

**GAIA ANTARCTIC DIGITAL REPOSITORY:
MANAGEMENT AND DISSEMINATION OF ANTARCTIC KNOWLEDGE**

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Abstract

The experience of creating the Gaia Antarctic Digital Repository a specialized subject repository, is described. It was born during the Convenio de Desempeño MINEDUC-MAG 1203 "Gaia Antártica: Conocimiento y Cultura Antártica" and the collaborative partnership of the Universidad de Magallanes (Umag) with higher education and research institutions that contribute to the knowledge of the Antarctic Continent. The purpose of the repository is to develop a single digital platform to collect, preserve and disseminate scientific, academic and disclosure information about the Antarctic and Antarctic polar areas. It emphasizes partnerships with national universities and institutions of research. The paper also describes the process of selecting documents; specifying the terms for scanning; the technical aspects of the selection and implementation of the management platform of digital objects; selection of open access software and the use of standard bibliographic description; and the implementation of hardware and networking technologies. Finally, it describes uses, policies and copyrights, settlement and dissemination.

Keywords: Digital repositories, Antarctica, Gaia Antarctica, open access, knowledge dissemination.

Introduction

The growing generation of knowledge at the global level has raised important challenges for researchers and preservers of scientific information. Publishers took charge of publishing and disseminating this knowledge, and higher education and research institutions invest resources that directly affect budgets for publication, dissemination and new research. There is a global tendency to publish on open or free access sites: "... when referring to open access, we are referring to its free availability on the public Internet, allowing any user to read, download, copy, distribute, print" (Suber, 2002). It means that it is becoming more common to find information generated by scientific research without having to be subscribed to a particular title or to a specialized or multidisciplinary commercial database. Now the author or holder of the rights of the information generated has a quick and effective way of explicitly allowing publication to be shared through open access, using Creative Commons licenses. This innovative international licensing project strikes a balance between the traditional "all rights reserved" and the freedom of the author to define and establish the terms in which their works can be used in the public domain. Librarians have traditionally played important roles in gathering and connecting users with the information they require. This has been facilitated by the incorporation of new information and communication technologies (ICTs), allowing access to content not only in an agile and efficient way, but also in different formats.

The Chilean National Antarctic Policy prioritizes among others the following areas:

1. Effective participation in the Antarctic Treaty System.
2. Preservation of peace, scientific activities and ecological reserves.
3. International cooperation.
4. Promotion of facilities in continental Chile as a bridge country, especially strengthening the participation of the Region of Magellan and Chilean Antarctica.
5. Orientation of Antarctic national science in a way that is linked to major trends.
6. Conservation of marine living resources.
7. Promotion of controlled tourism.

Likewise, each of the institutions invited to be part of the project has among its objectives to study, protect and/or develop a territory that offers a lot to discover, and has a large number of documents that needed to be collected, stored, preserved and make available to public domain.

Genesis of the Project

Digital repositories occupy an important place in the information world, both in research institutions and in higher education. "Repositories have two fundamental purposes: to distribute research articles via the Internet and to ensure their conservation in an electronic and dynamic environment" (Barton, 2004-2005). Repositories are based on open access, facilitating communication between researchers, sharing and finding results online, thus increasing the impact of research. Now it is easier to recover data quickly and efficiently in specific subject areas thanks to different free access initiatives such as software and data exchange protocols, and also thanks to information retrieval library techniques, archiving techniques, optical character recognition technology and mass storage.

Along with the institutions that measure scientific productivity through the control and registration of bibliographic citations and that produce a series of rankings and indicators at national and international levels, some measure and qualify repositories and generate directories with impact measurements (visibility or number of links received), number of pages, number of rich files, and entries in search engines like Google, raising the research profiles of the institutions. On the other hand, our country as an Antarctic country conducts active scientific work on that continent, supporting national and international research initiatives. In its Strategic Plan for Institutional Development (2012-2016), the University of Magallanes (UMAG) has prioritized three research areas: human settlement in high latitudes, Antarctic and sub-Antarctic biodiversity, and energy.

The Antarctic concern of UMAG also operates within the guidelines of the Regional Agenda for Productive Development of the Regional Government, and the creation of the Antarctic Programs Directorate further enhances the role that naturally belongs to it as an entity of higher education that is geographically and strategically positioned in the region closest to the icy continent.

In this context there is a Performance Agreement (CD) in the Regional Higher Education Area "GAIA-Antarctica: Antarctic Knowledge and Culture," which was signed in 2013 between UMAG and the Chilean Ministry of Education. Its general objective is "to substantially improve knowledge and Antarctic knowledge in the Region of Magallanes and Chilean Antarctica, leading the UMAG to be recognized at regional, national and international level for its competence in Antarctic matters."

All of the aforementioned was enough reason for the Libraries System of the University of Magallanes (SIBUMAG) to be involved in the Performance Agreement, proposing a specialized Digital Repository, allowing the availability of quality and updated information on the Antarctic agenda and the local, national and international production of Antarctic data, based on a public domain Web platform. It also gathered information dispersed in the collections of national and international institutions dedicated to the subject. The core of the repository would be documents previously collected, selected and digitized from the collections of the institutions with which agreements are established and the documents generated by the University of Magallanes in the context of the different actions that emanate from the Plan of Institutional Improvement (PMI).

Methods

Several stages were established to optimize the work:

1. Identification and selection of institutions with which to establish cooperation agreements.
2. Selection of the relevant resources in each of the involved organizations.
3. Digitalization of documents.
4. Design and implementation of the database.
5. Population of the repository.

