Fostering the Institutional Repository Through Policies and Interoperability With Online Services: The Case of La Plata National University

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Abstract
This article presents the work being done by La Plata National University (Universidad Nacional de La Plata, UNLP) to ensure both the preservation and dissemination of its academic and scientific output. To this end, the university has established a combination of institutional policies, workflows among departments, and services and software developments for its programs and projects. Developments focused on importing and exporting metadata between DSpace – the software used by the UNLP main repository – and OJS/OCS – used by its Journals Portal and Conferences Portal – and integrating repository assets into the most common content management systems (CMSs) used by institution parties, such as WordPress and Joomla! The first results of four years of back-and-forth collaboration show an important growth in size, rankings, usage, and the online visibility of the whole university.

Keywords
Knowledge dissemination; Software development; Institutional repository

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Introduction

Among the main objectives of La Plata National University (Universidad Nacional de La Plata, UNLP) is the open dissemination of its scientific and academic production, both in order to increase its visibility and to allow it to give back to society part of the effort invested in public universities. The growing production of scientific and academic material by the university itself – which includes journals and the proceedings of conferences organized by members of the institution – and the promotion of the ongoing generation of these materials have been approached from several perspectives. Most notably, subsidies for the organization of and participation in scientific meetings for university researchers, and the creation of services and tools that can be used to support the management and publication of its own intellectual production, including scientific and academic journals, various department blogs, tools for distance education, and software for the organization of scientific-academic meetings. This article will focus mainly on two of these services and their tools: the Journals Portal (Portal de Revistas, 2013) and the Conferences Portal (Portal de Congresos, 2013) of the UNLP.

The Intellectual Creation Dissemination Service (Servicio de Difusión de la Creación Intelectual, SEDICI) (SEDICI, 2013b) of the UNLP was created in 2003 with the aim of preserving and disseminating the university's intellectual production. This initiative represents one of the university's main efforts to increase the visibility and dissemination of the work of its faculty, researchers, and students. In order to achieve this goal, the SEDICI was designed to be the central institutional repository of the UNLP, focusing on production in the academic units and research centres and articulating its activities with other university departments and initiatives, such as the UNLP publishing house (EDULP), the university radio program, and the Department of Distance Education, Classroom Innovation and TIC (EAD). UNLP's Journals Portal is an initiative that aims to promote the creation of journals in different areas of the university, including laboratories and research centres, departments, work groups, and for independent professors and researchers. This initiative follows the same line of many institutions across the world that have implemented similar services with the objective of maximizing the impact and visibility of their journals and their professors and researchers.

Many of the institutions that have portals for their journals use the Open Journal Systems (OJS) open source software as their basis. According to the official Public Knowledge Project's Open Journal Systems site, the platform, as of its 2013 update (PKP, 2013b) is used by more than 24,000 journals, including UNLP's Journals Portal. The widespread use of this platform is due to the broad support it brings for each stage of a journal's editorial process – from indexing and publication to its reception – for its ease of use, and for its availability in many languages. It is important to note that the use of this portal is not mandatory for UNLP members; for that reason, not all journals from the UNLP are hosted by OJS. Many journals existed before the portal was launched, some without a digital version, and even though some of them were migrated into the portal, others continue to publish on their own. For this reason, while SEDICI holds nearly 100 journals, the Journals Portal hosts almost 20 percent of them.

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In a similar way to what happened with the Journals Portal, the UNLP chose to create a service called the Conferences Portal, which offers support to all of its researchers and professors in the organization of any type of scientific and/or academic meeting. This service is based on Open Conference System (OCS) software. The team in charge of maintaining the Conferences Portal provides technical support to the organizers, hosts periodic meetings with the users, creates and offers documents and help tools, and ensures the service is always running and updated.

Two of the challenges that arose from the very beginning of the implementation of the UNLP's journals and conferences portals were establishing a workflow and developing technological tools to allow these services to have an ongoing collaboration with the SEDICI. This collaboration is to ensure the preservation of the intellectual production of the members of the UNLP hosted in said portals and to minimize the redundant work of the staff of both services. To this end, several collaboration policies were implemented between the work teams of SEDICI, the Journals Portal, and the Conferences Portal, and the tools that support these services were configured and enhanced in order to foster interoperability through the collaborative exchange of documents. This was possible thanks to the use of free open source tools: DSpace as the basis of the SEDICI Institutional Repository, Open Journal Systems for the Journals Portal, and Open Conference Systems for the Conferences Portal. In this context, there was an effort made to incorporate additional parties from different areas of the UNLP in this work of dissemination and preservation.

This article outlines which policies were implemented (UNLP, 2011), together with the mechanisms and technologies developed to concentrate, preserve, and enhance the visibility and dissemination of the whole intellectual output of the UNLP. Although this article has mainly focused on the services mentioned in the preceding paragraph with the SEDICI as a central point, further efforts and developments that share a similar goal and involve other departments from the university are also mentioned.

