Gamification in sport – improving motivation for recreational sport

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***Abstract* – Nowadays, people find it difficult to get time and interest for doing sports activities in the form of recreational sport. The main problem is the lack of content which will make these activities more attractive to people. In this paper, gamification principles are used to enhance the experience in those activities. For this purpose, two applications are created which showcase organizing tennis matches, writing results and presenting statistics based on the collected data and comparing it with friends. The aim is to determine if gamification is going to influence positively on peoples' motivation for recreational sports activities.**

Keywords - gamification; game; sport; motivation

I. INTRODUCTION

These days a lot of people are trying to find a game or activity which will relax them during pastime. These activities are not necessarily related to sport, but primarily they belong to that group. When we consider that people nowadays organize everything using applications on their smartphones, we can assume they will also use applications for sporting activities.

In this paper, tennis will be used as an example for real life solutions. Tennis is used as an example because of its simplicity and the fact that many people know basic tennis rules. Also, it is the 4th most popular sport globally and the most popular individual sport [1].

Available solutions that currently exist on the market are used only for organizing sporting events or for tracking sporting results, but there isn't a known solution for combining those two elements in a unique form of experience. „Tennis Buddy“ is an application for organizing tennis matches and finding players by certain criteria [2]. „tennisTOUCH“ is an application for tracking results in tennis matches [3]. In this paper, certain elements of the gamified system which don't exist will be provided.

For clarity, a solution that will be provided is focused on recreational sport only. So, a lot of components used here exist in professional or amateur sport meaning that the ideas for some solutions came from mentioned types of sport, but they are simplified to be more user-friendly.

II. GAMIFICATION AND MOTIVATION

Earlier was mentioned that gamification elements are going to motivate users more than other applications could. These elements, as well as gamification itself, will be defined here and also, motivation in the sport will be explained in theory.

A. Gamification

Gamification is the use of game design elements within non-game context [4]. Authors see gamification as an innovative and promising concept that can be applied to a variety of contexts [5]. The term gamification appears in the early 2000s [6]. Global companies increased attention to the gamification since the beginning of the 2010s when the term started to be used in conferences around the world [7].

Some of the contexts in which gamification has previously been successfully implemented include the following: marketing [8], crowdsourcing [9], social networks [10], and healthcare [11]. Within all these contexts, it is expected that gamification can foster the motivation of the individual to achieve their goal [12].

Gamification elements are divided into three categories [5]:

- Components
- Mechanics
- Dynamics

Components are base elements which are used for every other high-level element. The main components are [5]:

- Points
- Badges
- Leaderboards

Players are collecting points for every achievement in the game. Points are measurable, so they are used for showing player's progress. They give feedback to the player, as well as the designer of the game who can improve the game by tracking the distribution of points.

Badges are a representation of achievements in the game. They can be earned by collecting a target number of points or by other achievements. Badges are visual components which have a message in their design.

Leaderboards are also a visual representation of achievements, but they can also show a player's position compared to the other players. On the leaderboards the player can see all the points, so he can calculate how much points he needs to be ahead of his opponent.

Mechanics are more high-level elements in the game which are action oriented. Known mechanics are [5]:

- Challenges

- Competition
- Feedback

Challenges define aims for the player so that he can make progress in the game. The ultimate goal of the competition is to win and earn a prize. Feedback is important for the player to be aware of the progress and to know who the winner of the game is.

Dynamics are the most high-level elements in the game responsible for enhancing enjoyment in the games. The main dynamics are [5]:

- Progression
- Relationships

Progression refers to the path from the starting point of the game to the final point. Relationships refer to the possibility of becoming friends with other players and also it refers to a possibility of competing with those players.

In this paper, the emphasis is on organizing sports events and tracking results using game elements described in this section.

B. *Motivation in sport*

Motivation refers to the causes of human behavior. Motivation directs an individual toward achieving his or her goal. In sport there are three different approaches to motivation [13]:

- Individual factors
- Situational factors
- The interaction between individual and situational factors

Individual factors are focused on needs, interests, and aims of players. They define how much a player is interested in some form of activity and if there is a need for that. These individual factors are used for showing preferences. Some people like activities with contact (e.g. soccer) and some activities without contact (e.g. tennis).

Situational factors define coaching style, possibilities which come from playing a chosen sport, wins and losses ratio. When we talk about possibilities, they can be observed through the possibility of participating in tournaments, winning prizes and acknowledgments for successful achievements.

The interaction between individual and situational factors leads us to one hybrid factor which defines the most realistic motivation for athletes. This means that player enters every sporting event with his individual preferences. Example for this can be seen in the research of sports students' motivation for participating in table tennis at the Faculty of Kinesiology in Zagreb [14].

