have to be considered. Besides their suitability for the desired task and having the right motivational effect, the target group for the game design element has to be identified.

Knowing the target group for a product stands in the beginning of the design process of any product. In the case of a complex business application, even specific functionality can have its target audience. From a marketing perspective the goal of segmentation is to identify groups of people that are as homogenous as possible, but that differ from each other in a significant way. In marketing literature the geographic, demographic, psychographic and behavioral segmentation have acquired an established standing (Tuunanen and Hamari, 2012, p. 2).

In game design players can additionally be assigned to player types, based on behavioral and psychological segmentation. This grouping distinguishes players by the way they interact with the game, which mechanics they prefer and what motivates their gaming (Tuunanen and Hamari, 2012, p. 5).

A number of different categorizations into various player types have been developed. The most prominent categorizations are the behavioral categorization into Achievers, Explorers, Socializers and Killers by Bartle (1996) and the psychological categorization into Achievement, Social and Immersion by Yee (2006) based thereon. Bartle's categorization results from two dimensions to playing, namely action vs. interaction and player-orientation vs. world-orientation as seen in Figure 4.1 (Tuunanen and Hamari, 2012, pp. 6-8).

Bartle's player archetypes are not mutually exclusive, even if they are often naively used this way, and players can incorporate multiple aspects at various degrees. Even if these player types are developed for massively multiplayer online role-playing games (MMORPGs), they are widely used for gamification. According to Bartle (2012) there is no reason they should work for gamification, but lacking a superior system they bring at least some differentiation between players (Bartle, 2012; Dixon, 2011, p. 2).

4. Game Design Elements in the Context of Gamification

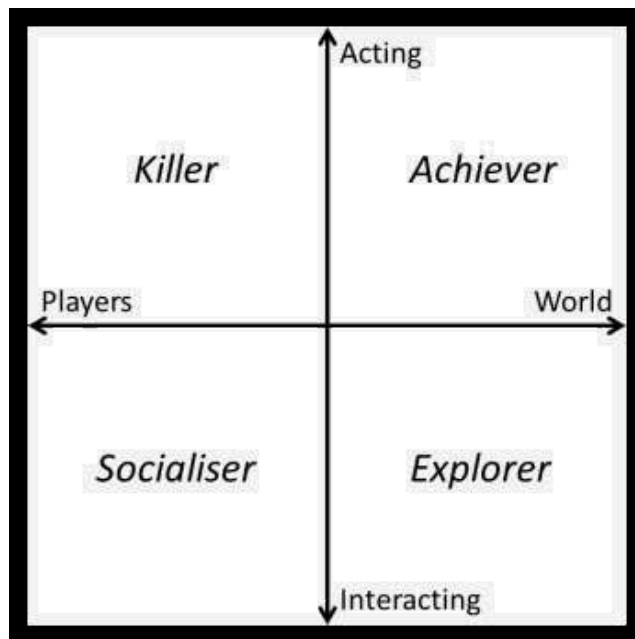


Figure 4.1.: Bartle (1996)'s player type axes (Bartle, 1996; Tuunanen and Hamari, 2012, p. 7)

The division of players in gamification shows, that different types need different rewards. Points and leaderboards for example are rewards for Achievers and do not work for others. Especially in the case when an application with a given user group has to be gamified, it is important, to provide rewards and game goals which are suitable for as many of the players as possible.

In general Socializers are the by far the biggest group of player types. They make up about 80 percent (Bartle, 1996). Particularly in a gamification setting focused on points, it is very important to provide game mechanics suitable for Socializers.

The design challenge discussed by Nicholson (2012) is either, to offer a wide variety of ways to interact with the game, or to create a flexible system that will allow user customization, so it can be personalized by the user.

It is often desired to have a mix of different player types playing a game, following their respective goals, so each player is at least more successful at pursuing her/his own goal than a player not pursuing it (Bartle, 2012).

4.3. Game Interface Design Patterns

In addition to the categorization of player types discussed, for gamified business application there is also the non-player type who finds little to no appeal in any implemented game element. For this target group it is important to implement an option for disabling the whole gamification aspect of the application.

As Tuunanen and Hamari (2012) point out these player types might work as marketing or design frameworks, but not necessarily as an explanation to more fundamental human characteristics, because of the self-fulfilling and self-validating situation introduced by designing games according to these topologies with the result that mainly players matching them play the game.

In the case of a gamified business application the user segmentation also applies through use cases. The challenge of designing game elements targeting all player types for each use case arises. This might introduce additional vectors in classification.

4.3. Game Interface Design Patterns

The user interface of every software has to fulfill many objectives like consistency, reliability and aesthetics. Studies in the field of human-computer interaction (HCI) define these objectives and provide design principles for creating interfaces meeting these objectives.

Additionally to HCI's objectives a gamified application has to combine two major abilities. On the one hand it should provide a tool to perform the needed task, such tools are typically focused on structure and functionality. On the other hand the application should be gameful and fun to use. It does not have to be humorous but should evoke an emotional response from the player (Moore, 2011). To support the player's motivation the interface should also provide clear and immediate feedback (as discussed in Section 3.1.3.1) (Niebuhr and Kerkow, 2007, pp. 51-53).

A wide variety of game interface design patterns are used in game design. The most common ones used in gamification are discussed here. Achievements are the most often used and studied in literature, in the context of

4. Game Design Elements in the Context of Gamification

gamification (Hamari and Eranti, 2011, p. 2). Achievements were also the first idea that came to mind when designing the gamified CRM-tool.

4.3.1. Achievements (Badges)

Achievements are rewards for the completion of goals. They are often represented as badges players can earn. Achievements originally were not part of the game mechanics. They were introduced as an addition to complete games. Most games can be played without interacting with achievements and do not have any drawbacks because of that. In this case achievements reward the player for completing goals, otherwise not inherent in the game mechanics.

The decoupled nature of achievements makes it possible to introduce them in later releases or extensions of a game. There are also no limitations in the type of games to which achievements can be applied. This is apparent in the fact that Microsoft was able to mandate achievements for all games published on its Xbox 360 platform in the year 2005 and by doing so dramatically increasing their popularity (Jakobsson, 2011).

With its rise in popularity achievements have become an ever more important part of many games' design. The versatility of the achievements mechanic made it a prime candidate for usage in gamification. One of the first popular applications using gamification, Foursquare, used achievements as their core game mechanic and established them as the most used and discussed game element in gamification (Lindqvist et al., 2011, p. 2409; Deterding, Sicart, et al., 2011, p. 9).

By introducing additional goals to games, players may be motivated to continue playing a game after completing its main objectives thus prolonging the games' attractiveness and the players' engagement. It encourages the players to explore the game in different ways and rewards this effort, frequently by making it visible to others (Montola et al., 2009, p. 94; Jakobsson, 2011).

The following examples illustrate goals rewarded with achievements that do not necessarily require the need to complete the game:

4.3. Game Interface Design Patterns

- Completion of a section of the game in a given time.
- Mastering a game goal without using otherwise available resources.
- Exploration of the game and finding hidden places.
- Completion of goals a specific number of times.
- Collection of a given amount of items.

The components of an achievement are described by Hamari and Eranti (2011, pp. 5–14) as follows:

- **Signifier:** The Signifier component consists of the visible parts of the achievement. This can be the name, a description and a badge (Hamari and Eranti, 2011, pp. 5–7, 13).
- **Completion logic:** The fundamental logic of an achievement is what defines the trigger (a player-invoked action or a system-invoked event), how many times it has to be triggered, under which conditions and what prerequisites exist (Hamari and Eranti, 2011, pp. 7–10, 13–14).
- **Reward:** The reward element defines the reward(s) a player acquires after unlocking the achievement. These elements can be categorized by their relation to the game as in-game, achievement game and out-game (Hamari and Eranti, 2011, pp. 11–12, 14; Jakobsson, 2011).

In addition achievements can have levels which can be described as a collection of multiple achievements which have a similar completion logic. Besides a connection through the same goal, like performing the same action but more often, achievements can be connected in a way that they are a prerequisite for other achievements (Hamari and Eranti, 2011, p. 12).

In-game rewards for achievements can influence the game by affecting the aesthetics of the game or even the performance of a player and they can also contribute to the affective tone of the game. (Hamari and Eranti, 2011, pp. 11–12; Moore, 2011)

4.3.1.1. Goal Setting of Achievements

Besides using achievements as a secondary reward system as in most games they can also function as the primary mechanic for goal setting. This can

4. Game Design Elements in the Context of Gamification



Figure 4.2.: Achievements gallery in StarCraft II[®] (personal screenshot used courtesy of Blizzard Entertainment Inc.)

be intentionally as it is done in most gamification applications or unintentionally for example when players compete in the collection of achievement points.