OJS and DSpace

From OJS to DSpace

The aim of the collaboration between the UNLP's Journals Portal and the SEDICI is to simplify the submission of articles hosted in the Journals Portal to the repository. This is important not only to help disseminate journal articles, but also to ensure the preservation of the documents – a task accomplished by the repository. This can be done at two points in the lifecycle of a journal inside the portal: the initial point, when a massive import of every previous issue of a journal is required to incorporate it into the repository, or on a day-to-day basis, whenever a new issue of a journal is published. Different alternatives were evaluated for integrating OJS and DSpace, taking into consideration two possible use scenarios for this integration: on the one hand, OJS hosts documents (articles) that need to be shown in DSpace, and on the other hand, many journals that already had a preservation and dissemination mechanism through SEDICI have started using the Journals Portal, so their articles must be sent from DSpace to OJS. To be able to do this, two alternatives were analyzed:

- ALTERNATIVE 1: export articles from OJS using a metadata format compatible with both systems – in this case, Dublin Core (DC) (Harper, 2010). The export would generate a single Extensible Markup Language (XML) file containing each issue of a journal, its sections, its articles grouped by section, and the authors of each article. Additionally, the full PDF document is added to the XML of each article, encoded in Base64 format (Josefsson, 2013). The main advantage of this alternative lies in the fact that the portal already has tools for exporting to XML, so the only development needed would be to reinforce the functions for transforming several isolated XML files into a single unified file that will later be interpreted from the SEDICI DSpace. However, the intermediate process of adapting each of the exported XML format and generating a global XML file could be too costly for importing journals with a large quantity of back issues and articles. Alternatively, the exposition export of DC metadata through the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) in Open Archives Initiative Object Reuse and Exchange (OAI-ORE) format was also considered. This would be followed by making DSpace harvest articles and full text files downloadable from metadata URLs. Even though this solution also turned out to be too costly, its implementation has not been wholly discarded for the future.
- ALTERNATIVE 2: perform the export from OJS using the Sword v1 plug-in. This alternative takes advantage of the tools the portal already offers and adds to them in order to perform this kind of operation; furthermore, DSpace also can accept deposits through Sword v1 or Sword v2, which means that the communication between both systems can be done in a simple and uniform way. However, given that the metadata schemes in both systems are considerably different from one another, this alternative requires the adaptation of exported metadata into a format that can be shared through Sword. A great advantage of this option is that the tools offered by both systems are already available and only need to be adapted to the particular requirements of the UNLP.

Alternative 2 was chosen mainly for its ease of development, as it generated an applicable solution in less time according to the protocol requirements. The implementation was carried out based on the Sword v1 export plug-in in OJS. This tool generates what is known as a "deposit package," which contains all the information that is considered relevant about the article or articles to be deposited. The restrictions of the internal metadata structure itself used by the SEDICI – an internal representation combined with DC and a Metadata Object Description Schema (MODS) emulation – required some minor modifications to the procedure used to build this package, which was enhanced with additional relative data for each article. The first adaptation was done to incorporate a date of publication for each OJS article, given that in this system articles lack their own field with the date of publication (because this information is already in the issue they belong to), and it is a mandatory requisite for each SEDICI record. The modification to the OJS export tool allows for the addition of the date of publication of the issue or, at least, considers the date of the article's incorporation in the repository as the date of publication, to avoid leaving it with a null value. In order to maintain compatibility between metadata profiles, some of these metadata values

were omitted or in some cases a data transformation was applied. Transformed, a data transformation is applied when performing the export (such as the author's affiliation, which is not considered as part of the metadata structure of SEDICI). Moreover, with the modified tools, the title metadata allows multiple instances, which allows for sending several titles for the same article; this is a characteristic feature of OJS, in case an article is present in different languages. For this same reason, the abstract metadata was altered to allow for the incorporation of multiple abstracts for each article. The identification metadata for each journal is assembled from its configuration in OJS, whether it is only by volume; by volume and issue; by issue alone; by volume, issue, and year, etc. The language metadata, required by SEDICI in every document, was also incorporated as an additional field in each OJS document sent through Sword. Table 1 shows the compatibility adaptations implemented between the metadata of the Journals Portal and SEDICI. Besides making the relevant modifications in OJS at the time of exporting the documents, some modifications were also implemented in the DSpace software of the SEDICI, particularly in its crosswalk (Chan & Zeng, 2006), which is in charge of transforming data received through Sword (see Figures 1 and 2).