When we look at motivation in a sport by using self-determination theory, we have to consider two types [15]:

- Intrinsic motivation
- Extrinsic motivation

Intrinsic motivation refers to the inner satisfaction. It is not measurable. In this type of motivation, we can strive for knowledge, achievements and stimulus experience.

Extrinsic motivation refers to the external goal. These are material things like money, medals and other kinds of tangible assets. External motivation, unlike internal motivation, is a short-term motivation because it does not satisfy as much as internal motivation does.

III. RESEARCH OF RECREATIONAL TENNIS ACTIVITIES

Recreational sport is a sports activity in which the main goal is to entertain a player so that he returns to that activity because it was joyful and relaxing.

For this paper research was done to find out if there is a need for enhancing the creation and tracking for organizing and playing tennis matches. The gamified system was used for three months and the research was conducted on the same group of people to see if there are some concrete benefits of using a new approach to improve tracking and organizing tennis matches. It should be noted that the research is focused on tennis and it doesn't include other sports activities.

The target group are employees of the Ericsson Nikola Tesla company. A lot of these employees are involved in some sort of recreational sports activities, so this should be a good sample for research. The subjects of this research are 200 Ericsson's employees. The results of the three asked questions which are focused on the current satisfaction and potential future improvements will be presented. After that, the results of the two more questions will be presented which refer to users' feedback after using gamification.

A. *Playing tennis before gamification*

The first question is very simple and is trying to find out how many people are already playing tennis. Possible answers are „Yes“ and „No“. Figure 1 shows that 22% of respondents are already playing tennis.

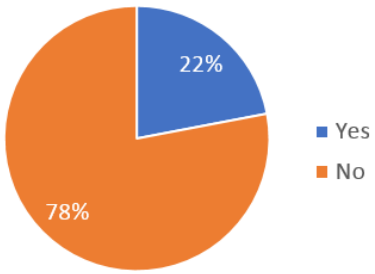

Figure 1. Percentage of people playing tennis before gamification

B. *Satisfaction with tennis organization before gamification*

The second question is focused on satisfaction with current organization of tennis matches. There are five possible answers from „very dissatisfied“ to „very satisfied“. Figure 2 shows the result of this question. On the X-axis of this chart are marked levels of satisfaction and on the Y axis are marked numbers of respondents. It is visible that only 18% of respondents (marked as “4“ and “5“ on Y-axis) are satisfied with the organization of tennis matches.

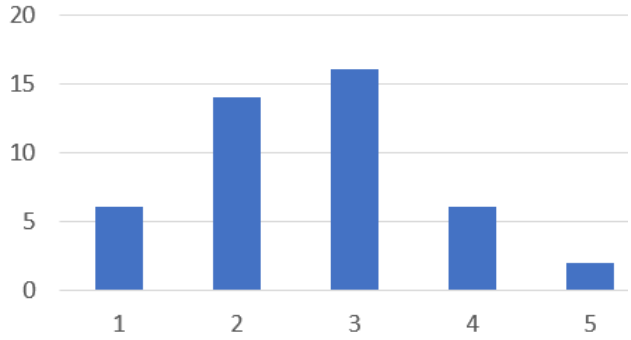

Figure 2. The result of satisfaction before gamification

C. *Tracking results using modern applications will cause more involvement in playing tennis*

The third question is trying to find out if respondents think that using modern mobile and web applications for tracking their tennis results will manifest in a way that more of them will be playing tennis in the future. Possible answers are „Yes“ and „No“. Figure 3 shows the result of this question on a chart where it can be seen that 54% of respondents think that using those applications will affect positively on them to play tennis in the future.

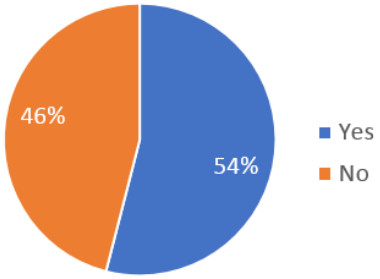

Figure 3. Percentage of people wanted to play using gamification

D. *Playing tennis after gamification*

The fourth question is the same as the first question described in the subsection A, but it is asked after using gamification for three months. Figure 4 shows that 36% of respondents are playing tennis now. It can be interpreted as a positive trend for people playing tennis.

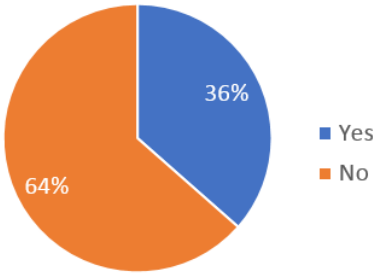

Figure 4. Percentage of people playing tennis after gamification

E. *Satisfaction with tennis organization after gamification*

In the last question, the users are questioned about their satisfaction level as they were in the second question described in the subsection B. Figure 5 shows that after using gamification for three months, 43% of respondents are satisfied with the organization of tennis matches. It is a big step forward regarding the results collected before using gamification.

