Management of informational content in Federal Institutions of Higher Education: a roadmap for the implementation of repositories in university libraries

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ABSTRACT

This work aims to present a roadmap for the implementation of Institutional Repositories in university libraries. The objective is to propose guidelines for its implementation. As a research technique, a qualitative approach is adopted, using literature review, exploratory research and documental survey. As an implementation strategy, there are important phases, such as the construction of the drafts of the Institutional Repository Management Policies. In addition to building the Technical User Manual, Software Requirements, Communication Plan and Guidelines Guide. Based on the relevance of scientific knowledge produced in Brazil, the Repository has the role of driving technological development and innovation, contributing to the production of knowledge,

Key words: Institutional Repository; Scientific divulgation. University Libraries.

INTRODUCTION

By recognizing the importance of scientific production for the academic development of Brazil, University Libraries are increasingly aligned with the policies of dissemination and accessibility of knowledge production and institutional research in the digital context.

University Libraries' mission is to support teaching, research and extension activities in Universities, according to Inácio (2018). The world trend of Information Units is to make their digital objects available, and thus share information resources through information and communication technologies, in an attempt to eliminate distance and physical space, optimizing research and scientific and technological development.

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For this dissemination of knowledge to occur, according toQueiroz (2016) apud Silva (2007) the Institutional Repository – RI is a tool created to facilitate access to scientific production. It is a set of databases developed to gather, organize and make the scientific production of researchers more accessible, which can be institutional or thematic, depending on the purpose.

Another factor that contributes to the implementation of the Repository is the mission of University Libraries, as stated by Gomes and Barbosa (2003, p. 2), is "To provide, disseminate and transfer information in order to enable the full performance of the university to promote teaching , research and extension, through the offer of undergraduate and graduate courses, production and transfer of knowledge and technology."

This article presents guidelines for the implementation of Institutional Repositories in Federal University Libraries. The objective is to propose an implementation roadmap in order to consolidate the information necessary to carry out the desired activities, thus ensuring greater assertiveness and prior correction of any problems. The main role of the IR is to group, store, organize, preserve, recover and disseminate the scientific and academic production of Universities with a view to managing scientific information, increasing the visibility and prestige of the institution at the national and international level and at the same time promoting the transparency of public expenditures and support for research activities and the creation of scientific knowledge within the scope of Universities.

The Institutional Repository implementation roadmap consists of the act of introducing a technical solution and services in an organization in a coordinated way. These guidelines will promote better management of scientific information management processes. In addition to presenting the main actions to be carried out in the short and medium term with the planning that subsidizes the effective implementation of the Repository in the Institutions, having as important pillars: documents, infrastructure, information technology and people.

According to the Brazilian Institute of Science and Technology - IBICT (2020), there are Digital Repositorieswhich can be institutional or thematic. Institutional

repositories deal with the scientific production of a particular institution. Thematic repositories with the scientific production of a given area, without institutional limits, as shown in Figure 1 below.

Figure 1

Organizational chart of types of Repositories.
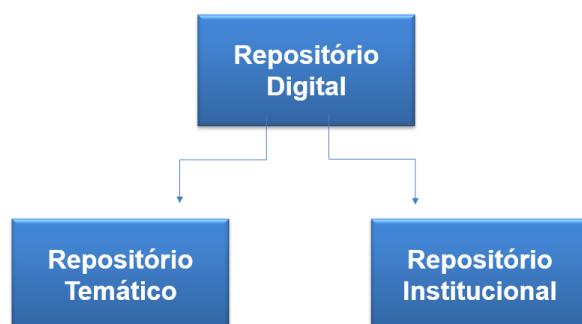
Source: Own elaboration (2021).

The IRs, on the other hand, will promote the integration and gathering of all the academic production of the Federal Institutions of Higher Education - IFES (of professors, researchers, technical-administrative, undergraduate and graduate students), in a single virtual place, thus avoiding duplication and documentation inconsistencies. There is a differentiation between the types of repositories.

The specific objectives of this deployment roadmap are to present a draft policy template, user manual, software requirements, communication plan, and deployment guide. These guidelines will contribute to more repositories being deployed.

According to Sayão (2007) digital preservation can be understood as the set of strategies and protocols in the information unit aimed at maintaining the database and the digital objects available, duly formalized, there is no way to develop environments with digital content without think about its preservation.