In gamification there is often no inherent game goal of the application. Performing the action the application is traditionally designed for, does not provide any game reward and it cannot be won or completed. Players can commit themselves to the goals provided by the achievement system. It provides feedback for progress and rewards for performing actions. If there is no other game goal, achievements have to be added continuously in order to keep up the players' engagement.

The most motivating achievements provide specific and challenging goals just outside the comfortable reach for the player. Achievements have to clearly indicate the progress and the necessary actions for reaching the goal thus additionally motivating the player when she/he knows a goal is near completion (Antin and Churchill, 2011, p. 2; Niebuhr and Kerkow, 2007, pp. 49–50).

4.3. Game Interface Design Patterns

Playing a gamified application with achievements as the primary goal setting mechanism, can be compared to playing the achievement system of game platforms in the sense that the only goals are the achievements. If different games provide achievements in one combined system, the goal to get the maximum amount of achievements can replace the goal to win or complete a single game. Achievements lose their property as optional or secondary goals and become the main goal of an achievement game (Hamari and Eranti, 2011, pp. 4,11).

In some cases this can result in players playing games they don't like, or to an extent they don't actually enjoy competitively excelling in this meta-game. At this point other game goals are neglected which may result in playing the game in other ways than intended (Lindqvist et al., 2011, p. 2415; Jakobsson, 2011).

The design of the achievements has a huge impact on how well a game is perceived. Although various difficulties of achievements are desired, not being able to achieve a specific goal, can be very frustrating.(Jakobsson, 2011)

4.3.1.2. Motivations for Completing Achievements

Motivations for completing achievements can be to complete every aspect of the game, to increase one's social status by comparing achievements with others, or just to continue enjoying a game after its core goals are reached. It is a way to interact socially with other players of the game, even if it is played alone (Montola et al., 2009, p. 95; Jakobsson, 2011).

In gamification, achievements are often the main goal and since the interaction with a gamified application should not be completable the social status is often the most important goal in this context.

For social status and personal affirmation the accomplishments are visible as badges to others and easily comparable. They provide information about the user's engagement level, expertise and interests without explicit bragging. It is a symbol for the user's experiences and evidence of past success.

4. Game Design Elements in the Context of Gamification

Since many players will have a subset of identical achievements, the group identification is strengthened by shared activities and experiences. Also the trustworthiness of other players in relation to the game is increased even without direct shared experience. The value of the player's experience is increased by sharing it with others and being part of a community having the same goals (Antin and Churchill, 2011, p. 3; Hamari, 2013, pp. 238-239; Lindqvist et al., 2011, p. 2414; Jakobsson, 2011).

4.3.1.3. Guideline, Introductory Functionality

Besides providing the goal-setting functionality, achievements can also guide the player in how the application is meant to be used. Actions are valued differently shaping the players' form of interaction. Players can be helped to explore the application and diversify their interaction by spreading the rewards over a variety of functionality. To introduce new features, achievements can be provided, motivating players to engage with them (Hamari, 2013, p. 238; Montola et al., 2009, p. 97; Antin and Churchill, 2011, pp. 2-3; Lindqvist et al., 2011, p. 2412).

4.3.1.4. Immediate feedback

In order to grant the effect of accomplishment the achievement of rewards needs to be clearly and prominently visible. The reward has to follow the action immediately, to provide the causality between reward and action and thereby support the feeling of competence as shown in Section 3.2.2. An example for such immediate feedback is seen in Figure 4.3. The visual and often auditory experience provides the desired positive feedback. Multiple achievements earned at the same time, should be presented separately so as not to diminish the value of a single feat. It has to be clear what has been achieved and which interactions have led to the achievement. The ability to show others how to achieve the same, gives the player the possibility to share his experience. The immediate feedback is no replacement for a possibility to see all achieved rewards as displayed in Figure 4.2. Even if the immediate feedback would be disabled by the player the achievements would still be granted and visible in the player's profile (Montola et al.,

4.3. Game Interface Design Patterns



Figure 4.3.: Display of achievement in StarCraft II[®] (personal screenshot used courtesy of Blizzard Entertainment Inc.)

2009, p. 97; Hamari, 2013, p. 238; Jakobsson, 2011; McGonigal, 2011, p. 57; Deterding, 2011a).

4.3.1.5. Unexpected rewards

Unexpected rewards are a good way to keep up the player's engagement. In the beginning the player is introduced and reminded of achievements by simple rewards for the first actions in the game or gamified application. This first form of unexpected rewards should spark the interest in the achievement system. Often the player can then see which achievements can be earned and choose her/his actions accordingly. Sometimes, especially when pursuing a more complex goal, other achievements out of the player's focus are completed "by accident" providing unexpected rewards (Montola et al., 2009, p. 96; Groh, 2012, p. 43).

Another way to provide surprise rewards is to include achievements not visible to the player before completion. This will provide some level of

4. Game Design Elements in the Context of Gamification

excitement and tension even if there is no immediate achievement within reach. Such rewards can also result in a higher social status, because they are not as easy to get and not predictable (Groh, 2012, p. 43).

When surprise, goal oriented rewards are included the hierarchy of players is weakened due to partly random achievements earned by novice players before some artisan players has achieved them.

4.3.1.6. Criticism of Achievements

Achievements in the context of games are sometimes seen as an unnecessary addition that distracts from the original game experience and can shift the players' focus to achievement hunting. This misguided focus can then lead to unintended usage patterns due to the narrow focus on quantifiable aspects. Misuse of the game to earn achievements can also have a strong negative impact on the experience of other players (Hamari, 2013, p. 243; Hamari and Eranti, 2011, p. 2; Montola et al., 2009, p. 96; Jakobsson, 2011).

In gamification achievements are criticized as extrinsic motivation not motivating play but quantifying productivity. It is therefore crucial that the player perceives the system in a motivating and challenging context and not as a method of oversight or manipulation. The perception of rewards may not only be the result of the application's design but also due to outside factors and the broader context in which the application is introduced. An easy way for the user to opt out of the achievement system is therefore recommended, although opting not to display ones achievement to others can be interpreted by other players as an attempt to hide embarrassing information (Antin and Churchill, 2011, p. 4; Montola et al., 2009, p. 97; Jakobsson, 2011).

In order to engage players in a compelling game and to support their intrinsic motivation more than just achievements might be needed. Since a decline in the importance of achievements over time has been observed, a compelling story and other game mechanics within a consistent concept can help the player to immerse in the game and provide a positive experience (Hamari, 2013, p. 244; Lindqvist et al., 2011, p. 2415).

4.3.2. Points and Levels



Figure 4.4.: Experience points gain and level up displayed in StarCraft II® (personal screenshot used courtesy of Blizzard Entertainment Inc.)

Points are used in many games as the universal reward. The goal of the game is thereby often replaced by the goal to earn points which are rewarded for the actions the player should take. Arbitrary amounts of points can be applied to anything measurable in a game. The player immediately gets a validation for their interaction and is guided by an all-time present reward system. The hunt for ever more points can be a very strong incentive for players. The point score is often displayed prominently at all stages of the game and additionally highlighted whenever points are earned (Zichermann and Cunningham, 2011, pp. 128-129).

Gamified applications often use this powerful mechanic of points as reward system. It is relatively simple to implement and to amend to an existing application (Nicholson, 2012, p. 223).

Points provide a value system in a game. The different amounts of points given to each interaction directly represent its value. This has a very strong

4. Game Design Elements in the Context of Gamification

influence on the way a game is played since players often optimize their interaction to yield the most points. In a game with a prominent focus on points, interactions with no or relatively few points are neglected. Since points reward quantifiable actions other criteria are often underrepresented (Mekler et al., 2013, pp. 1140-1141).

Games using points often also award a sense of progress in form of levels. After gaining an amount of points a higher level is awarded (see Figure 4.4). The continuous process of gaining points is thereby structured into sub goals. Levels often represent other rewards given to the player. Levels can also have the function as a social reward when recognized and valued by other players (Von Ahn and Dabbish, 2008, p. 63; Rigby and Ryan, 2011, pp. 110,148; Nicholson, 2012, p. 223).

In order to function as a social reward the player's level is associated with the player's representation in the game. For example the player's name has her/his level amended in brackets (Groh, 2012, p. 42; Zichermann and Cunningham, 2011, pp. 128-129).

