

SPerifa: Technology as a tool to promote leisure in urban slums of the city of São Paulo

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Abstract

The right to leisure has been a topic of debate since the enactment of the 1988 constitution, in Brazil, which established social and individual rights to guarantee the well-being of the population. This article proposes a discussion about the possibilities of using technology as a tool to help guarantee this right in peripheral regions of the city of São Paulo, proposing a mobile application for iOS that presents options for easily accessible locations for the focal populations. Thus, the article presents the process of developing an application for the purpose described, based on the CBL methodology. Also, it brings a usability evaluation carried out with specialists in Design and Usability of mobile applications.

Keywords

slum, leisure, software, mobile

1. Introduction

The main discussions about leisure in Brazil are based on its basic definition as "time called free [...] that can build a sense of freedom" [11]. This aforementioned freedom refers to the absence of coercion or notions of productivity outside working hours. Information and Communication Technologies (ICTs) have played an important role in discussions about public policies in social contexts [9], and the creation of mobile applications can be a tool to expand this debate and its intersections with the current world.

Since the promulgation of the Brazilian constitution of 1988, leisure has been presented as a social right for all citizens. The 227 article of the Brazilian Constitution [2] presents the duty of the family, society and the State to ensure basic conditions for maintaining the quality of

life of individuals. Among these, leisure appears as one of the basic needs for freedom, family and community coexistence of the individual. However, in marginalized regions of large urban centers – popularly called “periphery” or "urban slums" – these rights are constantly curtailed, contradicting these policies that focus on maintaining well-being in the exercise of public management.

In order to decentralize and democratize cultural alternatives, as well as to generate an impact on digital inclusion, generating equal opportunities in the information society [16], this article presents an application that proposes to create a collaborative network between residents of these peripheries, through the use of a mobile application for iOS SPerifa, which consists of sharing existing leisure options in their neighborhoods, with the aim of expanding cultural options in the slums of the city of São Paulo.

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The article is structured in 6 sections. In addition to this first section, the theoretical framework of the work is presented; in section 2, which presents the documentation, articles and tools used to develop the application. In section 3, related works are presented that show the importance of the proposal presented and other alternatives that served as guidelines for the research. Section 4 presents the application development, discussing the methodology used for development, requirements analysis, implementation, and testing. In section 5, the results and discussion about the application are presented and, finally, in section 6, final considerations are made about the observed results and the limitations found in the proposal.

2. Theoretical Reference

This section presents the theoretical concepts and materials used to guide the research. The main elements that enabled the development of the application and the necessary documentation for the elaboration of the presented proposal are presented.

2.1. Apple Documentation

As the project is a mobile application for iOS, one of the main theoretical foundations used during the research was Apple's development documentation. Documentation on Swift used for consulting and learning the programming language, native iOS, and whose main compiler is the xCode application. The language was chosen because it has access and support for native libraries, which facilitates the development of iOS applications in an optimized and native way according to the standards stipulated by the Human Interface Guidelines.

2.2. Human Interface Guidelines

Apple's Human Interface Guidelines (HIG) are used for UX and UI standards to be implemented within the application, in order to place the user who will interact with the application at the center of development. HIG was consulted during the application's prototyping and development process so that navigation standards were respected, aiming at the use of native iOS components.

2.3. Challenge Based Learning

The Challenge Based Learning (CBL) [15] was the methodology used to guide the project ideation process. The CBL was used due to the prior knowledge of the developers of this project, in order to document the development and learning process. The main stages of the project are:

- Engage: Engage: Big idea, essential question of project and initial challenge;
- Investigate: developing the challenge through key questions, carrying out guiding activities, looking for references;
- Act: final development of the solution, based on the references acquired in the Investigate stage and to respond to the challenge formulated in Engage.

The process happens in a cyclical and procedural way, to allow the development team to return at any of the stages to refine ideas, improve processes, etc.