The relevance of Institutional Repositories in the context of scientific dissemination and the open access to information movement has increased considerably due to the emergence of of the pandemic by the new coronavirus, the IR became the showcase of the internet in terms of democratization of knowledge, as the University

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Libraries were closed, the user was left without access to information in physical support, there was social isolation, growth in the participation of students and teachers in distance education and the enlargement of the access to different sources of information that could be used remotely.

2. METHODOLOGY

It consists of a bibliographic survey to apprehend concepts on the subject, documental research for knowledge of the aforementioned Institutional Repository. This study was carried out using a qualitative descriptive approach (CRESWELL, 2010), based on the analysis of the main references available in the literature on the researched object, including works published in virtual databases, legislation and information available on IBICT portals. In addition to a survey in the Directory Registry of Open Access Repositories - ROAR of Federal Universities that have IR and that use Dspace. This Directory lists all Open Access Academic Repositories, allows the identification, navigation and search of repositories, based on a range of resources, such as location, software or type of material maintained.

The Institutional Repository implementation script took place in several stages and comprises the elaboration of several products that will compose it, such as the drafts of the Management Policy (Operational Policy, Copyright Policy, Digital Preservation Policy), Requirements software, Manual for IR Users, Communication Plan and Guidelines Guide. These guidelines will consolidate all the information necessary to carry out the desirable activities during the implementation of the Institutional Repository in the IFES.

3. RESULTS AND DISCUSSION

The construction of the Institutional Repository implementation guidelines took place in several phases. The following is a table that presents a panoramic view of the stages in the elaboration of the Institutional Repository Implementation roadmap. This

framework is divided into: draft policies, software requirements, user manual,
communication plan and implementation guide.

Table 1
Deployment steps roadmap

Policy draft	software requirements	User manual	communication plan	guidelines guide
Institutional Policy ✔	Cover and Table of Contents ✔	Introduction ✔	Introduction ✔	Cover and Table of Contents ✔
Operating Policy ✔	Introduction ✔	How to access ✔	Goals ✔	Presentation ✔
Copyright ✔	Goal ✔	Quick search ✔	Law Suit ✔	Introduction and Goals ✔
Digital Preservation ✔	Scope ✔	Advanced search ✔	Query public ✔	Methodology ✔
	Specific Requirements ✔	faceted search ✔	Awareness ✔	Products ✔
	Librarianship Technical Criteria ✔	Search by Communities and Collections ✔	Actual Action ✔	Phases ✔
	Computational Technical Criteria ✔	Results of Search ✔	Seduction ✔	Results ✔

	Other Requirements ✔	Start a new deposit ✔	Marketing strategy ✔	References ✔
	System improvements ✔	Language ✔	Disclosure of statistics ✔	
	Design Thinking ✔	Contact us ✔	Disclosure of news ✔	
	Interactive IR ✔	Help ✔	collection subscription ✔	
	References ✔	My space ✔	Rss and social networks ✔	
		Updates by email ✔	Flowchart ✔	
		References ✔	References ✔	

Source: Own elaboration (2021).

3.1 INSTITUTIONAL REPOSITORY POLICIES

It is very important to design and implement IR policies, according to Leite (2012). The first step in the implementation guidelines was the drafting of RI policies. These policies consist of 4 (four):

• Institutional Repository Policy;

• Policy ofOperation;

• Copyright Policy;

• Digital Preservation Policy.

The Institutional Repository Policy comprises in regulating the information guidelines of the Institutional Repository of the Federal University. Defines the RI Management Group in charge of the development, implementation and maintenance of the Repository, which will be formed by: four librarians; an archivist; a technical information technology server; a technical-administrative server.

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This Policy has as a guideline that the IR aims to preserve institutional memory, in addition to promoting open access to scientific, philosophical, cultural, artistic and technological production, through the organization and socialization of works and other academic productions produced by employees, students, professors and collaborators linked to the University.

Definition, Purpose, Objectives, Organization, Operation, Information Structure, Requirements for submitting documents to RI, how the Repository will be populated, who will be part of the implementation and maintenance committee are the main topics related to this Policy.

The Operation Policy defines those responsible for installation and maintenance. Clarifies the documentation for deposit and authorization terms for submission of digital objects. It outlines which materials can be deposited at the RI, who will be the depositors, establishes how the submission process will be and who will record the scientific production of the academic community.

