FEDERAL UNIVERSITY OF PAMPA

Igor Dalepiane da Costa

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

Alegrete
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Term Paperpresented 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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Committee members:

Prof. PhD. Maicon Bernardino da Silveira
Supervisor
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<sigla da instituição>

Prof. <titulação> Nome Professor
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I dedicate this work to my family and to God,
who have always been my greatest strengths.

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First and foremost, I would like to thank my family Eliane, Jair and Mateus, who always helped me in all my obstacles and above all taught me the values, love and religiosity that I carry with me to this day. I also thank all the family members who gave me strength and support to keep me on the road.

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Thank you for everything and God bless you all!

“Everybody should learn to program a computer,
because it teaches you how to think.“
Steve Jobs

RESUMO

Devido às diretrizes impostas pela Resolução Nº 7 de 2018 do Conselho Nacional de Educação (CNE) (MEC, 2018), a curricularização da extensão se tornará obrigatória no ano de 2023. Tendo em vista que o processo de criação e manutenção de um programa ou projeto de extensão é demasiado demoroso e adicionado com a obrigatoriedade eminente, o objetivo deste trabalho é implementar uma ferramenta que ofereça suporte ao processo como um todo, permitindo desde a criação até a emissão de certificados para os participantes. Para isto ser possível, realizou-se primeiramente uma revisão sistemática na literatura cinza, em busca de ferramentas semelhantes, sendo extraído funcionalidades e aspectos mais pertinentes entre estas. Posteriormente, utilizando a lista alcançada, foi executado um levantamento (*survey*) com os possíveis usuários finais da comunidade acadêmica da UNIPAMPA, com objetivo de classificar por ordem de importância as funcionalidades, além disso, permitindo com que os participantes fornecessem sugestões relacionadas as mesmas, ou até mesmo sugerindo novas. Os resultados foram analisados e iniciou-se a produção da solução proposta, uma ferramenta baseada na Web que auxiliará no esforço manual requerido nos processos relacionados a atividades de extensão. O desenvolvimento foi realizado por dois alunos de graduação, dividindo a carga em frontend e backend, este trabalho se concentra na área do backend.

Palavras-chave: Ferramenta. Survey. Literatura Cinza. Backend. Extensão. Atividade Extensionista. Comunidade. Universidade.

ABSTRACT

Due to the guidelines imposed by Resolution No. 7 of 2018 of the National Education Council (CNE) (MEC, 2018), the curricularization of the extension will become mandatory in 2023. Given that the process of creation and maintenance of an extension program or project is too time-consuming and added to the imminent obligation, the objective of this work is to implement a tool that supports the process as a whole, allowing from the creation to the issuance of certificates for the participants. For this to be possible, a systematic review was first carried out in the gray literature, in search of similar tools, extracting the most relevant features and aspects among them. Subsequently, using the list reached, a survey was carried out with the possible end users of the academic community of UNIPAMPA, with the objective of classifying the functionalities in order of importance, in addition, allowing the participants to provide suggestions related to them, or even suggesting new ones. The results were analyzed and the production of the proposed solution began, a web tool that will assist in the manual effort required in the processes related to extension activities. The development was carried out by two undergraduate students, dividing the load into front-end and back-end, this work focuses on the back-end area.

Key-words: Tool. Survey. Grey Literature. Backend. Outreach. Community. University.

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LIST OF ABBREVIATIONS AND ACRONYMS

CAEX Outreach Actions Control

CLE Local Outreach Committee

CONSUNI University Council

CSE Superior Outreach Committee

FOREXT National Forum for Extension and Community Action of Universities and Community Higher Education Institutions

FORPROEX Forum of Pro-Rectors for Outreach of Brazilian Public Universities

HEI Higher Education Institution

ICES Higher Education Community Institution

IDP Institutional Development Plan

MEC Ministry of Education

MoSCoW Must have, Should have, Could have and Will not have

MVP Minimum Viable Product

NGO Non-Governmental Organization

OA Outreach Activity

OCA Outreach Curriculum Activity

ProExt University Outreach Program

PROEXT Dean of Outreach and Culture

SAP Academic Project System

SGCE Electronic Certificate Management System

SIGAA Integrated Academic Activities Management System

SIPPEE Information System for Research, Teaching and Outreach Projects

TAE Administrative Technician in Education

TP Term Paper

UNIPAMPA Federal University of Pampa

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1 INTRODUCTION

Federal University of Pampa currently offers three categories of extra activities, teaching, research and outreach. Teaching activities consist of student learning in general, they can be courses, lectures, monitoring activities, among others. Research activities are constituted by everything that is related to research itself, among them are scientific initiations, Term Papers (TPs), publication of papers in events, and so on. Finally, we have the Outreach Projects and Programs, which are the focus of this work, and according to the 2019 Institutional Development Plan (IDP), "Outreach assumes the role of promoting a dialogic relationship with the external community, for the democratization of access to academic knowledge as well as for the feedback of university practices based on this dynamic" (UNIPAMPA, 2019).

To explain what outreach is within an academic environment, Resolution No. 332 of 2021 will be used (UNIPAMPA, 2021c), which clarifies Outreach Activity (OA) as an action that encourages research and development, increasing the bond between the community and Higher Education Institution (HEI). OAs must have the participation of the external community and promote a balance between practical and theoretical activities. To classify these outreach activities, four terms are defined, namely: (1) Projects, "set of actions articulated around a common theme and objectives"; (2) Programs, "set of articulated projects, which may include more than one type of action (project, courses, events)"; (3) Courses, "training activities"; (4) Events, "activities of an artistic or scientific nature". Therefore, it is necessary for some bodies to be responsible for managing these activities, also defined by Resolution 104, they are: (1) Dean of Outreach and Culture (PROEXT); (2) Superior Outreach Committee (CSE); (3) Local Outreach Committee (CLE).

The curricularization of the outreach described in Resolution No. 7 of 2018 (MEC, 2018), explains that OAs must have their proposal, development and conclusion, duly recorded, documented and analyzed, so that it is possible to organize work plans, methodologies, instruments and knowledge generated. Also ordering that educational institutions should include in their IDP, at least 10% (ten percent) of the total course load focused on OAs, in addition to all related terms, with a deadline of up to three years from the date of its approval. In view of this demand, Federal University of Pampa created University Council (CONSUNI) Resolution No. 317 of April 29, 2021, (UNIPAMPA, 2021b), which implements all the guidelines presented by the Ministry of Education (MEC).

To control all this, a complete software is indispensable, and that is easy to use, with which users are comfortable to use and can complete their tasks using it. Currently, Federal University of Pampa only has a system called Academic Project System (SAP), which serves only for registration outreach projects, submit proposals to the public notices offered and manage the scholarship holders of the awarded notices, but does not support other processes. Because of this, it ends up making the bureaucracy concentrate outside the system, making this process boring and time-consuming, teachers often even give up

doing it, opting for other less bureaucratic activities.

Related to this matter, Normative Instruction No. 18 (UNIPAMPA, 2021a) was released a short time ago, which stipulates the norms of the Institutional Program "UNIPAMPA Cidadã". Which is an outreach program that should be composed of citizenship and solidarity actions, such as clothing campaign, food collection, support for asylums, etc., being mandatory to offer them. When effective, in all undergraduate courses, a minimum workload of 60 and a maximum of 120 must be allocated.

1.1 Motivation

The process of curricularization of outreach proposed by Resolution Nº 317 (UNIPAMPA, 2021b), will become mandatory in 2023, given the effort that will be required to manually complete demands such as registration, control, issuance of certificates and entry of participants, implicit in an Outreach Curriculum Activity (OCA), it was proposed to create a support tool in the management of these projects and outreach programs, thus managing to reduce bureaucracy and speed up the process.

