CONNECTING THE KNOWLEDGE COMMONS

FROM PROJECTS TO SUSTAINABLE INFRASTRUCTURE

The 22nd International Conference on
Electronic Publishing - Revised Selected Papers

ELPUB 2018

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Connecting the Knowledge Commons — From Projects to Sustainable Infrastructure

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Leslie Chan and Pierre Mounier (dir.)

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The End of a Centralized Open Access Project and the Beginning of a Community-Based Sustainable Infrastructure for Latin America

Redalyc.org after Fifteen Years

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Abstract: The Latin American region has an ecosystem where the nature of publication is conceived as the act of making public, of sharing, not as the publishing industry. International, national and institutional contexts have led to redefine a project—Redalyc.org—that began in 2003 and that has already fulfilled its original mission: give visibility to knowledge coming from Latin America and promote qualitative scientific journals. Nevertheless, it has to be transformed from a Latin American platform based in Mexico into a community-based regional infrastructure that continues assessing journals' quality and providing access to full-text, thus allowing visibility for journals and free access to knowledge. It is a framework that generates technology in favor of the empowerment and professionalization of journal editors, making sustainable the editorial task in open access so that Redalyc may sustain itself collectively. This work describes Redalyc's first model, presents the problematic in process and the new business model Redalyc is designing and adopting to operate.

Keywords: Redalyc, open access, Latin America.

The Open Access Ecosystem in Latin America

Although Open Access (OA) is a worldwide reality, it displays various levels of growth in each region, leading to uneven regional impacts.

Latin America, for example, has created and maintains a noncommercial structure where publishing belongs to the academy and not to large publishers, where the Open Journal Systems software has been key in the birth of the electronic journal, where the need for visibility, interoperability and presence on the web was the breeding ground for the emergence of platforms such as Latindex, Redalyc and Scielo. The Latin American region, as a result, owns an ecosystem characterized by the fact that "publishing" is conceived as acts of "making public", of "sharing", rather than the activity of a profit-driven publishing industry.

A fee has not been included neither for authors nor for readers in the regional editorial tradition. Fees where they may exist are definitely designed outside of a profit motive, the reason being that the corresponding journal business model usually relies on institutional funds.

Latin American academic journals are led, owned and financed by academic institutions. It is uncommon to outsource editorial processes.

In Latin America, each academic institution, de facto, is part of an informal cooperative system that is neither formalized nor made explicit. Every institution supports journals that are driven by their own faculty members, and then that content is made available to other institutions in OA. Which means that everyone benefits from everyone's investment. This kind of informal cooperative was already working before Open Access got its present label.

Regarding Green Open Access, the region has different initiatives such as the growing quantity of institutional repositories that currently reaches 362 (OpenDOAR). For its part, LaReferencia, the network of national networks of institutional repositories, integrates through metadata harvesting more than 1,3 million documents.

In the Latin American region, a number of laws in favor of Open Access have been voted in several countries, including Peru, Argentina and Mexico. According to RoarMap, 48 mandates are available at national and institutional level (ROARMAP). However, as it is pointed out by Babini institutional mandates tend to be weak.

Disciplinary repositories have also emerged, such as CLACSO, specialized in Social Sciences, SIDALC in Agriculture, CLAD in Public Administration, LaborDoc in Labor, BVSDE in Environmental Health and BVS in Health.
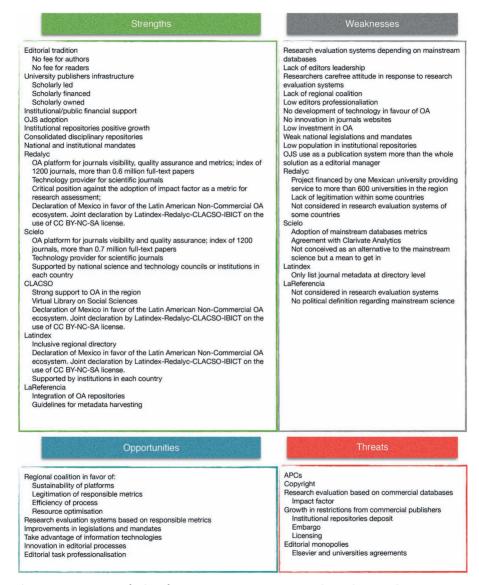
Strengths	Weaknesses

