

Getting Residents Closer to Public Institutions through Gamification

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Abstract. With the huge growth of mobile device users, in recent years, the need and the opportunity to create new digital services and platforms has arisen. These platforms and services not only make people's daily life easier, but also facilitate and improve communication between institutions and people. Also, new ways of achieving the intended goals are being developed and tested. Gamification is an example, where institutions and people's communication is encouraged through the offering of incentives/rewards that potentiate involvement with that particular institution. In practice, institutions offer rewards to participants who perform predetermined tasks, for recommendation, dissemination, evaluation or greater involvement of people with that particular institution. The concept of smart cities is also getting huge attention nowadays. Making a city "smart" is emerging as a strategy to mitigate the problems generated by the urban population growth and rapid urbanization. In this work, we propose a digital solution, in the form of a mobile application, which has as its main goal to improve city hall public services and people's communication, bringing them closer. This is achieved using gamification techniques that aim to engage residents with city hall services. It is provided a report system that enables residents to communicate to the city hall services, some issues regarding their town that they wish to be solved, such as broken structures, clogged sewers, among others. The proposed system also has a lore that leads to extra motivation to complete missions, be part of player gatherings and events, and meet new people and to better explore the cities' wonders. An admin platform for the maintenance and administration of the system is also proposed, to better help keeping the application's content fresh and updated, allowing for a better user experience for the population. The proposed system is being prepared for testing in real environments, the simulation results, as showed in this work, indicate very promising results towards the achievement of the proposed goals.

Keywords: Smart Cities, Mobile Computing, Computational Creativity

1 Introduction

We live in an era in which a large percentage of the population, regardless of age, has contact with the most diverse technologies, and in particular, it is rare to find those who, on current days, do not have access to a computer and / or to mobile devices such as tablets or smartphones. Coupled with this growing trend, and in particular the need for people to be in constant contact with the rest of the world, there has been a huge growth of applications that are now within reach of these devices. Taking advantage of this growth, there is an opportunity to conceive new ways of bringing citizens closer to public institutions, throughout technology. Alongside all this, and with the fast growth in the field of intelligent systems and artificial intelligence, the increasingly fashionable concept of Smart Cities appeared naturally, often framed with the concepts of e-Participation [1] and e-Government [2], which characterize the transition from existing, and sometimes somewhat outdated, processes towards digital ones. Specifically, the concept of e-Government is the opportunity, driven by necessity, to bring government products and services to citizens, taking advantage of the evolution of technology and of their own technologies to shorten the distance between them and the government and try to return some transparency to some of these services provided by the state. It can be compared to electronic commerce in the way that it is intended to automate state service processes, making them available in any device, anywhere, twenty-four hours a day, and every day. The main purpose of this concept is to make the work of public institutions significantly more effective and efficient, increasing, as mentioned above, transparency, but also the capacity to respond and manage resources of each of these institutions. However, the growth of this trend is largely conditioned by the decision of those responsible for public institutions. On the other hand, we need to take into account the acceptance of “the customers”, the citizens. It is not new that the human being is unenthusiastic to change [3]. The challenge is then to propose and develop a platform that will allow public institutions of cities to create events or challenges for their citizens to participate and have fun while taking care of their own city. It is intended that a City Hall, for instance, will be able to get closer to all its citizens, including those who live on the outskirts of the city and that, in the case of users, they feel important, heard and involved in the matters that concern their city functioning. With this, these institutions gain the possibility of studying the support that their citizens may give to certain initiatives, such as the construction of something new or an alteration of something existing, to perceive which paths can be traversed in the direction of the future as a species of study of daily and constant market, allied to a tool of promotion not only of the pre-populated city and its values as well as its commercial, cultural, artistic and leisure spaces.

2 Background Issues

To accomplish what we propose to do in this work, several technologies and concepts need to be addressed in order to establish a solid background that will allow us to propose and validate this new approach. All these steps will be briefly mentioned next.

