

Gamification in the context of user productivity and engagement

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ABSTRACT

This article presents an approach on dealing with the engagement of mobile devices users, with the purpose of increasing productivity. As it seems that more and more smartphone users acknowledge the benefit of tracking down things they do, from physical to social activities and doing so in a competitive way, a lack of solutions that address a wider range of coverage was noticed. The proposed solution provides motivation and a competitive environment for users, while tracking their objectives and challenging others, by using an approach that covers the best practices of the concept in use and by being developed in a user-centered manner. Unlike existing applications, our proposed model covers a wider range of objectives and encourages the engagement in a game-like manner. The application's fundamental background consists of the concept of gamification, applied in a day-to-day environment.

This concept, together with a series of other user-oriented concepts implemented in the proposed application, have as main goal maintaining users' interest while ensuring increased productivity. This application is meant to cover a wide range of necessities, for smartphone users, by allowing users to track objectives proposed by themselves or others, as well as ensuring motivation through a gamification system.

General Terms

Gamification, motivation, engagement, SMART, usability, user-centered design

INTRODUCTION

Our everyday life is becoming more and more loaded, and we end up with a full agenda. The application proposed in this paper promotes an easier way to track one's objectives, with the use of a device that is almost never left out of sight, the mobile phone. By doing so, we attempt to create a solution that maintains the users' interest, increases their productivity and always challenges them to exceed others or their past achievements.

In this paper, we propose an application that motivates users to accept challenges and complete objectives in

a competitive way by providing a user-friendly interface.

While there are many applications that serve as agendas, their lifetime is significantly short. It does not take much for the user to slowly forget about them or lose interest and ending up deleting them soon afterwards [1]. Therefore, we propose a user-centered design and as a main tool, the gamification technique.

In large terms, gamification refers to the application of game-design elements and game principles in non-game contexts. Such elements and principles are adopted in order to increase motivation, improve user engagement, ease of use and even usefulness of systems. The idea came from the fact that people like having clear goals and even more being awarded once achieved. In this way, the users' behavior is easily influenced to do the expected actions when treated as "players" with game elements such as challenges and rewards [2].

The roots of gamification lie in the User-Centered Design, considering the user in every decision made. User-Centered Design (UCD) means, more than anything, understanding exactly what users need, how they behave in given circumstances and what is their approach - and considering all these in the process of development [3].

As mentioned before, a fundamental step of the gamification process is considering the users. In most of the cases, the users do not have the same complex overview of the project as the developers, thus they will focus more on the fun than on the complexity. In this way, the features should be filtered based on how intuitive and understandable they are for the users.

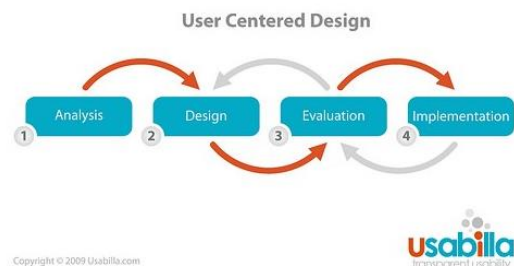


Figure 1. User Centered Design Diagram [3]

When leading on a UCD, one focuses more on

analysis, design, (re)evaluation and implementation, visually illustrated in Figure 1.

Gamification uses its own version of UCD, namely Player-Centered Design (PCD). The user from the standard User Experience (UX) design [4] now becomes the player. It follows the same pattern, by placing the player at the heart of the process. The PCD starts from the premise that the “players” in the exercise are participating because they want to, unlike the “users” from the UCD.

The main purpose of gamification is to engage, motivate and encourage the audience to exceed previous results or other competitors. Players, unlike users, have the free choice of getting involved and it is this option that enables them to have fun.

One of the main concepts that enhance the engagement of users are the challenges. Human nature makes us accept challenges and prove our ability to handle them. In order to enhance its effect, it is a good idea to use rewards in order to increase the motivation as well.

Competition is also very stimulating. Leaderboards increase significantly the desire to be the leader, and by stimulating the enthusiasm, it engages the user.