Table 1: Relation between OJS and DSpace metadata

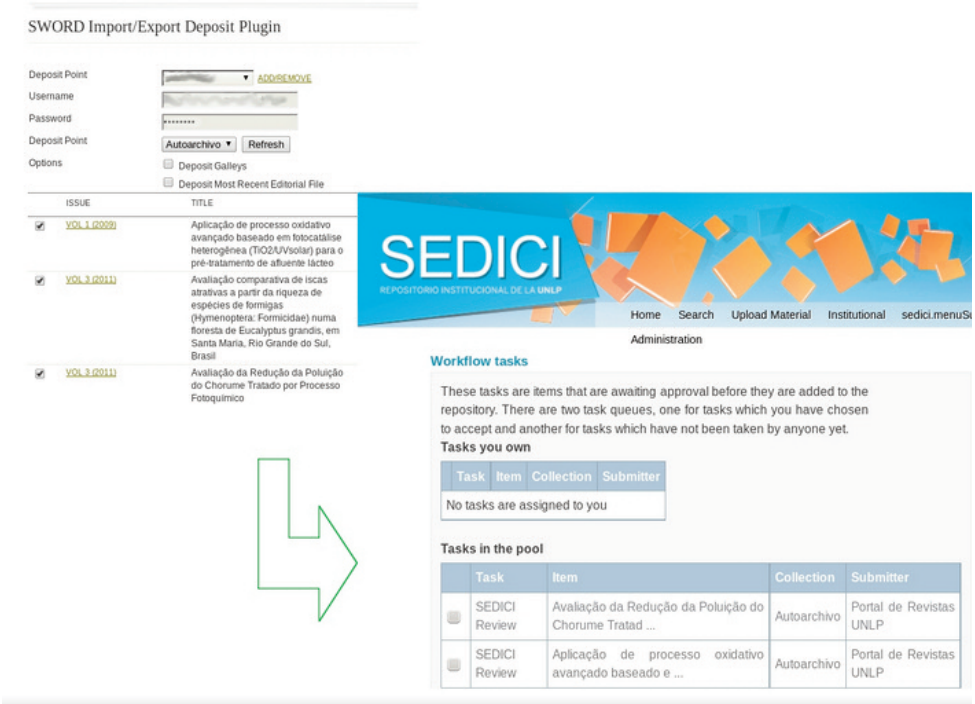
Name in natural language	Name of the field in DSpace	Name of the field in OJS
DOI	sedici.identifier.doi	doc.doi
Title	dc.title	doc.title
Alternative title	dc.title.alternative	doc.title
Author	sedici.creator.person	doc.author.fullName
Date of publication	dc.date.issued	doc.DatePublished
Language	dc.language	doc.language
Summary	dc.description.abstract	doc.abstract
Type of document	dc.type	doc.type
Issue identification	sedici.relation.journalVolumeAndIssue	journal.year, journal.number, journal.volume
Title of the journal	sedici.relation.journalTitle	journal.title

Notes: The first column shows the meaning of each field, the central column shows the field's denomination in DSpace, either as defined by Dublin Core (DC) or the proprietary definition in SEDICI, and the third column shows which attributes of the article (doc) or the journal are used to obtain each metadata.

Figure 1: Part of the XSLT code adapted from the DSpace crosswalk, which transforms metadata sent from OJS through Sword 1 to the metadata format used in SEDICI

```
<?xml version="1.0" encoding="utf-8"?>
<xsl:stylesheet
    xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
    xmlns:dim="http://www.dspace.org/xmlns/dspace/dim"
    xmlns:epdcx="http://purl.org/eprint/epdcx/2006-11-16/" version="1.0">
    <xsl:template match="text()"></xsl:template>
    <xsl:template match="/epdcx:descriptionSet">
        <dim:dim>
            <xsl:call-template name="el_titulo"/>
            <xsl:apply-templates/>
        </dim:dim>
    </xsl:template>
    <xsl:template match="/epdcx:descriptionSet/epdcx:description/epdcx:statement">
        <xsl:if test="./@epdcx:propertyURI='http://purl.org/dc/terms/isPartOf'">
            <dim:field mdschema="sedici" element="relation" qualifier="journalVolumeAndIssue">
                <xsl:value-of select="substring-before(epdcx:valueString,'*')"/>
            </dim:field>
            <dim:field mdschema="sedici" element="relation" qualifier="journalTitle">
                <xsl:value-of select="substring-after(epdcx:valueString,'*')"/>
            </dim:field>
        </xsl:if>
    </xsl:template>
    <xsl:template name="el_titulo">
        <xsl:if test="epdcx:description/epdcx:statement[@epdcx:propertyURI='http://purl.org/dc/elements/1.1/title'][1]">
          <dim:field mdschema="dc" element="title">
            <xsl:value-of select="epdcx:description/epdcx:statement[@epdcx:propertyURI='http://purl.org/dc/elements/1.1/
            title'][1]/epdcx:valueString"/>
          </dim:field>
        </xsl:if>
    </xsl:template>
    <xsl:template match="/epdcx:descriptionSet/epdcx:description/epdcx:statement[@epdcx:propertyURI='http://purl.org/dc/
    elements/1.1/title']">
        <dim:field mdschema="dc" element="title" qualifier="alternative">
            <xsl:value-of select="epdcx:valueString"/>
        </dim:field>
    </xsl:template>
    <xsl:template match="/epdcx:descriptionSet/epdcx:description/epdcx:statement[@epdcx:propertyURI='http://purl.org/dc/
    elements/1.1/title'][1]">
    </xsl:template>
</xsl:stylesheet>
```

Figure 2: Sending articles through Sword from the UNLP's Journals Portal to the SEDICI



Notes: For this type of self-archiving, the sender is the Journals Portal, which helps the administrators of SEDICI differentiate it from the traditional self-archiving done by users.

