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MeRINS – Methodology for the Design and Implementation of Institutional Repositories

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Abstract. In this paper we present a Methodology for the Design and Implementation of Institutional Repositories, called MeRINS. It is customized to the National University of Santiago del Estero (UNSE). MeRINS is to consider the application of the concept of knowledge management to the university, requires thinking the university management from a paradigm that recognizes that knowledge is produced in a context of multiple interactions. The proposal is developed taking into account the characteristics of the UNSE and the suggestions in *LEADIRS II Manual* which offers practical advices that can be used when we start creating an Institutional Repository (IR).

Keywords: Institutional Repository (IR), methodology, design, implementation

1 Introduction

This paper presents a methodology for the design and implementation of institutional repositories (MeRINS), which arises from the need for a tool to facilitate effective and efficient development of digital repositories since there is no specific methodology for this. This methodology is based on the suggestions in the manual *LEADIRS II* to create an Institutional Repository (IR), suggestions that describe and illustrate how to create an online RI.

The proposal MeRINS, consists of seven basic steps intended to serve as a guide for the development of effective and efficient university digital repositories. This is a sequential methodology, in which each stage has its importance and complexity, making it necessary to carry them out in the order presented.

An academic IR is a set of services offered by a university to its community members to manage the dissemination of digital materials created by the institution and its members. It is essentially an organizational commitment to the preservation of these digital materials, including long-term preservation, as well as their access and distribution. [1]

Tramullas y Garrido [2] identifies four basic characteristics that define an institutional repository:

- It has been institutionally defined and established.
- Its content is academic and / or scientific.
- It is accumulative and perpetual.
- It is interoperable and open access.

MeRINS is based on the guidelines proposed by LEADIRS II, it has been proposed to meeting the needs of institutions. Each university has its own idiosyncrasies and unique values that require a custom method. MeRINS takes into account that the best suited information model to college is not right for all cases.

As expressed Tissera, “research that is not disclosed is an investment that is not recovered. It is time now to create institutional repositories and retrieve content retrospective documentary or not, to archive and disseminate them intelligently”. [3]

Moreover, the movement of open access to scientific literature has prompted the development of repositories worldwide. Its main goal is the free availability of scientific and scholarly content. The Open Archive Initiative (OAI) develops and promotes interoperability standards to facilitate the efficient dissemination of content. The OAI has its roots in the open access and institutional repositories.

2 Institutional Repositories

An IR is a set of services to store and make available research material in digital form created by an institution and its community - a digital collection of the product of the research carried out by the community. IRs are becoming essential tools for academic communication in the digital age. They can be part of a larger system, national, regional and global repository, indexed and searchable in a standard way, using an access interface. They can also provide the basis for new models of academic edition and can be linked to other services, such as electronic distance learning, electronic publication of research journals or on-demand publishing.

The RI open access offer a fast and efficient carrying out these initiatives, taking advantage that the WWW means for the academic environment. Facilitate access to research results from universities, research institutes, government agencies and individual researchers. They offer a window to knowledge of the research product in the country and should be an essential part of content strategy to preserve, share and manage digital objects.

The repositories that support open access are highlighted, these repositories have the ability to transform scholarly communication allowing researchers to find and share research results, through the free and unrestricted online availability.

We emphasize the IR definition of Repositories Support Project RSP (Repositories Support Project): “A digital repository is a mechanism for managing and storing digital content. Repositories can be subject or institutional in their focus. Putting content into an institutional repository enables staff and institutions to manage and preserve it, and therefore derive maximum value from it. A repository can support research,

learning, and administrative processes. Repositories use open standards to ensure that the content they contain is accessible in that it can be searched and retrieved for later use. The use of these agreed international standards allows mechanisms to be set up which import, export, identify, store and retrieve the digital content within the repository”.

According to the SHERPA project, which aims to promote the use of open access repositories, a repository is "a website which aims to collect, preserve and provide intellectual production electronically issue or organization without charge to the world."

Among the benefits of institutional repositories for scientific communication are the following:

- Institution raises the visibility of their research by providing access to scientific production of its members.
- The scientific and academic organizations around the world obtain advantages of a faster and easier access to the research developed in other institutions.
- Increased global projection of scientific work and impact of the research.
- Studies of scientific production and research impact can be performed.
- Promoting the preservation of research produced.