3. Related papers

Among the works found in the literature, the research developed by [14] stands out, which analyzes the use of Solidarius, a social donation application, which promotes solidarity as a new proposal of assistance, characterized by the feeling of belonging, satisfaction and empowerment experienced by its users. The work brings a reflection of the use and development of technologies by society and its potential for social transformations from the construction of solutions in a collective way, in this way, instead of accentuating the social and cognitive abyss resulting from the economic character that accompanies science and technology, social applications present an alternative to the way technology operates in contemporary society, proposing development and transformation to marginalized

populations [5]. This work was built through bibliographic research, the use of the CBL method, and through the development of the Solidarius application. It can be seen that social applications provide new types of relationships, and the Solidarius application, specifically, may also provide public utility services, such as the collection and proper destination of some donation items.

The work brought by [3] points out a relationship between the citizen's right to mobility, transport and access, and the inequality between the classes of the capitalist system. The research also suggests the use of applications based on geotechnologies, with a focus on the use of Android technologies, as an equity policy tool. The method used for the research started from the definition of the study area, which is the city of Uberlândia, Minas Gerais, Brazil. After that, a field survey was carried out and the classification of leisure points was stored in a database.

The work of [7] also presents a possibility of a tool for leisure, now in the city of Parnaíba, Brazil, which evaluates the use of an application to facilitate tourism interactions within the city, promoting local commerce and exploring access to the city and its main tourist attractions. This proposal, therefore, also are proved to be valuable for understanding the use of technology as an aid in accessing leisure.

Finally, the study by [6] goes towards the validation of the proposal, analyzing how technology and applications for different platforms can be combined with leisure and well-being, evaluating the solutions found in 100 different applications to solve the leisure problem access during the lockdown period experienced during the Covid-19 pandemic.

The references analyze the use of technology in the urban context, focusing on ensuring access and development of a local community, each in its own way. The first research is focused on the development of the solidarity characteristic of a community, through an application prototype, idealized through the methodology of learning based on challenges. The second reflects on the impact of geotechnologies on accessibility and on the occupation of spaces in cities, later validated by the prototype of a potential application. The third presents a proposal to validate the idea of access to leisure through the use of technology in a tourism context, emphasizing a city and its leisure aspects. And the last proposal makes a broad analysis of different technological initiatives via apps and their importance in promoting well-being in a period of social isolation.

4. SPerifa app development

4.1. Application description

The application was developed over a period of two months, using the aforementioned CBL methodology to design each of the steps necessary for its realization. The project's target audience is residents of the slums of the city of São Paulo, with the aim of expanding this audience's access to leisure, promoting events and places for cultural and/or recreational activities. The development of the project has a developer, a designer and a person responsible for the business planning and marketing.

The application has an onboarding screen, where the user is presented with basic information about the application and its social mission as a tool to promote leisure in the periphery; initial screen, which contains the events of the periphery registered in the database; "near me" screen, with geolocation of crop points close to the user; and, finally, the "About" screen, where the user is presented with two different forms – one to report errors in the application and another to indicate locations –, a sharing option and an evaluation option on the App Store.

4.2. Development Methodology

The CBL methodology relies on the principles of developing an idea from a guiding question [15]. This question is developed in order to act within a big idea and, finally, to generate a challenge. Finally, the answer to the challenge, that is, its resolution, is found in the application. The SPerifa has the following topics related to CBL:

- Big Idea: How to help people from the periphery to have access to leisure?
- Essential Question: What edge problems can an application solve?
- Challenge: Create an application that brings together leisure places on the periphery.

The process is guided through essential questions that guide the process of developing the central idea, in order to develop the solution in a procedural and cyclical way, allowing developers to reformulate questions and answers that seek to solve the main challenge.

Table 1
Requirements analysis

Functional Requirements	Description
FR1	The system should present the list of registered locations
FR2	The system must present the information of a location
FR3	The system should present the map with the user's current location
FR4	The system must present the locations registered on the map through a marking
FR5	The system should allow the user to browse the map
FR6	The system must allow the user to rate the application
FR7	The system must allow the user to share the application
FR8	The system should allow the user to send a location suggestion

4.3. Ideation

The ideation process was based on a brainstorming session that aimed to find solutions to problems in the peripheral communities of São Paulo, Brazil. From the survey and selection of some ideas, three semi-structured interviews were carried out to validate the raised hypotheses and recognize the needs of the project's target audience. Based on the interviews, a benchmarking was carried out with the objective of evaluating applications with similar proposals and surveying the main features used to implement the proposal. In this investigation stage, the surveys and interviews were documented in the "investigate" phase of the CBL, being used to define the scope later on.