The community periodically contacts the university to request some type of solidarity action, with this demand, OAs are generated, which can be carried out by students managed by a coordinator or even within a subject of their courses. But this communication is not the most intuitive, not having a system to manage them, it leads to the only option of having to do it through calls or even in person, this is very discouraging for the community. In view of this, one of the motivations for the development of the tool is to strengthen this link between academic communication and external communication, allowing new demands to be created in the tool itself.

Regarding the dissemination of OAs, nowadays emails are sent to students informing them about new opportunities, but usually students inboxes receives a lot of emails on a daily basis, leading to the lack of interest in reading all of them. For this reason, with a tool that concentrated all the information, opportunities and news related to the outreach. Hence, the students would no longer need to venture into their sea of emails when they need to look for a new activity, they would just resort to the tool where everything is already organized and ready to use.

Another motivator that encouraged the development of this tool is that from the review in the grey literature that was conducted, no tools were found that completely solved the problems related to these processes. Some tools had features and details that others did not and vice versa, but together they would build a complete tool.

1.2 Objectives

In view of what has been presented, the research aim of the theme of this term paper is the development of the *back-end* of a tool that will serve as support in the

management of outreach programs and projects, reproducing and assisting in all processes related to this demand, from its creation to the generation of certificates when it is finalized. The aim is to reduce the effort and time spent by those involved in these manual steps of the process. In addition to allowing a new communication channel to be built between the academic community and the external community, allowing suggestions for demands for OAs directly in the tool.

Therefore, the Table 1 presents the synthesis of the research aims and objectives, as well as the subject, the study, the research question (problem) and the solution hypothesis.

Table 1 – Synthesis of the Research Aim and Research Objectives.

Topic	Description
Subject	Management of outreach programs and projects.
Study	Tool for Support in management of outreach programs and projects.
Research Question	How can a tool to support the management of outreach programs and projects of UNIPAMPA can optimize the management of proposition, registration, dissemination and accountability processes of outreach actions?
Research Hypothesis	With a tool to support the management of outreach programs and projects, it's possible to have a reduction on the effort needed to create an outreach activity and an increase in the engagement of volunteer outreach participants.
Research Aim	Develop the *back-end* of the tool to support the management of outreach programs and projects of UNIPAMPA
Research Objectives	Report results and execution methods of the following processes: (i) Research: Analyze similar tools, state the processes that will be made available by the tool, conduct surveys with the organizers and participants of OAs, understand the limitations of current processes. (ii) Planning: Elicitate functional and non functional requirements, identify stakeholders, define architecture, technologies and tools. (iii) Development: Develop the features raised, build and run test cases. (iv) Deployment: Perform experiments with possible end users, collect feedback and implement appropriate improvements and corrections.

Source: Author.

1.3 Contribution

The proposal for this tool is designed for the participation of two students, Igor Dalepiane da Costa and Lucas Alexandre Fell, because its complexity is high, justifying this double development.

For this, the division was made between the development of *back-end* and *front-end*, the first being developed by the proponent of this work and the second by the other student. For better visualization, a feature model was developed with the exact division of the tasks that will be performed by each of the students, represented in Figure 1. Contributions of this work:

- Research among university professors on the real need for this instrument to organize the OCAs processes;
- Development of the *back-end* of the system, encompassing all the processes that will be made available by the tool, explained in Figure 7.

1.4 Organization

This document is organized according to the following:

- **Chapter 2: Methodology:** Details of the the methodology adopted during the search, along with it's classification and research schedule.
- **Chapter 3: Background:** Details of main concepts related to this work, such as, resolutions and OAs.
- **Chapter 4: Grey Literature:** This chapter presents in more detail the review performed in the grey literature to find similar tools.
- **Chapter 5: Survey:** Provides details about the survey performed, its protocol and results.
- **Chapter 6: Extensionly:** Provides details of the design and implementation of the proposed tool.
- **Chapter 7: Conclusions:** This chapter presents the partial conclusions about this study.

2 METHODOLOGY

In this chapter, we presente the methodology, techniques and procedures that were used in the course of this study. Starting with Section 2.1, where we presente the context of the research. In Section 2.2, the search will be classified using terms and definitions presented by Prodanov e Freitas (2013). Then in Section 2.3, it is presented how this study was conducted, along with the research design, the research schedule, with deadlines and time spaces is in Section 2.4.

2.1 Introduction

In order for the objectives of a study to be successfully achieved, scientific research is considered very important for its contributions. According to (PINGPING; YULAN, 2013), the purpose of a research is to explore the present situation and development of the world, under the previously set goals and unknown knowledge plans.

There are several ways in which scientific research can be conducted and it is assigned to researchers to define which one to use, aiming at the greatest relevance in their results. It is very important that they are chosen as the basis for the development of research, authors and successful studies, because as Dampier e Wilson (2000) says, the advances made previously and the known truths, serve as a basis for the advances of the scientific method.

2.2 Research Classification

The classification of this research was given according to the definitions made by Prodanov e Freitas (2013), in Figure 1 the classification of the research is separated by four groups, each with its respective categories, are the groups: (i) According to the **Approach**; (ii) According to the **Nature**; (iii) According to the **Objectives**; (iv) According to the **Procedures**. In Figure 1 the rectangles filled with blue color represent those that apply to this research.

Starting with the point of view of nature, this fits into **Applied Research**, as it seeks to apply new knowledge generated in objective problems, involving truths, interests and local demands. Bringing to the reality of this work, the knowledge generated refers to all the data collected related to outreach in the course of the study, and the objective problem is the bureaucracy involved in OAs.

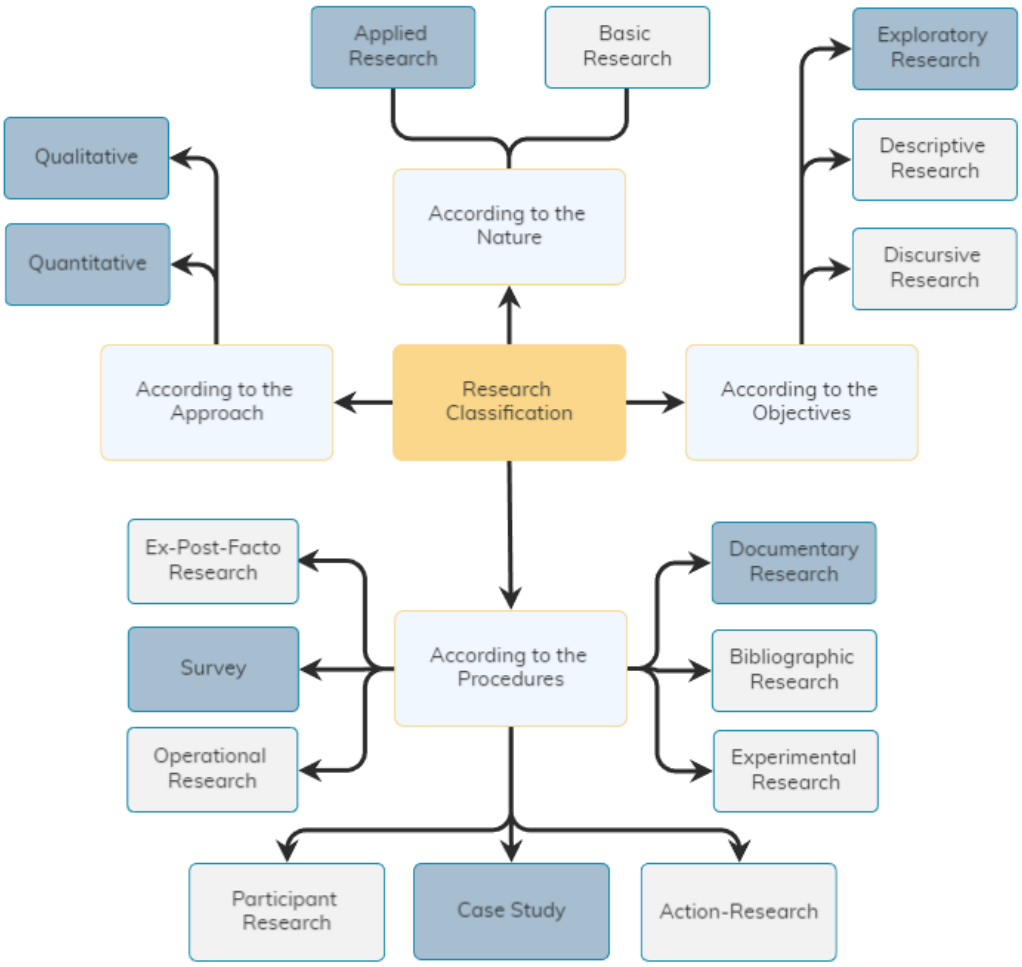
In view of the objectives, this is classified as **Exploratory Research** because to achieve the defined objectives, research in the grey literature and questionnaires with people related to the subject were performed. Thus, using what already exists as a basis, we seek to build a new improved solution.