Metadata is specified and must follow international and national standards, Freyre (2019) presents the standardization of metadata for Dspace. In addition to the fact that the contents of the materials must be scientific or academic, the intellectual works must be in digital format produced by the institution or by members of the academic community and that have been submitted for evaluation by peers and/or evaluators.

The Copyright Policy conceptualizes technical terms, such as: Creative Commons, open access, embargo, metadata, utility model, invention patent and golden way. This policy guides the implementation of Open Access, policy management and the management of Copyright in the repository, guaranteeing the non-violation of Copyright, of a patrimonial or moral nature, protecting the University from future legal implications.

This policy regulates that authors are the copyright holders of the documents made available in the Institutional Repository, prohibited, under the terms of the law, the commercialization of any kind without the prior authorization of the holders of the rights. With regard to licenses, flexible and open licenses are granted in order to maximize the dissemination and use of the University's technical-scientific production and research data.

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Regarding the embargoes of technical-scientific production, it is recommended to comply with the established periods. In this case, the metadata must be made available in theInstitutional Repository until the end of the embargo, when the full text must be released. When there are applications for patents for inventions and utility models, industrial design registration and trademark registration, the metadata must be deposited in the Institutional Repository. Full access will be released after its publication by the National Institute of Industrial Property – INPI.

This policy may be amended upon approval by the Institutional Repository Implementation Commission at an extraordinary meeting convened specifically for this purpose. The review and update of the policy will be every 05 (five) years or according to the need to follow the current Brazilian legislation.

The Digital Preservation policy has guidelines that will guarantee continuous long-term access to scientific, technological and cultural information existing in digital format in the Institutional Repository. This policy defines technical terms such as: Backup, InternationalOrganization for Standardization – ISO, Metadata, Migration, Digital Object, Open Archival Information System – OAIS, Redundant Array of Independent Disks – RAID, Refreshment and Replication.

The purpose of this policy is to manage and store collections of digital objects, over a long period of time, providing appropriate access and acting as data providers. In this way, they must have an organizational structure that supports and reflects the university's structure, function and activities, aiming at their internal and external relationships of the digital materials under their responsibility.

Maintaining the authenticity of archival documents in digital format, preserving them, and presenting a contingency plan that provides information security, preserves the university's cultural and intellectual heritage, and ensures that it is accessible and reliably maintained for future use are fundamental guidelines for the protection of the Institution's collection.

Another important item that is ensured in this policy is social sustainability, which promotes administrative practices with the reduction of environmental impacts, with smart solutions, such as saving on paper consumption, causing the balance of the

environment, because through the digitization of documents, there is a greater control over these records and facilitates the search for digital information, ensuring the long-term sustainability of the data and developing actions for maintenance, preservation and adding value to the data throughout its useful life.

University Libraries will adopt consistent criteria for the selection and preservation of digital material. Once this material has been selected for administration and digital preservation, the Central Library is committed to maintaining it for as long as necessary or desired.

Preservation levels and the period of time to keep digital material accessible will be determined by those responsible for selecting the material and by digital curators, with the support of specialized technicians. The Central Library will participate in the development of community digital preservation standards, practices and solutions. Looking at a scalable, reliable, sustainable and auditable digital preservation infrastructure.

software requirements

Institutional Repositories follow the philosophy advocated by the Open Archives Initiative (OAI), according to Shintaku (2010). This initiative argues that all research materials should be publicly available on the Web, without access restrictions, especially research developed with resources from public research funding agencies, according to Santos Júnior (2010).

The software with the largest number of implementations in the world for building repositories based on the Open Archives Initiative Model is the Institutional Digital Repository Systems – Dspace. It is the platform recommended by IBICT for the construction and management of Institutional Repositories in Brazil, according to Santos Júnior (2010).

According to IBICT (2020), Dspace is free software that, when adopted by organizations, transfers to them the responsibility and costs of archiving and publishing activities of their institutional production. Dspace has a specific operational nature to preserve digital objects, an initiative of great interest to the scientific community.

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In order to have a quality Information System with good structure and relevance, the necessary requirements that involve Librarianship and the area of software development must be observed. The Software Requirement is intended to gather and present configuration proposals on the Dspace Platform for the administrators of Institutional Repositories of Federal Universities. Using an accessible language for Information Technology professionals, Librarians, among others.