During the ideation, it was noted how social inequality is reflected in urban spaces, since the center of São Paulo concentrates a variety of popularly known leisure and cultural places [12], while in the peripheral regions of the city, the options for Existing leisure facilities are poorly publicized and promoted by government agencies and neighborhood organizations, making it difficult to implement the right to leisure for the peripheral population. Thus, it was defined that the focus of the project would be to publicize options of leisure places close to the slums of São Paulo, as a way to face the difficulty of access by peripheral communities.

For prototyping, low, medium and high fidelity prototypes were developed using the Figma application [8]. The projection of the screens was designed to bring the user satisfaction when using the application, seeking to reduce the possibilities of rejection of the application [4]. To validate the design and user experience of the prototypes, consultations were carried out with designers and interviews with potential users to ensure, through the interactive prototypes, that the application would meet its proposal.

4.4. Requirements analysis

The requirements analysis took place through competitor research, in interaction with the development team and human-computer knowledge. In this way, it was possible to establish the functional and non-functional requirements of the application. The application's functional requirements are described in Table 1, below, as so the non-functional system requirements, described in table 2.

Table 2

Non-functional requirements of the system

Non-functional Requirements	Description
NFR1	The system should present the list of locations within 5 seconds
NFR2	The system must follow HIG design standards

The application use cases were designed in such a way as to place the user as the main actor. The user can perform actions within the application by navigating through its main tabs: Discover, Near Me and About. The use cases are modeled as shown in Figure 1 below.

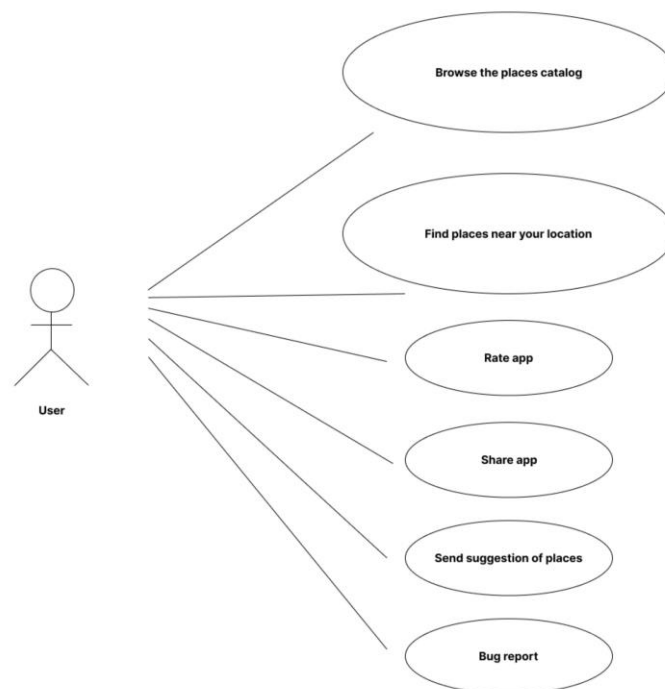


Figure 1: SPerifa use case diagram. Source: Authors.

4.5. Project

The app is designed to run on iOS devices. The programming language used was Swift with the UIKit library [20], which provides the use and customization of interface elements. The fundamental parts of the project can be described through the main use cases for the user to interact with the application.

For the development of the application, the Swift programming language was used, since it has native libraries, such as UIKit, for the development of iOS applications. In this way, the application is developed natively and with standard iOS components, which facilitates user familiarity and human-computer interaction with the software [18].

