FEDERAL UNIVERSITY OF PAMPA

Lucas Alexandre Fell

Extensionly - A tool for supporting the management of outreach projects and programs in the university: Frontend

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Term Paper presented in Software Engineering Graduation Course in the Federal University of Pampa as a partial requirement for obtaining the title of Software Engineering Bachelor

Supervisor: Prof. PhD. Maicon Bernardino da Silveira

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Term Paper presented and approved on .... of .....
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This work is dedicated to all software engineering empiricists who,
at some point, felt like giving up
and throwing everything up in the air,
but still made it to the end.

ACKNOWLEDGEMENTS

I would like to thank my family, Isabel, Marco and Maitê for their unbounded love and support. I wouldn't be here without their help throughout the years and the education they were able to provide me. For that, I will be always grateful.

I am also thankful for the knowledge and education I received from each of my professors during my time at the University. This work wouldn't be possible without them. College has been a challenge since the start, especially during the COVID pandemic, but thanks only to their patience and effort in teaching, that was I able to reach this far in the course.

My advisor, Maicon Bernardino, for motivating, guiding, and being a great supervisor. For without his help and patience, this whole study could've been much more difficult than it needs to be.

My friend and roommate throughout the college years, Igor, for the bond we created through college that I'm sure will last for many years to come. Also, thanks for all the discussions and knowledge sharing we've had during each discipline of the course. It would've been much, much harder to come this far without his help.

"The most beautiful experience we can have is the mysterious.
It is the fundamental emotion that stands at the cradle of true art and true science."
(Albert Einstein)

RESUMO

Em 2023, o processo de curricularização de novas Ações de Extensão será implantado obrigatoriamente pelas universidades. Apesar disso, essa gestão dos Programas e Projetos de Extensão continuaria sendo realizada manualmente pelo coordenador ou colaboradores da UNIPAMPA. Essa é a motivação principal por trás da Extensionly. Desenvolver uma solução que contemple todos os processos envolvidos no ciclo de vida das atividades extensionistas. Para isso, um protocolo foi formulado e executado para a realização de um mapeamento sistemático na literatura cinza, de acordo com as diretrizes da Engenharia de Software, com o objetivo de encontrar ferramentas similares. Os resultados foram classificados e, a partir de sua análise, foi feita uma extração de requisitos e necessidades iniciais da aplicação. Posteriormente, foi feita a confecção de um survey segundo definições e diretrizes encontradas na literatura. Direcionado à comunidade acadêmica da UNIPAMPA, teve como objetivo classificar, escala de importância, os requisitos previamente coletados com a revisão na literatura cinza. Os resultados foram analisados e, a partir deles, iniciou-se o desenvolvimento da solução proposta, uma aplicação web que suprirá as necessidades do público-alvo e reduzirá o esforço manual atualmente colocado nos processos de extensão.

Palavras-chave: Ferramenta. Survey. Literatura Cinza. Frontend. Extensão. Universidade.

ABSTRACT

In 2023, the process of curricularization of new outreach activities will be obligatorily implemented by universities in Brazil. Despite this, this management of outreach programs and projects would continue to be carried out manually by the coordinator or collaborators of UNIPAMPA. This is the main motivation behind Extensionly. Develop a solution that includes all the processes involved in the life cycle of outreach activities. For this, a protocol was formulated and executed to carry out a systematic mapping in the gray literature, according to the guidelines of Software Engineering, in order to find similar tools. The results were classified and, from their analysis, an extraction of requirements and initial needs of the application was made. Subsequently, a survey was carried out according to definitions and guidelines found in the literature. Directed to the academic community of UNIPAMPA, it aimed to classify, on a scale of importance, the requirements previously collected by reviewing the gray literature. The results were analyzed and, from them, the development of the proposed solution began, a web application that will meet the needs of the target audience and will reduce the manual effort currently placed in the outreach activities processes.

Key-words: Tool. Survey. Gray Literature. Frontend. Outreach Activities. University.

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IT Information Technology

MVP Minimum Viable Product

OCA Outreach Curriculum Activity

PROEXT Dean of Extension and Culture

UNIPAMPA Federal University of Pampa

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1 INTRODUCTION

This work is part of a collaborative effort by two students from the Software Engineering course. Since the complexity and size of the problem were bigger than what the academy is used to seeing on term papers, the work was split among both authors. This decision was supported and previously agreed upon by their supervisor.