Progression of points in a form that players who are more advanced in the game get more points for more complex actions provides a sense of accomplishment and mastery. A nonlinear rise in difficulty will result in optimal engagement and a continued experience of flow (Groh, 2012, p. 42; Rigby and Ryan, 2011, p. 20; Zichermann and Cunningham, 2011, pp. 45-47).

As powerful and practical as a point based reward system is, on its own it does not motivate for long. Gamified applications are strongly criticized for just applying points without any other gaming aspect as discussed in Section 2.5. Points are rewarding if they represent achievement and progress toward an aspired meaningful goal in the game, not by themselves as visualized by "Progress Wars"³ by Jakob Skjening (see Figure 4.5) (Groh, 2012, p. 42).

³<http://www.progresswars.com>

4.3. Game Interface Design Patterns

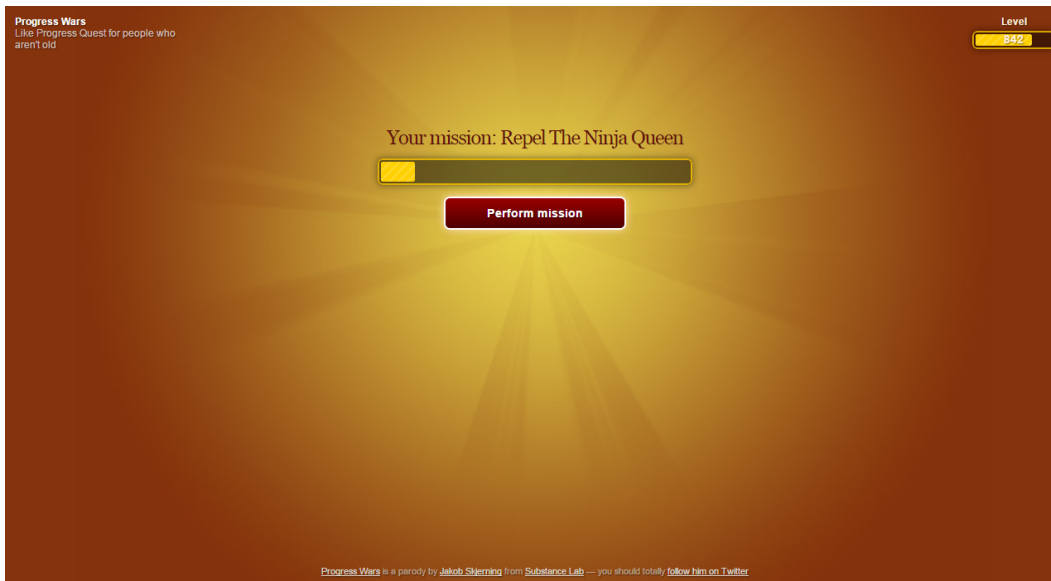


Figure 4.5.: Progresswars: a game parody existing solely of points and level mechanic

4.3.3. Leaderboards

A leaderboard is a listing of users ordered by ranking. It visualizes the progress and success of a player in comparison to other players in a game. The rank of a player is displayed by her/his position on the leaderboard, prominently placing the leader on top. Points are displayed alongside each player to visualize the difference each player has to overcome in order to gain ranks. This social competition rewards players with prestige in the game and the feeling of accomplishment (King, Delfabbro, and Griffiths, 2009, pp. 94-95; Halan et al., 2010, p. 483; Zichermann and Cunningham, 2011, pp. 50-53).

A high score list is similar to a leaderboard but ranks scores per interaction. Players try to beat their own high scores or those of others. High scores are used for short games to motivate repeated interaction. They can also be implemented with a time constraint like acquiring the most points in a week (Niebuhr and Kerkow, 2007, p. 51). To keep up constant engagement, players may be notified when their score is beaten or they lose a rank (Halan et al., 2010, p. 485).

4. Game Design Elements in the Context of Gamification

Leaderboards provide more social interaction than achievements, but also give negative feedback for low ranks. In a business environment an absolute ranking of employees should not be desired, since it can result in too much competition and negative feedback. In contrast to games where discouraged or frustrated players have the option to stop playing, for employees this would mean quitting their job (Deterding, 2011b, p. 3).

To minimize negative feedback, especially with many players, leaderboards can be sliced, reducing the visible part seen by a single player. This can be done by just showing a few, selected competitors directly above and below the player or reducing the players considered for the leaderboard based on geographic or social distance. A sliced leaderboard displays a manageable amount of competitors with scores within the reach of the player thus presenting an encouraging challenge (Zichermann and Cunningham, 2011, pp. 50-53).

4.3.4. Social Networking

As discussed in Section 3.2.3 and Section 4.2, 80 percent of all players are Socializers. The possibility to socialize is therefore the most important factor in playing a game (Zichermann and Cunningham, 2011, p. 24).

Social contact between players is a very high motivation to keep on playing, even when other game mechanics lose their effect. After the initial phase which is dominated by points and badges, cooperating players have built a social network they value and a group connection they want to prolong. This connection is strengthened by communication, coordination and collaboration aspects in the game and may even reach a point where the game is played solely to not disappoint the in-game-friends (Halan et al., 2010, p. 483; Lindqvist et al., 2011, p. 2416; Manninen, 2003; Rigby and Ryan, 2011, pp. 100,110).

Game platforms can further utilize the connection between players to tell them if their friends play games and make it convenient to join them (Moore, 2011).

4.3. Game Interface Design Patterns

Even a challenging form of social interaction, like having a nemesis can satisfy the need for relatedness (Moore, 2011).

The representation of the players is a crucial part of their social interaction. At first the representation has to appeal to the individual players, so they can identify themselves with the avatar. In order to match the players' tastes many games provide a wide variety of customization options (Moore, 2011).

In addition to the avatar, the information displayed about the players is important. Game accomplishments are often prominently visible and provide a social connection since they are representations of shared experiences. Care has to be taken that displayed information does not extend to private areas of the player such as location based information (Lindqvist et al., 2011, p. 2413).

When players engage with each other as avatars, it is important that the game provides the possibility to communicate with each other. By providing in-game chat or messaging possibilities the players can stay anonymous and in their role. The form of communication can be guided by enhancing the set of possibilities and game content related features (Manninen, 2003).

A multi-user game or gamified application is successful if it attracts an active and interacting community. Therefore the game design has to have enjoyable social interaction between players at its core.

Part II.
Practical Part

5. Application design

After becoming familiar with the concept of gamification the practical realization of the application began. Before the implementation could begin the basic application design had to be defined. In this chapter the software development process that has been agreed upon, the basic features and the gamification concept based on this will be explained in detail.

5.1. Agile Software Development

As suggested by literature an agile software development process was considered to be best suited for the realization of this project. This method of developing provides short feedback cycles which are useful for the developer as well as for the customer. Since the company's employees were the target users, the possibility for a close cooperation, required for such a process, was given.

The desired application focuses strongly on usability and the best suited interface for the most common use cases while simultaneously providing fun and engaging game mechanics. This focus on user-centered design while developing gamified systems profits from an agile software development process by incorporating the high amount of user feedback needed (Nicholson, 2012, p. 227).

Agile development has the additional benefit that requirements can be changed whenever needed with minimal impact. This was helpful because not all requirements were known beforehand also due to the lack of experience in developing gamified applications. The knowledge acquired in the process could be applied continuously (Bates, 2004, p. 218).

5. Application design

Gamification needs continuous testing during the development process to experience and evaluate the feeling of the game mechanics. Continuous testing is part of an agile development process. After release gamified systems need continuous improvement as more goals are needed as well as tuning as the player behavior can be observed on a larger scale. An agile software development process used during development can then be continued for improving and adapting the gamified application without alterations (Zichermann and Cunningham, 2011, pp. 73,98).

The implementation phase was divided into sprints with a duration of 80 hours of work. In the beginning of a sprint, in the sprint planning meeting, the detailed requirements were defined in the form of user stories. A user story describes an acting user and a clear goal to achieve within a specific situation. When needed the interface was developed in the form of paper prototypes. After the implementation of the sprint the requirements were tested with those users who requested the features. Continuous integration in combination with continuous testing was implemented to ensure a stable state of the software after each sprint.

5.2. Basic Requirements

Even though the detailed requirements were not defined at the beginning of the project due to the agile development process, a basic understanding of the application to be implemented and its functionality was found.

The fundamental functional requirements were given by the project objectives:

The application should provide a convenient and motivating way for the user to create and retrieve customer informations from the existing CRM application via mobile access.