In relation to technical procedures, **Case Study** is applied, as it seeks to collect information from individuals, tools, processes, related to the main theme using **Qualitative**

methods, to be able to place the results and graphs and analyze them, and **Quantitavive**, allowing a deeper understanding of what was answered. The **Survey** classification also applies, as this is one of the ways of collecting information used by researchers. Before the survey execution with the participants, a pilot test was conducted to validate organization, completeness, coherence and other points of the questionnaire, more of this will be discussed in Chapter 5.

Finally, the study is also classified as **Documentary Research**, for using as a knowledge base, materials that have not yet received an analytical treatment, such as internet search results, the subject of grey literature will be better explained in **??**.

Figure 1 – Research Classification



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

2.3 Research Design

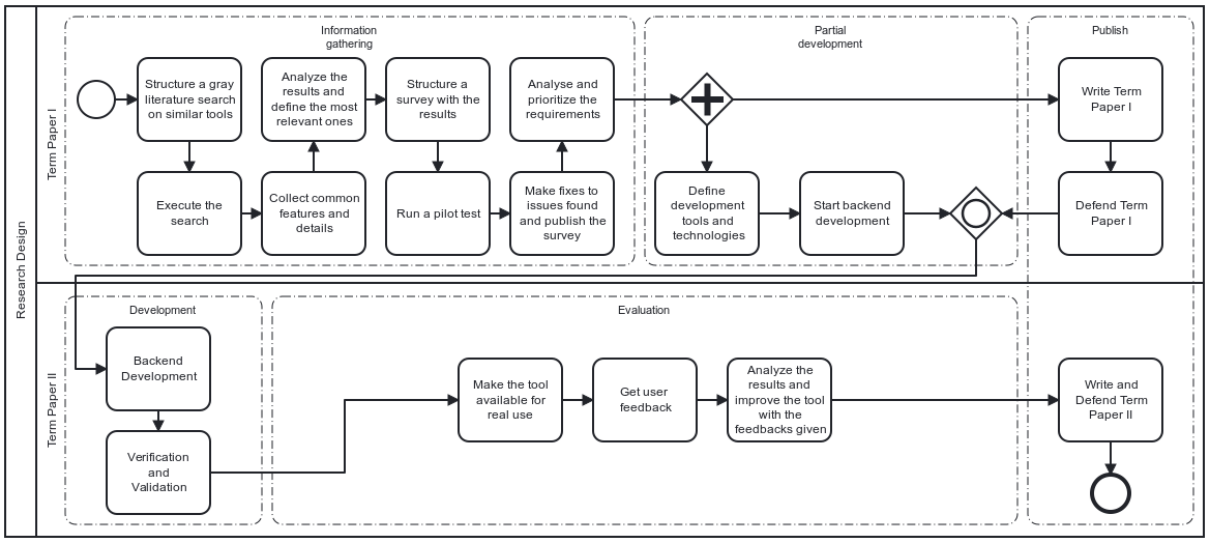
In Figure 2 is represented the flowchart followed in the course of this research, the activities placed in it are divided into five phases: (1) Information gathering; (2) Partial development; (3) Development; (4) Evaluation; (5) Publish.

The first phase, **Information Gathering**, is focused on organizing research structures, questionnaires, prioritization of information, and learning about the research topic. Mainly aimed at producing two important artifacts of the research, the review in the grey literature and the survey with possible end users.

Moving on to the second phase, **Partial Development**, where it was decided among those involved in the project, that it would not be feasible to implement the entire tool at this first moment, so only some more important functionalities and that would already be sufficient for a Minimum Viable Product (MVP) (LENARDUZZI; TAIBI, 2016), would be developed. Within the **Publish** phase, the two TPs will be written and defended, occurring in parallel to the development of the tool, mostly happening in the **Development** phase.

After there is a stable version of the tool, where users can use it, it will be available for real use, allowing UNIPAMPA's outreach activities to be registered and opening vacancies for participant or volunteer registrations, with this in the phase of **Evaluation**, feedbacks will be collected, analyzed the results and improvements in the tool will be made.

Figure 2 – Research Design



Source: Author.

2.4 Research Schedule

To facilitate the visualization of how the activities took place over time. Table 2 presents the entire schedule of what was planned from the collection of information to the defense of Term Paper II.

Table 2 – Research Schedule

>->———–| -2* **Activities** |	**2021/2**	**2022/1**					**2022/2**				
	Nov - Mar	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
Plan and execute systematic review in the grey literature											
Plan and execute survey with target users											
Analyze results from previous steps and map requirements											
Plan and start tool development											
Write Term Paper I											
Defend Term Paper I											
Continue the development of the tool											
Execute a real use case on the tool											
Write Term Paper II											
Defend Term Paper II											

Source: Author.

2.5 Chapter Summary

In this chapter we have presented the meaning of methodology, and how it can be classified within a scientific scope, along with what terms apply to this TP. In addition, the research design was presented containing the steps taken by the author, as well as those that will be given.

3 BACKGROUND

This chapter discusses subjects that complement the objective of this work, helping to understand the policies and resolutions involved. In Section 3.1 the national outreach activity policy will be presented, which is valid for all of Brazil on the objectives that university outreach has in relation to the academic and external community. Then in Section 4.1 the vision of how Unipampa has adapted to receive these new rules. After that, in Section 3.2.1 the difference between outreach programs and projects will be presented, followed by a more detailed explanation about the "Unipampa Cidadã" project in Section 3.2.3. The Section 3.3 highlights some tools related to the subject of the work, their commonalities and a high-level description. Finally in Section 3.4 a general summary of the chapter is presented.

3.1 National Outreach Policy

It is well-known that university outreach is an area of great importance for the academic and external community, also being a tool for connecting professors, students and the population, having a great impact on the formation of a student. To strengthen the objectives that university extension has within this universe, the Forum of Pro-Rectors for Outreach of Brazilian Public Universities (FORPROEX), updated the old version of the National Outreach Policy document, published in 1999, with current situations and challenges found in recent years. The new version of the document, (FORPROEX, 2012), within its objectives, has as an example the following:

- Achieve the recognition of university outreach activities as an essential tool for the public university;
- Ensure that the outreach activity is the solution to any type of social problem faced by the country;
- Defend the funding of outreach programs and projects so that they can continue to function;
- Promote environmental and sustainable awareness in outreach projects in Brazil;
- Promote solidarity both nationally and internationally, covering the area of impact of outreach actions.

