

# Mobile application for playing a localized story

Francisco Manuel Maya Múrias de Melo Campelo

[Francisco.campelo@ist.utl.pt](mailto:Francisco.campelo@ist.utl.pt)

Instituto Superior Técnico, Lisboa, Portugal

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## Abstract

Storytelling has been used since the humanities' first steps. Today there are a great number of systems to create, save and share stories with friends, family and the general public. This project has produced an application that allows a new type of storytelling, a localized storytelling. With this application the user is allowed to download a story and play it, going through a path with a few stopping points, where more story elements are unlocked and he's able to read them, it has been made so that every bit of story is related with the user's location. This report describes the way it was conducted the process of planning, development, execution and analysis of the tests. It finishes by approaching the next steps to be done in the future developments of this application. The application was completed satisfactorily although some improvements are required.

Keywords: Localized storytelling, Mobile application, Requirements, Tests, Multi-platform

## 1. Introduction

Storytelling precedes the written word; since the beginning of time, humans have been using speech, gestures and drawings to narrate stories. The first stories ever shared had the purpose of spreading their religion, share the daily life 'stories or help perpetuate the traditions by repeating old tales. It was through those narrations that knowledge passed from generation to generation, normally told around the fire by the ancient people of each village.

Stories were told using narration, music and dance. Those tales recalled and reproduced passed experiences and would make people feel a sense of belonging, so important to the human race.

Throughout times there have been used many different methods to preserve the tales and knowledge, from craved tree drawings, using

pigments in the cave walls to skin tattoos reporting family lines or social connections.

With the arrival of the written word, the transmission and report of their stories became much more efficient. It was now possible to write and store stories in one place, and then read them all across the world, far away from the storyteller. The means of sharing these tales have evolved enormously, from simple craved wood planks to the general use of paper, and recently film and multiple digital supports.

We are surrounded with stories, either in movies, series or books, a lecture or a speech, even on television advertising, today we appreciate that almost everything is transmitted using, in one way or another, a story.

With the arrival of smartphones, people started to get accustomed to have high performance machines in their pockets. More than that, we

started to demand instant access to information, friend's status and their stories. The number of smart phones has been growing, the Pew Research Center estimated that in 2012 85% of the American population had a telephone (Pew Internet Projects , 2015), a number which increased to 90% in January 2014 (Pew Internet Projects , 2015).

With the growth of smartphones popularity, there came an immensity of applications, games and systems that lets people play, share things and talk with others all across the world.

One of the many applications that people enjoy is the location games, like GeoCache ( Groundspeak, Inc, 2015), Niantic Labs' Ingress (Niantic Labs, 2015) or Zombie- Run (Six to Start, 2015). Those kind of games have been becoming more and more popular because they're both innovative and good for the health of the players.

## 2. Motivation

Throughout history, Human beings investigated and registered events and information that relates to the very beginning of our Universe. We've been perfecting the ways to store, search and share all this information. Today, through the internet, we have almost all the knowledge of the world with a touch of our fingers, through a great many systems that are at our disposal.

The generations of adults and young adults are using search engines, social networks and blogs to find out about stories told by friends and others, to discover information about local places, new experiences and activities to occupy their free time and make their life a little bit more interesting.

However, this huge amount of information is inherently scattered. Spread over a multitude of websites and pages on social networks. It does not exist or it isn't easy to find ways to access all this information in a systematic and organized manner, with a single thread that provides an experience that is simultaneously unique, engaging and interesting.

In Lisbon, for a tourist to get access to information on local cuisine and cultural experiences, he must purchase a tour guide,

printed or in a digital form, or hire a tour guide to take him through the streets with a sightseeing tour. These experiences do have a lot of good information and can guarantee a minimum quality of the service, but they are usually very tourist oriented and provide similar routes and/or activities, not leaving much space to improvisation and personalized visits.

The startup Lost in Reality conducted a study, through inquiries, to understand what kind of difficulties tourists and local walkers have when traveling and visiting some city or village. In this study the great majority responded that they would like to have a story to guide them through the streets, and almost half responded that they wouldn't mind pay a few euros for them.

## 3. Related work

Currently there are many digital storytelling systems, ranging from simple narration platforms, where its users can create and share stories, to mobile systems with localization capacities.

### 3.1. Audio-guides

There are in the most tourist destinations, several audio guides with which a tourist can wander around the relevant points of a city and get information about the monuments or buildings around him. Companies like GoCarTours developed a vehicle in which a tourist can travel through the city's streets and get information about the places he's going through, using a GPS signal to acquire its localization (Gocar Tours, 2015).

These platforms have their content curated by professionals which ensures its quality, but prevents anyone from creating a story which they find interesting to share with their friends or even strangers. This means that these systems do not have a crowdsourcing component.

The fact that the content is only focused on tourists makes the experience very similar from guide to guide and very restrictive as it normally does not expose a local experience and cannot be adapted to the taste and personality of each tourist.