From DSpace to OJS

The institutional repository of the UNLP was created almost six years before the implementation of the Journals Portal (2003 and 2009 respectively). Many publications already existed by 2009, some of which have recently decided to migrate their management and communication system to the Journals Portal. In this case, a need arose for inverting the integration process between OJS and DSpace, as these journals also wanted the new website to show all their previous volumes and issues, but it became too costly to upload all the issues manually together with their metadata and complete articles.

Given that DSpace has tools for the export of collections and OJS has options to allow mass imports, the relevant adaptations were made in order to make use of these developed features to bring compatibility between both systems. An alternative method to importing/exporting might have been to expose documents through a software Application Programming Interface (API). The RIOJA project, which finished in 2008, followed this path by generating an API for ePrints repository software (RIOJA Project, 2008). However, implementing an API over DSpace was considered too costly for this project, and thus this option was not considered an alternative.

During the stage in which alternatives were being considered, different options were proposed to integrate SEDICI documents into the Journals Portal.

- Alternative 1: setting up a way of communicating from DSpace to OJS through the use of RSS/Atom feeds (Nottingham & Sayre, 2013). To dump information from DSpace, an RSS channel could be used to update the information required by OJS, periodically or on demand. This also required the implementation of a plug-in to give OJS the ability to read RSS, which is a relatively simple task. The main advantage of this alternative is the ease of implementation and the little time it would take to reach a working solution. However, some disadvantages must be taken into account: RSS is a passive protocol, so for it to work correctly, the feed reader in OJS would have to be continuously active and waiting for the information sent from DSpace. This can be avoided if there is a person who can perform this task periodically, synchronizing the sending of information from DSpace and its capture from OJS. In any case, there is an even bigger difficulty: in the case of the articles contained in DSpace, it is not possible to send the file attached to the article, as the RSS standard does not support the sending of attached documents *a priori*.
- Alternative 2: expose documents from DSpace and collect them in OJS by means of the OAI-PMH protocol (Rusch-Feja, 2002). DSpace already has an OAI data provider in place, which simplifies the implementation of this option. From the side of OJS, there is also a plug-in that offers a data provider for OAI; however, in this case it would be necessary to develop an OAI harvester that could receive the content exposed from DSpace. The main advantage of this option is the use of a protocol that is widely used to share content, so the implementation of a plug-in with a service provider for OJS could be reused in the future. The main disadvantage of this solution is basically the same as the RSS-based solution – given that OAI-PMH is a protocol for sharing content

metadata but not for sending attached files, it would still require the editor of the journal to upload the full documents manually.

- ALTERNATIVE 3: connect DSpace with OJS through Sword. In this case the inverse solution is proposed for integrating OJS and DSpace. The Sword client present in DSpace can be used to achieve this goal, though the development of an additional plug-in or an add-on would be required to run a Sword server in the context of OJS. The advantage of this option lies in the unification of the communication method between both systems. Besides, as shown before, Sword allows sending attached files, so all the articles, together with their data, could be sent from DSpace after the transformation between the data of each of the two systems. The most important disadvantage is the need for the full implementation of a Sword server, which involves a larger development effort. Even though for the time being this option was rejected, its medium-term implementation has not been completely discarded.
- ALTERNATIVE 4: consider the export methods already implemented in DSpace, for example, exporting to an Archival Information Package (AIP) (Wolfe & Reilly, 2013), and creating a plug-in for OJS that is able to interpret the structure of this export, take the data, and create the articles from it. This option allows a relatively quick implementation to establish a direct way of communicating between DSpace and OJS. The idea is to establish a method that is triggered manually, in which a repository administrator generates a single file with the complete export of a journal in the repository and sends it to an administrator of the Journals Portal. This administrator then takes the file, bulk processes all its articles, and imports them in OJS through a specifically designed plug-in. Implementing this solution is relatively simple, allows for the processing of a large quantity of records at the same time, and it also includes attached files as part of the export-import method. However, a downside to this solution is the degree to which it is specific to DSpace and OJS, which restricts its potential in other contexts.

The fourth alternative was chosen, coupled with the implementation of a new import plug-in for OJS that takes the AIP package generated by DSpace, analyzes the information it contains, and uses it to create the issues and articles of the journal in OJS. This should be applied to each journal to be incorporated. The plug-in can be used by a journal manager as well as by the OJS system administrator. It offers the choice of several import methods and allows imports from different media, such as systems like OCS and OJS, and importing from DSpace by means of the AIP format. Additionally, for each one of these alternatives, the processing of a full exported packaged was implemented by decompressing a zip file and creating the necessary articles, together with their corresponding metadata (authors, dates, titles, issues). All the article metadata is extracted from a Metadata Encoding and Transmission Standard (METS) file (METS, 2013), included in each AIP that follows the SEDICI metadata profile, and for which only the information necessary for meeting the OJS metadata article requirements is transformed.