Serving as a basis for universities, the document "Referentials for the construction of a National Outreach Policy in Higher Education Community Institutions (ICES)" (FOREXT, 2013), discusses a little about the doubt of classifying an academic activity as outreach or not, but leaving as a fact the following sentence "If the theoretical dimension of university outreach tends towards greater rigidity - in the sense that it needs to keep

principles, resume references, dialogue with other institutional documents – the practical dimension allows for greater flexibility, giving rise to a considerable diversity of actions". This document also highlights the importance of integrating extension with research and teaching, with discussions of a social nature and the effects of the results on society.

In the aforementioned document, nine types of possible OAs are discussed in depth, each with its peculiarities, dividing them into direct outreach actions and actions that allow the integration between outreach and teaching or outreach and research.

3.1.1 Outreach Activity Curricularization in Higher Education

Entering the scope of higher education, Resolution No. 7, of December 18, 2018 (SUPERIOR, 2018) was created, where it established guidelines, principles, foundations and procedures for university outreach in Brazilian higher education. In this way, it was regulated that the OAs will be made available in the form of curricular components for the courses.

In this document, it is also determined that OAs must make up at least 10% (ten percent) of the entire workload of undergraduate courses, being characterized as an interventionist activity that directly involves the external community and is related to student training.

Another important point raised is related to the self-assessment of outreach activities, in order to constantly improve it. This evaluation should include the identification of the relevance of the use of OAs in curricular accreditation, the contribution to the fulfillment of the objectives of the IDP and the Pedagogical Projects of the Courses and, finally, the presentation of the results achieved in relation to the participating public.

All OAs must also be registered according to the rules mentioned in the same resolution (SUPERIOR, 2018), and must contain the planning of their internal activities, strategies for self-assessment, proposal, development and conclusion, these must be duly registered and analyzed in order to be able to organize your work plans.

Finally, the aforementioned resolution determines that "Higher education institutions will have a period of up to 3 (three) years, counting from the date of their approval, to implement the provisions of these Guidelines."

3.2 Outreach Activity Curricularization in Federal University of Pampa

In UNIPAMPA's view, like all other Higher Education Institution, must have a resolution aimed at standardizing OAs in general, presenting what they are, their target audience, objectives, etc. In view of this, UNIPAMPA, in CONSUNI/UNIPAMPA Resolution No. 332 of 2021, (UNIPAMPA, 2021c), determines the types of extension activities, already mentioned in Chapter 1, its managing bodies, executing team, possible related processes, and some rules such as the minimum duration of 8 (eight) hours, taking into

account the period of organization, execution and preparation of the final report.

For some time now, UNIPAMPA has been implementing some outreach projects within its curriculum, for example in the Software Engineering course where, within the Problem Solving subject, students meet in groups, similar to development teams and project management, where they are assigned to work on real demand for someone in the external community. This activity provides the student with a very rewarding experience, for the opportunity to talk, interact and contribute directly with a customer who needs help in solving a problem.

The main objectives in the insertion of outreach activities in undergraduate courses, which UNIPAMPA highlights in its Resolution No. 317 of 2021, (UNIPAMPA, 2021b) are the following:

- Help students develop their critical, citizen, interdisciplinary and responsible education;
- Improve teaching in undergraduate courses as a whole and strengthen the inseparability between teaching, research and outreach;
- Strengthen UNIPAMPA's social commitment;
- Stimulate constructive discussions in all sectors of UNIPAMPA;
- Promote actions that strengthen UNIPAMPA's ethical principles and social commitment in all areas;
- Encourage the academic community to be more present in human, academic, social, cultural, and economic development.

3.2.1 Outreach Programs and Projects

To explain what outreach projects and programs are, the definitions of FOREXT (2013) will be used, which says that they are activities regulated internally by the institution that articulates events involving teaching and research, always involving the external community. With them, students can take attitudes and decisions directly about the community in which they live, contributing to its evolution and progress. In addition to helping the external community, National Forum for Extension and Community Action of Universities and Community Higher Education Institutions (FOREXT) says that the programs and projects do not seek to create a bond of dependence with the university, so it is necessary to solve the problem with the most efficiency and quality possible.

Because the two terms are similar, some confusion can arise, so VIERO (2012) highlights the difference between the two, citing the definitions made by University Outreach Program (ProExt):

> It is important to point out that ProExt provides for two sets of university outreach actions: outreach projects, defined as "a set of continuous procedural actions, of an educational, social, cultural or technological nature, with a specific objective and a determined period"; and outreach program, as "an articulated set of projects and other outreach actions, preferably of a multidisciplinary nature and integrated with research and teaching activities (VIERO, 2012).

Within the UNIPAMPA Alegrete campus there are some current projects and programs, examples of which are with their respective coordinators: (1) **Ciência a Cavalo: University and Basic Education Hand in Hand for Strengthening Education**, Profº Marco Antonio Durlo Tier; (2) **IT consultancy for Agribusiness Companies**, Profº Elder de Macedo Rodrigues; (3) **Empresa Júnior: Multi Advisory and Solutions in Junior Engineering - MASE Junior**, Profº José Gabriel Vieira Neto; (4) **Espaço Maker** - Criative Learning, TAE Vitor Almada; (5) **Programa UniHacker.Club**, Profº Diego Luiz Kreutz; (6) **UNIPATAS Alegrete: Protection, Sterilization and Adoption**, TAE Camila da Costa Lacerda Tolio Richardt; (7) **Programa C**, Profª Aline Vieira de Mello; (8) **Programa JEDI**, Profº Maicon Bernardino da Silveira.

3.2.2 Processes for New Proposals for Outreach Programs and Projects

In order to register a new outreach program or project and generate certificates at the end, there are some rules defined by UNIPAMPA (2021c), which must be performed beforehand. With these documents in hand, UNIPAMPA standardized some process flow schemes, so that all proponents are aware of what happens after the proposal is made.