A further outline of major user stories was defined as a road map for the implementation and as the basis for the gamification concept. The most central user stories were the retrieval of contact information containing notes from previous meetings and entering notes about a meeting that happened. In addition to the meeting notes contact informations of the

5.3. Gamification Concept

customer should be available and it should be possible to create a new contact.

While designing the application the following non-functional requirements emerged:

- The security of the customer data is crucial and no unauthorized access and alterations should be possible.
- The application should be the basis for a possible commercial product and developed with matching sophistication.
- The application should function with and without the gamification aspect.
- The CRM connection should be abstracted so the underlying CRM system could be replaced.

5.3. Gamification Concept

A workshop with the users for a user-centered approach to gamification was held in order to gather ideas for the gamification of the application. This illustrated the users' preferences in relation to game elements and created relatedness to the project itself. In the workshop associative techniques were used in various iterations to gather ideas. In the end the results were gathered and illustrated on a poster (see Figure 5.1).

Based on these ideas, the basic requirements and the research done, the gamification concept was created.

The creation of meeting notes was identified as the main task to focus on. It was the task where the lack of motivation was apparent and gamification could therefore have the most notable impact.

When gamifying the task of creating meeting notes the principles of the SDT were used. In order to enable intrinsic motivation the player should feel autonomy, competence and relatedness as described in Section 3.2.

5. Application design



Figure 5.1.: Poster illustrating gamification ideas developed during the workshop

5.3.1. Competence

Beginning with competence the player should feel accomplishment when using the gamified application and should steadily improve while using it.

In order to visualize a player's accomplishments the concept of experience points should be used. A player should receive points for entering meeting notes and other customer information. The points should be awarded prominently and in immediate connection with the awarded action. The awarded points should be added to the current amount of the player's points which should be displayed at all times.

In order to structure the hopefully continuous stream of gathered points levels should be used. An increasing amount of points should result in an advance of the player's level.

Besides the general reward for progress with points, achievements should be used to encourage tackling specific tasks. Achievements are visually

5.3. Gamification Concept

strong rewards for accomplished game goals. In a well-structured reward system at least one achievement should always be within comfortable reach for the player, keeping up a constant level of excitement and success (see Section 3.2.2).

Displaying the progress in a more detailed fashion than just with points, also enables players with a lower score to find things in which they are better than their overall more advanced colleagues and thereby also keeps up their motivation.

5.3.2. Relatedness

A strong connection with other players is needed especially for the dominating socializer player type. When in contact with other players in a positive way the relatedness to those players and to the game is strengthened and intrinsic motivation supported.

As an especially relatedness focused feature, likes should be used as a mechanic for players to encourage each other. When players find a meeting note especially useful they should be able to like this particular note and thereby grant a reward to the player who has created it.

This game mechanic should also create the connection between creation of a meeting note and its use. Making the creation of meeting notes a valued action by one's peers may boost the intrinsic motivation by closing the motivation gap as described in Section 3.1.3.1.

The players should also be able to recognize each other's progress and accomplishments. The relatedness can be strengthened when experiences are shared and accomplishments can be displayed to others. Players should also be notified of other player's achievements to support engagement as a group.

5. Application design

5.3.3. Autonomy

With awards promoting competence and relatedness, autonomy was recognized as the most difficult desire to satisfy. A too game like experience promoting autonomy through free play elements or multiple game goals was not desired for a business application. Concerns about unnecessary and unproductive time spent on game parts without direct purpose were raised and discouraged those implementations. It was discussed that in order to successfully enable intrinsic motivation, autonomy is crucial.

The ability to choose weekly achievements should be implemented and should encourage players to set their own, realistic and motivating goals. Reaching autonomously chosen goals should increase the players' feeling of accomplishment and make the rewarded action more meaningful and in line with their own interests (Nicholson, 2012, p. 225).

5.4. Technology Decisions

With the rough layout of the application completed the right technologies and tools had to be selected.

5.4.1. Mobile Website or Native Mobile Application

The application should be accessible via mobile phone. The two alternatives were to create a mobile website or native mobile applications. Since a mobile application would have to support multiple device architectures and no phone functionality only available to native applications was needed, the only benefit of implementing native mobile applications would have been offline usage. Offline usage was not desired since the data is sensible and should not be stored in insecure places. Further the gamification reward rules would have to be implemented decentralized on the client side as mentioned by Herzig, Ameling, and Schill (2012, p. 221).

The implementation as mobile website has the benefit that it can be updated without user interaction, especially useful as game mechanics need constant

adaptations. The implementation as mobile website made it also possible to make it usable in a desktop browser.

5.4.2. Server Side Technology

Since Axtesys OG should be able to further develop and maintain the application, Java¹ was used as server side programming platform as the majority of employees were familiar with the technology. A Java Platform, Enterprise Edition (Java EE)² implementation is capable of comfortably handling all requirements and provides a very wide variety of sophisticated libraries and frameworks providing a good basis for continued extension and maintenance. The architecture proposal by Herzig, Ameling, and Schill (2012, p. 221) based on an enterprise message bus can be easily implemented.

5.4.3. Interface Framework

The biggest criteria for an interface framework was immediate asynchronous feedback to the client as was necessary for gamification notifications.

The Errai framework³ was selected as it implemented a fully integrated message bus between client and server already handling multiple clients as well as multiple users. A client widget simply has to subscribe to a type of message and gets notified whenever such a message is published by another widget or by any server-side service.

Besides perfectly suited server client communication the framework integrated a security package, an internationalization package, had a good HTML5 templating system and was designed for Java EE. Errai is based on GWT⁴ and therefore client-side code can be written in Java. Code and data model translation into JavaScript is done automatically. GWT was also already used at Axtesys OG.

¹<https://www.java.com/>

²<http://www.oracle.com/technetwork/java/javasee/overview/index.html>

³<http://www.gwtproject.org/>

⁴<http://www.gwtproject.org/>

5. Application design

The framework has good documentation and support and is continuously developed by Red Hat⁵. Since Errai was developed by RedHat it was designed for the JBoss Enterprise application platform⁶. Even though other platforms would be possible the JBoss Application Server will be used to run the application.

In case the mobile website should be transformed into a native mobile application the apache Cordova⁷ framework is supported.

⁵<http://www.redhat.com/>

⁶<http://www.jboss.org/>

⁷<https://cordova.apache.org/>

6. Implementation Process

After the application design was completed the implementation could begin. The implementation took place in three phases. In the first and shortest phase the infrastructure had to be created. In the second phase the application core was implemented, while in the third phase the functionality was added.

6.1. Infrastructure

In order to use an agile software development process with short release and test cycles an appropriate infrastructure had to be available, automating the process. The first sprint was used to create such infrastructure.

An external hosted root server was rented and set up as development server.

- It hosts Git¹ as a source code management system with GitLab² as web interface.
- The existing ticketing system was transferred to the server in order to have external access to requirements.
- Jenkins³ was installed as continuous integration application automatically building and unit testing committed code and publishing it to the development instance of the JBoss Application Server.
- SonaQube⁴ was used to perform and present code analysis automated by Jenkins.

¹<https://git-scm.com/>

²<https://about.gitlab.com/>

³<https://jenkins-ci.org/>

⁴<http://www.sonarqube.org/>

6. Implementation Process

- For repository management Nexus⁵ was used. Self-developed library packages could thereby be included via Apache Maven⁶.

Because of this infrastructure, test users had at all times access to the current development state of the application connected to a test installation of the CRM system. An instance of the application connected was published to the live system only after testing at the end of a sprint.

6.2. Core Implementation

The implementation was started with the creation of an application core. This application core was created over the course of the following four sprints and was to have all the needed frameworks integrated and configured. The application core contained the following functionality:

- Authentication and authorization was implemented and configured using the Errai security package and the picketlink⁷ security framework, extended by a custom user profile to store application related information.
- Multi-language support for the view, server generated messages and error messages was realized using the Errai internationalization package.
- File handling was implemented using a custom GWT widget on the client side and the Apache Commons FileUpload⁸ library on the server side. The Java Image-Scaling Library imgscalr⁹ was used for providing images in various sizes.
- The database connection was established using Java Persistence API and Hibernate¹⁰ to a PostgreSQL¹¹ database.