2.1 Gamification

Gamification is a relatively informal term to describe the use of game elements, such as rewards, classifications and missions, in systems or environments without any relation to games, with the aim of improving the user experience and also their degree of involvement and motivation [4]. Despite the implementation of new games and with new ideas appearing every day, the concept itself is more than a hundred years old. Among the many companies that use this technique, there were a number of companies that created playability platforms such as Bunchball [5], which in 2007 was the first to offer game engines or components and Badgeville a company which started in 2010. Large names in the market, Microsoft, IBM and Deloitte, among others, began to apply gamification to various applications and processes. Massachusetts Institute of Technology has a program called Education Arcade whose aim is to explore the natural interest of the people in the games and transform the process of education in a way that motivates students [6]. In [7] some behaviors that are associated with gaming, are found to be also necessary at school for instance. Many advantages are recognized to gaming, as in [8, 9, 10]. All these being said, gamification arises as a promising field to be used in several contexts, particularly in this work associated with the concept of Smart Cities.

2.2 Smart Cities

More than half of the World's population now lives in urban areas. This shift to a primarily urban population is expected to continue for the next couple of decades. Many new issues regarding how we live in those cities and how they are organized are then in order. In the last two decades, the concept of "smart city" has become more and more popular in scientific literature and international policies. Although there is an increase in frequency of use of the phrase "smart city", there is still not a clear and unfailing understanding of the concept among specialists and academia. Only a limited number of studies investigated and began to systematically consider questions related to this new urban phenomenon of smart cities. The concept of a smart city is still emerging, defining and conceptualizing it is still in progress [11,12]. In [13] several smart cities definitions are enumerated. As a good starting point we can use the following statement: "The buzz concept of being clever, smart, skillful, creative, networked, connected, and competitive becomes a key ingredient of knowledge-based urban development and hence of a smart city [14].

2.3 Used Technologies

Nowadays, a huge variety of technologies are available, that enable us to develop our intend work. The choice or preference of one to another, must be driven by many factors, such as the specific goals of the work, development timings and availability for instance. For the web server, Flask (a python microframework) was chosen along with a PostgreSQL database, after a carefully study of the ones available, because it complies with all the conditions necessary for the development of the project. In particular, it was

chosen the PostgreSQL version 9.5 that allows to have JSON type fields to store dynamic structures. For the mobile application, after evaluating several alternatives Cordova [15] was chosen as the development framework. With Cordova we were able to develop the entire application using web technologies (HTML, CSS and JavaScript) and use the same code for multiple platforms such as Android, iOS and Windows Mobile. Cordova offers a minimum support for the device's sensors, especially the GPS which is a huge part of the application

3 The Proposed Platform

As stated before, the main goal of this work is to get residents engaged in tasks related to their city, throughout the use of gamification techniques, allowing participants to explore and knowing better their city, as well as having goals to achieve and contending to win prizes.