For the incorporation into OJS and the indexing of each article, part of the QuickSubmit plug-in is reused (PKP, 2013c). This plug-in enables different users to

easily publish articles by sending all the necessary data through a Web form. The code of the plug-in was modified to allow it to take the previously decompressed data, as sent through the Web form, and create the corresponding article in the exact same way – as if a user had uploaded it manually. This solution, called the QuickImport plug-in, was designed in a modular way to simplify the incorporation of other import methods from DSpace or from other systems, and its implementation has proved useful with data from both the Journals Portal and the SEDICI. As a consequence, there are already certain initiatives that are planning to take advantage of this solution and apply it to other export and import contexts, such as the integration of the Conferences Portal with the institutional repository.

Conferences Portal and SEDICI

UNLP's Conferences Portal is a service that has been available since early 2009. Its objective is to offer a management tool for every member of the institution who wishes to organize any kind of scientific and/or academic meeting. In order to achieve this, the portal team holds meetings and training courses on the use of the Open Conference Systems (OCS) software used for conference management. During these meetings, the organizers of the conferences are informed about the software's advantages and the importance of making every article and presentation an open publication. To maximize the dissemination and visibility of this scientific-academic output, conference organizers are also offered the opportunity to add it to the UNLP's institutional repository, SEDICI. Of course, this work is done in a way that is transparent to the organizers, and they only need to sign an explicit permission for the dissemination of these materials.

Once the conference proceedings have been published, the SEDICI team undertakes the collection of every publication. To simplify this work, the Conferences Portal team developed a plug-in for OCS (PKP, 2013a) capable of exporting publications' and authors' metadata in multiple formats (plain text, .doc, .pdf, .html, .csv, .zip, among others) (De Giusti, Villarreal, & Terruzzi, 2013). The information generated from the plug-in works as a reference for the SEDICI team to help ensure the correct loading and cataloguing of every document generated in the conference; it also accelerates the incorporation by saving the administrator from browsing all the conference presentations. Given that this tool has recently been widely used by SEDICI administrators, the Conferences Portal team has started the design of a semiautomatic solution that can take advantage of the flexibility of the existing plug-in and can also generate an OCS export file that can be imported into DSpace, which is the basis for SEDICI. Moreover, the integration of OCS with DSpace through Sword or through OAI-PMH under the OAI-ORE format is being considered, in a similar way to the analysis that is taking place with the OJS-DSpace integration.

Self-deposit and channels for dissemination

The activities aimed at maximizing the visibility of the intellectual output of the UNLP also include other parties, services, and policies associated with the university. The dissemination methods fostered by the different groups in the UNLP are possible thanks to constant encouragement from the university's administration. In this respect, in 2011, resolution 78/11 (UNLP, 2011) established that all master's and doctorate

theses produced in the UNLP are to be disseminated and preserved in a digital format through the SEDICI. At the time of deposit, the author of the thesis must agree to a non-exclusive distribution license (SEDICI, 2013a), which states that, "the work shall be made available to the public for them to make a fair and respectful use of its copyright, under the requirement of following the conditions in the use license." In the same text of the distribution license, authors must also choose a license for use (which states the uses authors allow for their work) from among the different possibilities offered by the Creative Commons licenses (Creative Commons, 2013). It is important to note that SEDICI must issue a certificate of deposit, which authors will require to obtain the postgraduate title. In order to make this fast and easy, a deposit Web form has been developed to help authors complete basic metadata related to their thesis, attach all related files, and fill in the deposit license form. Once a SEDICI administrator has reviewed the deposit, which usually takes less than an hour, the author receives an acknowledgement email with the corresponding certificate attached as a PDF file.

Besides SEDICI, an increasing number of the UNLP's academic units have their own repositories in which they store similar documents to those in the SEDICI central repository (theses, articles, conference papers), as well as other documents such as the curricula for their courses and internal resolutions. Many of these repositories implement the OAI-PMH protocol, with which they can show all of their documents. In these cases, the SEDICI team conducts an initial harvesting through said protocol to obtain a subset of the large amount of records hosted in these repositories. This subset includes every document managed by the SEDICI and excludes those that will not become part of the central repository of the UNLP. The records obtained are then processed and normalized, and finally incorporated to the SEDICI database in order to disseminate and make available in their Web portal. Nevertheless, in the SEDICI's portal a link is maintained to the original record at the repository from which it was imported. Once the initial export is done, the SEDICI team conducts the work of permanent monitoring, looking for new records incorporated in these repositories.

