

Mobile first proposition of UFPR CampusMap

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Abstract:

Currently, the use of mobile devices, according to the statistical data presented by Statcounter Global Stats (2022) is higher than the use of desktop devices and likewise, as Roth (2019) states, maps are more viewed on mobile devices than on other platforms. To meet the growing demand for mobile device users without compromising user experience (UX), the concept of mobile devices first emerged, which, according to Mullins (2015), consists of creating the design initially for mobile devices. According to Wroblewski (2012) design first for mobile devices require attention to their constraints, such as the reduced screen space for displaying content. Additionally, mobile devices are equipped with sensors that enable the implementation of new functionalities.

UFPR CampusMap (UCM) is a Web Map that provides outdoor and indoor information on campuses of the Federal University of Paraná (UFPR). UFPR has several campuses throughout the state of Paraná, totaling 502,511 thousand square meters of built area, and has about 43,084 undergraduate and graduate students and 5,919 teaching and technical staff. The UCM was developed for desktop devices and uses a responsive design to access mobile devices. Among the existing functionalities in the system are search by location, search by campuses, access to reports through searches by institutes and environments, selection of layers for visualization, enabling visualization of indoor layers by floor, editing tools (polyline, polygon, and marker), and downloading and uploading files, among others. Martins (2021) tested UCM's usability by comparing desktop and mobile devices, and after confirming the necessity to provide the user with greater ease and satisfaction in using the system on mobile devices, recommends the creation of an application for these devices, with the aim of improving the user's experience.

In this way, this research aims to accomplish the proposition of the UFPR CampusMap mobile first to meet the growing demand of mobile device users. The methodology employed combines the steps of requirements engineering and UX Design techniques. The methodology is shown in Figure 1.

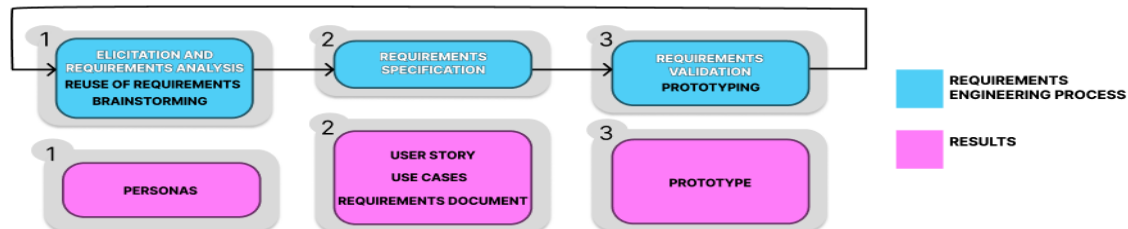


Figure 1. Methodology scheme

The requirement engineering process is cyclic and interactive and aims to create a Requirement Document. The steps of elicitation and analysis of requirements, specification of requirements, and validation of requirements comprise this process. The methods used in each step were defined based on the project. In this way, the methods used in this project focused on the users to guarantee their satisfaction. In each step, at least one product was generated, which was useful for the next step. Parallel to the cycle process of requirement engineering, Design Thinking techniques were employed. These techniques consist of a problem-solving approach that, according to Norman (2013), has a tool known as user-centered design, which is a cyclic process and consists of steps of Observation, Idea generation (ideation), prototyping, and testing. The requirement engineering steps used the reuse of requirements and brainstorming methods. The reuse of requirements consisted of the final consultation of functional and non-functional requirements in the existing version of the UCM. The brainstorming meeting was held with the participation of developers and users of the system, that is, stakeholders. In this step, in addition to the insights for functional and non-functional requirements, four personas were also created, which, for Lowdermilk (2013), are fiction characters that consist of the personification of real users. These personas represent different user profiles, classified according to the frequency of campus visits. Users' stories were created to describe the requirements and motivation for using the system. The second step consists of elaborating a use case diagram to list the

main needs of the users represented by the personas and then generating the document of the requirements. In the third step, the prototyping method was chosen to validate the requirements for generating a high-fidelity prototype of the user interface. According to Lowdermilk (2013), prototyping is an efficient way to help users view what is intended to be available in the application, as the prototype is tangible to be tested with users, focusing on user interaction with the application. Before creating the high-fidelity prototype, a low-fidelity prototype was created that consisted of drafting ideas quickly and objectively, which helped stakeholders define the best idea to invest time in the production of the high-fidelity prototype. A vote was held to select the best low-fidelity prototype. Figure 2 shows the prototypes presented for stakeholders to vote. Number 3 was the chosen option, which allows the user to have a larger map-viewing area and, on the homepage, can search for locations, which is one of the main features of the system. The main functionalities at the bottom are search, routes, and editions. In this interface, other functionalities are available on the menu. The button that activates the legend and requests the user's location is permanent on the screen, as is the map legend. The user can access their profile or register at any time through an icon on the upper-right side. From this choice, the implementation of the high-fidelity prototype will be carried out using Figma software. Figure 3 presents the three steps of the methodology: (1) definition of personas, (2) use cases and requirement documents, and (3) prototype.

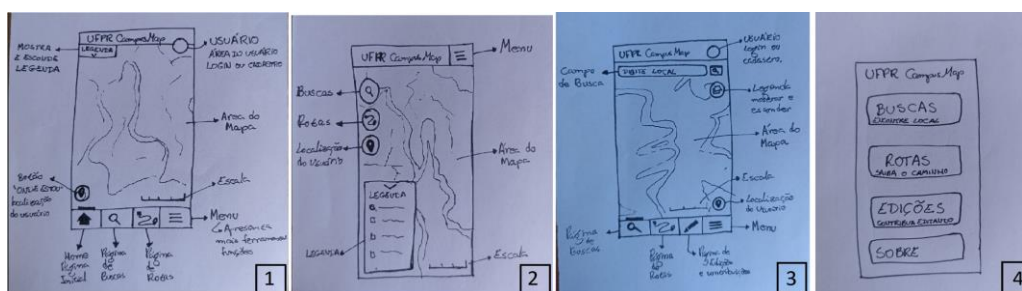


Figure 2. Low-fidelity prototype for stakeholders voting.

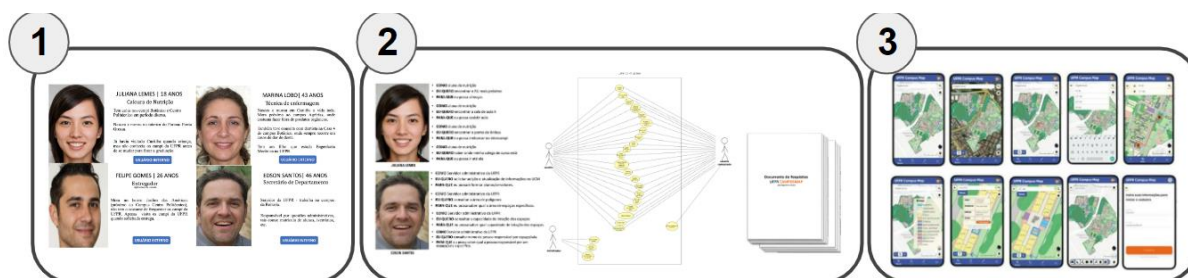


Figure 3. Steps of the methodology

It is expected that with the results obtained from this research, it will be possible to implement a version of UCM for mobile devices. Finally, an appropriate user interface prototype survey will be conducted through interviews with users, thereby concluding the cycle of Design Thinking.

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