Editorial tradition
    No fee for authors
    No fee for readers
University publishers infrastructure
    Scholarly led
    Scholarly financed
    Scholarly owned
Institutional/public financial support
OJS adoption
Institutional repositories positive growth
Consolidated disciplinary repositories
National and institutional mandates
Redalyc
    OA platform for journals visibility, quality assurance and metrics; index of 1200 journals, more than 0.6 million full-text papers
    Technology provider for scientific journals
    Critical position against the adoption of impact factor as a metric for research assessment;
    Declaration of Mexico in favor of the Latin American Non-Commercial OA ecosystem. Joint declaration by Latindex-Redalyc-CLACSO-IBICT on the use of CC BY-NC-SA license.
Scielo
    OA platform for journals visibility and quality assurance; index of 1200 journals, more than 0.7 million full-text papers
    Technology provider for scientific journals
    Supported by national science and technology councils or institutions in each country
CLACSO
    Strong support to OA in the region
    Virtual Library on Social Sciences
    Declaration of Mexico in favor of the Latin American Non-Commercial OA ecosystem. Joint declaration by Latindex-Redalyc-CLACSO-IBICT on the use of CC BY-NC-SA license.
Latindex
    Inclusive regional directory
    Declaration of Mexico in favor of the Latin American Non-Commercial OA ecosystem. Joint declaration by Latindex-Redalyc-CLACSO-IBICT on the use of CC BY-NC-SA license.
    Supported by institutions in each country
LaReferencia
    Integration of OA repositories
    Guidelines for metadata harvesting
	Research evaluation systems depending on mainstream databases
	Lack of editors leadership
	Researchers carefree attitude in response to research evaluation systems
	Lack of regional coalition
	Low editors professionaliation
	No development of technology in favour of OA
	No innovation in journals websites
	Low investment in OA
	Weak national legislations and mandates
	Low population in institutional repositories
	OJS use as a publication system more than the whole solution as a editorial manager
	Redalyc
	    Project financed by one Mexican university providing service to more than 600 universities in the region
	    Lack of legitimation within some countries
	    Not considered in research evaluation systems of some countries
	Scielo
	    Adoption of mainstream databases metrics
	    Agreement with Clarivate Analytics
	    Not conceived as an alternative to the mainstream science but a mean to get in
	Latindex
	    Only list journal metadata at directory level
	LaReferencia
	    Not considered in research evaluation systems
	    No political definition regarding mainstream science

Opportunities	Threats

Regional coalition in favor of:
    Sustainability of platforms
    Legitimation of responsible metrics
    Efficiency of process
    Resource optimisation
Research evaluation systems based on responsible metrics
Improvements in legislations and mandates
Take advantage of information technologies
Innovation in editorial processes
Editorial task professionalisation
	APCs
	Copyright
	Research evaluation based on commercial databases
	    Impact factor
	Growth in restrictions from commercial publishers
	    Institutional repositories deposit
	    Embargo
	    Licensing
	Editorial monopolies
	    Elsevier and universities agreements

Figure 1. SWOT Analysis. The Open Access ecosystem in Latin America

From our perspective, there are many strengths but also important threats that are shaping different aspects of how OA is evolving in Latin America. The illustration below shows a SWOT analysis of the OA landscape in Latin America.

A crucial weakness is that the majority of research assessment systems rely on simplistic metrics which, ultimately, rest on the position of journals in the JCR rankings of Clarivate Analytics or Elsevier Scopus, regardless of the scientific conversation taking place within the journal and of the local or regional problems being solved or discussed. Researchers are strongly impacted since they are judged by the journals they publish in, rather than what they publish. Colombia offers a good example of this flawed approach: in 2017, it eliminated 40% of its national publications from its national index, Publindex.

Most Colombian, as well as Latin American journals, are published in universities from the educational sector and as a consequence of such decisions they are receiving less and less resources each day, causing thus a devastating disappearance of journals which are not indexed by JCR or Scopus, ignoring the journal's contribution to science and society.

The same happens with Redalyc, as it is an index that is out of what is considered the *status quo* in research assessment systems, its financial supporters start to question the feasibility to continue investing in this project overlooking the ten million article downloads per month or the 54,000 users accessing to Redalyc per day.

This problem, along with the lack of editors' leadership and the researchers' carefree attitude with minimal response to research assessment policies, puts at risk the legitimation of both regional and Open Access initiatives that could function as a counterweight to commercial publishing.