The effort was separated as follows: While this paper encompasses all of the front-end system requirements, such as analytics, multiple languages, component styling, design of the pages with the user interface and user experience, the counterpart focuses heavily on the back-end system requirements. Both projects are separate implementations and live in different version control repositories, and both have their own specific devops pipelines and deployments.

The Federal University of Pampa offers several opportunities for students to participate in environments external to the university. According to the 317th CONSUNI Resolution from April 29th, 2021, an outreach activity can be described as the following: An action that integrates the curricular matrix and the organization of research, constituting an interdisciplinary, political, educational, cultural, scientific and technological process. It also promotes the transforming interaction between UNIPAMPA and society, through the production and application of knowledge, in permanent articulation with teaching and research (UNIPAMPA, 2021b).

There are 4 different modalities for outreach activities (UNIPAMPA, 2021b): (i) Program: a set of actions that are oriented towards a common objective, with a medium to long term duration; (ii) Project: usually linked to a Program, it has a specific objective and a fixed term; (iii) Course: training activity, with short duration, and; (iv) Event: an action with an artistic, cultural and scientific character, with a well-defined duration.

An example is the JEDI Program, which aims to solve local problems and stimulate capacity building and training in Information Technology (IT) with the involvement of the community (academic and external) together with public or private companies (BERNARDINO, 2021).

To register a new Outreach Curriculum Activity, it is first necessary to identify whether it is a Specific or Linked OCA - whether it is linked to an Undergraduate Curriculum Component or not (UNIPAMPA, 2021b). The OCA insertion process is carried out at the Dean of Extension and Culture (PROEXT) of Unipampa (UNIPAMPA, 2021b). Once registered, the course committee will need to appoint one or more professors as outreach supervisors (UNIPAMPA, 2021b).

Among the supervisor's responsibilities are: the evaluation of the formative nature of the action carried out by the student, the validation of the use of Specific OCAs and also the construction and dissemination of a biannual report containing the extension activities carried out in the course.

After contacting the supervisor, showing interest in an OCA, it is the student's responsibility to request the use and validation of the hours spent in the activity with the Academic Secretary of the course (UNIPAMPA, 2021b). And the professor is responsible for selecting and enrolling each student interested in the OCA, until there are open slots.

1.1 Motivation

It's not a mystery that time is of utmost importance on the academic environment. It is an invaluable resource, and as such, must be dealt with with great care. Thinking about time is what drives this project forward, as currently, there is no solution to take care of all the requirements of creating and managing outreach activities in UNIPAMPA.

In 2023, due to Res. Nº317 (UNIPAMPA, 2021b), the process of curricularization of new Outreach Curriculum Activity will be obligatorily implemented by universities in Brazil. However, all management would be carried out manually by the coordinator or collaborators of the Outreach Programs and Projects. With that in mind, a number of issues were identified with this manual approach that would be easily resolved by introducing a tool to support the process.

This means that everything - from developing a project, submitting and having it approved, sending emails and creating registration forms to open it for the students to join and later on receive their participation certificate - has to be manually done by the professors and coordinators. From the student's perspective, there is a possibility that one or more of the offers will go unnoticed amid the large amount of emails received daily from the university. The whole process is unoptimized, and takes a great amount of time and effort to be concluded.

So in order to create a more efficient and welcoming environment for the outreach activities in the university, the idea of a system to support the needs of this whole process was conceived.

Also due to the institutional action "Unipampa Cidadã" - which aims to dedicate a portion of the hours currently invested in outreach activities in projects and areas of great social relevance - it is expected that the enrollment rate of new students in higher education will increase (UNIPAMPA, 2021a), which consequently highlights even more the importance of automating manual processes at the university.

1.2 Objectives

According to what has been presented, this Course Conclusion Work has the general objective of developing the front-end part of a tool in which all the current management of OCAs will be carefully observed and reproduced, in order to reduce the effort of the professors and supervisors with the manual steps of the process.