Among the factors that have led to research institutions to build or promote the creation of repositories can be cited:

- Publicly financed research should have public access. The research result stored in an institutional repository with open access reduces barriers of access and cost.
- Repositories increase efficiency; it is possible to relate the acquisition of research results to study current processes, allowing capturing the data produced which can then be reused for multiple purposes.
- It is necessary to preserve the digital product research; they see the repositories as digital boxes and accept responsibility for their safekeeping.

3 LEADIRS II

The LEADIRS II Manual is referenced in MeRINS proposal development, is the result of the seminar program on Digital Learning Institutional Repositories that attempts to describe and illustrate how to create an online institutional repository. The series of seminars LEADIRS (Learning About Digital Institutional Repositories) presents a group of specialists in the UK and abroad who share his skill and experience in creating institutional repositories.

This manual, digital version and translated the book of Mary R. MIT Libraries Barton, offers a guide that covers the various aspects to be considered in designing an institutional repository, presents essential aspects ranging from the definition of the service, its mission, the types of users and associated functionality, or content accepted to the formats, the spaces assigned to each user type and the definition of who can add content, who provide the metadata, and so on. They form an important group of

aspects that guarantee the efficiency and sustainability of service and efficiency in the recovery and preservation of information.

Since every Institutional Repository service is unique to the institution where it was created, the information provided by the Manual LEADIRS II intended to be useful for analysis is not intended to be prescriptive and cannot know or anticipate the challenges and specific resources of each institution.

The content provided by LEADIRS Manual II is divided into five chapters:

- Chapter 1: Creating an Institutional Repository.
- Chapter 2: Organizing Your Institutional Repository Service.
- Chapter 3: Choosing the software platform Institutional Repository.
- Chapter 4: Legal framework and regulatory policy development.
- Chapter 5: Guidelines for Cost Planning Institutional Repository.

4 MeRINS

MeRINS (Methodology for the design and implementation of institutional repositories) is a methodology consisting of seven basic phases for the effective and efficient development of a digital repository for UNSE. This is a sequential methodology, in which each stage has its importance and complexity, making it necessary to carry them out in the order presented.

4.1 Phase 1: Establishment of Work Teams

The importance of this phase is to define who will be the managers and staff involved in the project. So also specify personnel will be responsible for implementing the technical and administrative tasks, commissioning and system maintenance, dissemination, promotion and training, and the evaluation and control of service quality. We propose the creation of the following equipment: Planning and Control Equipment, Advisory Team in Policy Actuation, Software Development Team, and Integrated Service Team.

Composition of Planning and Control Equipment. Its objective is to identify the main activities needed to plan the RI. Creating a RI requires careful planning, which is essential for the final product can successfully address the needs of users, and conforms to accepted quality standards.

The plan focuses primarily on identifying various tasks related to the creation of the RI, the development of strategies to manage these tasks, the identification of necessary resources and developing a schedule for carrying out these tasks.

Formation of Advisory Team in Policy Actuation. The team constitution may differ according to the needs and characteristics of each university. In general, all members of a team that developed an IR must meet applicable governmental regulations and conform to the customs and practices of each institution.

However, the responsibility for maintaining and monitoring legal matters rests with the management of the project working with the person skilled in the institution's

copyright and legal counsel (if any). Group functions include drawing up rules repository for copyright and licensing for service (for both deposit and content access).

Composition of Software Development Team. It aims to develop the necessary prototypes of RI and then the final system to be implemented.

This equipment must conform to the following principles of agile methodologies:

- Continuous attention to technical quality and good design which enhances agility. Produce clear and robust code is the key to faster progress in the project.
- Simplicity is essential. Take the simplest ways that are consistent with the objectives. If the code produced is simple and high quality will be easier to adapt to the changes that may arise.
- The best architectures, requirements, and designs emerge from self-organized teams. The whole team is aware of the responsibilities and they fall on all members. Equipment itself decides the best way to organize, according to the objectives pursued.
- At regular intervals, the team reflects on how to become more effective, and adjusts its behavior accordingly. Since the environment is constantly changing, the team also must adjust to the new situation continuously.