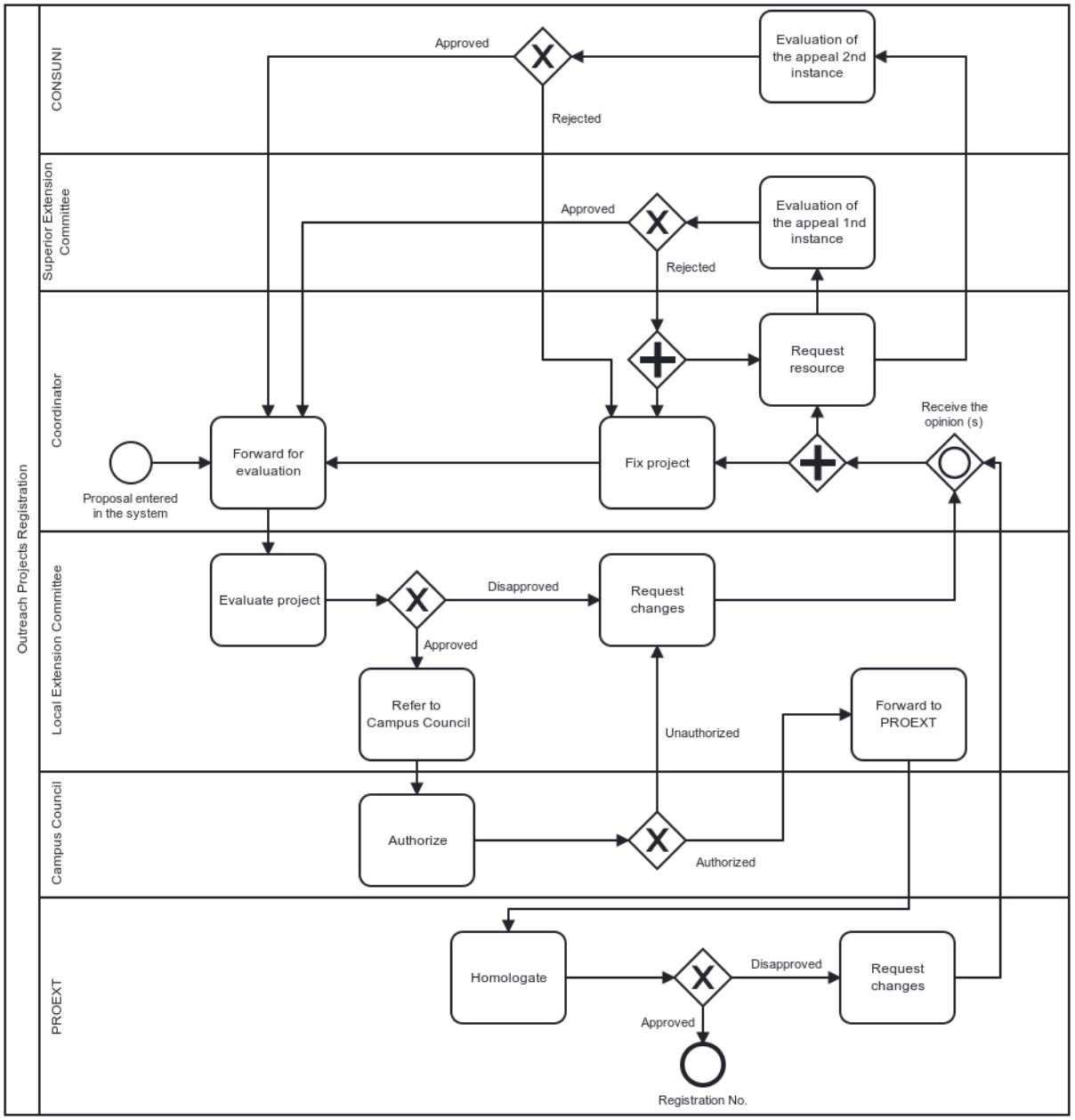
In Figure 3, the registration flow of a new outreach project is presented, in which it is possible to see that the proposal goes through several steps of corrections and evaluations, being sent to several actors throughout the process.

In the Figure 4, the steps related to the approval and generation of certificates are represented, starting with the proponent of the activity having the attendance list and the spreadsheet with information for the generation of certificates. Then, a final report is built and inserted in the Information System for Research, Teaching and Outreach Projects (SIPPEE) system, it is evaluated and approved, reaching again at PROEXT which, with the spreadsheet sent, sends its data to the Electronic Certificate Management System (SGCE) system, receiving the certificates and sending them to participants' emails.

3.2.3 "Unipampa Cidadã" Program

UNIPAMPA through Normative Instruction No. 18 (UNIPAMPA, 2021a), using Resolution No.317 (UNIPAMPA, 2021b), established that the outreach project called "Unipampa Cidadã" must be offered by all courses, consisting of citizenship and solidarity activities and with the objective of training graduates aware of their social responsibility, stimulating and increasing integration with the local community.

Figure 3 – Outreach Projects Registration



Source: Adapted from (UNIPAMPA, 2022).

After the implementation of the project in the institution's courses, it must be carried out by all students, the course offered for the project must have a minimum of 60 and a maximum of 120 hours. Community actions must be carried out in public institutions, Non-Governmental Organizations (NGOs) and organizations or associations of organized civil society. The course extension supervisor is responsible for carrying out the project evaluation, planning, monitoring, validation and he will be responsible for approving the beginning of the activities.

The project also makes available in Normative Instruction Nº 18, a form template for filling in data when the activities are completed, allowing the student to reflect on the impact of the project under their view, pointing out what they learned during the execution. Finally, the supervisor can make observations about the student and indicate whether he or she passed or failed.

3.3 Similar Outreach Support Tools

In conjunction with Chapter 4 that will present the review conducted in the grey literature, some tools were researched to acquire information on how the market is in relation to outreach in universities. With the results it was possible to raise functionalities, details and common points among the tools.

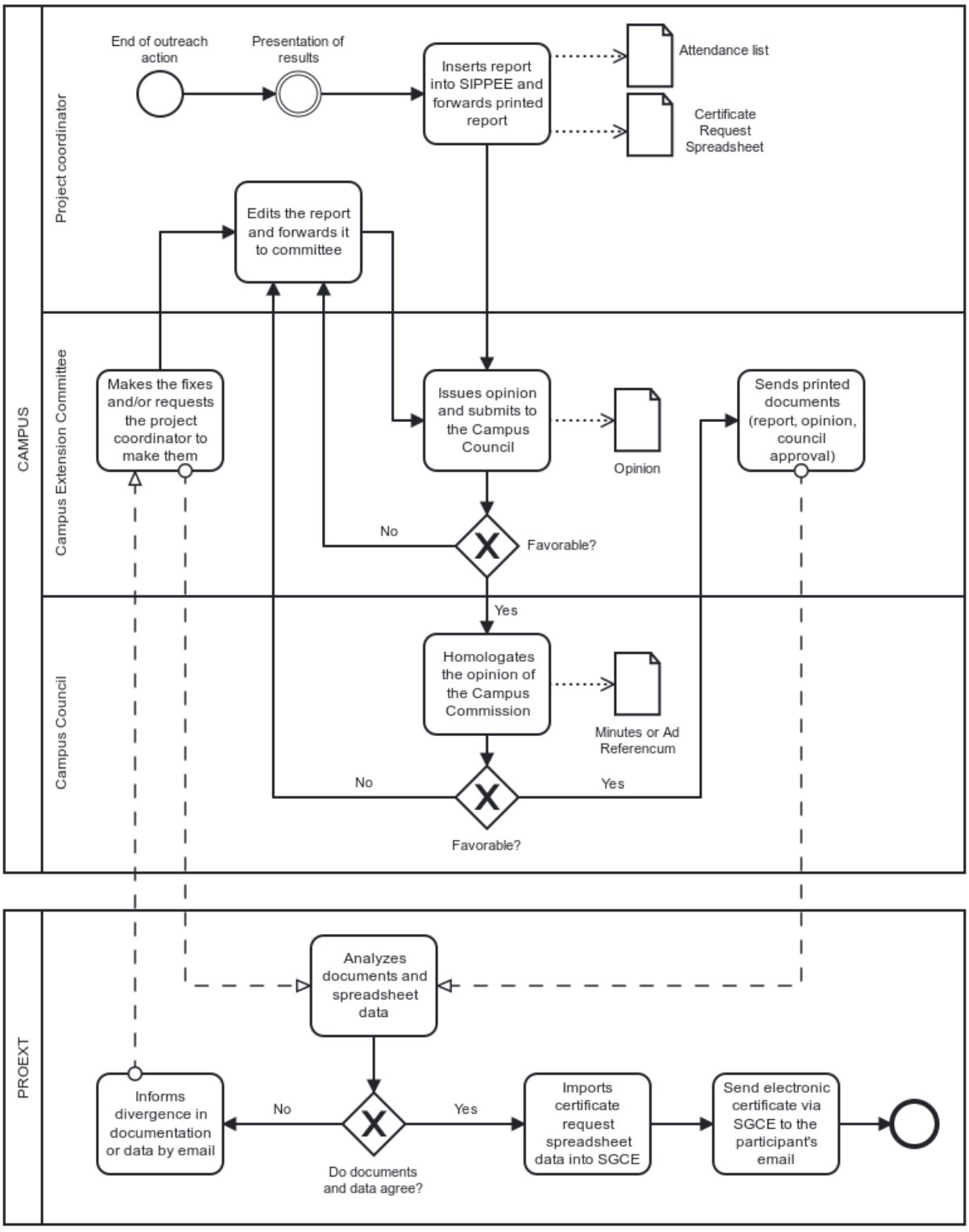
At first, the authors sought to make a systematic review of the white literature, but the results found would not be completely satisfactory, since the manual exploration by various tools related to the topic would bring more content to be classified and discussed among those involved in the research.

