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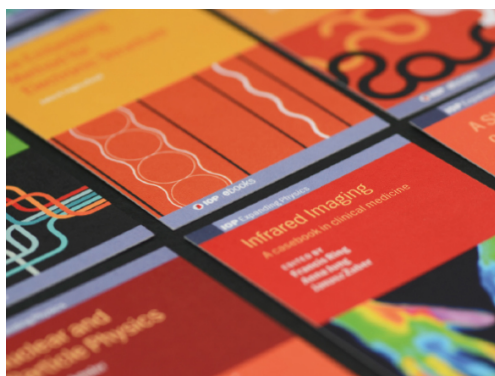
Visibility strategy of the academic production and research output of the UFPS: Institutional digital repository

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Visibility strategy of the academic production and research output of the UFPS: Institutional digital repository

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Abstract. Within the University Francisco de Paula Santander (UFPS), activities are conducted to generate a large amount of academic and research output for which there exists a high demand for access to them. The objective of this article is to describe the construction of the Institutional Digital Repository (IDR) as a strategy to strengthen the visibility and the national and international impact of the academic output of the UFPS-Cúcuta. The framework for the development of the IDR was developed with The Dublin Core standard of Metadata interoperability using open source software DSPACE which is greatly accepted in the community as it has tools for the management of bibliographic collections. As a result, a description of the concepts of repositories, data representation and the process of building the IDR was done. By managing these strategies, the UFPS will strengthen its visibility and the national and international impact of its academic and research output and improve the scientific performance in the University's Web Ranking.

1. Introduction

At the regional level, of the 12 universities and university corporations whose headquarters are in the Norte de Santander department, only one has a platform for storing academic information (institutional digital repository) - dissertations and undergraduate theses. This is the situation of the Universidad Francisco de Paula Santander (UFPS), which is why the initiative was taken to design and develop the Institutional Digital Repository (IDR) for dissertations and undergraduate theses, within the framework of the macro-research project "*Development of a strategy to manage the construction of a digital repository that will strengthen the visibility and national and international impact of the academic and research output of the Universidad Francisco de Paula Santander-Cúcuta*" [1].

The Institution is made up of six Faculties: Engineering, Basic Sciences, Business Sciences, Education, Arts and Humanities, Health Sciences, Agricultural and Environmental Sciences, and 33 Academic Programs; each of these Faculties has its undergraduate and postgraduate programs, laboratories according to its specialty and research groups. In these training processes, valuable information is generated from teachers and students in the form of: documents, learning objects, theses, articles, among others; information that in some cases is not shared not only with the entire university community, but also with the entire region.

Likewise, the Eduardo Cote Lamus Library of the University has a web portal that allows access to various services such as free access to databases or by subscription, of digitized books (e-books) for viewing and downloading, book search and reservation and a section with links to very important free access repositories where work and research from various universities around the world are stored. In



general, all these services, both physical and technological, are useful and contribute to university development, but lacks an IDR that allows the storage and consultation of projects, research and theses work carried out by students and teachers in an agile, easy and fast way.

Being of great importance, it was outlined as an objective to create the Institutional Digital Repository (IDR) to support the dissemination and accessibility of scientific documentation, the UFPS as a knowledge-generating institution requires processes and tools that facilitate its researchers to publish documents, grey literature, and institutional projects and that these are not lost due to limited accessibility, affecting the visibility of the researchers' production.

2. Introduction to the architecture of the application

Institutional digital repositories are known as collections that are available to the scientific and academic community, where the material produced by teachers and students are deposited in digital format, which have free access to scientific production and without economic restrictions. These repositories make it possible to increase the visibility of the digital contents generated by the institutions' researchers, guaranteeing their preservation [1].

The main objective of the institutional repositories is to facilitate access of the international scientific community to the results of the research carried out by its members and to increase the visibility of the institution's scientific production. Likewise, to contribute to the preservation of the digital documents deposited therein, among other contents that are generally present in an institutional repository, and that are relevant such as: undergraduate theses, articles from scientific journals, documents relevant to research groups (research projects or books), among others [2].

2.1. The open access initiative

The initiative known as Open Access was taken into consideration [3], as it allows any digital content to be published, read, downloaded, copied, distributed, printed and referenced freely, eliminating legal, economic and technological barriers, and having greater accessibility to documents in educational, academic and scientific materials, accessing information without prior registration or paid subscriptions for the community in general, gives rise to the OAI protocol for metadata collection.