Formation of Integrated Service Team. This team has the goal of carry out the execution of the technical and administrative tasks, the implementation and system maintenance, dissemination, promotion and training, and the evaluation and control of quality service.

4.2 Phase 2: Plan Tasks, Exploration and Analysis

At this stage we want to know the reality experienced by the institution and the needs that the institution would take over the management of digital documents. Another important goal of this phase is to characterize and analyze the institutional repositories of other Universities. This phase has four steps.

Development Plan for Exploration and Analysis Tasks. Goals of this step are identify the possible tasks to carry out in the next stages, develop an implementation schedule, and fix possible deviations in the implementation of the plan.

Study the current reality of the institution. At this stage the Planning and Control Team will conduct a survey of the current state of the University, exploring criteria off institution related to organic / functional structure, library and digital documents which are managed in present.

Analysis of the needs of the institution. The goal of this step is to value the university community level needs, in terms of the services that the repository should offer.

To achieve an adequate analysis of the needs of the institution, it is suggested the application of data collection techniques such as surveys, questionnaires and / or interviews.

Exploring existing repositories and working in other institutions. At this stage the aim is to identify institutional repositories in operation, objective is to see how other universities have organized and presented their repositories, and perform basic

and descriptive characterization of them, observing and analyzing key issues such as visibility, policy, legal topics, interface, content organization and interoperability.

4.3 Phase 3: Identification of the User Communities

This phase consists of selecting the user communities that can make use of the repository once implanted in the University. It is essential to identify potential users and sectors to which the IR service might affect. It must identify the intended users or potential repository, key user groups between communities of teachers, students, library staff, administrative and service personnel, internal and external researchers, or others. From the identification of user communities and their different needs, we can define profiles consistent with different access levels, supported by politics and regulations for use of the repository as well as technological aspects of the system.

4.4 Phase 4: General Service Definition of Repository

First we will set the targets to be achieved by implementing the repository based on the interpretation of the needs of the University made in Phase 2 and then we define the repository pattern projected for the University. This phase has two steps.

Identification of goals. The first step in defining the service of an IR is the formulation of the objectives to be achieved in relation to the needs of the educational community of the University. To perform this task is important to specify what is to be offered through the repository, indicating what content will be included and what services will be offered, for which users it is intended, who may deposit the contents, which are the rules that govern its use and operation, if the library is involved, which are the responsibilities of the library and the user community, among others.

Model of service. To set a service definition for RI is necessary to specify what offer to users. It is important to define precisely how the system will be used and what type of services offered. In some cases the universities create their repositories to store only academic researches, others include also thesis students, teaching materials or university reports.

4.5 Phase 5: Identification of Policies Action

Advisory Team in Policy Actuation should set standards to regulate the service repository determining specifications regarding content contribution and distribution, privacy and licensing, and other rules. There are legal and intellectual properties to address when developing a IR. It is necessary to consider the main aspects of intellectual property rights and then develop policies that fit the reality of the University, in order to ensure the smooth operation of the repository service and considering that each institution has unique needs that characterize it. Each university develops a need to determine IR policies and regulations for their digital collections, as well as each IR is unique and regional laws vary, your performance will be policy unique to your service.