Another dissemination method that is starting to be adopted is publishing a subset of records in other portals, with publications and works from the UNLP's central repository, according to a certain filtering criteria, such as author, subject, laboratory, type of document, etc. These records are retrieved by means of a query in the OpenSearch protocol (OpenSearch, 2013), and results are structured under the Atom format and sent to the client through HTTP. This allows, for example, a research centre to publish every document done by its researchers in its Web portal, or researchers can even publish their works on their personal websites. Even though this service is already working, it is necessary to have a method that allows the export of these records in other portals in a simple way. With this objective in mind, a plug-in has been added for WordPress (Polychniatis, van der Rijnst, van Vliet, & Wirken, 2013), the popular open source CMS. This plug-in is being used in the development of the new Web portal for the UNLP's Library Linkage Project (Proyecto de Enlace de Bibliotecas, PREBI) (PREBI, 2013), in which all the publications from a group of researchers are made accessible, and all the publications of each of the researchers are shown on their personal page. This service offers great advantages: it provides a simpler way for keeping the publication list updated in the different pages of the PREBI; it increases the

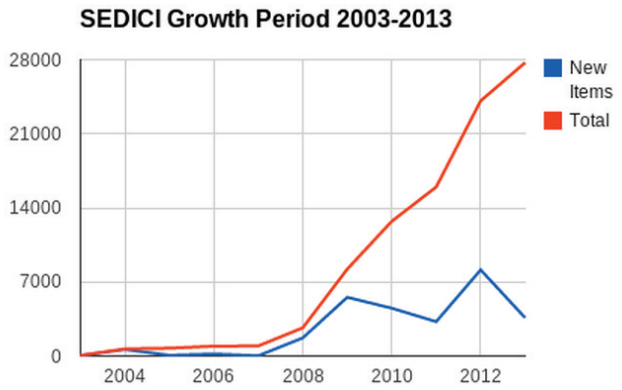
visibility of the UNLP's publications through their dissemination to other portals; and it promotes the use of the university's repository by its researchers and research centres as the main method of preserving and disseminating their output and developments.

A similar solution has been used in the Scientific Journals Portal (Portal de Revistas Científicas, 2013), which includes all the journals from the UNLP that are considered to achieve high-quality standards. This portal, also developed in WordPress, collects all recent articles from every journal via RSS, and lists them in a special page for each journal. A second WordPress plugin has been developed, one that receives an XML with information of all issues from a specific journal and parses and transforms it into HTML as an un-ordered list, always showing the up-to-date journal issues history. The same plug-in has been ported into Joomla! as a module (Joomla, 2013), and it is currently being integrated into the Grupo Montevideo website (AUGM, 2013), in order to display *AUGMDOMUS* journal's (UNLP, 2013a) issues and articles.

Conclusions

This article mentions many of the efforts made by La Plata National University to maximize the dissemination, visibility, and preservation of its academic and scientific production. Many of the efforts have been focused on improving the interaction mechanisms between the different services the university offers to its members. In many cases this has required the implementation of improvements and enhancements to the different software tools used to offer those services, such as Open Journal Systems, Open Conference Systems, and DSpace. In other cases, the efforts are possible thanks to the joint work of different groups and parties in the university – through the implementation of administrative policies and services that promote the use of the repository as the main method of dissemination of knowledge output.

Figure 3: Growth of SEDICI in the last 10 years (higher is better), from February 2003 to March 2013

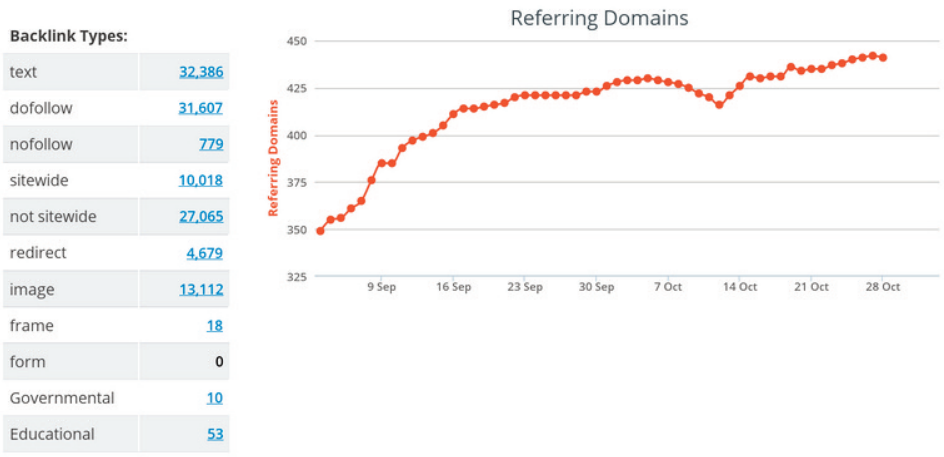


Notes: Since 2008-2009, the size of UNLP's repository has shown an exponential growth, in which the quantity of documents incorporated each year is three times that of previous periods.

As a result, UNLP's SEDICI repository has increased its size from approximately 2,000 documents in the year 2008 (De Giusti, Sobrado, Lira, Vila, & Villarreal, 2008) to over 27,000 by the end of 2013, which represents an increase of more than 1,200% in 4 years (Figure 3).

This growth has come with an increasing number of pages from different domains – according to ahrefs (Ahrefs, 2013b) – that link to SEDICI content (Figure 4), which maximizes the dissemination and impact of the UNLP's academic and scientific production.