Scheliga and Friesike analyze the fact that while many researchers support Open Science in theory, the individual researcher is confronted with various difficulties when putting Open Science into practice. They argue that the phenomenon of Open Science can be seen through the prism of a social dilemma: what is in the collective best interest of the scientific community is not necessarily in the best interest of the individual scientist.

As it is said in DORA:

> The outputs from scientific research are many and varied, including: research articles reporting new knowledge, data, reagents, and software; intellectual

property; and highly trained young scientists. Funding agencies, institutions that employ scientists, and scientists themselves, all have a desire, and need, to assess the quality and impact of scientific outputs. It is thus imperative that scientific output is measured accurately and evaluated wisely.

Another circumstance to analyze is the lack of innovation, professionalization and development of technology in the regional institutional publishing. The big OA platforms are given the role of providing publishers with technology and innovations.

Talking about big regional OA platforms, currently each one is going in a different direction, preventing a strategic regional coalition to be possible. Such is the case of Scielo, which opted to look towards Clarivate Analytics in order to create a journal citation index inside Web of Science (out of the core collection), a strategy to achieve the inclusion of journals in the mainstream science. On the contrary, Redalyc seeks to strengthen publishers inside universities by empowering editors, with technology and training, and providing a set of metrics that show different aspects of the research performance rather than impact based on citations.

Redalyc's vision is more aligned with Curry who argues that it is time for academics to take back control of research journals and he underscores that the evolution into a highly-profitable industry was never planned. Academics must make the case for lower-cost journals.

Apart from that, there are some "external" phenomena affecting the noncommercial nature of the Latin American ecosystem. After the formalization of the Open Access movement through the three statements: Budapest (Chan et al.), Berlin (Max Planck Society), and Bethesda (Brown et al.); the Global North started to transform its editorial practices, which focus mainly on commercial publishing in order to achieve OA. Those changes caused the relocation of costs, from readers to authors with the so called Article Processing Charges or APCs. The big four players in the publishing industry: Elsevier, Springer, Wiley and Taylor & Francis, have all embraced OA, to varying degrees. They have also employed highly different strategies as to how much they would like to charge their authors (Socha).

Since then, researchers have witnessed an increase in APCs, a circumstance that hinders Latin-American authors to publish. Besides, as it was said by Katie Shamash, the number of article processing charges paid doubled between 2013 and 2014. The average APC increased by 6% in those years, a rise well above the cost of inflation. Publishers' APC costs are converging to a more uniform price range, although they

still vary widely. Journals with low APCs are raising their prices, perhaps to avoid being perceived as low quality following expectations set by Finch's report.

As asymmetries between the *for-profit* and *non-profit* OA are extended, corporations impose rules that restrict access to knowledge in multiple ways. Gadd and Covey's paper demonstrated this by analyzing the Sherpa/ROMEO database:

> Just as there is an upward trend among these 107 publishers in the number of publishers allowing some form of self-archiving, there is also a year-on-year rise in the number of restrictions and conditions constraining the right to self-archive and the offer of paid open access options. . . Restrictions around when a paper may be self-archived grew 1000% . . . Restrictions relating to where a paper may be archived were even more prevalent and followed a similar growth pattern of 190%.

This work describes Redalyc's first model that led the project to achieve its original goals, presents the problematic it is facing and the new business model Redalyc is designing and adopting to operate. A new configuration of strategies, in response to the international, regional, national and institutional contexts, that seeks a collaborative, sustainable, protected and noncommercial Open Access solution for Latin America.

Redalyc as a Centralized OA Project

Redalyc began in 2003 with the main goal of contributing to the visibility of scientific journals published in the region, in a time where the majority of them did not even appear on the Web. It started indexing only journals of Social Sciences and Humanities and in 2006 included all areas of knowledge owing to a high demand from editors.

Today, Redalyc's collection contains more than half a million full-text articles from 1,260 Open Access peer-reviewed journals published by 622 publishers from 22 countries of Latin America, Spain and Portugal.