### 3.2. JiTT – Just in Time Tourist

The JiTT also offers a mobile application that guides the user through the city exploring it (JiTT, 2015). The concept is more akin to this project, but focuses more on video as a mean of narration and just like the audio guides and tour guides, the content is cured and developed by partnerships. The JiTT is not currently available in Portugal.

### 3.3. StoryTrail

The StoryTrail is a startup that recently obtained financing in Portugal Ventures, whose product is a similar application to an audio-guide, but with videos (Story Trail, 2015). Users install an application and have access to short videos in which people show some of their favorite spots in the city, referring to some historical facts as well as personal comments about the site. This application is still in a developing stage.

### 3.4. Geocaching

Geocaching is a game where a user can hide a cache with a message, object or challenge, and then share its GPS coordinate with other players.

There are many mobile applications that facilitate the game, aiding in the creation of caches, allowing users to comment them and listing caches that are in close proximity. These applications are interfaces to the online service and are based on its content.

This game has been growing in popularity, with 20266 active Portuguese users and over 2 million worldwide ( Groundspeak, Inc, 2015). This application does not explore the storytelling and focuses mainly on the exploring of nature.

### 3.5. Stray boots

The Stray Boots is a treasure hunt kind of a game (Stray Boots Inc, 2015). It is also based on a mobile application and uses a web platform for content creation, but does not explore a concept of story. It's given to the

player, or teams of players, challenges which, to be solved, require moving through the city or location where it's based. This game also has the option of having some of the content adapted by users, they can put on the map points of interest and later share them with friends and family. This application applies manly to the United States territory, since presently it has only been developed in three European cities (Paris, London and Copenhagen).

## 4. Proposal

In the context of a localized storytelling, it was proposed to do the development of a mobile application that allows the users to play a story whose chapters are localized in a set of places.

This application uses an existing web platform that is responsible for storing the users' data and their stories. This platform also exposes a Rest Web service that allows the download of the stories that are accessible to the user.

With multiple mobile operating systems in mind, it was proposed to draw the architecture and choose a software development kit that allowed the deploying on the most used mobile systems, Android, IOS and Windows Phone.

## 5. Application's Requirements

### 5.1. Functional requirements

The application's functional requirements are based on the user actions or the stimuli of the OS sensors, like the localization service. The diagram on Figure 1 describes the mobile system use cases. This diagram exposes all the current application's functional requirements, even though this thesis did not implement all of them.

The requirements that will not be focused on this work are:

- Story market
- Story creation
  - Post creation
  - Story publication



FIGURE 1 - USE CASE DIAGRAM

## 5.2. Non-functional requirements

The application was evaluated through the following non-functional requirements: Efficiency, Fault management and fault tolerance, performance and stability.

Even though security is an important requirement to this application, it was left out of this project because an exhaustive security study is a complicated process and would take too much time to be included in. It will be

explored in future work in the context of the Lost In Reality startup.

Efficiency was measured through the consumption of battery. Performance was measured through three parameters: the application's startup time, the story list load time and the time it takes to start playing a story. It was also evaluated the data transmitted over the network throughout those tests.

## 6. Implementation model

The project was implemented using Xamarin's software development kit. This system takes as input code written in C# and Xaml, and generates native code for all the mobile platforms.

It was chosen because the development can be done using a single code and then exported to multiple platforms. In addition, the produced application should have a similar performance when compared to one produced with original or native SDKs.

## 7. Application architecture

The application was designed to have a layered architectural system. This choice was made to respect the separation of concerns principle, simplify the implementation and create a code base that is more easily maintained.

It was designed with 4 architecture layers as represented on figure 2:

- Services – Layer with the persistence and server communication's services.
- ServiceAccess – Abstract layer between the Business Layer and the Service Layer.
- Business Layer – Layer with the business logic, including story management and story running services.
- View – View Layer where the visual elements reside.

## 8. Development process

As this project is inserted in the startup Lost in Reality, its development process started by analyzing the results of a previous prototype application, extracting the first requirements from previous experiences and following the business model developed by the team.

Then there were defined the requirements, both functional and non-functional of the

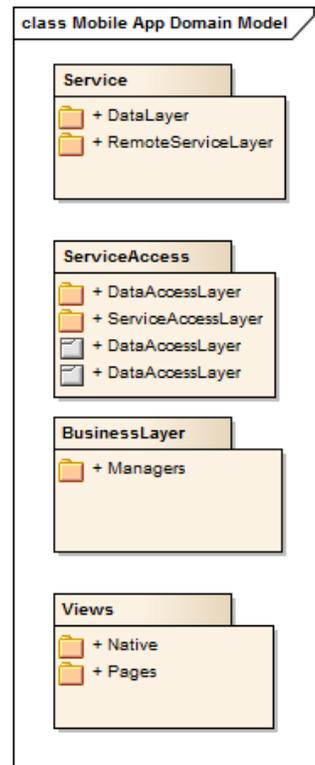


FIGURE 2 - MOBILE APP  
MODULE DIAGRAM

application, as well as the planning, stages and deadlines for the project.

Afterwards it was conducted a research on development tools, analyzing the advantages and disadvantages of the multiple approaches available to develop a multi-platform application.