By making a promise that awards will come to those who accomplish tasks, the users are encouraged to go back and the curiosity, excitement and competitiveness drive people to spend more time on the app. The idea that completion of an activity has as result getting something in return keeps you motivated and engaged. It is all about tricking the mind, and at a point when it can get boring, the system should be able to engage again, by playing with psychology.

Setting goals is one of the fundamental aspects of a good gamification system. You can see in the Figure 2 the meaning of the SMART acronym [5].



Figure 2. SMART objectives [6]

In order to make a goal specific, one can simply answer to the “Who, What, Why, Where” type of questions. By making it measurable, you make sure you are heading towards completing a goal. Attainable means being realistic when setting a goal and making sure it is achievable. Relevant is relative to you, making sure you like it and formulating it in a way that it challenges you. One last thing to set is the time period and making sure the goal is time-bound and so taking advantage of the effect time has on decision making. Setting SMART goals works like a contract between parties, by ensuring they use the same

terminology, that they agree upon the measures.

However, it was proven countless times that the reality is never as perfect as a plan on paper. While it can be easy to think of the benefits of establishing SMART goals, in real life it can be hard to be specific, measurable and time-bound [7]. It is easy for users to get stuck in front of the input boxes and not know how to adapt their specific situation. The issue is even more visible in the moment when the objective is not fully understood. Sometimes one cannot assess how much time it would take to achieve goal X simply because it is too far in the future or has no experience in the field. It is these exceptional cases that might come in the way of users achieving full engagement.

Leaderboards that were mentioned before, work hand in hand with goal setting. By achieving certain goals, one can advance in the leaderboard and receive afferent rewards.

The concepts above have been integrated in the application presented in this article, which is currently available, as a proof of concept, on Android devices. Platform selection has been related mostly with subjective authors preference, and has very little to do with specific capabilities required for the application domain itself.

The ideal scenario would require less input from users and would use existing APIs to keep track of certain categories of objectives.

This paper focuses on presenting the concept dealt with, such as game mechanisms, game principles and engagement methods, presents related work in direct comparison with the proposed application, a psychological side of motivation followed by a brief presentation of the specific implementation of the concepts in use.

RELATED WORK

Google provides an application, similar in purpose with our proposed application. However, unlike our solution, Google Fit [8] targets a more specific area of motivation. It is oriented towards sports or fitness motivation, helping users keeping track of their objectives (e.g. running, walking). The application has a small number of predefined objectives, but these are too restrictive, focusing only on the ones mentioned before. Users are not allowed to see other users’ accomplishments so the only competitiveness present here is the one with past self.

Another similar application is Wunderlist [9] which is ideal for keeping track of things, in the form of a list. The application comes with a series of predefined lists, but they have limited space for information. It is more oriented to tracking shopping lists or lists of movies, for example. These lists can be shared; thus, users can have an overview of other persons’ activities. However, there is no competition, the access to information being strictly informative. One could use this to track short term objectives, that do not require

a lot of follow-up, but it is not suitable for a bigger objective that needs milestones in order to track it properly.

In this way, a need for an application that not only helps users tracking goals, but also engages them by consolidating a competitive environment with the purpose of increasing productivity was noted. This application is suitable for personal use, but can also manage a more professional environment, such as a workplace, where team members can challenge each other.

GAMIFICATION CONCEPTS

Game mechanics

The whole purpose of gamification is to educate a desired behavior of users. Thus, the first step of building such a system is to set an overall goal and the expected behavior [10].

Next, one should consider how to motivate the users to act as expected. While it is easy to motivate users for a short term, finding valuable and invested users can be more demanding. This is where the difference between intrinsic and extrinsic motivation comes in. Extrinsic rewards can be easily demotivating. By giving rewards for the completion of a task only to certain competitors, the others feel unsatisfied and predisposed to lose interest in the service provided, thus the motivation was short-termed and can lead to loss of users. Intrinsic motivation, however, addresses the user directly, by rewards specifically customized for him/her, by referring to more abstract accomplishments, such as efficiency, productivity, personal achievement, sense of pleasure and satisfaction, as well as more specific emotions such as loyalty.

As a last aspect, the motivation should be supported by motivators. These are rewards. Depending on the type of application, it handles one type of economy, be it financial or game-invented. The most typical elements are reward points, badges, leaderboards and other forms of charts.