Figure 4: The dissemination efforts are reflected as an increasing number of referring domains that link to SEDICI content in the last year (Ahrefs, 2013a)



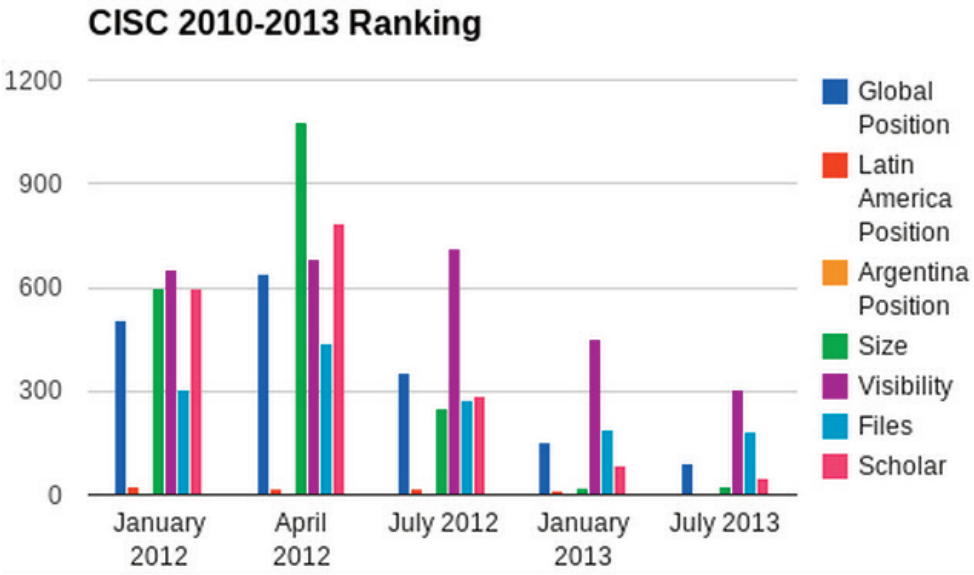
Backlink Types:	
text	32,386
dofollow	31,607
nofollow	779
sitewide	10,018
not sitewide	27,065
redirect	4,679
image	13,112
frame	18
form	0
Governmental	10
Educational	53

Thanks to this exponential raise, the SEDICI has positioned itself as the main repository in Argentina in terms of visibility, the second largest in size (ROAR, 2013) and one of the top ten largest in Latin America (webometrics, 2013b). This has helped to increase the visibility of the intellectual production of the university, ranking it as number 4 in Latin America and number 93 worldwide (Table 2 and Figure 5), according to the latest university ranking published by the Cybermetrics Lab in Spain (webometrics, 2013a). These results confirm that the efforts put into the preservation and dissemination of the UNLP's intellectual output have been very effective, and encourage every actor to keep working in this respect.

Table 2: SEDICI positions –Worldwide, Latin America and Argentina– in the webometrics 2012–2013 ranking (lower is better), and parameters evaluated for the ranking: size, visibility, rich files, and scholar (webometrics, 2013c)

Edition	World	LA	Argentina	Size	Visibility	Files	Scholar
January 2012	508	22	3	600	650	307	600
April 2012	637	19	3	1081	683	441	788
July 2012	356	18	1	248	711	276	286
January 2013	150	10	1	20	449	189	88
July 2013	93	4	1	24	305	180	50

Figure 5: Position of SEDICI in the webometrics 2012–2013 ranking since 2010 (lower is better)



Notes: Whereas a regression can be seen in May 2012, the period in which the migration to DSpace was done, the latest editions of every indicator (size, visibility, rich files, and Google Scholar) show significant improvement, which had a repercussion both in the ranking for Latin America (LA) as well as the global ranking (World) (see Table 2).

References

Ahrefs. (2013a). *Ahrefs overview: sedici.unlp.edu.ar*. URL: https://ahrefs.com/site-explorer/overview/subdomains/sedici.unlp.edu.ar [October 29, 2013].

Ahrefs. (2013b). *Ahrefs site explorer*. URL: http://ahrefs.com/ [March 13, 2013].

AUGM. (2013). *Asociación de Universidades Grupo Montevideo*. URL: http://www.grupomontevideo.edu.uy/ [October 29, 2013].

Chan, L.M., & Zeng, M.L. (2006). Metadata interoperability and standardization: A study of methodology, part I. *D-Lib Magazine*, *12*(6).

Creative Commons. (2013). *About the licenses*. URL: https://creativecommons.org/licenses/ [October 29, 2013].

De Giusti, M.R., Sobrado, A., Lira, A.J., Vila, M.M., & Villarreal, G.L. (2008). SEDICI (Servicio de Difusión de la Creación Intelectual). *D-Lib Magazine*, *14*. doi:10.1045/september2008-villarreal.

Giusti, M.R.D., Villarreal, G.L., & Terruzzi, F.A. (2013). Generación automática de resúmenes de congresos e integración con el Repositorio Institucional. In *Conferencia Internacional Acceso Abierto, Preservación Digital y Datos Cientìficos*. URL: http://biredial2013.ucr.ac.cr/index.php/Biredial2013/ai/paper/view/17 [June 24, 2015].