These requirements specifications are for the graphic design of the page, addition of functionalities, alteration of communities and subcommunities, the usability and accessibility of the scientific production of the Repository, Information Architecture, in order to facilitate the interaction between the Platform, the user and access to information. Taking into account a collection of the University Library. Observing and maintaining the graphical interface to the Dspace standard, such as colors and logos, using a standard interface for Portuguese and adapting the metadata availability structure.

There is a lack of standardization of descriptive and thematic metadata of Institutional Repositories (PROPRIEDADE, 2020). This Roadmap is intended to bring greater functionality to the System and improve the Information Architecture and Information Retrieval, as the search results depend on correct indexing so that the treatment of subjects will collaborate to provide relevant and accurate information to the users, generating an indexing policy, cross-reference control, the use of qualifiers, the treatment of generic subjects, the use of explanatory notes and the selection of new subjects. Which will generate better quality of the metadata. The metadata of each Community and Collections must be respected in their specificity, format and context.

The ISO 9126 standard, in its part 1, presents the characteristics of software quality:

• Functionality: ability of the software to provide functions that meet expressed and implied needs, when used under specified conditions. • Reliability: ability of the software to maintain its level of performance, when used under specified conditions. • Usability: ability of the software to be understood, learned, used and appreciated by the user when used under specified conditions.• Efficiency: ability of the software to operate at the required performance level, in relation to the amount of resources employed, when used

under specified conditions.• Maintainability: capacity of the software to be modified. Modifications may include corrections, improvements or adaptations to the software. Changes in the environment or in the functional and requirements specifications.• Portability:

On the other hand, the control of the language that takes place through indexing, in the use of controlled vocabularies, ontologies, thesauri, taxonomies, among other standards, will in the future be the essential support for the occurrence of the Semantic Web. And as basic requirements, the System must containFunctionality, Reliability, Usability, Efficiency, Maintainability, Portability. In addition to being necessary to Dspace's scalability and sustainability.

To improve the usability of the system, the user-centered innovation approach was used, which is the Design Thinking tool that will help the Library to develop a new way of working, in a more collaborative way with users, according to Juliani (2016). Design Thinking is an approach to problem solving. According to Global Libraries (2017) its main characteristics are:

• User focus;

• Search for ideas in different spheres that can be brought together in a common innovative concept;

• Multidisciplinary action, with the union of forces and varied insights on the same obstacle.

The research methodology in Design Thinking is about listening, observing and being open to the unexpected. The design project is about opening up possibilities rather than validating or providing evidence.

With the right to preparation, this phase can inspire the new, new perspectives on the challenge and offer a great basis for the next stages of the project, contributing to provide quality information and promote the usability and informational accessibility of scientific production in the Library environment. university. The following is a process mapping demonstration that will help you build Design Thinking.

User manual

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It is a proposal to assist in the usability of IR websites that use Dspace software. This Manual presents the user navigation step by step in search of answers to his research. There are possible searches such as quick, faceted and advanced. In addition to carrying out searches through communities and collections, finding search results and depositing works. Therefore, there is guidance in providing explanations, in a simple way, on how to perform the tasks that are part of the daily life of the user who uses the Institutional Repositories in the IFES.

This Manual is aimed at teachers, students, administrative technicians and the external community. Access to the IR takes place in two (2) ways:

• Through the University Central Library Portal;

• By the URL of the Repository itself.

To search the entire Repository, use the search box in the middle of the home page. Through the search bar, on the home page bar, search by keyword, subject, author, title by university.

In the advanced search, it is possible to search by various fields, such as Entire Repository or search individually for the Graduate Programs of the Federal University of Rio de Janeiro - UFRJ. In the case of Universities, the search is carried out by the Institution's campuses. To better specify the search, the user can choose the following metadata: title, author, subject and publication date. As with the Boolean search, it is possible to combine keywords to limit, filter or refine the search. In the advanced search, you can search by advisor, board members, author identifier, abstract or abstract, subject, CNPQ, access release, Institution acronym, among others, as shown in Figure 2 below.

Figure 2
Advanced search.