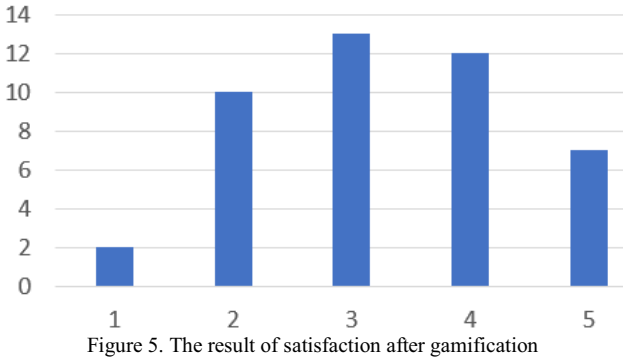

Figure 5. The result of satisfaction after gamification

IV. SOLUTION IMPLEMENTATION

After theoretical background considering this problem, a solution containing two client-side applications and one server-side application will be explained here. The solution combines all gamification elements listed in this paper.

A. *Technologies and user experience*

For server-side application ASP.NET Web API 2 Microsoft's framework is used. It is used for creating the RESTful type of application. It contains endpoints which are used for serving requested data and writing new data into Microsoft's SQL Server database.

The client side of this solution consists of one mobile application for Google's Android platform and one web application created in Facebook's library React. Both applications are using API calls to achieve communication with previously explained Web server [16].

For the design of client applications, Google's Material design principles are used. This is a common solution for today's applications and because of that, it is decided to be used for this solution. People are used to it and they are feeling comfortable in that user experience.

B. *Mobile client application*

The mobile application is used for organizing tennis matches and collecting data about played matches. It is designed to be used on the go, so the user interface is simple and intuitive. The mobile application has following functionalities:

- Sign up and sign in
- View and edit of personal information
- Searching players
- Making friendships
- Organizing, editing, and searching matches

The user has to be logged into the system to use it. It has to provide personal information which is helpful for other players to be able to find the desired opponent.

Figure 6 shows the screen in Android application for searching players by provided filters. Filters are city, gender, and skill. Every filter can be omitted. You can request friendship with target player or request a match with that player.

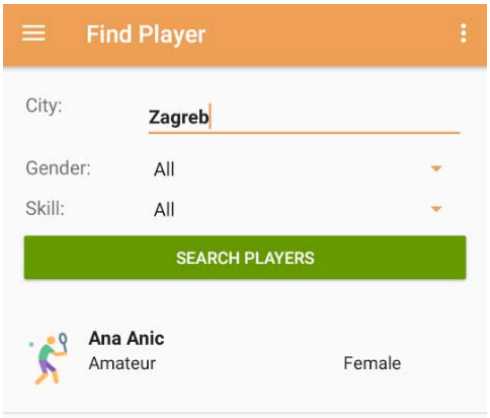

Figure 6. Find a player in mobile application

Figure 7 shows the screen in Android application for creating or editing a match. A player can pick a city, date and time. After the match, they can also write in their result. In the end, they can rate the match by giving it up to five stars and they can also comment on the match. The result is important parameter because it is used in further analysis of the played matches.

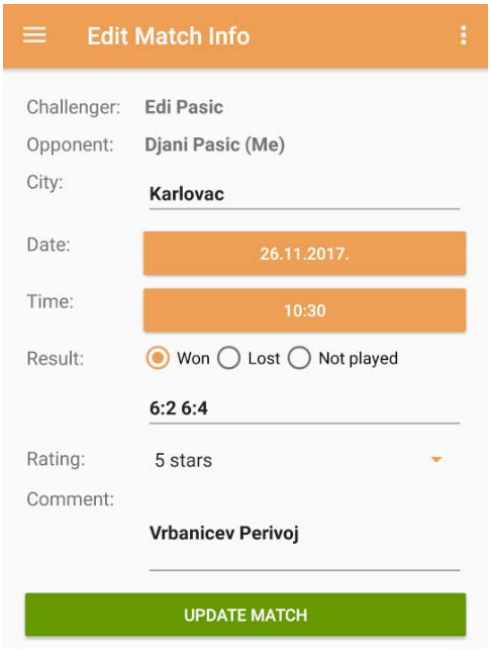

Figure 7. Edit match in mobile application

C. *Web client application*

The web application is used for an overview of results and comparing them with friends. Unlike a mobile application, this one is designed to be used on a bigger screen where it's easier to view the charts with statistics. This application is focused on three main gamification components. It has following functionalities:

- Sign in
- View of profile
- Comparing with friend
- Leaderboards with points and wins

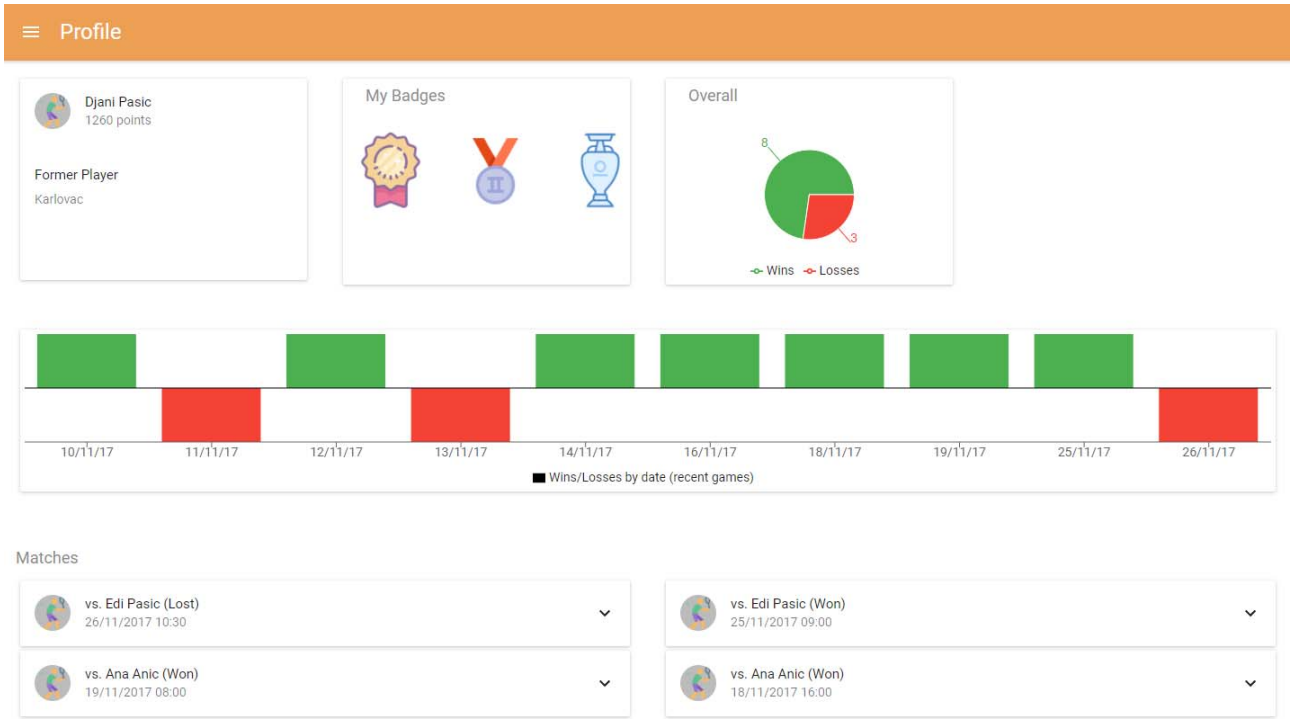

Figure 8. Profile in web application

After the user is logged in, he can view his profile, compare it with friends and see the leaderboards. Figure 7 shows a profile in React web application. There a participant can see basic player information, his badges, overall wins and losses ratio on the pie chart, results of the last ten matches on the bar chart and preview of all of the matches.

Comparing matches with friends has similar screen design as player's profile. The difference is that in the screen section for comparing matches you have to select a friend with whom you want to compare the results with and show data to and that information is only visible to the two comparing players.

Leaderboards screen is presenting the most successful players by showing points and wins and each player can see in which place they are in regardless of their ranking on the board.

V. CONCLUSION AND FUTURE WORKS

This paper describes a solution which improves motivation of individuals for recreational sport by using gamification elements. Research has shown that people think this approach is going to motivate them to start playing tennis and to play longer. The second part of the research shows a positive trend of employees playing tennis during their pastime, and their satisfaction with the organization of that events after using gamified applications for three months. The research was done in wintertime while there are a few global tennis events, so it can be assumed that the target group isn't necessarily motivated to be involved in tennis, so we can say that this system is mostly responsible for motivating the target group or employees to play tennis more.

This solution can be taken as a prototype for a more generic system which will be able to handle all popular sports. Furthermore, it can be integrated with existing systems responsible for booking sports' objects. Also, in the booking system, the data could be used to implement its valuable information with a gamified system which can then improve the connection between the players.

Additionally, the solution can be implemented for all mobile platforms (including iOS), as well as applications for smartwatches which can be used for accepting friendships and matches' requests.

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