These are collected and can be in any format established by a community (or by any specific set of Data Providers and Service Providers), regardless of whether they have established the Dublin Core [4] standard- protocol currently used and accepted by a large amount of software for the creation of repositories.

This created the first open source institutional digital repositories such as *EPrints* developed by the University of Southampton School of Electronics and Computer Science and applied the OAI protocol allowing document management systems (Repositories and scientific journals) in its early days.

Once the SPACE project was created (written in Java and released under BSD license which allowed the customization and extension of its functionalities by third parties [5] and offer digital collection management services with support for multiple types of data including video, images, theses and books. Years later [6], concrete steps were taken for organizations to empower and promote a rapid and efficient transition to open access publishing, leading to the *Bethesda Statement on Open Access Publishing*.

Additionally, thanks to the Budapest Statement and the Green and Gold routes, where the first route refers to the archives themselves, implying the creation of institutional repositories, promoting their use and organization of the contents that are the products of studies and research but that are freely accessed by members of the community in general. The second route promotes the free production and dissemination of electronic journals where the communication between the authors of these journals and their readers must be direct, thus seeking to reduce the economic barriers that lead to the birth of the *Open Access Initiative* [6].

2.2. Metadata

It is highly structured data that describes various attributes of information objects, describes the content, quality, condition and other characteristics of the data and gives them meaning, context and organization.

In the institutions there are different types of documentation that make up the institutional repositories: 1) Documents of institutional management (administrative management, manuals and procedures, among others) 2) Documents resulting from the research (documents resulting from the mission activities of the Institution, as well as the procedures at the organizational level, as they would guarantee the generation of the corresponding metadata) and 3) Documents belonging to the documentation centers for which all the metadata are held, and it is necessary to implement a digitalization plan. The integration of these would allow the recovery of institutional memory and facilitate access to administrative staff and researchers, among others, to any type of information such as articles, presentations, partial and final progress, among others.

2.3. Dublin core metadata standard

The Dublin Core standard, a metadata scheme used worldwide, sponsored and maintained by DCMI (Dublin Core Metadata Initiative) [4], is an open organization that supports innovation in metadata design and best practice, and maintains a series of formal links and relationships with standardization bodies and other metadata organizations. For the project, the ISO 15836:2003 Standard is applied, in which 15 elements are defined to describe any information object (Digital Repositories), which is divided into three groups where the class or scope of the information included in them is indicated, and which respond to the user's expectations when faced with information from the Network.

3. Methodology

The digital repository for the UFPS is conceived as a digital space whose purpose is the portal of the investigative results of the research projects of the University's researchers. To this end, it is necessary to archive, organize, preserve and disseminate in open access electronic documents of any kind created by researchers from the university community as a result of their academic, teaching and research activities. It is an institutional project because it is a product of technological development for the University, with the aim of visualizing the results of the research conducted by the researchers.

The methodology was outlined according to the nature of the objectives that had been designed for its construction. Regarding the level of knowledge, the first stipulated specific objectives put into practice a methodological scheme of exploratory-descriptive order, aimed at identifying and analyzing the needs of teachers and researchers of the research groups of the University. From this exploration and analysis of the communication practices of academic and research entities, a viable reporting unit model was created that facilitates access, visibility and dissemination of scientific production within the Institution.

To this effect, its analysis focused on establishing a diagnosis based on the research activities of the models derived from the lessons learned by the research units and which, when applied to a pilot group such as the Faculty of Engineering, allowed its coherence and relevance to be captured and enhanced.

However, it corresponded to a qualitative approach due to the nature of its data and the analysis of the information, which conducted an applied research by means of a deductive logical method [7], in keeping with a technological development type research where a schema of the necessary metadata was created for the compilation of the information of the academic and investigative production of the researchers. Subsequently, the software and hardware architecture of the IDR was designed, which collected, preserved and gave visibility to the results of the research and academic production activities of the researchers of the Universidad Francisco de Paula Santander.

This allowed the analysis and proposal of the constituent elements of the model to be developed to be built and installed in the UFPS Library, allowing the establishment of the most appropriate services

for a research community in an Academic Unit, facilitating access, retrieval and dissemination of the documents, and allowing their visibility.