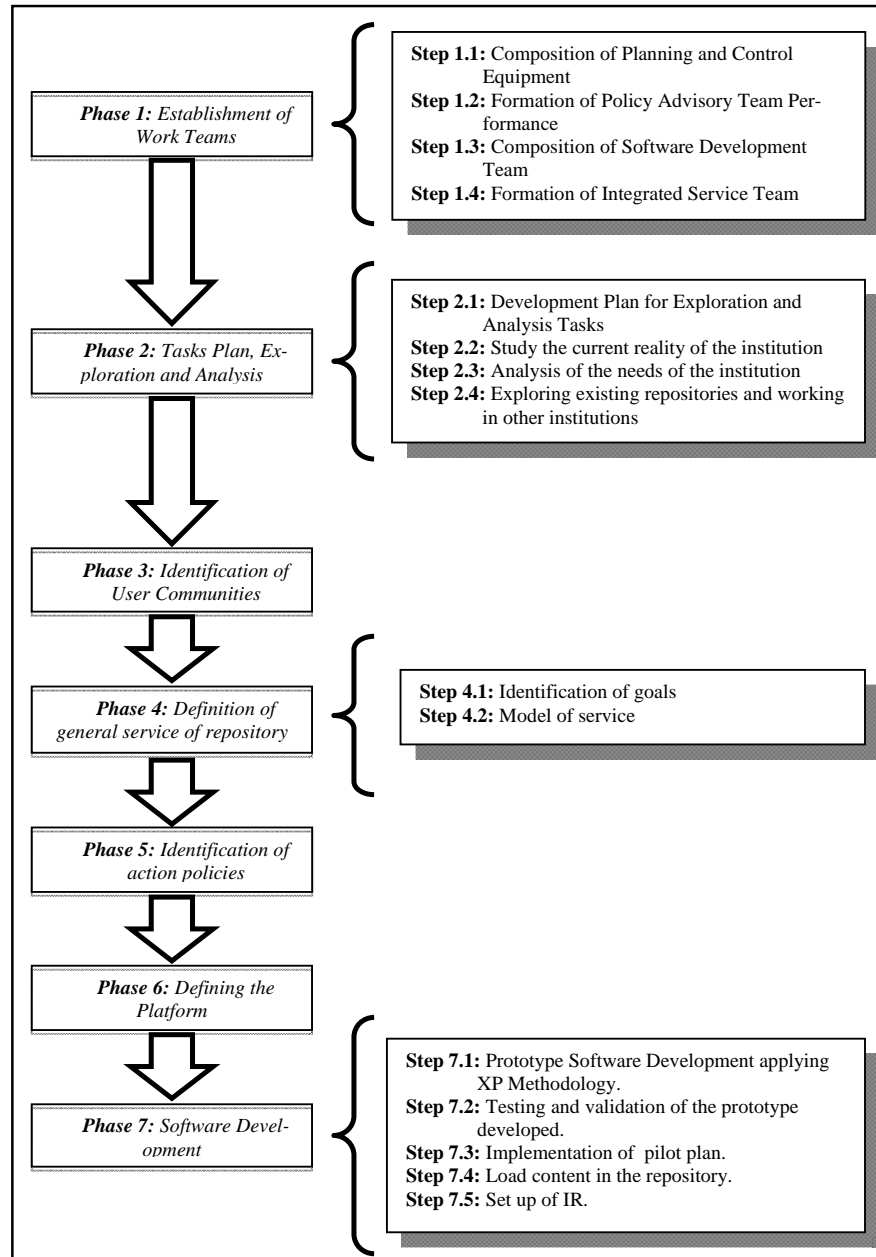


Fig. 1. MeRINS phases

4.6 Phase 6: Defining Software Platform

Taking into account the specific characteristics of the software platforms available, the development team must choose the one that best suits the needs of the institution where we want to deploy the repository. The IRs for implementation and development require the interaction of several technologies covering various fields of operation. Specific technologies in IR can be implemented in different ways and for that we need a technology framework to solve and articulate the particular requirements of the institution that establishes and appropriate adjustments and specific academic community. The platform we choose will depend largely on the particular needs of each repository, primarily should consider the types of digital objects to be stored, the number of items you plan to establish the repository, and a short growth forecast and medium-term

4.7 Phase 7: Software Development

Using techniques that are part of the XP agile methodology, the Software Development Team in conjunction with the Advisory Team in Policy Actuation, define the functional and nonfunctional requirements for RI, as well as software and hardware required for implementation. On this basis, the development team can carry out the necessary development of prototypes and the final system. MeRINS intends to apply to the development of IR techniques for developing some programming.

Prototype Software Development applying XP Methodology. General scheme of development process prototype software used by MeRINS is shown by Figure 2. Principal goal of this step is to develop the necessary prototypes of RI and the final system to be implemented.

Testing and validation of the prototype developed. Testing and validation of the prototype by the Development Team tasks include search, browsing and retrieval, system administration and content loading.

Integrated Services Team will conduct the evaluation and control of service quality by analyzing the quality of the repository search and navigation.

After completing the testing and validating the system, the Service Team suggest improvements (if necessary) to the development team, who will develop the final system.

Implementation of pilot plan. A pilot plan for the prototype repository will get in execution. This stage will be in charge of the Integrated Service Team.