Game principles

Gamification principles are all about the game design [11]. Applications started using game principles because games are engaging and promote continuous use. Thus, these game principles have been borrowed by applications that have few or no things in common with games, in order to fuel the motivation and attention of users.

One first principle is letting users know how they are doing. Use visual indicators to make their status and their progress visible and to illustrate how they are getting closer to the goal. By seeing progress, users are more motivated to continue.

Another principle is the rewarding system. When users complete a goal, we reward them. It could be either a leveling up, an increase of score, going up in a leaderboard or simply a visual change, depending on

the context.

The look and feel of an application, while not being the most important aspect, it has a significant impact on the users' interest and engagement. Aesthetics is crucial since the expectation of mobile phone users have increased significantly in the last years. In this way, the visuals of an application make up the first impression of the app. The look and feel is what sparks the initial interest and then drive the engagement.

By giving the users something to aim for or something to collect, a great motivation can be achieved. This is the core of user satisfaction since it allows users to relate to others, by sharing and comparing results.

Competitive engagement

Even though people grow up and become functional members of society, they never stop wanting to play. Games have a factor that stimulates and keeps players engaged. The main trick is competitiveness, either with past self or with other players. Almost always, the scope is collecting. Collecting reward points, badges or money in a specific economy.

Games are mainly associated with competitions. Highest performances are rewarded, motivation coming either intrinsically or extrinsically [12] - motivated by doing our best to reach a goal, by our work getting there or by external factors such as badges, collector's points or monetary rewards.

Game factors found in non-game applications have the purpose to enable what we call friendly competitions. By always being able to compare themselves with others, users are more likely to continue using the application and coming back to it in order to exceed past results or others. With the help of the leaderboard, the user has a sense of omniscience and transparency, always knowing exactly who they have to surpass and how much they need to gain in order to do so. By visually seeing how they climb up the ladder, they become actively engaged.

Motivation

We settled so far that there are two categories of motivation for an application's users, namely intrinsic and extrinsic motivation. The end scope of providing these motivations is emphasizing lasting engagement.

Extrinsic motivation means acting towards a goal with the scope of receiving external rewards such as points, badges or money in some monetary system. For users that are extrinsically-motivated, it is not the action or behavior of getting there which they like, but the outcome. Meaning that they might not like what they are doing, but continue doing it for what they get in return [13].

On the other hand, intrinsic motivation focuses on internal rewards like the sense of satisfaction, positive feelings and happiness. Unlike extrinsically-motivated people, these people have a genuine desire to achieve the goal, while enjoying the process itself and having

a great time doing it.

Before considering a user engaged, he/she is no more than an observer. An observer is prone to lose interest. However, if you can reach them, they become engaged, evolving into active “consumers” who will persuade their goals and will head towards our desired behavior. This is precisely why the main focus must be on motivation. Users must be motivated otherwise the audience will become a crowd of disinterested, disengaged and demotivated people, losing sight of the app’s values, highly prone to stop using it.

PROPOSED APPLICATION

Overview

Before going any further, there are a few technical details to be noted. Two of the main concepts of the application are the challenges and the objectives. Objectives are proposed by users for themselves. They set up a deadline, a description, a suggestive title and other helpful information. Challenges are proposed by users and are available for all the others as well. A challenge, once accepted, turns into an objective for that user. The challenger himself can accept the challenge.

From a technical point of view, the system consists of an API and an Android application serving as Graphic User Interface. A brief presentation can be seen in figure 3.

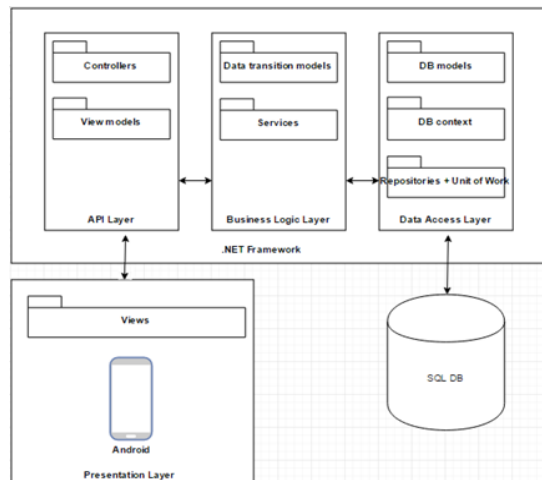


Figure 3. System architecture

To increase usability, users are faced with multiple ways to initiate objectives. They can either launch an objective themselves, or accept a challenge launched by another user. To keep things as structured as possible, challenges follow the pattern of SMART goals to describe what is expected from users as a result, after finalizing the challenge.