This model was initially established from an organic scheme, which was defined considering the elements and structures needed in the context of the application of standards, for example, for the construction of a structure such as the information architecture for a unit of digital information.

3.1. The life cycle of the IADN development process

For the development of the IDR platform, the following was taken into account: 1) Preparation, based on the objective of searching and gathering information that would allow the identification of both structural and organizational characteristics that would make up the repository. Establishment of policies and rules for the creation and use of the repository, analyzing the different norms and standards used in the management of data and information from the digital repositories.

The organization and representation of the contents to be included in the repository, as well as the design of some of the main services, was conducted by designing the interfaces and visual components of the repository based on the institutional identity (Information Architecture) [8]. Installation and configuration of DSpace components and visual interfaces over a Debian Free Software distribution. Generate the Institutional Digital Repository platform, framing it within the regulations and standards established for platforms of its nature, adapted to the needs and internal model of operation of the University Francisco de Paula Santander.

And following a life cycle model, Extreme Programming (XP) was taken, which is adapted to the needs of the Institution, knowing that the final product would not be developed from scratch, but the installation, configuration and adaptation of the free software DSpace as an Institutional Repository. However, as with all software projects, this process required 4 stages: 1. Project planning: where the stories are defined which are used to estimate development times. 2) Design: here it is suggested to use plain and simple designs to ensure that everything is as less complicated as possible, easily understandable and implementable. 3) Coding: a suggested working model is suggested using code repositories and where the partners of programmers publish their codes implemented and corrected along with the tests they must apply. 4) Tests: the realization of tests allows to verify the operation of the codes to be implemented.

4. Application architecture

4.1. Basic parameterization of DSPACE and its configuration in the IDR

Here you define the necessary parameterization for the configuration and operation of the institutional repository. For its operation, users were configured to have access to the system and their respective privileges and permissions to perform actions taking into account the Roles or Groups, which allow users to group together and in quantity grant them permissions on the functionalities, assign them permissions to send content to specific collections, be reviewers of the content sent and queued in the workflow, be administrators and have access to all published content [8,9].

In addition to the users, it became fundamental to configure the Faculties and Institutional Academic Programs in the system, with the objective of representing the reality and business model of the University as it is. Each Role (group) is assigned a series of actions that it can perform as: *Read, Write, Add, Remove and Manage*.

4.2. Content licensing

Content licensing is a contract between two parties or entities that grants certain rights to, or publication of, a work by one party to the other for the purpose of legally recording the use and protecting the author against infringement, change, and illegal distribution of the work [9,10].

For the IDR, the graduate dissertations, theses, and research documents that are delivered to the Eduardo Cote Lamus Library will be stored, along with the assignment of rights, allowing the library to exhibit the content to the community in general, allowing it to be reproduced and consulted

whenever the purpose is academic, establishing primarily that the moral rights of the work belong to the authors without them being able to renounce them. Thus, there is a need to define a licensing system that generally covers the works stored in the collections of academic programs.

This licensing is done through Creative Commons, an international project that aims to strengthen creators to define the terms so that the works can be used, what rights they wish to give and under what conditions they will do so (Rincón, 2018). For the IDR, 6 types of licenses were defined that can be applied on a work: Attribution License, Attribution-NoDerivs, Attribution NonCommercial-NoDerivs, Attribution-NonCommercial, Attribution-NonCommercial-ShareAlike and Attribution-ShareAlike.

5. Results

The Institutional Repository generated is an administrable platform that allows the search of content by certain filtering criteria based on the academic and research production of the university, concentrated in the same place, in the UFPS-Cúcuta digital repository, said production is discriminated by faculties, programs and collections, providing an order and grouping with the objective of increasing the visibility of the university.

The platform allows to define the faculties, programs and collections. These programs and faculties are configured by defects, but it is allowed to create, modify or eliminate those previously created. The publications (theses, research works, etc.) can be published at the level of collections, which allows grouping them, allowing a greater order when carrying out a search on the platform. It is also allowed to register (using the institutional mail of the university) the students and teachers to upload the works, but this does not mean that they will be published, these publications will enter a workflow (evaluated by the manager of the Cote Library Lamus) where it will be checked in detail if it meets the minimum requirements to be published, such as sufficient metadata [11]. The IDR offers a wide range of statistics [12], such as visits or downloads that the repository has had, categorized by month and year, and by country (using a map), these statistics can be displayed using a bar graph to help easy understanding and analysis.

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