⁵<http://www.sonatype.org/nexus/>

⁶<https://maven.apache.org/>

⁷<http://picketlink.org/>

⁸<https://commons.apache.org/proper/commons-fileupload/>

⁹<https://github.com/thebuzzmedia/imgscalr>

¹⁰<http://hibernate.org/>

¹¹<http://www.postgresql.org/>

6.3. Feature Implementation

- Logging was configured to use SLF4J¹² on the client side and jboss-logging on the server side making it possible to adapt logged output at runtime in the JBoss management console.
- The connection to the REST API of the OnlyOffice CRM system was established using the JAX-RS¹³ library and JSON data parsing was done using the jersey-json¹⁴ library. The Errai security package was adapted to authenticate against the CRM system.
- Frontend frameworks JQuery¹⁵ and Bootstrap¹⁶ were included and a basic layout was implemented.
- Unit testing was configured using junit¹⁷, Mockito¹⁸ and Powermock¹⁹.
- Integration testing was configured to run in the JBoss application container using arquillian²⁰.
- Dependency management, build management and reporting was done via Apache Maven.

Based on this application core, further feature implementations were able to focus solely on the desired functionality and had a stable basis to build on.

6.3. Feature Implementation

The third phase profited the most from the described agile software development process (see Section 5.1). Functional requirements were driven by the user stories at the beginning of each sprint. Gamification requirements were not in the users' focus and were implemented, based on the gamifi-

¹²<http://www.slf4j.org/>

¹³<https://jax-rs-spec.java.net/>

¹⁴<https://jersey.java.net/>

¹⁵<https://jquery.com/>

¹⁶<http://getbootstrap.com/>

¹⁷<http://junit.org/>

¹⁸<http://site.mockito.org/>

¹⁹<https://github.com/jayway/powermock>

²⁰<http://arquillian.org/>

6. Implementation Process

ation concept created in the application design phase. Adaptations to the gamification implementation were done based on user feedback.

The functionality implemented over seven sprints is shown in Table 6.1

During each sprint improvements to the functionality and interface as well as bug fixing was done for previously implemented functionality.

6.4. Acceptance Testing

After a usable implementation was completed the application was deployed to the production server connected to the live CRM system. The number of test users was increased and they were able to use the application in everyday work context.

The reported bugs were fixed continuously to ensure further usage. Most bugs concerned concurrency problems as they did not occur in single user testing.

The novelty effect of the gamification aspect was experienced to fade quite fast when testing the application. When seriously testing an application one does not get into a gaming mood providing an enjoyable experience, especially as long as major bugs interfere. The entering of test data is also nothing the tester may be proud of and the rewards were therefore perceived as meaningless.

It became a concern not to use too many potential testers as long as there were known bugs in the system, since there would in the end no new testers be left to evaluate the effect of the gamification system properly. To some extent this also limited the user-centered approach during the development.

6.4. Acceptance Testing

Sprint	Implemented Functionality
1	<ul style="list-style-type: none"> • listing contacts • searching contacts • displaying contact details
2	<ul style="list-style-type: none"> • pagination of contact listing • creation of simple events • point rewards for actions • point reward presentation
3	<ul style="list-style-type: none"> • extended event creation with multiple properties transformed to and parsed from plain text • like functionality for events with reward for creating player • awarding of levels for an increasing amount of points
4	<ul style="list-style-type: none"> • creation of new contacts • creation and update of contact details • message log functionality with read/unread status • player profile presentation
5	<ul style="list-style-type: none"> • creation and update of contact's additional information • enhanced text representation of event properties • simple statistics functionality • achievement functionality
6	<ul style="list-style-type: none"> • achievement presentation • advanced statistics functionality • weekly achievements functionality
7	<ul style="list-style-type: none"> • weekly achievement presentation • weekly achievement points reward • testing

Table 6.1.: Implemented functionality per sprint

7. Implemented Gamified CRM Application

In this chapter the implemented gamified CRM application is presented.

7.1. Software Architecture

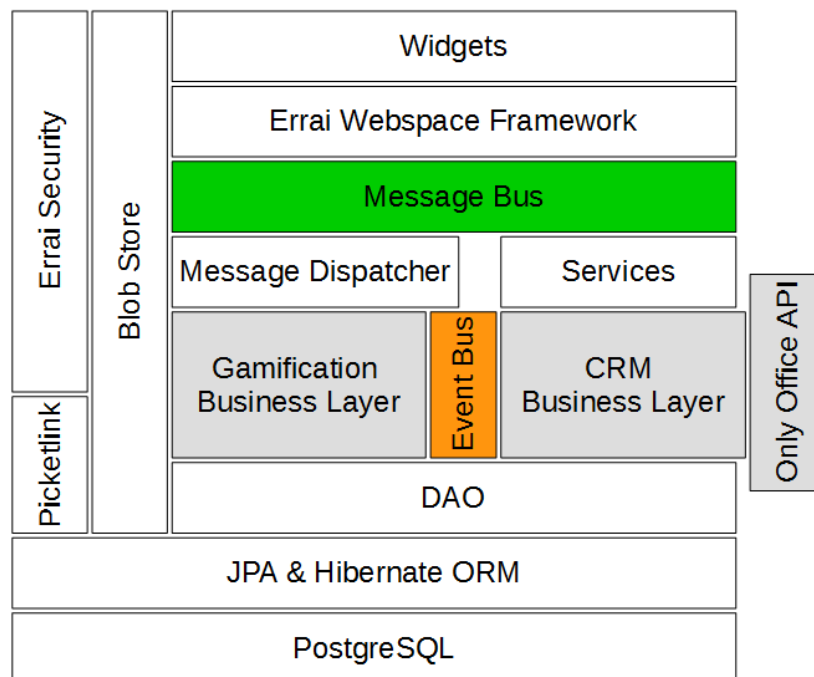


Figure 7.1.: Modules Structure of the CRM application

7.1. Software Architecture

The software architecture is designed to combine preferably loosely coupled components. The gamification functionality is decoupled from the CRM functionality making it possible to provide the CRM application without the gamification aspect as well as to reuse the gamification functionality for other applications. The approach taken using an event-driven architecture (EDA) was proposed by (Herzig, Ameling, and Schill, 2012, p. 220).

The CRM functionality consists of basic create read update delete (CRUD) commands forwarded to the CRM system's API (see Figure 7.1). Most business logic consists of model conversion and error handling. The interface to the client side GWT widgets is implemented as a model view controller (MVC) architecture with data transfer objects (DTOs) sent over the Errai framework's message bus on a request-response basis.

The one thing in addition to performing the CRUD action done by the CRM business logic is to fire action notification events. Those events contain the action type, the acting user information and the acted upon model. These action notifications are fired by the contact service and the event service as seen in Figure 7.2.

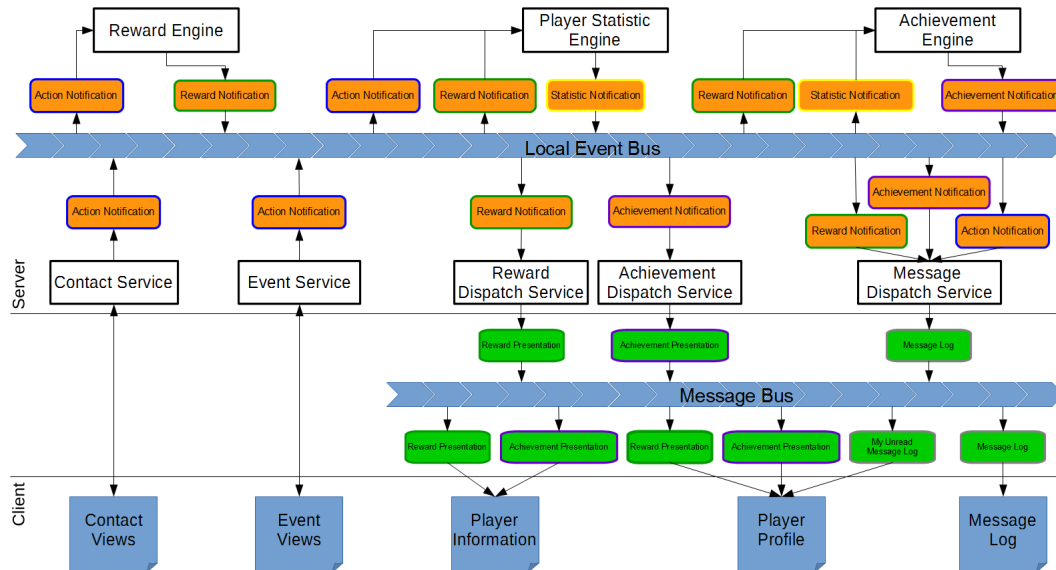


Figure 7.2.: Overview over the messaging communication in the CRM application

7. Implemented Gamified CRM Application

The gamification business layer is event driven, consisting of services observing the action notification events of the CRM part of the application. Depending on the game state and the processed action notification event, a gamification event may be triggered (see Figure 7.2). The persisted game state is updated and a new event is sent, notifying about rewards, statistic updates or the awarding of achievements.