In order to emphasize the concept of gamification, users are able to compare results with others and his own old statuses, in a page of reports, with highly visual slots.

The usability is also increased by the notification system implemented using the cross-platform solution provided by Google, Firebase Cloud Messaging, by the user-centered design and by the competitive algorithm maintaining ranks between users. Besides this, the proposed solution is implemented in a manner that makes the user only one tap away of the required information.

Proposed game mechanics

By considering the game mechanics presented before, a different approach to the rewards system was adopted, one that tries to provide a better balance between the intrinsic and extrinsic motivation for its users. The image below shows the key elements of the gamification system.

Expected Behavior	Motivation	Motivators
Track objectives and accept challenges	Challenges	Competition with other users; Reminders; Challenger grade
	Loyalty	Custom / Personalized rewards
	Rewards	Leaderboard; Progressive icons; System grades
	Ranking	System grades; Users grades
	Purpose	Increase productivity; Track objectives

Figure 4. Gamification elements

They work as follows: the motivators support the motivation needed by the users to achieve the desired behavior.

This system emphasizes competition between users by encouraging them to accept challenges proposed by the other players. The supporters are then grades received from the system upon completing a challenge/objective, grades received from other users and, optionally, grades received from the challenger. The progress is also represented through a progressive set of icons that are gained upon achieving certain steps. It encourages loyalty by providing custom and personalized rewards upon reaching certain milestones.

The application also comes with a notification algorithm that is implemented in a way that engages the user even more, by providing relevant notifications and avoiding overwhelming users with not-so-relevant messages. For example, users are prompted when someone accepted their challenge for the first time or when an objective is about to reach its deadline.

The end scope of this is the ability to track the progress on user’s objectives, with the purpose of increasing productivity and engagement.

Proposed game principles

By now, we know that game principles are basically borrowed from games’ psychology in order to increase engagement and to increase continuous use.

To start with more general aspects, the looks and feels of the proposed application follow the KISS [14] principle, acronym for "Keep it simple, stupid". It uses a flat design with a simple color palette, allowing users

to focus on content while also providing catchy elements that emphasize the game-like aspect of the app. The application is consistent through its screens, maintaining the looks throughout the whole application. Sample pictures from the app can be seen in Figure 5.

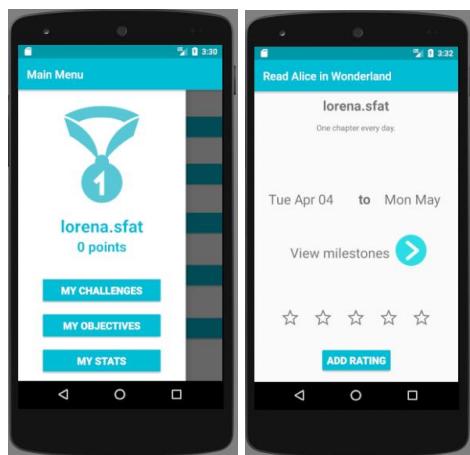


Figure 5. Application User-Interface sample

The application also proposes a ranking algorithm that works hand in hand with a rewarding system. Users gain their rank as an arithmetical mean between the grades of all their finalized objectives. We call objectives finalized when they were either completed or are past deadline. When an objective is finalized, through any of the means mentioned before, the system automatically gives it a grade, based on the difference between the deadline and the completion date or the lack of it. Penalties are applied and are calculated considering the duration of the objective, the start date, the end date and how long the deadline was violated. For example, if I planned to learn 3 new words in a foreign language, every day, for 2 weeks, but I started one week later and finished one week after deadline, I still held up part of the bargain, so the penalty will be smaller than in the case I simply prolonged the implementation with one week. In case of an accepted challenge, that is a challenge turned into an objective, the system also considers the correlation between the deadlines chosen for planning steps by the challenger and the actual end dates. Penalties for surpassing deadlines for milestones are also applied, by the same principles as for the objectives.