In order to achieve the general objective, the following specific objectives were defined:

- Systematically review grey literature works and products in order to find similar solutions, collecting the first batch of requirements.
- Elaborate a survey, according to (KASUNIC, 2005), in order to discover new system requirements and in order to better understand the target users' needs.
- Analyze the results and refine the elicited requirements to create tangible tasks and an implementation roadmap.
- Study current market technologies, programming languages and frameworks to build a stack which delivers a great user experience and is creates a codebase that is easily maintained.
- Create a working Minimum Viable Product (MVP) of the system which implements at first the most critical collected and refined requirements.

1.3 Contribution

The main contribution of this study is the implementation of an MVP, in the form of a web application, to support and automate the whole process of Outreach Curriculum Activities in the university. Due to the complexity of this proposal, as previously mentioned, the effort was split amongst two papers. This focuses on the development of a web app, with all its related challenges, but it doesn't encompasses the backend services in detail.

As for the artifacts generated to support the research, such as the gray literature systematic review and the survey, all of them were done in conjunction by both authors and are not related specifically to a single work.

1.4 Organization

This document is organized according the following chapters:

- **Chapter 2: Methodology**: Describes how the study was planned, the adopted methodology and the approaches used to conduct it.
- **Chapter 3: Background**: Important information and details of concepts related to the study, e.g. outreach activities in Brazil and in the Federal University of Pampa, federal laws and similar tools.
- **Chapter 4: Gray Literature**: How the protocol was structured, results, discovered tools, preliminary requirements.

- **Chapter 5: Survey**: How it was structured, results, validation of refined requirements with the target audience.
- **Chapter 6: Extensionly**: Revolves around implementation details, created artifacts, technologies used, the software engineering process, DevOps practices and the incorporation of analytics.

2 METHODOLOGY

This chapter discusses how the study was planned, the adopted methodology and the approaches used to conduct it. The next sections will describe in more detail the procedures and techniques used on the research. Scientific research is described on section 2.1. In section 2.2, the possible research classifications according to (PRODANOV; FREITAS, 2013) are defined. After that, in section 2.3, the research design is shown and explained. Finally, in section 2.4, the whole chapter is briefly summarized.

2.1 Introduction

The word "Science" comes from the latin word "Scire", which means to learn and to know. For science to be done, there has to be a way to gather new information, building upon what is already known. This is where scientific research fits in. The scientific method, says (PRODANOV; FREITAS, 2013), is a way, through a set of adopted procedures, to achieve knowledge.

It is the basic instrument which turns thoughts into systems, ordering them through procedures, which guides the scientist along the way to achieve his predefined scientific goals. (PRODANOV; FREITAS, 2013) also mentions that without the scientific method, there is no science.