The next step was the definition of the architecture. This was done after the SDK research because the development tools had a great potential to influence the architecture at the root level. So it would be frugal to develop an architecture that could be invalidated in future steps by the chosen software development kit.

Then the source control system was installed, even though there was only one programmer, using a source control system helps ensure the code is safe from accidents, creates a historic of all the changes done to the code and allows changing back the code to past versions if a bug appears.

After the installation of the SDK and source control system, the implementation started. It was composed of 5 principal stages:

- Creating the login page and server initial communication (3 weeks)
- Organizing the story list (4 weeks)
- Developing the localization module (1 week)
- Securing the story running service (4 weeks)

- Developing the compass and Map functionalities (4 weeks)
- Fixing the remaining modules and bugs (5 weeks)

The project plan and all the development process are summarized on table 1.

Task	Duration	Start	End
Planning	3 days	2014/05/14	2014/05/17
Objective definition	1 week	2014/06/11	2014/06/17
Related work	1 week	2014/06/18	2014/06/25
Architecture definition	2 weeks	2014/06/26	2014/07/23
Test definition	1 week	2014/07/24	2014/07/30
Vacation	2 weeks	2014/07/31	2014/08/13
Implementation	21 weeks	2014/08/14	2015/01/07
Non Functional Requirement Definition	1 week	2015/01/08	2015/01/15
Arquitecture revision and Test Definition	2 weeks	2015/01/16	2015/01/29
Application conclusion	1 week	2015/01/30	2015/02/06
Test preparation	1 week	2015/02/07	2015/02/14
Test and corrections	2 weeks	2015/02/15	2015/02/28
Analysis and conclusions	2 weeks	2015/03/01	2015/03/14
Report finalizing	7 weeks	2015/03/15	2015/05/02

TABLE 1 - PROJECT PLAN

## 9. Testing

The tests were designed to assess and quantify the requirements defined at the beginning of the project.

They evaluated the application in two ways: a usability testing that evaluated the difficulty users had in performing the different scenarios in which the application will be used and a test for non-functional requirements where it was quantified the use of some application resources in different devices.

The usability tests tried to evaluate the experience the user has with the mobile application. The tests had an incremental difficulty and took into consideration the time the users took to complete the tasks, the mistakes they made and the difficulties they expressed. The process of choosing the subjects submitted to testing was a well thought plan, choosing people among the target audience of the application, adults and young adults between 17 to 50 years from both genders and with a varied background, being either a technology experienced person or people with limited technological bases. When introducing the tests there was an attempt not to reveal too much of the tests' objective in order to prevent influencing the behavior of the subjects, which could lead to invalid results.

The testing of the non-functional requirements was based in the implementation in the code of a system that monitors the times used by the various application's modules. This system aggregates performance data and then communicates with a rest service implemented in the Lost in Reality website. There were defined three critical processes whose performing times were to be evaluated: downloading the list of server stories, download a story to play and playing a story.

## 10. Results

The tests with users were found to be very productive. From these came out quite a constructive criticism both on a functional and non-functional level.

The comments and suggestions focused mainly on three points: Charging time, design improvements and user experience and improvements in functionality.

The most pointed criticism by users was the loading time associated to the list of stories and the start of running a story. Especially when the tests where effectuated without a WiFi network available, the story list charging time averaged about 40 seconds. This was due to the fact that the application was charging the complete list of stories and simultaneously its thumbnails. Some of the users also had the impression that the application had blocked due to the large loading time and had the urge to press the screen to test it. There were even those who quitted the application by pressing the "back" button on the system before the application responded.

There were also some pertinent suggestions about the interface, some were design related and others focused on the functionality of the interface. It was suggested that, as the story is unlocked and the various chapters are revealed, there should be an indication of the progress of the story, also that it would be interesting to create a display were the application would indicate which was the better way to reach the next points in the story, and finally that there should be created a story rating system.

After examining all the results of the tests it was decided that in the future it would be implemented a gradual loading of the stories, so that the user can interact with the application much earlier and thus have a much more attractive experience. Some of the small corrections within the interface that were pointed by the users will be corrected but the ones which require more advanced features, such as the directions to next point will be held in future work.

## 11. Conclusions

Lost in Reality is working in order to create an innovative way of storytelling, taking the reader to places in order to have access to the story whose elements are linked to the place where they are unlocked. To be able to launch this project, the startup needed an application that allows the users both to read and play the stories as well as to create and share them.

This engineering project took up the challenge of creating such a mobile application, which should be connected to a web server and should be able to list the stories and download the contents of a particular one chosen by the user, making use of various mobile devices' sensor systems.

The work had the involvement of a large set of technologies, programming techniques and algorithms. Since its beginning until the completion of the product there were carried out various engineering steps required to ensure a smooth implementation of the project. Starting with the definition of an action plan, with concise tasks and delivery deadlines, later following up to the definition of requirements and a balanced architecture that fulfilled the principles of modularity and responsibilities' separation.

In the final phase there were conducted some tests with users and also other tests that evaluated the application's performance. These tests revealed some points to be improved in future work.

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