1. Agreements

One of the specific objectives of the Performance Agreement is linkage with the environment "to generate permanent strategic alliances between the academic sector and the public and private actors that allow to spread the culture and to foment the Antarctic knowledge." The Chilean Antarctic Institute (INACH), under the Ministry of Foreign Affairs, is responsible for coordinating, planning and carrying out scientific and technological activities in Antarctica. Its Communications and Education Department is in charge of collaborating, participating and sharing the results of the countless campaigns, trips and scientific explorations carried out on the Antarctic continent, and since 2003 the national headquarters has been located in Punta Arenas, facilitating information exchange.

The next institution was the University of Chile, specifically the Information System and Libraries (SISIB). This agreement is meant to preserve titles, theses, books and articles produced by students and academics from different faculties and institutes. In order to involve the Directorate of Archives and Museums Libraries (DIBAM), the framework agreement established in the context of the Institutional Improvement Plan "Identity of the End of the World: Patagonia, Tierra del Fuego y Antartica" was used, which would allow access to relevant resources.

During 2014, the Board of the Center for Hemispheric and Polar Studies and the President of the Valle Hermoso Foundation also agreed to participate as collaborating institutions. At the end of 2015, a Collaboration Agreement was signed between the University of Magallanes and the Universidad Austral de Chile (UACH). As mentioned in the document, the planning, coordination and execution of the programmed activities will be channeled through the UACH Libraries Division (SIBUACH) and the Umag Libraries Division (SIBUMAG). As the Director of the Antarctic Department of the Army of Chile is part of the External Executive Advisory Commission of the CD, they have contributed documents dating from 1948, the year of the creation of the Antarctic Base Bernardo O'Higgins.

Participating institutions benefit not only from the visibility and dissemination of the information they generate, but also from the availability of digital versions of those resources for preservation. According to the commitment in the Performance Agreement, it is expected that in this first stage a total of seven national and international entities will participate in this initiative. The signing of an agreement with the University of Santiago De Chile (USACH) is currently pending.

2. Selection of Material

Once the cadastre was carried out in the bibliographic catalogs of the institutions in agreement considering the thematic pertinence, the resources that had released intellectual property were selected. This allowed the discovery of those already in digital format and also quantified the need to process in the first stage about 37,000 images, belonging to documents, slides, maps, books and photographs. Each of the articles, papers or references were reviewed in the authorized sources of verification of intellectual property like Sherpa/RoMeo, a database that facilitates the online consultation on editorial policies of the publishers and auto archiving. Each of the participants, in turn, retrieved the documents to be digitized and put them at the disposal of the University of Magallanes. As a policy of the repository, it was decided that if there was a restriction to access, the document will be registered and linked to the main source.

3. Digitization

For the selection of the company that would execute the service, the bidding terms of reference were described, including administrative and technical specifications, such as formatting, quality of image resolution for publication and preservation, and optical recognition technology (OCR) that facilitates retrieval because it allows identification of the required term throughout the text. As there were no companies dedicated to digitization in this Region, a move to Punta Arenas of the equipment needed to carry out the process was incorporated as a requisite, since many documents could not be exported from the region. Four national companies answered the call. Work was done digitizing resources such as photographs, maps and slides.

4. Implementation of Databases

The review of the literature on repositories allowed the establishment of the best parameters on standards and criteria available worldwide in the design and implementation of databases. The open source software DSpace was chosen because of its ability to manage and preserve digital files for a long time and in constant evolution. This software was developed in a strategic alliance by the Massachusetts Institute of Technology (MIT) and Hewlett Packard (HP).

For recovery it was decided to use the Dublin Core Metadata Model (DCMI) for its interoperability feature that would facilitate the description, visibility and retrieval of digital objects. There were four bidders to implement the repository. In the end it was awarded to Prodigio Consultores.

The information inside the repositories is organized in communities. In this case, they were associated with each of the participating institutions. Collections were established for the types and formats of documents detected in the review and selection. According to the types of resources, the following collections were established:

- Human activity
- Science
- Institutional Information
- Treaties and protocols
- Tourism
- Travelers and explorers
- Antarctica life in pictures
- Education and outreach

One of the tasks that required considerable time was the selection of metadata. In addition to incorporating traditional ones, others were established that allow access to resources in the most efficient way possible. It was also decided to acquire a dedicated server to host the digital objects with dedicated Internet access, to ensure both storage and access in an optimal way. Each of these activities required the relevant professional advice.

5. Repository Population

Once the company that was in charge of the digitization gave us the digital objects, we proceeded to make the descriptions and enter them into the database. This activity was carried out by the staff of the Library System of the University of Magallanes (SIBUMAG), which has been trained in these new techniques and technologies.

Conclusions

1. Gaia Antarctic Digital Repository consolidates the position of the University of Magallanes and collaborating institutions as a national and international reference for the development of studies in natural, social and normative sciences regarding Antarctica.
2. Institutional alliances with a common goal enhance results, especially on issues of national and international interest.
3. A large number of the information resources that were stored without any criteria to facilitate recovery will now be available via open access and with proper descriptions.
4. Incorporated technologies promote other similar initiatives that the University could develop.
5. Good practices and policies of documentary preservation are promoted.
6. Information professionals of the Library System have benefited by responding to the challenge of incorporating new knowledge in tools, techniques and technologies used worldwide, which enables them to continue with the service of being the disseminators of knowledge.
7. The dynamic of the information technologies allows to project a continuous development of both the contents and the participants and collaborators of this initiative, that promotes, diffuses and develops more knowledge about the Antarctic Continent every day.

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