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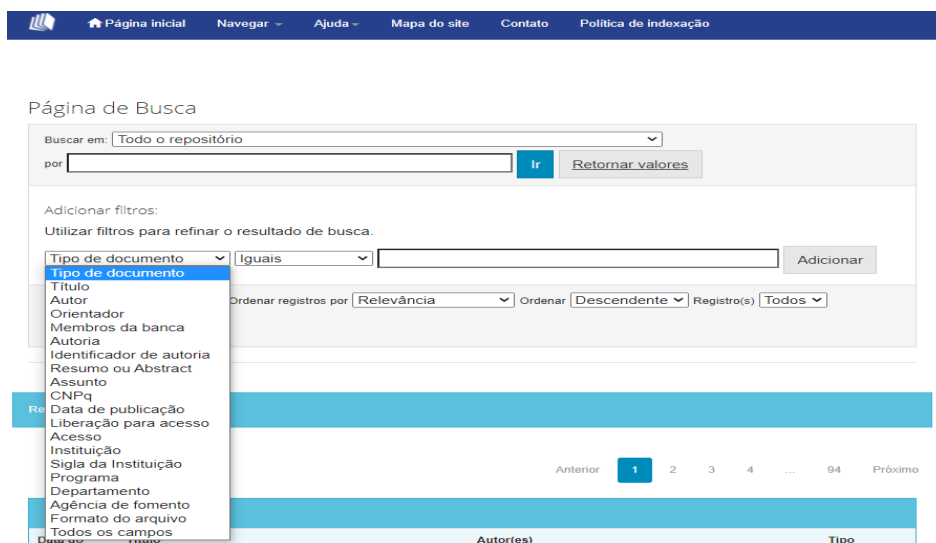
Source: IR of IBICT (2021).

In the right corner of the search is the faceted search that groups entities as part of a record. The filters implemented by RI's faceted search allow users to find the desired topic faster than traditional search. It is possible to carry out a faceted search by author, subject, areas of knowledge, document types, publication date, type of access (open or embargoed), as shown in Figure 3 below.

Figure 3

faceted search

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Source: IR of IBICT (2021).

In the "Browse" tab of the Repository, you can list the Communities and Subcommunities and the Collections present, such as articles published in Brazil, Works presented at Congresses. In the search results, it is possible to refine the search results, the filters are to sort the results in order of records (relevance, title and publication date), disbelieving or ascending order and records by quantity, according to figure 4 below .

Figure 4

Filters for results.

Source: IR of IBICT (2021).

There is the Meu Espaço Menu that registers the user in Dspace, allowing the user to subscribe to the Collections and receive updates when a new work is entered into the system. To start a new deposit, the user must select the Collection where the work will be deposited, choose the type of document being deposited, which can be a journal article, then fill in the form with title, authorship, among others. Then upload the file, verify that

the metadata is correct, and choose the public license that allows free distribution of a copyrighted work.

Regarding Repository policies, there are Indexing and Repository policies. Indexing guides RI depositors to analyze and represent the subjects contained in their documents. The Repository's policy, on the other hand, has as a guideline to preserve scientific production, enhance exchanges with other Institutions, and optimize the management of investment in research.

Communication Plan

The Plan's strategy is to define the ways to publicize the launch of the Institutional Repository inside and outside the IFES, because in order to have voluntary adhesion of the academic community, it is necessary that the RI committee engages, together with professors, students and administrative technicians. For researchers to be able to use this informational service, it is necessary to know its functionality and what are the advantages for the researcher and for the Institution of registering with RI.

The objective of the Communication Plan is to guide the processes necessary to generate good results in the communication and dissemination of IR and to make researchers understand the importance of scientific dissemination and, consequently, increase the visibility of the Institution's scientific production.

For Sayão (2009) there are some steps that make up the dissemination of Repositories, but we add the public consultation for the construction of the Communication Plan, which are:

• Carry out public consultation with the academic community to seek their opinion on issues that affect them and improve their daily lives;

• Sensitization – It is the awareness of managers, government policy makers and decision makers of funding agencies;

• Real action – Elaboration of operating policies for these repositories. Librarians should visit Academic Units to publicize the initiative and hold collegiate meetings for training in the use of RI and to present progress.

• Seduction – The entire Library team will populate the IRs, disseminate usage statistics, as this shows the benefits of the use and visibility of IRs.

• Marketing strategy – Investing in a marketing strategy to ensure community participation, in order to attract recognition and investment.