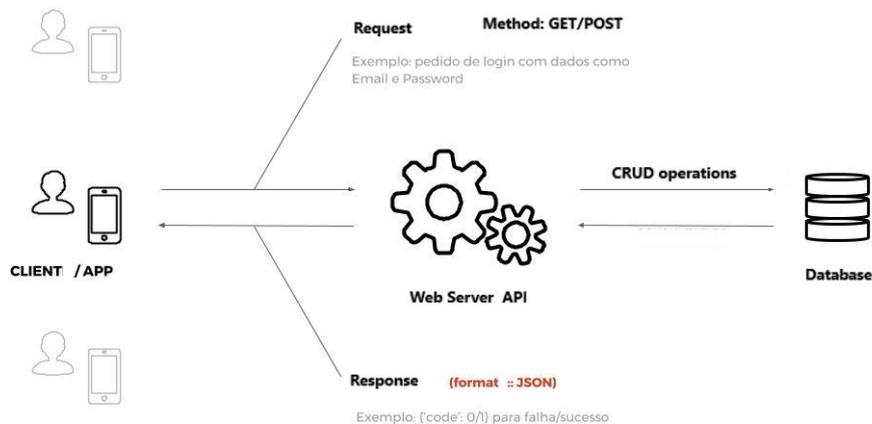


Fig. 1. Platform Architecture

The proposed platform will revolve around two concepts: competition and reward. A virtual world was conceived where society is governed by a council of tribes who, together, democratically dictate the course of the city. This council will meet once in a while and the level of influence each tribe has on the decisions taken will vary with the support it receives from the population each month. Each of these tribes represents a different philosophy of the city. Although the tribes are not necessarily rivals, they will compete for attention, respect and dedication of the citizens. This project requires the establishment of communications between a mobile application and a central web server that is the provider of all the necessary information for the correct operation of the application. This client-server communication is carried out through HTTP requests, the application trigger actions that, in turn, get a response by the server. The

platform architecture is detailed in figure 1. Users are encouraged to report anomalous situations they encounter in their city using the mobile app (figure 2).



Fig. 1. Reporting Anomalous Situations

Also, they are challenged to attend to events and fulfill challenges, placed in the platform by the systems administrator (figure 3), that intent to motivate users to participate in city events.

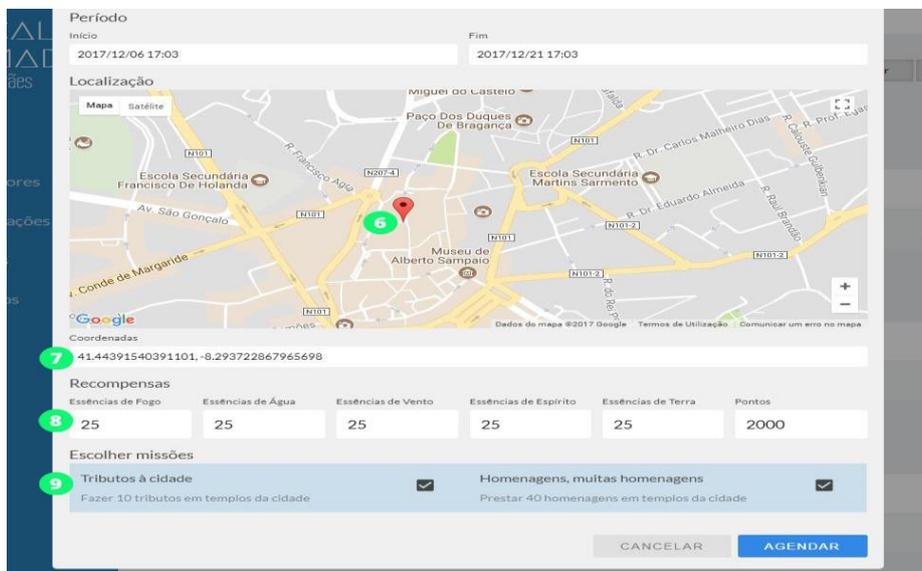


Fig. 2. New Event

Throughout this process, users can get rewards that they can trade in the application's store for the available products, and can with their vote, rate events and participate in city hall decisions.

4 Results

This platform was tested in a controlled environment, using volunteers that installed the mobile application in their smartphones. For a relative short period of time, they were encouraged to participate in the study, attending to "virtual events", reporting "virtual anomalous situations" and participating in "virtual challenges". The collected data of these interactions showed very promising results and are still being processed.

5 Conclusions and Future Work

With this work, we intended to provide a platform to allow citizens to interact with public services. To do so, and to motivate users, gamification was used. The application components, the administration area that controls it and the web server that supports and feeds both, are implemented in a sufficiently modular way to allow the system to be applied to any city in the world. It is only necessary to fill in initial information that one wants to use to fully set up information for the desired city. The platform makes it possible for the entity responsible for the system to retrieve information on the trends, complaints and wishes of the population. Speaking of interest and utility, the idea presented with this work is meant to encourage citizens to leave their homes and to get to know their city better, building a bridge between the fastidious process of interacting with public institutions and the playful aspect of participating in events and having fun, with one goal in mind: the rewards. It is intended to apply these concepts and this platform in a real situation, in order to validate all the assumptions that were made with the preliminary tests, which showed encouraging results

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