With the use of graphical, visual elements, just like in a game, users can easily track the status of their challenges and objectives as well as their progress and their rank. Users can filter through the list of objectives to see the ones that are completed, overdue or to keep track of how many other users accepted their challenge, all these strategically and intuitively available for the user. Users are also provided with a screen for statistics, where they can track their progress compared to other users and they can also see statistics, personalized for their accomplishments - for example the most popular challenge, the best-graded

objective.

The proposed application indicates to users their progress visually.

Proposed engagement methods

The main engagement method that we propose is the “competitive gameplay” [15]. We challenge the users to score as high as possible, to surpass their competitors and to do their best while finishing a challenge in order to get the best grades.

We engage the users by making it easy for them to have an overview of their challenge and/or objective stats through a specific screen with leaderboard and statistics. To help them keep track, users are visually notified when objectives are about to reach the deadline, by receiving a general message on the main screen. When entering the list of their objectives, the priority is set to the ones that are about to reach the deadline sooner.

To keep them focused on the challenges they launch, users also have access to: information about users accepting those challenges (e.g. number of involved users), a general status overview when players finish a challenge implementation and the possibility to add a review for a player. Remember that this review is a part of that objective’s grade, together with the grade from the system.

We know from experience that users are prone to forget about an application, simply because of a busy schedule, leaving aside cases where the app does not meet their needs. We need to remind users about the app, and the best way to do so is implementing a notification system. To emphasize what we said before about this algorithm, we point out the main types of notification:

- with the purpose of reminder, the user is notified when he/she hasn’t used the app in a while.
- with the purpose of engagement, as updates, we notify the user when they reach a significant position in the leaderboard, when a challenge they launched becomes popular etc.

The whole structure of the application focuses on the user’s needs. Everything is placed in a way that the user is always one tap away from getting to the desired screen or performing the desired action.

For example, we considered intuitively to place the more accessed screens on a “drawer menu”. This menu is always available by swiping on the screen. There, users can access their statistics or objectives pages or access the list of challenges they launched.

APPLICATION EVALUATION

There are multiple ways of evaluating a system. Considering our proposed application, the evaluation will assess aspects on usability and also on performance improvements of the involved users in the contexts of the accepted challenges. Therefore, we propose a user-based evaluation technique.

Data acquired through the evaluation will give an insight on which further improvements that will enhance the ease of use and, specifically, increase user's performance and number of achievements, are recommended.

Designed experiments address two different but complementary environments: work and leisure. The application can either be integrated in the work process of a team or used between a group of friends, to track and compare common objectives/challenges. Conducted measurements will provide detailed statistics about the number of achieved objectives in a set interval of time (e.g. a week, a month, a year). In the same way, we will be able to track the average time a player needs to achieve an objective.

After collecting this data, we must interpret the results. We will compare diverse groups of users based on certain criteria (e.g. those who used the application for X months vs. those who haven't used the application almost at all) to see the factors that motivate or discourage players. The data will be interpreted for singular user and groups of users based on past results.

The types of users that take part in these studies have a significant impact on the results. For example, a user that never uses the mobile phone except for making calls, will be less likely to be engaged by any kind of application. In the same way, the reaction also depends on whether users are familiar with the concept of gamification, their types of objectives and challenges, whether they are "team players", etc.

CONCLUSIONS

This approach intends to cover best practices in the domain of gamification in the context of an application that focuses on users' productivity and has as goal users' engagement.

The proposed application is built in a user-oriented manner, having all screens and activities strategically and intuitively placed at hand. The only thing required from the user is the ability to create objectives and a challenge in a SMART way and being objective and fair to other users to maintain a satisfying environment.

Future development

The next step of our research will be focused on testing the performance of the application in different environments and provide support for more versions of this operating system, while also fixing issues that were not dealt with so far.

Considering the fact that this application focuses on increasing users' productivity, a feature that would be next on the list is one that measures this possible improvement. Be it either by simply asking for

feedback or through a more complex system. Together with the results from the evaluation, such a system could help building up statistics that would help the developers know where to invest more time, what to change to please the user and to have an overview from a non-technical point of view.

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