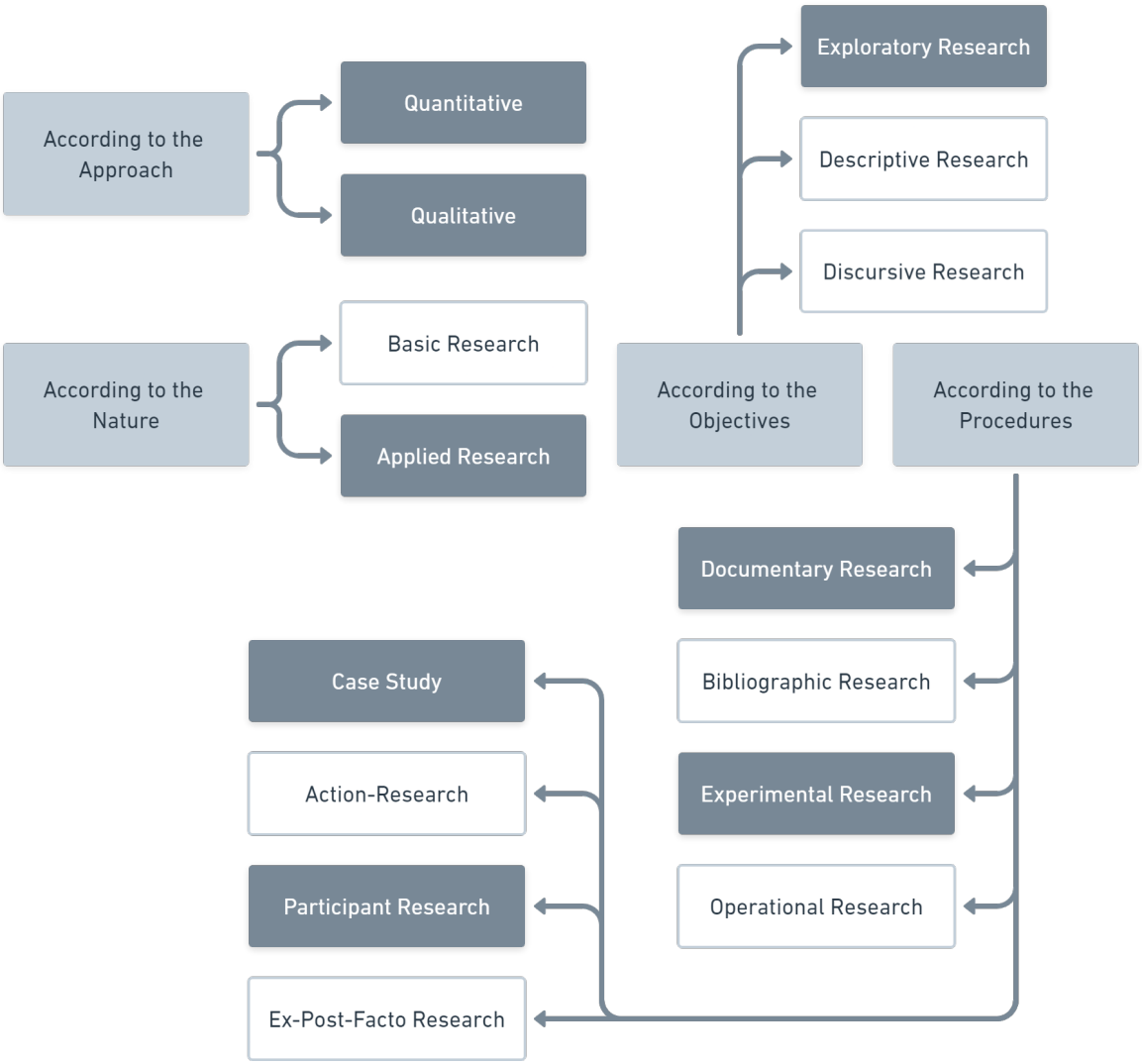
2.2 Research Classification

This research study is defined according to the classification created by (PRODANOV; FREITAS, 2013). It has multiple research types, each of which can be classified into several categories according to the nature, goals, approach and procedures of the study. Figure 1 shows how the research is categorized. The darker boxes represent categories which apply to this work. The terms in them are described in this section. The other boxes are kept for consistency with the original model.

Looking through the nature point of view, this is an **Applied Research**. It has the goal of generating knowledge to the solution of specific problems, through a practical application. It is related to local interests and often has a new process or product as a result.

From the objectives point of view, it is classified as an **Exploratory Research**, since one of its goals is to discover more information about what is being investigated, and maybe finding a new type of approach to the subject. This type of research generally takes the form of bibliographic research and **Case Studies**. The former doesn't apply to this study, though, because the final product won't be heavily inspired on white literature. Only the latter applies, because researches of this nature are more focused on the immediate application of knowledge in a circumstantial reality, emphasizing the development of theories.

Figure 1 – Research Classification



Source: Adapted from (PRODANOV; FREITAS, 2013).

However, the product will certainly be inspired by gray literature, meaning it fits as a **Documentary Research**. It is similar to bibliographic research, but the main difference between them is the nature of their sources. While bibliographic research makes fundamental use of contributions from various authors on a given subject, documentary research is based on materials that have not yet received an analytical treatment or that can be reworked according to the research objectives.