The UIKit library [20] was also used to enable the use of native iOS components, such as:

- UIButton: Button element with native functions implemented for the user to interact with the application through actions that accompany the navigation flow through user selection;

- UIImage: Element that receives expository images. Within the application, they were used in order to facilitate non-verbal communication to represent the locations available in the app in a visual and complementary way;
- UICollectionView: Component used to represent, through a collection in the form of a list, the locations available in the app. The Collection View is implemented in order to facilitate user interaction with each item, allowing its configuration in a standardized way;
- UIAlertView: Element used to facilitate the communication of feedbacks to users, since, given a certain action that generates some result, the user is faced with the alert informing him of the precedents of that action;
- TableView: TableView was used in the application as a way to standardize user interaction with the options menu available in "About", since it is used in a standard way in iOS applications in menus that present different options, facilitating the representation of navigation sequential, where clicking on an option results in the opening of some screen, allowing interaction with that screen or returning to the original menu;
- tabBar The tabBar is used to represent the parallel navigation available in the application through its main use cases:
 - Discover a location: tabBar's "Discover" button;
 - Interact with the map and nearby places: tabBar's "Near Me" button; – Find additional app information: tabBar's "About" button.

4.6. Implementation

The main points related to the development of the application will be described below, which make up its prototyping, programming and, finally, the internal tests applied to validate the interaction with the user.

Application flow and navigation (Figure 2): the application has parallel navigation, allowing the user to view a tabBar [19] that directs him to different contents within the app, as exemplified in Figure 2, below.

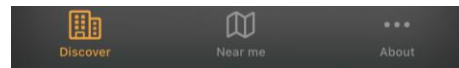


Figure 2: Navigation Tab Bar. Source: Authors

The main sections within the app, represented by the tabBar, are: Discover, Near Me and About, as shown below:

Discover (Figure 3): Section that presents the user with the collection of locations within the application's online database. The user can browse the list of locations and view small previews through images of each topic. By clicking on one of the items, the user sees more information about the item (description, time, location), in addition to having the possibility to share this item with their contacts:

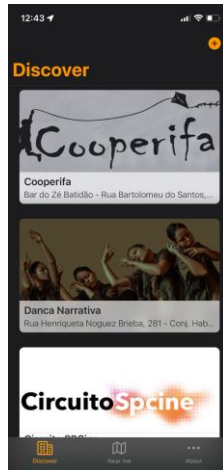


Figure 3: App main page, with events and locations. Source: Authors.

Near me (Figure 4): Section with the visualization of a map that represents the user's current geolocation, so that he has a visual feedback, through the map, of which places and events are closest to his location, and in this way, can trace routes on how to get to the chosen event, through a map application; The MapKit library [13] was used within the application to visually represent the geographic location of each item (event or establishment) within the application's database. Using the latitude and longitude of each location, points on the map are marked in order to highlight which locations are available to the user (Figure 4);



Figure 4: Map with locations located close to the user's location. Source: Authors.

About (Figure 5): Section that allows the user to select the following options:

- About SPerifa: User can read a text about the project;
- Rate the app: User submits their app rating and feedback directly to the AppStore;
- Share the application: User can share the application in the way they prefer with their contacts or on social networks;
- Send a location suggestion: In this option, the user can send a location suggestion to the developer team to be added to the app's online database;
- Report bug: Dedicated section for bug or error reporting.

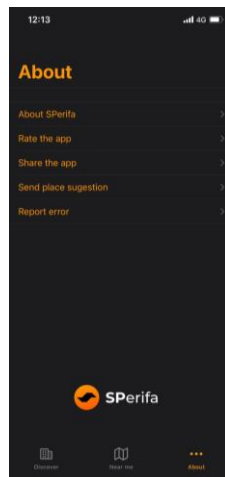


Figure 5: "About the app" section. Source: Authors.

Storyboard (Figure 6): Programming through Storyboard [17] was used in order to outline the main flow of the application, as shown in Figure 6.



Figure 6: Project's Storyboard. Source: Authors.

The storyboard visually assists the development of the application, in order to allow the connection of components inserted in the project, with classes developed to manipulate each of these components.