During the execution of the review, the tool that returned the most results and was always present in the research was Integrated Academic Activities Management System (SIGAA), which is the most used by several institutions, being very complete, containing parts in its system aimed at most processes involving an institution. Another one that presented interesting results was Outreach Actions Control (CAEX), which presented several unique features, being only it that presented them, with this it was possible to extract ideas of great importance for the construction of a complete tool.

3.4 Chapter Summary

In this chapter, guidelines of various resolutions and regulations related to extension were presented, both in the country as a whole and in UNIPAMPA. It was also discussed the similarities and differences between the terms outreach program and project, presenting the most relevant processes involved in its life span. As a more recent example of an extension program, “Unipampa Cidadã” had part of its objectives and guidelines presented, finally, a little discussion about the grey literature review carried out by the participants of this research was discussed, so in the next chapter, criteria will be more in-depth, methodology, results, research questions, among other information relevant to grey literature.

Figure 4 – Issuance of certificates



Source: Adapted from (UNIPAMPA, 2022).

4 GREY LITERATURE

4.1

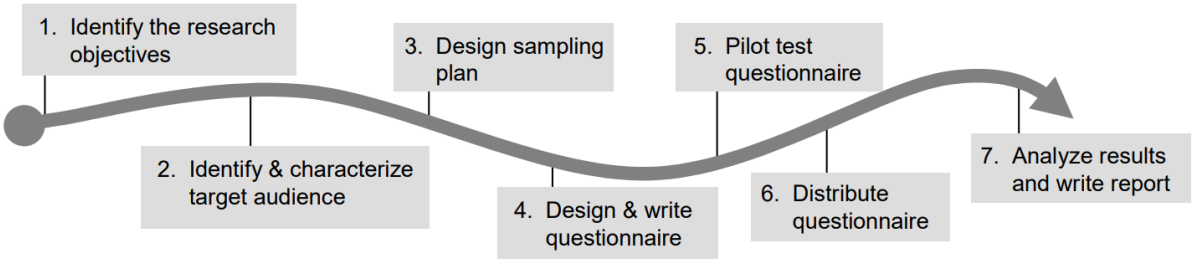
5 SURVEY

Neste capítulo informações mais detalhadas são apresentadas sobre o levantamento (*survey*) que foi conduzido. Na Section 5.1, é apresentado detalhes sobre o protocolo adotado, autor de referencia e divisão de tarefas entre os pesquisadores. Logo na Section 5.2, as ameaças a validade do estudo são relatadas, e por fim na Section 5.3, todos os resultados alcançados durante a execução são discorridos.

5.1 Survey Protocol

Um levantamento (*survey*) é uma abordagem de coleta e análise de dados em que os participantes respondem a perguntas ou a declarações que foram desenvolvidas antecipadamente. O protocolo escolhido para a elaboração desta pesquisa foi inspirado nas diretrizes propostas por Kasunic (2005), em *Designing an effective survey* e está ilustrado na Figure 5.

Figure 5 – Seven steps of the research process



Source: (KASUNIC, 2005).

Como será dito posteriormente, o objetivo é compreender as necessidades de discentes e docentes em relação aos projetos e atividades de extensão. A escolha do *survey* como abordagem de coleta de dados se deve ao fato de que as características de uma pesquisa deste tipo nos permite generalizar sobre as crenças e opiniões de muitas pessoas estudando apenas um subconjunto delas (KASUNIC, 2005). Sendo, neste caso, a ferramenta ideal.

Tendo em vista que esta pesquisa foi executada por dois estudantes, a carga de trabalho foi dividida, de maneira que a qualidade e desempenho fossem melhorados. Na Table 3 se encontra a divisão de atividades adotada, contemplando as já definidas por Kasunic (2005).

Table 3 – Activity Division

Activity	Responsibility
Define and document research objectives	Lucas F.
Define and document research questions	Lucas F.
Define and document how research results will be used	Lucas F.
Define the appropriate target audience for the research	Igor C.
Determine the appropriate media to apply the research in	Igor C.
Recruit members of the target audience to participate in pilot test	Igor C.
Breakdown research questions into questionnaire topics	Lucas F.
Organize and sequence questions	Lucas F.
Review the questionnaire based on the pilot test	Igor C. and Lucas F.
Perform the pilot test	Igor C. and Lucas F.
Evaluate comments	Igor C. and Lucas F.
Perform final corrections before the distribution of the questionnaire	Lucas F.
Questionnaire ready for distribution	
Distribute questionnaires	Lucas F.
Monitor answers	Igor C. and Lucas F.
Send reminders	Igor C.
Questionnaire response deadline	
Perform analysis	Igor C. and Lucas F.
Write draft report	Igor C.
Revise draft	Igor C. and Lucas F.
Perform the final corrections	Igor C. and Lucas F.
Completed report	

Source: Author.

5.1.1 Identify the Research Objectives

O objetivo deste primeiro passo é identificar qual a importância e o por que de fazer um survey, o que poderia ser conquistado com ele. Levando em conta os resultados gerados pela revisão na literatura cinza, mencionados no Chapter 4, foi possível elaborar questões de maneira que o participante informe, na sua visão, a importância de determinado requisito levantado. Logo, o objetivo deste survey é ordená-los por prioridade, utilizando a opinião de possíveis usuários finais.

Além de ser perguntado a opinião dos participantes, foi permitido com que eles fornecessem sugestões ou melhorias em relação a requisitos da ferramenta, já que um dos objetivos da pesquisa está voltado a entender as necessidades dos possíveis usuários do sistema. Assim, tendo uma base mais sólida para começar o processo de desenvolvimento da solução corretamente, com os escopos das atividades mais bem definidos.

5.1.2 Identify and Characterize the Target Audience

Neste estágio, é necessário olhar para os possíveis públicos respondentes e identificar quem será o público respondente e quem é a população do estudo. Assim sendo, a população é composta por todos as pessoas dentro da comunidade acadêmica, logo foi escolhido para representarem a amostra desta população os coordenadores de programas ou projetos de extensão, docentes e discentes, tendo preferência em participantes que

tenham experiência com atividades de extensão. Com este público é possível ter o ponto de vista de todos os usuários da ferramenta, quem cria atividades e quem se inscreve em uma.

5.1.3 Design the Sampling Plan

De acordo com Kasunic (2005), o objetivo desta fase é determinar os seguintes tópicos:

- How individuals will be selected to participate in the survey;
- The required size of the sample.

Por isso, o primeiro tópico buscou abrangir a maioria de campus da UNIPAMPA possível por meio de envio de emails para as suas secretarias academicas, direcionados para os alunos e para listas de coordenadores de programas e projetos de extensão, mantendo o equilibrio entre docentes e discentes. Com isso, campus como Uruguaiana, Bagé e Dom Pedrito que, como visto na Figure 6 foram os campus que mais possuíram atividades de extensão no ano de 2017 (BUCCO; MAURER, 2017), assim, esperava-se que fornecessem mais respondentes para a pesquisa.