According to the technical procedures, this research fits in the **Experimental Research** classification. It requires an object of the study, in this case the proposed tool. Also, the variables that would be able to influence it were selected, and observation of the effects that the variable produces on the object were defined. Related to this classifica-

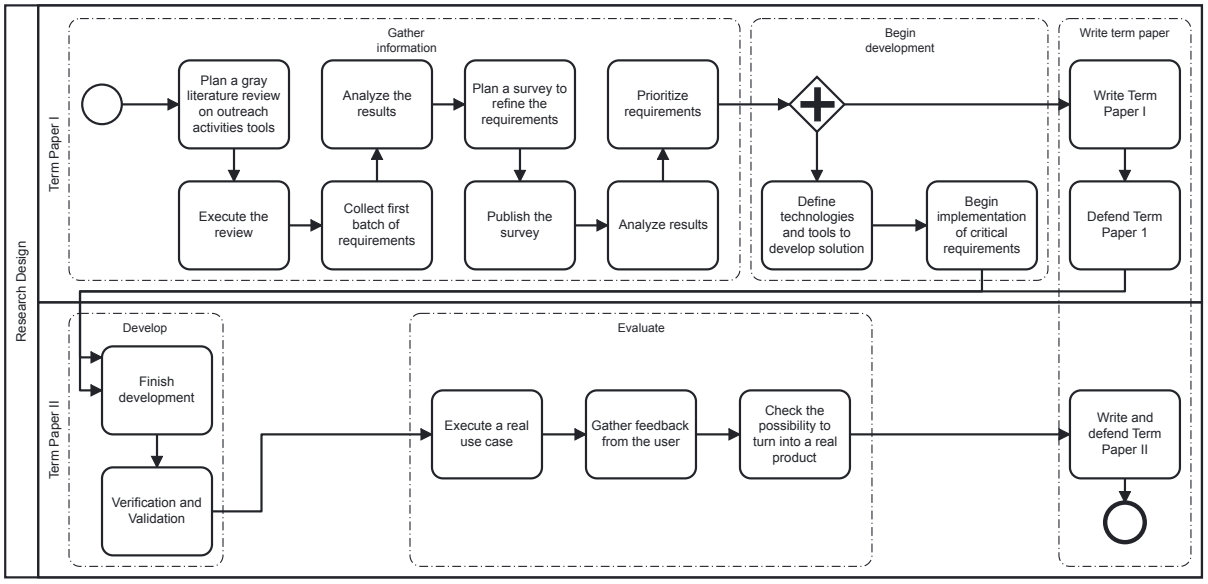
tion, the study also fits in the **Participant Research**, because discovering the universe experienced by the population implies understanding, from an internal perspective, the point of view of individuals and groups about the situations they experience. Which will be achieved through a survey, described in more detail in Chapter 5.

Through the approach point of view, the research is both **Quantitative**, meaning translating opinions and information into numbers to classify and analyze them. And also **Qualitative**, because some parts of the study can't be quantified, and must be understood subjectively. An example would be to receive written, detailed feedback from a target-user through the survey.

2.3 Research Design

In order to conduct the study correctly, a research design was created. The activities are grouped in five phases: (1) gather information; (2) begin development; (3) write term paper; (4) develop; (5) evaluate. They are all described in this section and can also be observed in Figure 2.

Figure 2 – Research Design



Source: Author.

The **gather information** group aims to create two tangible artifacts: the gray literature systematic review and the survey to better understand the scope of the goal product and most importantly collect a list of well defined requirements.

The **begin development** group is where the implementation and the term paper writing begins. This is where the technologies used throughout the development of the

product are defined. The most important requirements should already be implemented as well.

Next, there is the **write term paper** group, in which both first and second term papers are going to be written and defended. It is important to notice that the first work will be written while the initial MVP implementation is on going.

Continuing to the next milestone, is the **develop** group, where it is planned to finish the product development. After that, in the **evaluate** group, is where the real use case will be ran, and the feedback from it, analyzed. If all goes well, the product might turn into a real solution, adopted by the university to be used.

2.4 Chapter Summary

This chapter provided an idea of how the methodology is defined for the study and how the research can be classified. In addition, the created research design was presented, showcasing the different planned processes for the future and those that have already been executed. The Chapter 3 describes all the information and background necessary for the success of this work, while also assisting the reader in better understanding the research methodology previously described.

3 BACKGROUND

3.1 Outreach activities in Brazil

3.2 Curricularization

3.3 Similar solutions

3.4 Outreach activities types

3.5 User profiles

4 GRAY LITERATURE

5 SURVEY

6 EXTENSIONLY

7 PRELIMINARY CONSIDERATIONS

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