The gamification communication to the client is implemented as a publish-subscribe messaging pattern over the Errai framework's message bus. The client widgets subscribe to gamification messages they are able to process. Widgets are registered with the subscribed messages, its authenticated player and its HTTP session ID. Further on the messaging system is agnostic of whether multiple widgets in the same browser tab, in multiple browser tabs, on different browsers or on multiple devices are subscribed simultaneously. Dispatch services are responsible to push observed gamification events as messages to the subscribed widgets (see Figure 7.2).

7.2. Basic Features

The basic functionality is implemented in the application core as described in Section 6.2. Most basic functionality is mainly provided by the used frameworks, first of all the Errai framework.

7.2.1. Design

The basic application core was designed using the Bootstrap CSS framework enabling a mobile first approach to design. The default Bootstrap design was not altered during the development of the application as it provided a fast way to design basic functionality and no custom design was available. A more playful design might improve the gamification experience as mentioned in Section 2.6.1 and can be comfortably implemented with CSS knowledge only.

7.2.2. Security

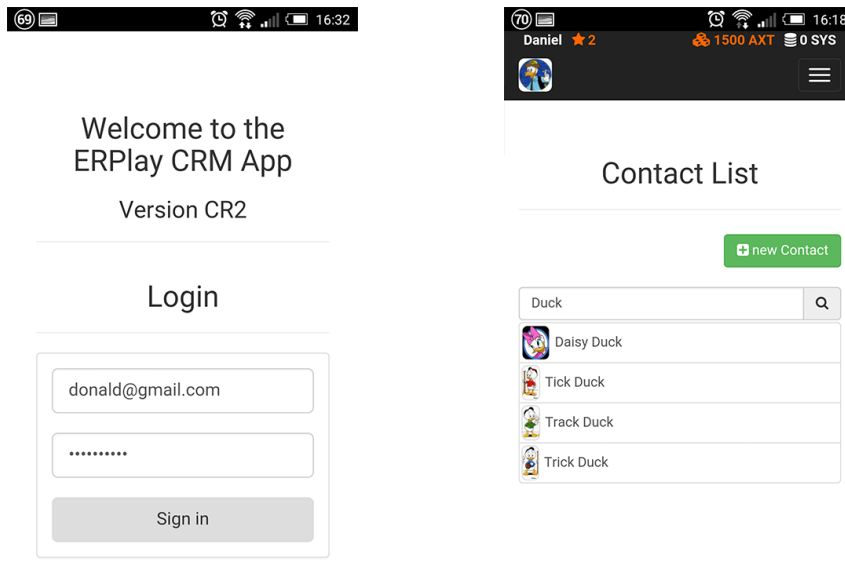


Figure 7.3.: Login page and contact search in the CRM application

The most visible basic functionality is the security implementation as the user is greeted by a login screen (see Figure 7.3) The Errai framework provides comfortable client and server side security by using picketlink authorization and authentication.

The authentication implementation was extended to provide a more detailed user profile with a game status information set which is displayed on the profile page.

The authentication implementation was additionally extended to authenticate against the CRM system with the entered credentials. If the authentication is successful the security token is stored with the user profile. Authorization is ultimately handled by the CRM system as the API provides access based on the logged in user.

7. Implemented Gamified CRM Application

7.2.3. Blob Store

The image and document links provided by the CRM system, are not accessible from outside the company network. Those files had to be provided on demand to the mobile client. Therefore the received links are converted into internal links using a custom blob store implementation. Whenever the client is requesting a file using the internal link, the blob store service provides the file from the CRM system. The blob store is implemented as a completely separate service with its own REST API as it is likely to be reused (see Figure 7.1).

7.3. CRM Functionality

The CRM functionality basically consists of CRUD operations. The interface was designed for a mobile device and based on the user stories.

7.3.1. Contact Search

After login the user is presented with the contact search. Contacts are listed, based on the given search term (see Figure 7.3). The results are paged, limiting the contacts per page to ten. As a mobile website the amount of data transferred has to be limited to ensure a short response time. The click on a contact opens the contacts details page.

7.3.2. Contact Details

The contact details are divided into sections displayed as an accordion. This provides direct access to the desired information on the confined mobile screen size (see Figure 7.4). The event history is the per default opened section.

Contact details are edited per section. On the one hand this behavior mirrors the application programming interface (API) of the CRM system and on

7.3. CRM Functionality

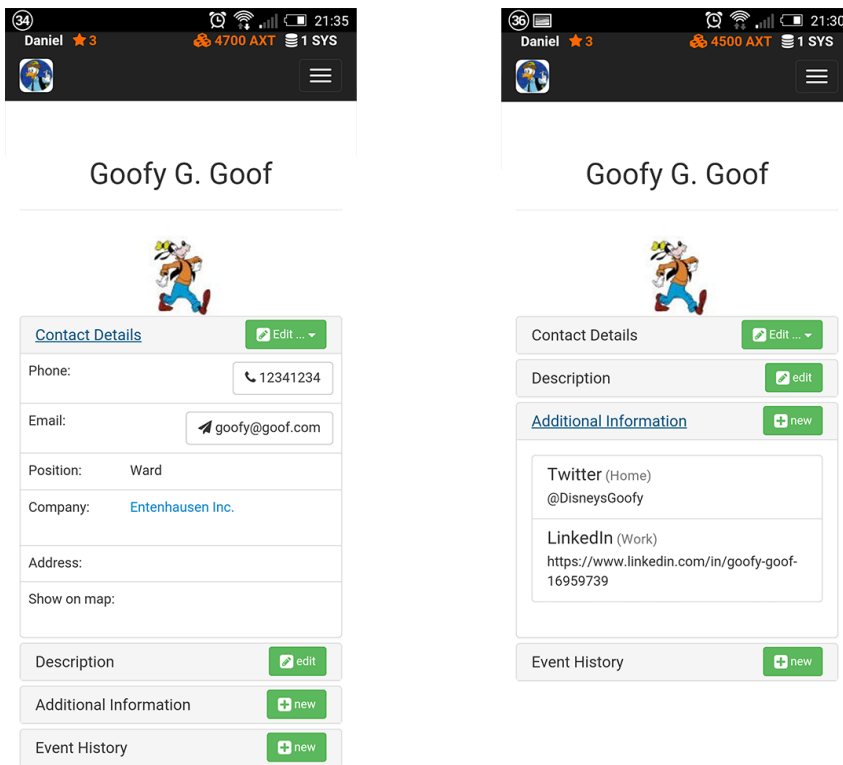


Figure 7.4.: Contact details page in the CRM application

7. Implemented Gamified CRM Application

the other hand enables fine grained rewards for each action. Each contact information is added and updated on its own page, accessed by the green edit or new button in the contact details page.

One benefit of using the mobile phone to use the application is to utilize the email and phone functionality directly. When a call is started by clicking on the contact's phone number, the user will return to a meeting note form to fill in information about the finished call immediately.

7.3.3. Contact Event List

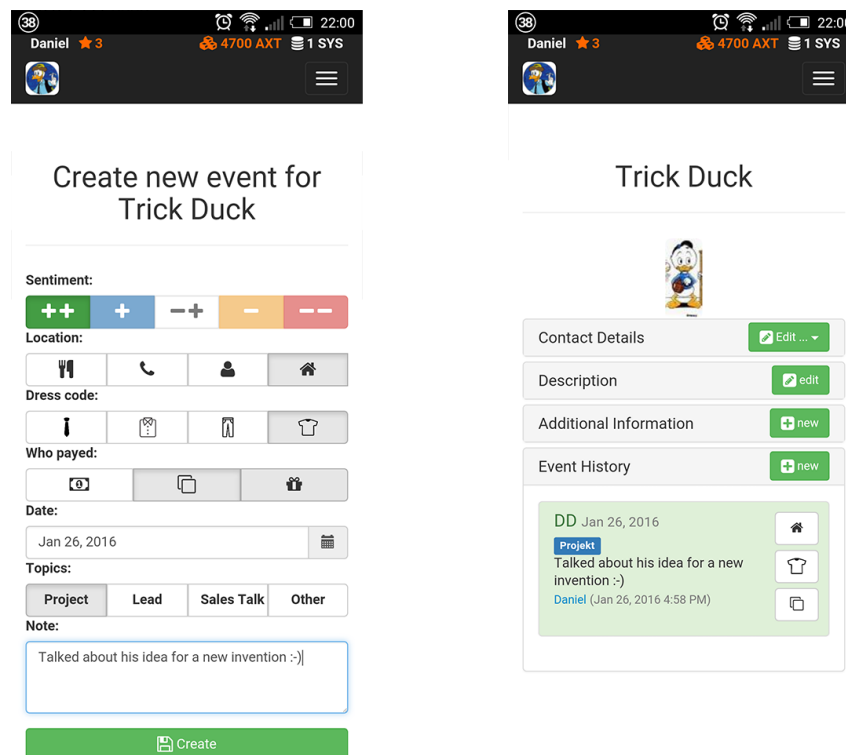


Figure 7.5.: Creation form and display of an event in the CRM application

The contact event list, consisting of the entered meeting notes, provides the central functionality of the CRM application. Reading the last and entering

7.4. Gamification Implementation

new meeting notes are the most frequent use cases performed on the mobile device. The form for entering the meeting notes is enhanced by standardized parameters to select various options. Those parameters are presented as compact symbols in the event list (see Figure 7.5).