The following diagram shows Redalyc's infrastructure. Each layer presents different added-value services that Redalyc provides to journals so as to complement the features and capabilities the institutional publishers are able to achieve. It is important to highlight that in other regions of the world there are commercial publishers in charge of providing these kind of services.
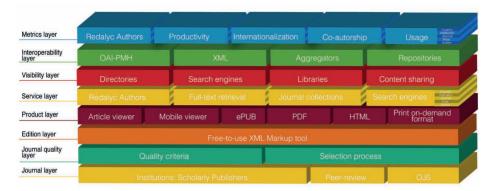
Metrics layer	Redalyc Authors	Productivity	Internationalization	Co-autorship	Usage	Country Institution Journal Area Author
Interoperability layer	OAI-PMH	XML	Aggregators		Repositories	
Visibility layer	Directories	Search engines	Libraries		Content sharing	
Service layer	Redalyc Authors	Full-text retrieval	Journal collections		Search engines	Country Institution Journal Area
Product layer	Article viewer	Mobile viewer	ePUB	PDF	HTML	Print on-demand format
Edition layer	Free-to-use XML Markup tool					
Journal quality layer	Quality criteria		Selection process			
Journal layer	Institutions: Scholarly Publishers		Peer-review		OJS	

Figure 2. Redalyc architecture

On the basis of the structure shown there are peer-reviewed journals along with their publisher institutions who sign an agreement with Redalyc in order to allow electronic distribution of metadata and the online publication of full-text articles.

For a journal to be indexed in Redalyc it must pass a rigorous selection process based on quality criteria (Redalyc, "Criterios") including among other mandatory require-ments: to carry out a peer-reviewed process and to publish at least 75% of original content, joint with criteria such as the variety of referees and editorial board, the efficiency of editorial processes, editorial, visibility and technological practices and periodicity compliance. After getting an internal result, the International Advisory Board, which is composed of experts from diverse fields and different countries, is asked for a qualitative assessment.

On the other hand, Redalyc is aware that one of the highest costs in publishing electro-nic journals is the XML tagging and that this process is key in reaching technological standards. Indeed, Redalyc developed an XML markup system—called Marcalyc—in order to contribute to the sustainability of journals (Redalyc, "Marcalyc").

Marcalyc is based on the Journal Article Tag Suite ANSI/NISO Z39.96-2015 standard (NISO) and allows journal editors to get its articles in XML file format. Free access to this tool is provided for Open Access non-APC scholarly journals indexed by Redalyc. It is a tool designed to prevent editors from outsourcing XML markup; it does not require technical expertise and it minimizes markup time. It is also compliant with JATS4R (JATS4R).

Marcalyc, together with the XML file format, automatically generates a media enriched article reader and a mobile reader available in Redalyc as well as the PDF, ePUB and HTML versions ready to be uploaded in journal websites.

Since Marcalyc was launched in September 2016, 1,158 journal issues have been processed. In a collaborative process, Redalyc provides the tool and the journal editor does the job. Based on the average market cost of XML generation per journal issue (US$300), that quantity of XML files would have cost approximately USD$347,400. For each of all those articles, Redalyc also provided the PDF, ePUB, HTML and the interactive article reader versions, which costs must be summed to the total subsidy that Redalyc is providing to journals in Latin America.

Coupled with that, there are successful cases that show Redalyc's contribution, e.g., journal editors generating XML content with no-cost in Marcalyc, and taking them to their own websites, along with all file versions listed above; and journal editors switching from a policy of APC to a non-APC in order to apply for a Marcalyc user account.

What is more, Redalyc provides homepages not only for journals but also for countries, authors, institutions and areas of knowledge with their journals collection, search engines, advanced filters, different data visualizations and metrics.

Regarding visibility, Redalyc works with search engines, libraries, directories and social media to disseminate broadly the scientific content and to improve its discoverability. Redalyc also works with repositories and aggregators through interoperability protocols such as OAI-PMH.

Besides, the signed agreements between Redalyc and journals enable the former to populate institutional repositories too, helping repositories to automatically integrate metadata of articles corresponding to the institutional output. For example, in the case of the National Autonomous University of Mexico (UNAM), Redalyc is able to send more than 10 thousand articles at metadata level to its institutional repository.

In different dimensions that is the case of more than 10 thousand institutions with research output published in journals indexed by Redalyc: they can take advantage of Redalyc's database to populate their repositories.