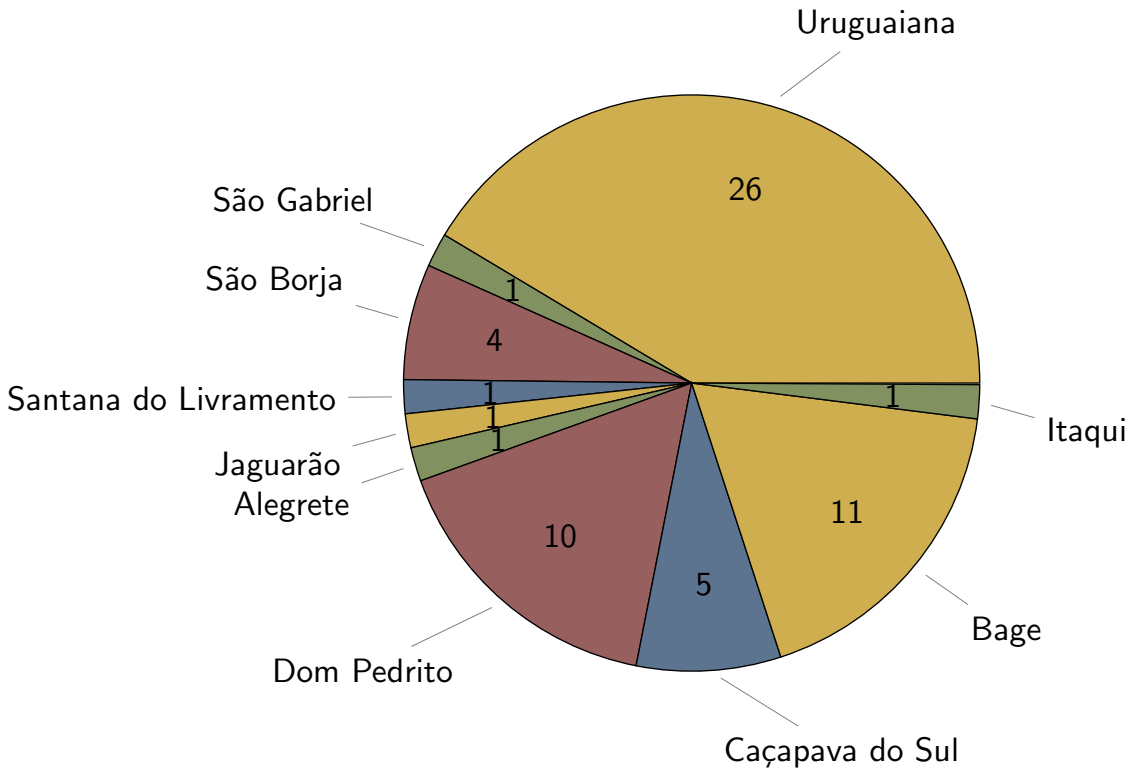
Em relaçao ao tamanho mínimo da amostra, tamanhos entre 100 e 150 respondentes já seriam suficientes, pois além das respostas quantitativas teriam todas as respostas qualitativas com sugestões e melhorias, demandando mais tempo para análise.

A separação da amostra é um ponto essencial para a melhor eficiência do survey, estando de acordo com a prática recomendada 22 definida por Molléri, Petersen e E. (2020), em que diz que a amostra deve ser dividida de acordo com as suas caracteristicas e semelhanças. Para contemplá-la, os respondentes do questionário que se declarassem como Administrative Technician in Educations (TAEs) ou docentes eram direcionados para uma área do questionário, e discentes para outra, ambas as áreas com perguntas relacionadas ao perfil reclarado pelo respondente.

5.1.4 Design and Write the Questionnaire

Kasunic (2005) ressalta que para a estruturação e escrita do questionário, os objetivos de pesquisa e as características da amostra devem ser levados em conta. De acordo com o autor, questionarios que não possuem objetivos bem definidos tem mais chances de possuirem perguntas que só consomem tempo do respondente, ele ressalta isso com uma pergunta Kasunic (2005, p.34) “How can you reach insightful conclusions if you do not know what you were looking for or planning to observe?”, neste questionário o objetivo é bem definido, focado em priorização de requisitos e levantamento de sugestões pelos possíveis usuários finais como bem descrito na Section 5.1.1. Da mesma maneira, as caracteristicas da amostra são importantes para escrever as perguntas de um modo que todos

Figure 6 – Number of Projects Contemplated in the Internal Public Notices



Source: Adapted from (BUCCO; MAURER, 2017)

entendam e não apenas pensando no entendimento dos proprios pesquisadores. Linåker et al. (2015) atenta que os resultados que serão obtidos com o survey, estão diretamente relacionados com a qualidade do questionário utilizado.

Para Linåker et al. (2015) existem dois tipos de questionários, self-administrated and interviewer-administrated questionnaire, de acordo com suas definições este se encaixa no primeiro tipo, pois por ser um questionario web-based, não é necessário ao acompanhamento dos pesquisadores. Este modelo permite a maior abrangência de respondentes, mas por outro lado tende a maior taxa de desistência, ressaltando a importância de uma boa estruturação.

Para a realização do survey, foi escolhida a ferramenta do Google Forms, já que ela contribui com uma interface simples e de facil entendimento, logo que esta já é utilizada pela maioria dos perfis dos respondentes.

A estrutura do questionário que está contido no Appendix A se da pela página inicial, questões de perfil do respondente, questões de priorização de requisitos e por fim sugestões de funcionalidades, estas estão descritas a seguir em suas respectivas seções.

5.1.4.1 The Welcome Screen

Seguindo instruções de Kasunic (2005), a primeira página do questionário contém informações importantes para o participante como:

- O objetivo da pesquisa;
- Duração estimada do questionário;
- Endereços de email para contato;
- Pesquisadores envolvidos;
- Caráter voluntário, anônimo e confidencial da pesquisa;
- Instituição e organização envolvida.

Por fim perguntando para o participante se ele aceita em continuar com a pesquisa.

5.1.4.2 Profile Questions

As questões referentes a adiquirir informações sobre o participante são importantes nas primeiras fases do questionario, pois motivam os participantes a continuar respondendo-o sem confundi-los com perguntas complexas logo no começo, (REA; PARKER, 2005). Além que com uma boa classificação de participantes, permite que a analise destes seja feita de maneira mais controlada e organizada como bem mencionado por Martins (2021).

Os dados que foram retirados com as perguntas de perfil, são listadas a seguir: (1) Se o participante faz parte da UNIPAMPA; (2) Sexo do participante; (3) Faixa etária; (4) Formação acadêmica; (5) Se o participante ja esteve em alguma atividade extensionista; (6) Se a anterior for verdadeira, quais papeis ele desempenhou; (7) Papel do participante na comunidade acadêmica; (8) Campus/Cidade do participante; (9) Curso em que esta relacionado.

5.1.4.3 Requisites Priorization Questions

Nas perguntas relacionadas ao objetivo da pesquisa foram utilizados alguns direcionamentos descritos por Forza (2002), são eles:

Suggestion 1. Define the way questions are asked to collect the information on a specific concept;

Suggestion 2. For each question decide the scale on which the answers are placed;

Suggestion 3. Identify the appropriate respondent(s) to each question;

Suggestion 4. Put together the questions in questionnaires that facilitate and motivate the respondent(s) to respond.

Em se tratando do **Suggestion 1**, onde é sugerido que as perguntas estejam escritas de maneira que toda a amostra respondente consiga entender e formular uma resposta. Já que as perguntas deste questionario se referem a requisitos de software, foi utilizado o modelo de estórias de usuário, em que deixa bem explícito qual o ator, o que se deseja com o determinado requisito e o seu motivo. Também foi determinado que as perguntas seriam classificadas como closed questions, que determinam as possíveis respostas do respondente como descrito por Forza (2002). Assim, no final de cada página do questionário também continha uma questão open-ended permitindo o respondente dissertar da maneira que bem entender.