• Dissemination of statistics – Strategy to attract authors interested in seeing their works in RI.

• Dissemination of news – Use the IR as a point of dissemination of events and news related to the Repository.

• Subscription to collections – The user will be notified when a new work has been registered according to the interest.

• Rss and social networks – These are tools that bring communication closer to the user.

In Brazil, despite advances in the implementation of IR in Federal Universities, there are still many University Libraries that do not use this tool, as is the case of the Federal Institutes - IF. Mendonça et al (2019) performed a survey and found that of the 38 IF's, only 32% have an Institutional Repository.

Another result of the survey in the Directory ROAR shows us that of the 69 Brazilian Federal Universities, 34 Institutions have IR, that is, about 49% of these Institutions. This shows that 51% of the Federal Universities still need to implement their Institutional Repositories.This percentage reflects that there is a demand for the use of the RI Implementation Roadmap in Federal Institutions, without counting on State and Private University Libraries and Research Institutions.

4. CONCLUSION

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Institutional Repositories are currently the main strategic tools for Universities and University Libraries to promote the visibility of academic scientific production and the transparency of public investments in research for the benefit of society.

Considering the relevance of scientific knowledge produced in Brazilian Universities, this dissemination also has the role of boosting technological development and innovation, contributing to the production of knowledge and research. Therefore, it is imperative that educational entities consolidate, in fact, access to the intellectual production of Universities and that the population knows what has been done in the academic sphere.

Digital repositories can be considered an innovation in digital information management. Publishers, libraries, archives and information centers in several countries are creating large repositories of digital information, containing different types of content and digital file formats (LEITE, 2009).

It is important to emphasize that the IR appear as a result in the Google Scholar search, which highlights and amplifies the scientific productions of the Institutions. In addition to raising the evaluation grade of the Ministry of Education - MEC in undergraduate courses, as having its own RI accessible on the internet and making the Course Completion Works - TCC available is an analysis criterion and makes the Institution achieve the concept 5 in this item, according to the Assessment Instrument for in-person and distance undergraduate courses, Brazil (2017, p. 14).

Therefore, the Institutional Repository presents itself as a key part of the scientific dissemination process, offering new opportunities for information sharing, contributing, in addition, to the development of science, since they provide visibility, storage and recovery of information, which leads to the appreciation of the researcher and Brazilian scientific knowledge.

The Institutional Repository has become the internet's showcase in terms of the democratization of knowledge. Since the beginning of the pandemic caused by the new coronavirus, with the closing of University Libraries, society has been without access to information in physical support and with social isolation and the increase in the participation of students and teachers in distance education, there has been an increase in

relevance of Repositories in the context of scientific dissemination and the open access to information movement.

The IRs have become more evident, as there are currently 4 (four) regional Repositories that are called Repository Networks and these encompass academic and scientific institutions in their respective regions, such as:

•Sudeste Network of Institutional Repositories which is managed by Fiocruz. The access link is: www.icict.fiocruz.br.

•Northern Network of Institutional Repositories which is managed by the Federal University of Amazonas – UFAM. The access link is: www.redenorte.ufam.edu.br.

•Northeast Network of Institutional Repositories which is managed by the Federal University of Rio Grande do Norte – UFRN. The access link is: https://repositorio.ufrn.br/wiki/doku.php.

•Southern Network of Institutional Repositories which is managed by the Federal University of Rio Grande – FURG. The access link is: https://redesul.furg.br/pt/.

IBICT is responsible for the National Network that is under construction. This overview of the current situation of Repositories shows us a great effort on the part of professionals. These Repository Networks greatly facilitate user research, as they do not need to access each repository or institution, it is enough to enter any network that already encompasses the various research institutions, which allows for more transparency in the production of scientific knowledge.

These implementation guidelines for IR's will contribute to technological development, providing the sharing of scientific production, unrestricted access to knowledge produced in the Institutions, dissemination of relevant and reliable information, in addition to providing greater evidence for Brazilian researchers.

Finally, it is expected that this Institutional Repository Implementation script will serve as a support instrument for IR managers and that it will have a very useful reach and that it will contribute and arouse interest in research, scientific and academic institutions to implement or improve their It is laughable that the democratization of

information and knowledge actually occurs and that access to science drives the technological, scientific and social development of our country.

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