The same happens with the scientific output at a country level as shown below, data which may be used to strengthen national repositories.
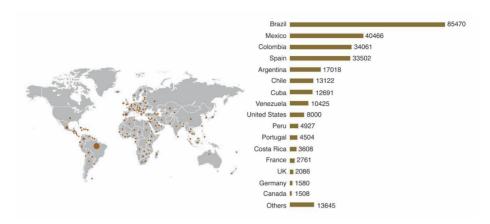
Figure 3. Scientific output by country available in Redalyc

Redalyc has also developed a full integration with ORCID. In the ORCID Registry, authors can use a wizard created by Redalyc to connect their ORCID ID to works published in journals indexed by Redalyc. In addition, the platform called *RedalycAuthors* enables researchers to create a scholar homepage, monitor article metrics and export works to an ORCID profile.

Redalyc is one of the thirteen databases that have done a full integration with ORCID, including ResearcherID from Clarivate Analytics and Scopus from Elsevier. This effort contributes to the insertion of Latin American authors in the global scientific conversation.

Finally, Redalyc offers an alternative set of metrics, which are intended to answer issues, such as institutional strengths, influential journals in a knowledge area, use of the knowledge generated by an institution, cohesion among institutions in terms of collaboration and trends in the internationalization of scientific output, among others.

The Study of the Use, Assessment and Impact of the National Consortium of Scientific and Technological Information Resources of Mexico (Scimago) shows that Redalyc's website is one of the most used sources of information in Mexico, preceded by CONRICyT (National Consortium of Scientific and Technological Information Resources)—which groups all subscription databases Mexico is paying access for—, Scielo Mexico and the journals' websites, even though Redalyc does not receive any national financial support. Indeed, CONRICyT and Scielo Mexico are sustained by the National Council of Science and Technology CONACyT.

With all this growth appears an urgent need to extend Redalyc's institutional support to other stakeholders rather than rely only on the Autonomous University of the State of Mexico, who has supported Redalyc since its beginning, yet it is aware that Redalyc's current reach exceeds the university's capacity. It is important to recognize that a project with that regional scope must not depend on a single actor in order to guarantee long-term sustainability.

These circumstances have led to redefine a project—Redalyc.org—that begun in 2003 and which has already fulfilled its original mission: give visibility to knowledge generated in Latin America and promote the quality of scholarly journals. Nevertheless, it is mandatory to be transformed from a Latin American platform based in Mexico into a community-based regional infrastructure that continues assessing journals' quality and providing access to full-text articles but taking into consideration individual journals' efforts for the sake of journals' positioning and visibility. It is a framework that generates technology in favor of the empowerment and professionalization of journal editors, making the editorial task in open access sustainable and which allows Redalyc to sustain itself collectively.

The Next Redalyc: A Community-Based Sustainable Infrastructure for Latin America

It is necessary not only to refine critical positions to face the global context of OA, but to design and put into practice collaborative systems that develop and socialize technology and know-how in scientific communication.

The goal is to build and sustain a collaborative infrastructure to develop technology and generate knowledge in order to strengthen and protect the scientific editorial work and its actors, a framework that can be extended to include the Global South, with a special emphasis on social sciences and humanities. All this to achieve a non-subordinate integration of this region into the global dialogue of scientific communication.

This is aligned with Johnson' vision, where it is said that:

> . . . we should work towards simplifying and standardizing processes to move towards a sustainable and scalable OA ecosystem which preserves academic freedom and author choice in publishing and makes the research as valuable as possible for the end user.

The new strategy consists of forming an alliance of institutions that are willing to maintain the noncommercial nature of the Latin American ecosystem and keep supporting scientific publications that contribute to benefit society and the development of science, regardless of whether they are indexed in the so-called mainstream science or which impact factor is assigned to it.

The participating institutions should share the following DORA declaration themes (DORA, 2012):

• the need to eliminate the use of journal-based metrics, such as Journal Impact Factors, in funding, appointment, and promotion considerations;

• the need to assess research on its own merits rather than on the basis of the journal in which the research is published;

• and the need to capitalize on the opportunities provided by online publication (such as relaxing unnecessary limits on the number of words, figures, and references in articles, and exploring new indicators of significance and impact).