Harper, C. (2010). Dublin Core metadata initiative: Beyond the element set. *Information Standards Quarterly*, *22*(1), 20.

Jones, R. (2013). *SWORD 2.0 profile*. URL: http://swordapp.github.io/SWORDv2-Profile/SWORDProfile.html [October 29, 2013].

Joomla. (2013). *Specification of language files – Joomla! Documentation*. URL: http://docs.joomla.org/Specification_of_language_files [October 29, 2013].

Josefsson, S. (2013). *The Base16, Base32, and Base64 data encodings*. URL: http://tools.ietf.org/html/rfc4648 [October 29, 2013].

METS. (2013). *Metadata Encoding and Transmission Standard (METS) official web site*. Washington, DC: Library of Congress. URL: http://www.loc.gov/standards/mets/ [October 14, 2013].

Nottingham, M., & Sayre, R. (2013). *The atom syndication format*. URL: http://tools.ietf.org/html/rfc4287 [October 29, 2013].

OpenSearch. (2013). *OpenSearch specifications*. URL: http://www.opensearch.org/Specifications/OpenSearch/1.1 [October 29, 2013].

Public Knowledge Project (PKP). (2013a). *Multiple report plugin (PKP)*. URL: http://pkp.sfu.ca/support/forum/viewtopic.php?f=28&t=8810 [October 29, 2013].

Public Knowledge Project (PKP). (2013b). *OJS stats*. URL: http://pkp.sfu.ca/ojs/ojs-usage/ [May 12, 2015].

Public Knowledge Project (PKP). (2013c). *OJS technical reference*. URL: http://pkp.sfu.ca/ojs/docs/technicalreference/2.1/index.html [October 29, 2013].

Polychniatis, T., van der Rijnst, S., van Vliet, R., & Wirken, G. (2013). *Software architecture WordPress*. Utrecht, NE: Utrecht University. URL: http://www.cs.uu.nl/wiki/pub/Swa/CourseLiterature/arch-E.pdf [June 24, 2015].

Portal Congresos. (2013). *Portal de Congresos de la UNLP*. URL: http://www.congresos.unlp.edu.ar/ [October 29, 2013].

Portal Revistas. (2013). *Portal de Revistas de la UNLP*. URL: http://www.revistas.unlp.edu.ar/ [October 29, 2013].

Portal de Revistas Científicas. (2013). URL: http://www.revistas.unlp.edu.ar/cientificas [June 24, 2015].

PrEBi. (2013). *Proyecto de enlace de bibliotecas*. URL: http://prebi.unlp.edu.ar/ [October 29, 2013].

RIOJA Project (2008). URL: http://arxivjournal.org/rioja/ [May 12, 2015].

Registry of Open Access Repositories (ROAR). (2013). *Country matches any of "Argentina."* URL: http://roar.eprints.org/cgi/roar_search/advanced?location_country=ar&software=&type=&order=-recordcount%2F-date [October 29, 2013].

Rusch-Feja, D. (2002). The Open Archives Initiative and the OAI Protocol for Metadata Harvesting: rapidly forming a new tier in the scholarly communication infrastructure. *Learned Publishing*, *15*(3), 179-186.

SEDICI. (2013a). *Licencia de distribución no exclusiva UNLP*. URL: http://sedici.unlp.edu.ar/static/resources/licencia_de_deposito.pdf [June 24, 2015].

SEDICI. (2013b). *SEDICI: Repositorio de la Universidad Nacional de La Plata*. URL: http://sedici.unlp.edu.ar/ [October 14, 2012].

UNLP. (2011). *Resolución no. 78/11*. URL: http://hdl.handle.net/10915/18184 [June 24, 2015].

UNLP. (2013a). *AUGMDOMUS: Revista elétronica del comité de medio ambiante*. URL: http://revistas.unlp.edu.ar/domus [October 29, 2013].

UNLP. (2013b). *Plurentes. Artes y letras*. URL: http://revistas.unlp.edu.ar/PLR [October 29, 2013]

UNLP. (2013c). *Relaciones internacionales*. URL: http://revistas.unlp.edu.ar/RRII-IRI [October 29, 2013]

Webometrics (2013a). *Cybermetrics lab*. URL: http://www.webometrics.info/en/About_Us [October 29, 2013].

Webometrics (2013b). *Latin America: Ranking web of repositories*. URL: http://repositories.webometrics.info/en/Latin_America [October 29, 2013].

Webometrics (2013c). *Methodology*. URL: http://repositories.webometrics.info/en/Methodology [October 29, 2013].

Wolfe, R., & Reilly, W. (2005). *DSpace METS document profile for submission information packages (SIP)*. Cambridge, MA: Massachusetts Institute of Technology, MIT Libraries. URL: http://cwspace.mit.edu/files/metssipvop9p1.pdf [June 24, 2015].