The event creation is also the most revised part of the application and was adapted after nearly every sprint, based on user feedback.

Since the parameters do not exist in the CRM system they are translated into the first part of the free text and parsed on retrieval.

7.4. Gamification Implementation

The following game elements were implemented in order to gamify the CRM application, based on the gamification concept described in Section 5.3.

7.4.1. Points and Levels

Points are awarded for every action of entering new data into, or editing existing data in the CRM application. The amount of points granted depends on the action performed. Creating a new contact for example grants one thousand points and changing a telephone number grants one hundred points. The current amount of points is shown in the header of the application and is thereby visible at all times.

Gained points are presented immediately and prominently as a counting animation in a modal window (see Figure 7.6).

Levels are rewarded when an increasing amount of points is reached. The Level is displayed directly beside the player's name in the header and on the player's profile page.

Focusing on the creation of meeting notes in a timely fashion, the points rewarded for this action are depending on the number of days that have passed since the meeting (see Figure 7.6). The less time has passed between

7. Implemented Gamified CRM Application

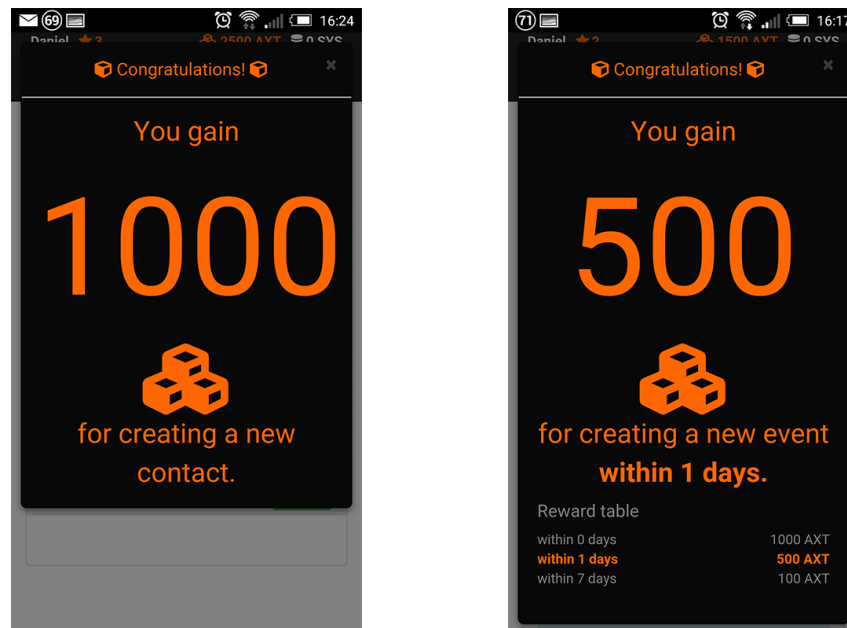


Figure 7.6.: Point reward presentation in the CRM application

the meeting and the action of entering the notes the more points are rewarded. The information when the meeting has taken place is a mandatory part of the meeting notes.

7.4.2. Likes

A Like functionality was added to the entries. Players can like an entry created by other players. The creating player receives a token for every like she/he gets. Like tokens are also prominently displayed with the player's profile. When likes have already been given to a meeting note, they are displayed on the like button (see Figure 7.7) and as a secondary effect they highlight important or especially useful entries. Those highly valued entries function as an example on how to design good meeting notes and give additional recognition to the creator.

7.4. Gamification Implementation

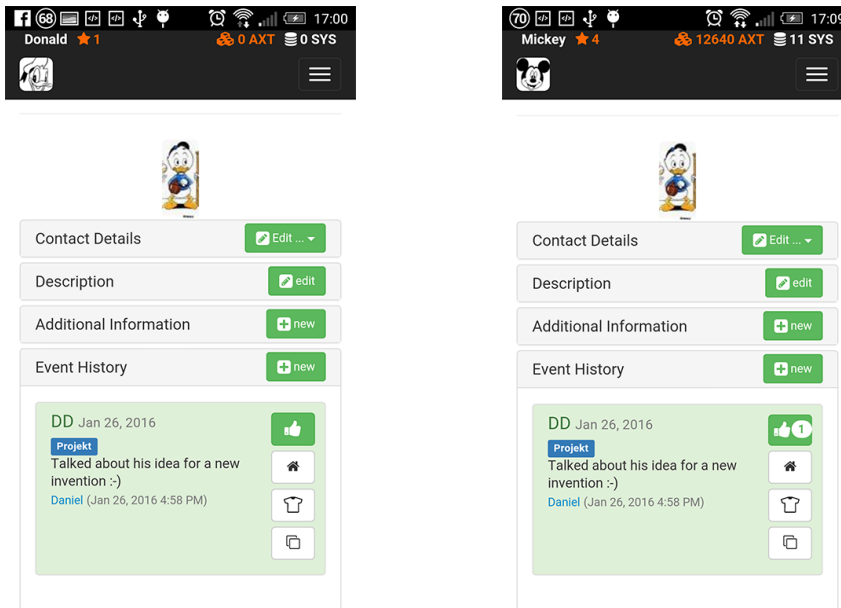


Figure 7.7.: Like functionality for meeting notes in the CRM application

7.4.3. Statistics

The statistics themselves do not function as game mechanics on their own. They are implemented as a prerequisite for the achievement mechanic, but enable the players to compare their progress with other players in more detail.

Statistics about the players' actions are displayed on their profile page. The number of times an action was performed is displayed per action for the current week and for the time since the beginning of the game. Statistics also enable the players to track their progress towards desired achievements.

7.4.4. Achievements

Achievements are implemented as special awards for the completion of specific challenges. When earning an achievement a badge is granted. Those

7. Implemented Gamified CRM Application

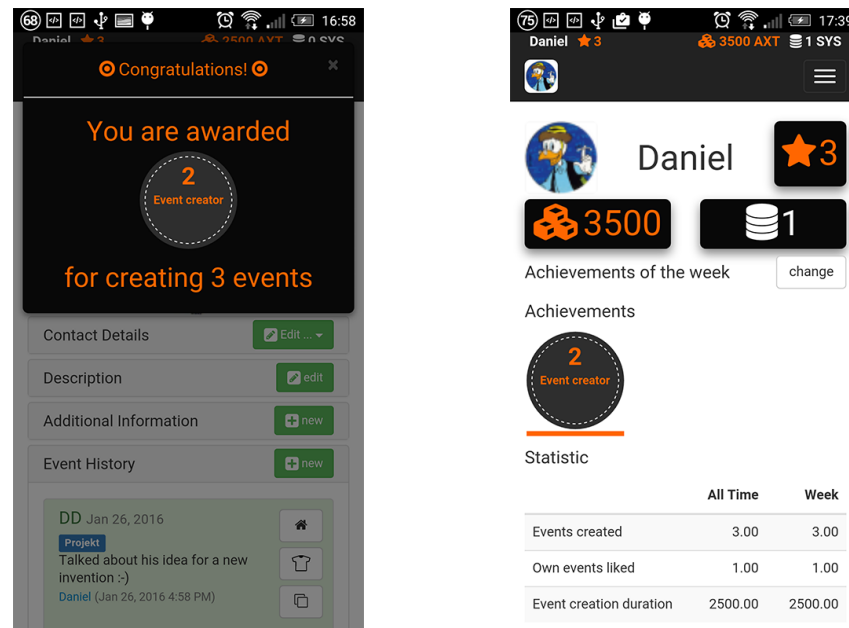


Figure 7.8.: Achievement reward presentation in the CRM application

badges are prominently displayed on the players' profile page representing the earned achievements.