In order to achieve this transformation, the most relevant tasks that have been established are:

• recognize Redalyc as an inclusive indexing journal system that contributes to the strengthening of scientific journals' quality published in the region;

• develop and adopt a set of responsible metrics for the assessment of scientific performance that takes into account the contribution made to the field of knowledge and society. This task includes the selection of the most suitable metrics already developed by stakeholders, or perhaps, develop new ones;

• develop and sustain a digital edition tool that enables collaborative paper XML tagging under JATS metadata standard that provides regional publishers with the possibility of being at the forefront of technology at minimal cost;

• develop technology and provide knowledge transference for tasks such as digital preservation of scientific content, visibility, interoperability and discoverability, among others;

• develop technology for the optimization of editorial processes through the promotion of forming a developers' community in order to take better advantage of the OJS;

• build a blog as a means for critical discussion on scientific communication and its particular problems in the Global South: challenges, actors, trends, news, advances, reviews and proposals.

The institutions that up to now have expressed their interest in taking part in this model are University of La Plata, Argentina, University of Antioquia, Colombia and CLACSO, Argentina, among others.

Some of these institutions also intend to contribute with computing power, software developers and high-speed connectivity to enhance the service for users and continue developing innovative solutions.

The new constitution Redalyc will adopt is based on these fundamental principles:

- Scientific knowledge generated with public funds is a common good and access to it is a right. Therefore, it must be available in Open Access. We recognize that Open Access has been used as a tool to benefit large publishing consortiums, it is an unwanted effect of the movement that must be controlled.

- Open Access cannot be consolidated unless it is legally protected. The Open Access mandates and laws, and the use of Creative Commons BY-NC (Non-Commercial Attribution) licenses and desirable SA (Share Alike) are fundamental protection strategies, which are aimed at not allowing the appropriation of scientific knowledge for profit.

- Open Access has no future or meaning without an evolution of research evaluation systems: if we recognize the value of Open Access as an appropriate channel of communication, it must be recognized as a legitimate way from which to evaluate scientific and scholarly practices.

- The consolidation of Open Access must consider the transition to digital scientific communication as an essential axis as well as the development and adoption of technologies that allow to think about new communication possibilities.

- The economical investment in Open Access must be coherent with its benefit to society just as commercial solutions are paid.

- The adverse economic scenarios Open Access faces in Latin America will have to be overcome with work schemes based on collaboration and sustainability; likewise, through a permanent disposition to dialogue with science and technology councils, governments, universities, international organizations and all actors with a shared vision of this movement.

- It is necessary to recognize the diversity of scientific journals and stop the pressures that seek to homogenize them, from language to research agendas. It is necessary to vindicate the relevance of local, or national and regional issues in journals; as well as the articulation with the needs of society's development and quality of life. Likewise, it is necessary that journals support the strengthening of

institutional repositories by means of removing embargo policies of scientific articles or retention of copyright that prevent the deposit.

• The sustainability of Open Access is the conviction that science can and should have a central role in the development of societies. The social impact of science is the foundation of its existence.

• Different areas of knowledge have different dynamics of generation and circulation of knowledge. It is necessary to respect the different idiosyncrasies by area, especially the dynamics of Social Sciences and Humanities, as well as their different communication formats.

• Open Access must be permanently conceptualized and defined according to the contexts it faces; this is an imperative that arises when observing that the context in which the statements of Budapest, Bethesda and Berlin emerged is different from the current one. The three "B" homogenize the conditions of development of science and the conditions of the South are different from those of the North.

Redalyc will now participate in a regional, multi-institutional infrastructure based on cooperation that allows obtaining resources. This new cooperative infrastructure is AmeliCA (Open Knowledge for Latin America and the Global South), whose main objective is to preserve the open nature of Latin American science communication environment.

With this, Redalyc's technology will be extended to the Global South by opening—in a distributed architecture—the technological developments in cooperation with other institutions, including: the journals markup system, bibliometrics, author pages and enriched reading formats.

This initiative will be composed of a Council, an Executive Secretary and Commissions.

Each multi-institutional commission will coordinate a line of work. Initially, the following commissions are proposed:

• Technological development;

• Research;

• Editorial processes;

• Continuous training;

• Responsible metrics;

• Observatory of scientific evaluation;

- Open Data;

- Repositories;

- Copyright.

Conclusions

It is necessary to think of Open Access from the Global South perspective, recognizing its experience and leadership in the defense and contribution to the movement. By the same token, it is necessary to think of the Global South not only as a geographical region, but also as a shared historical past and as a possibility of future construction. Thus, the defense of Open Access will also be a defense for the memory, justice, truth and development of people.

The future of academic publishing in our region must be a commitment by its actors, as well as a collective right that must be actively and creatively claimed.

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