This will help test the software, delete unnecessary procedures, and verify policies actuation and expectations before starting the service with the final system

Load content in the repository. This step performs batch load of historical content. This task will be in charge of Integrated Service Team and it will allow early users of the system can search on the repository.

Set up of IR. To achieve the performance final RI system, the Integrated Service Team will do several activities among others:

- Develop awareness activities regarding the utility of institutional repositories, these activities will be directed to academic staff and potential users.

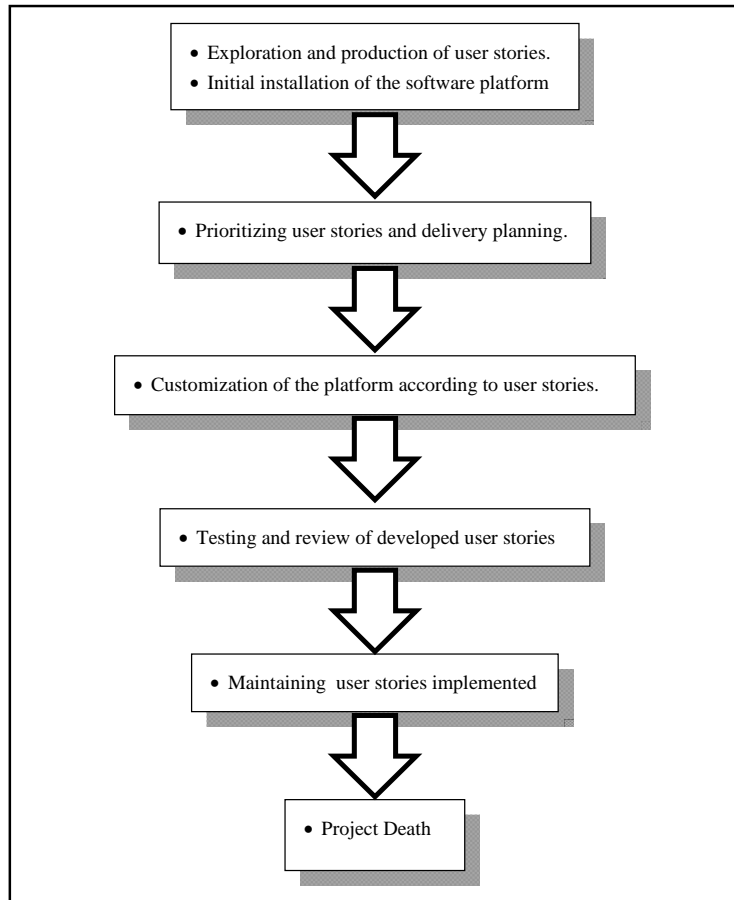


Fig. 2. General scheme of Development Process Prototype Software used by MeRINS

- Organize marketing campaigns.
- Leading practice and establishment of new content collections.
- Disseminate and promote the services provided by the RI.
- Dictate training courses for those who contribute content.
- Provide a support service to users.

Project Death. This phase will occur when the Integrated Services Team has no more stories to be included in the system, then, it is time to take into account other aspects such as performance and reliability of the system until to achieve the satisfaction of the needs presented.

This phase will generate the final documentation of the system and there will be no more changes to the architecture.

5 Conclusion

Institutional repositories have become the main way to organize, publish, preserve and disseminate digital scientific information from universities. The design of an institutional repository must take into account the needs of the institution and potential users.

As part of the development of this work a methodology called MeRINS, Methodology for design and implementation of institutional repositories, was developed in order to provide a tool to facilitate effective and efficient development of digital repositories in universities.

The MeRINS proposal was designed primarily for use in educational institutions of higher education, although its general character may also be helpful in other similar institutions interested in building an institutional repository.

Digital materials generated in the UNSE such as projects and research -and graduate thesis, teaching materials and other documents that are produced in the area of the institution- need a new way of management for describe, organize and present.

This documentation is managed through the Central Library of the university, but it cannot be freely accessed by members of their community as well other members either by national or international institutions.

Currently the management is interested in implementing a strategy for greater visibility and accessibility of scientific and university teaching. To solve this problem a prototype was proposed to build institutional repository.

The prototype was designed in order to be implemented as a final system in UNSE. The MeRINS methodology was used for the design and development of prototype.

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