4.7. Tests with experts

To evaluate the proposal, interviews were carried out with 3 experts in the field of mobile development. The objective was to understand if the choices of functionality and navigation taken by the developers were able to provide a user experience that was accessible to the end users of the application.

Requested tasks:

- Enter the third location in the application list;
- Find this same location on the app's map;
- Go back to the home screen;
- Find a place close to your location;
- On the "Near Me" screen, click on a location and choose a map app to plot the route;
- Fill in the form on the "About" page of the application.

Questions:

- Question 1. In your opinion, does the message on the onboarding screen explains the purpose of the application?. The first interviewer stated that he complies with the proposal. The second

reported that the “Welcome” message is pleasant, and shows the main purpose of the application. The third said he understood that it is an application made for the periphery, which shows leisure places within it. Furthermore, that the application was probably developed by someone from the periphery, or by some peripheral initiative.

- Question 2. Can you summarize your experience using the app?. The first interviewee reported that his experience was fluid. He managed to do everything he needed to within the app. The second already knew the application previously, and said it works well. The third also had a good experience. “The app is very simple and intuitive to use,” he said.
- Question 3. Has the presence of the map made your experience easier to find places near you? The first interviewee said he had difficulty understanding how the location of places on the map works. The second said yes, but the loading of the map on screen is not good. The third also said yes, fulfilling the role of showing the places around him.
- Question 4. Are there elements in the application that could be changed to facilitate your interaction with the interface?. The first interviewee said that he would change the hierarchies, that is, the positioning of the elements on the screen for a better understanding of them. The second said information about leisure venues such as opening hours and prices could be added, as well as missing a “Search” part within the app. The third reported that he would not make any changes.

5. Results and discussion

From these interviews with experts, some questions and limitations to the application emerged and are important to be considered. Among them are: I) the application was developed only for the iPhone, and a larger part of the target audience is an Android user, an operating system that is predominant in cell phones with more affordable prices in the country, evidencing the importance of expanding the platform to other operating systems; II) the database dependent on the community is a limiting factor for the application’s growth, since users are not always aware of the initiatives of their communities, and that is why they chose to use the application; III) the difficulty in establishing partnerships with people outside the periphery limits the growth potential of the application, reflecting the historical exclusion that these regions suffer from both public authorities, and private initiatives in the country. However, even with the aforementioned limitations, the application has expressiveness in the environment in which it is inserted. SPerifa was recognized and promoted on different technology sites, such as Tudo Celular, Perifatec and Mac Magazine [10], one of the largest technology portals in Brazil, in addition to other important information vehicles for the peripheral community, such as the Agência Mural de Jornalismo das Periferias [1], even participating in the largest business fair and startups with a social bias for peripheral solutions in Brazil, Expo Favela.

6. Conclusion

The developed application aimed to promote access to a policy and right that is denied to the peripheral population - leisure. Some of the challenges found in the construction and consolidation of the application were explored in this article, but the expansion of the discussion on the subject is necessary for further studies. The application has some limitations, mainly in terms of access to the target audience due to the exclusivity of the operating system developed, which directly influences users’ adherence to the proposal and equal access to information. Another limitation found refers to the discovery of new places by the population, which imposes the need for a database that is fed by the residents of the periphery, who often do not even know the application and, consequently, do not feed it. And, finally, there is difficulty in accessing projects to promote the initiative, since there is little interest in the development of applications with a social bias, especially when focused on places aimed at low-income people.

With future work, it is intended to validate the experience and interface of the application - that is, bringing, now, in addition to the perspective of specialists, also that of residents of peripheral regions, who will use the application to solve problems of their daily lives.

The application, although already available for download on the App Store, does not have forms for user feedback, and interviews were not carried out after publication to fully understand the tool. Some

of the limitations found for this result mainly from the need to use the internet to use the application, which restricts the public and makes it difficult to interact with users.

This limitation is part of the application backlog and will be resolved in the next updates, as developers understand the need for a cache as a way to facilitate the use of the application in the long term.

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