A **Suggestion 2** se trata da escala utilizada nas perguntas, em um primeiro momento pensou-se em utilizar a escala Likert, mas melhor pensado posteriormente decidiu-se utilizar a escala Must have, Should have, Could have and Will not have (MoSCoW), sendo as possíveis respostas as já presentes no seu próprio nome. Ela foi escolhida porque esta mais relacionada a requisitos e serve justamente para a priorização de requisitos de software.

Em seguida na **Suggestion 3**, sugere-se que o questionário direcione os participantes para as perguntas que eles possuam mais propriedade para respondê-las, trazendo respostas mais construtivas e relevantes. No questionário utilizado, esta divisão esta sendo feita utilizando as perguntas de perfil comentadas na Section 5.1.4.2, sendo o participante automaticamente direcionado para a seção correspondente com seu perfil.

Por fim, na **Suggestion 4** é aconselhado que todas as perguntas que tem um assunto em comum, sejam organizadas próximas umas das outras para facilitar as verificações cruzadas entre as respostas. Para implementar esta sugestão, os requisitos estão agrupados por papéis conforme os atores do sistema, sendo eles: (1) Proponente de atividade de extensão; (2) Instrutor de atividades de extensão; (3) Coordenador de projetos ou programas de extensão; (4) Participante de atividades de extensão.

5.1.4.4 Feature Suggestions

Para a última página do questionário foi disponibilizado um campo em que os respondentes podem sugerir aos pesquisadores qualquer melhoria, funcionalidade, correção etc. Com estas respostas é possível fazer uma analise qualitativa e conseguir novas ideias para o desenvolvimento e completude da ferramenta final.

5.1.5 Pilot Questionnaire

Após ser gerado uma versão estável do questionario, é necessário validá-lo, para isto foi realizado um questionário piloto. De acordo com Kasunic (2005) a pilot test is a

simulation of the real questionnaire carried out with a small number of members from the target audience. Para realizá-lo foram escolhidas 7 (sete) pessoas, divididas em: 4 (quatro) alunos de graduação, 2 (dois) professores da UNIPAMPA campus Alegrete e 1 (um) TAE. A escolha dos respondentes do questionario piloto se deu porque ela representa todos os perfis esperados na target sample, e representa a proporção esperada na realização real do questionario.

Dos escolhidos para a participação do questionário piloto apenas um não conseguiu respondê-lo a tempo, este foi o TAE, mas isto no final não foi um problema pois como mencionado na Section 5.1.3, o questionário está divido em duas partes em que TAEs e docentes respondem a mesma.

Com a execução deste piloto foi possível adiquirir diversas sugestões, correções e pontos importantes para a versão final do questionário. Um exemplo disso, foi que um participante não se sentiu confortável expondo a sua idade exata, então foi sugerido que esta fosse solicitada utilizando faixas etárias.

5.1.6 Distribute the Questionnaire

O questionário foi distribuído para todas as pessoas que compõem a amostra desta pesquisa. Para isto ser executado, primeiro foi realizado uma pesquisa para levantar todos os emails de coordenadores de projetos ou programas de extensão de todos os campus da UNIPAMPA, sendo eles os primeiros a responder as respostas do questionario. Após 2 (dois) dias, foi enviado emails para todas as secretarias academicas dos campus, solicitando que fosse repassado para todos os seus alunos de todos os cursos. Concluindo, ao todo o survey ficou aberto para respostas por 18 (dezoito) dias.

5.1.7 Analyze the Results and Write a Report

Os resultados quantitativos relacionados a priorização de requisitos, devem ser coletados e organizados em gráficos para melhor entendimento e visualização dos dados. Assim será possível ter uma lista ordenada de requisitos que foram considerados mais importantes para os usuários finais.

Em relação as respostas qualitativas, estas serão analisadas caso a caso e se pertinente a sugestão, serão adicionadas dentro do leque final de funcionalidades ou melhorias.

5.2 Threats to Validity

5.3 Result Analysis

5.3.1 –

5.3.2 –

5.3.3 –

6 EXTENSIONLY

6.1 Requirement Engineering

6.1.1 Requirements Elicitation, Modeling and Analysis

6.1.2 User Stories

6.2 Features

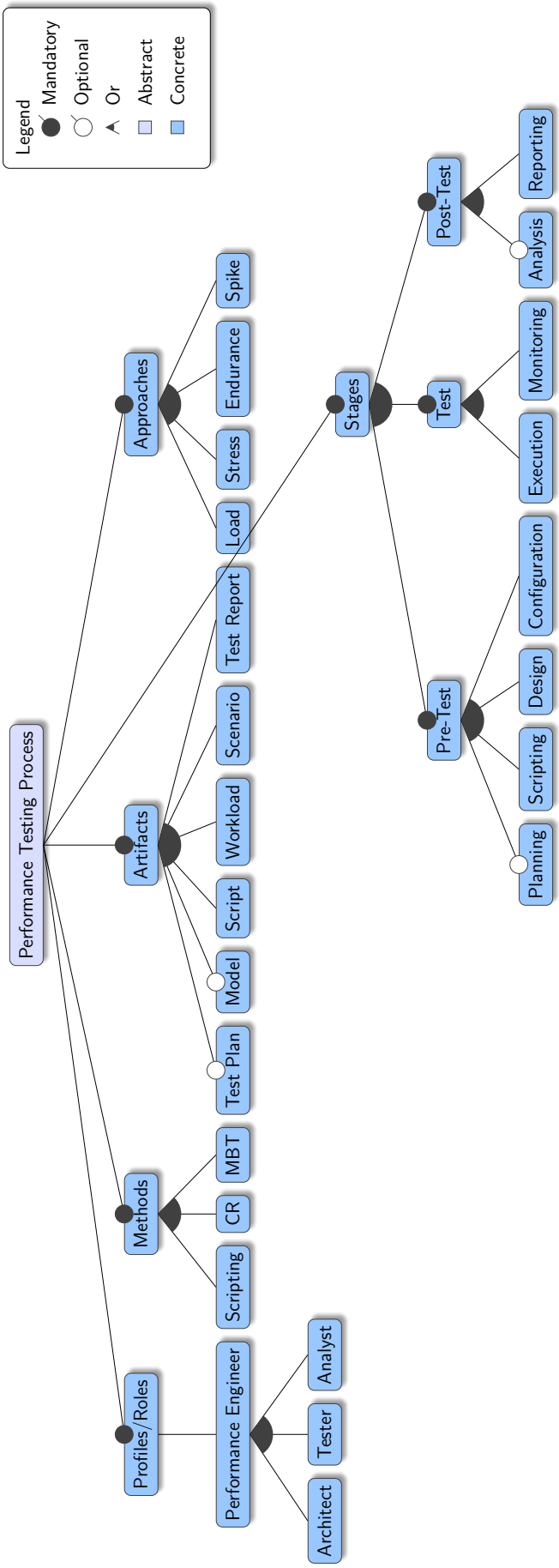


Figure 7 – Taxonomy of performance testing tools represented by feature model.

Source: Author.

6.2.1 Roles

6.3 Development

6.3.1 Technology Stack

6.3.2 Programming Paradigm

6.3.3 Design Patterns

6.4 Software Architecture

6.4.1 DevOps

6.4.2 Pipeline

6.5 Testing

6.6 Software Artifacts

6.6.1 Domain Model

6.6.2 Component Diagram

6.6.3 Database Schema

7 PRELIMINARY CONCLUSIONS

7.1 Dummy

Em Trabalhos de Conclusão de Curso, use "*Considerações Finais*" e não "*Conclusão*".

Bom trabalho!

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Annex

ANNEX A – SURVEY QUESTIONNAIRE