Achievements have their own level mechanic independent of the players' level. After initially performing an action, like entering meeting notes a few times, the achievement for creating meeting notes is awarded with level one. The award is displayed prominently and immediately after the action (see Figure 7.8).

The new badge is added to other badges on the acting player's profile page (see Figure 7.8). When an additional number of meeting notes are entered the same achievement is awarded but of a higher level. The award presentation is the same but instead of a new badge the level of the existing badge increases (i.e. "Event creator level 2").

7.4. Gamification Implementation

7.4.5. Weekly Achievements

Personal goal setting via weekly achievements was also implemented. Each week the players have the ability to select their own goals. The player can choose a previously reached achievement of a selected level. This means players can only set goals for the current week which they previously reached in total and therefore already know about the difficulty of reaching them. In the course of the week the performed actions are also counted towards those achievements. For reaching all set goals within the week, a bonus amount of points is granted.

7.4.6. Message Log

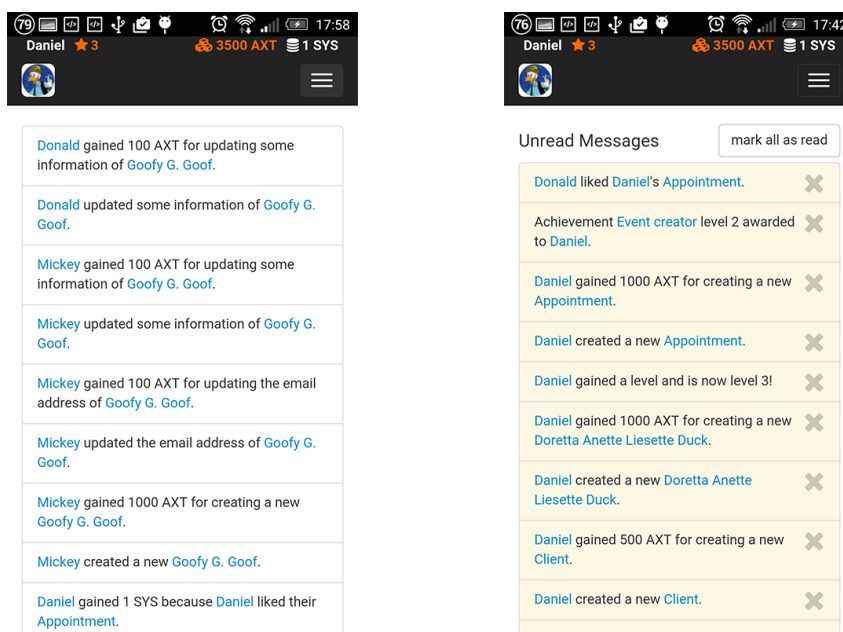


Figure 7.9.: The general and personal message log in the CRM application

A message log was implemented, listing all game relevant actions as soon as they are performed. Players can thereby follow up on levels gained or achievements earned by other players. They can also directly access the rewarded player's profile page and the data entered into the CRM-System.

7. Implemented Gamified CRM Application

Rewards earned while logged out are displayed in a separate message log on the players' personal profile page and can be marked as read in order for them to be hidden (see Figure 7.9). This has the function as a substitute reward presentation for the player when an immediate reward presentation was not possible. This is especially the case when another player likes a meeting note while the creator receiving the like is not logged in.

8. Further Steps

As the implementation of the gamified CRM application is completed, possible further actions are proposed.

8.1. Gameful Design

One missing aspect to improve the application is the overall design. The application is basically designed as a business application as those standardized designs were easily available. Added playful and gameful design features could significantly change the application's impression. In combination with an agreeable theme and consistent wording the game mechanics could provide a more enjoyable and fun experience (see Section 2.6.1).

Developing a gameful design is challenging as it is important to preserve the usability of the application while simultaneously altering the clear and familiar features of business layouts.

8.2. Extension of Gamification

As previously described, gamification needs continuous improvement, in order for the game to stay interesting and engaging to the player. These extensions will be required regularly as long as the application is in use. The implemented game logic is designed as a first approach to gamification and new and improved features will be needed when targeting a wider audience.

8. Further Steps

It is recommended to consult a gaming expert in order review the existing concepts and to further design the game mechanics. Deeper knowledge and experience will be required in order to create the most engaging and motivating experience.

8.3. Evaluation

It would be very informative to perform a sophisticated evaluation of the gamification aspect. To assess the effects of the implemented gamification in the future, evaluation techniques and considerations are discussed in the following section.

The implementation consisted of two parts. One part was the mobile website and the second part the application of gamification. In order to evaluate the gamification aspect these two parts have to be separated because benefits of mobile access and improved usability should not count towards gamification. The usage of the gamified application has to be compared to the usage of the same application without gamification. The software design supports the proposed removal or disablement.

Test phases would have to last over a long enough period in order to minimize the influence of business fluctuations. Especially in small companies the sales activities are highly dependent on the current and anticipated workload. A metric over all users of the same company may be used to normalize those effects.

The player typologies discussed in Section 4.2 may be helpful in evaluating different gamification features.

8.3.1. Quantitative Evaluation

In a data centric approach an A/B test could be performed. The application already has sophisticated logging and statistic mechanisms which were required for the game rules. These mechanics could be used to evaluate

8.3. Evaluation

the change in performance of users before and after the introduction of the gamified functionality into the application.

Evaluating the same users with and without gamification would reduce the effect of multiple external and personal factors as the same factors would be assumed to be present in both situations.

It would also be interesting to perform an A/B/A test to identify, if the return to the non-gamified application would change the performance.

In the case the gamification actually has a positive effect on performance, it could be postulated that an increase of performance in the second phase without gamification in comparison to the first one would indicate an increase of intrinsic motivation. Furthermore a decrease of performance in the second non-gamified phase below the performance of the first one would be an indicator of an extrinsic effect.

Theoretically these evaluations could be done for each newly developed feature in order to test its effectiveness. When tested on actual users the negative effect of extrinsic motivation leading to a loss of intrinsic motivation would have permanent effects.

8.3.2. Qualitative Evaluation

While a quantitative evaluation may provide information about measurable performance, the user experience is best expressed by the user. Personal interviews with the users would be the most expressive way to evaluate the users' opinions.

The users should have fun using the application whether their individual performance is affected or not. The users should be able to express their personal experience and many will probably like or dislike different parts of the gamification functionality.

In interviews it would be important to question the effects of the game on the cooperate culture and vice versa since the ability to enjoy a gamelike experience at the workplace is highly dependent on the environment. Maybe

8. Further Steps

the best way to improve the intrinsic motivation lies outside the application and cannot be found in performance statistics.

Although interviews will work for most questions, concerns about privacy influencing the gamelike experience may be best expressed in an anonymous questionnaire.

9. Conclusion

The gamified CRM application was implemented and introduced in the company. Through an agile and user centered software process it was possible to improve the usability of handling contact information significantly.

Concerning gamification it was seen that as a prerequisite to a positive effect on motivation and user experience, a sophisticated implementation is needed. The creation of such a gamified application requires a wide variety of skills from software engineering to graphics design to game design. During the development not all of the necessary requirements and skills were at hand and further work is needed in order to evaluate the effect of gamification in the work environment more conclusively.

Regardless of whether or not the gamification mechanics used, can be shown to enhance the experience or the users' performance, the considerations regarding user experience and the motivation aspect taken into account in the application design benefited the implementation.

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Acronyms

API application programming interface. 56, 57, 61, 63, 64

CRM customer relation management. vii, 3, 4, 9, 10, 25, 32, 48, 49, 56–58, 60–71, 73, 77, 81, 82

CRUD create read update delete. 61, 64

CSS Cascading Style Sheets. 62

DTO data transfer object. 61

EDA event-driven architecture. 61

GWAP games with a purpose. 14

GWT google web toolkit. 56, 61

HCI human-computer interaction. 31

HTTP Hypertext Transfer Protocol. 62

ID identifier. 62

Java EE Java Platform, Enterprise Edition. 53

JSON JavaScript Object Notation. 57

MMORPG massively multiplayer online role-playing game. 29

MVC model view controller. 61

OIT Organismic Integration Theory. 21

REST Representational State Transfer. 57, 64

SDT Self-Determination Theory. 17, 21, 24, 49

SLF4J Simple Logging Facade for Java. 57

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