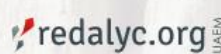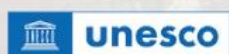# Acesso Aberto Angola

# Documentation of the activities carried out to undertake an Open Access strategy in Angola

Work derived from the collaborative project among Redalyc UAEM, AmeliCA, MESCTI and U. Óscar Ribas funded by UNESCO for the development of an Open Access strategy in Angola

**Project managers**

**Arianna Becerril-García, Eduardo Aguado-López, Alejandro Macedo-García, Eurico Wongo-Gungula**

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Documentation of the activities carried out to undertake an Open Access strategy in Angola. Work derived from the collaborative project among Redalyc UAEM, AmeliCA, MESCTI and U. Óscar Ribas funded by UNESCO for the development of an Open Access strategy in Angola. Vol. 16.

Project managers: Arianna Becerril-García, Eduardo Aguado-López, Alejandro Macedo-García, Eurico Wongo-Gungula.

March, 2022

This piece is the result of work carried out in 2021 as part of a collaborative project between UNESCO and the Redalyc Scientific Information System. The project had the collaboration of the Government of Angola through the Ministério do Ensino Superior, Ciência, Tecnologia e Inovação (MESCTI), the Universidad Autónoma del Estado de México (Mexico), AmeliCA and the Universidade Óscar Ribas (Angola), and its objective was to carry out a comprehensive diagnosis of scientific communication in Angola, a critical roadmap for the development of Open Access in the country and a series of technological developments in favor of non-commercial open scientific communication. The project resulted in a set of 38 works that are made public with the aim of contributing and influencing a technological, legal and knowledge infrastructure of non-commercial Open Access in Angola.

**Project managers:**

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The "Acesso Aberto Angola" project was structured based on a series of specific objectives that were concretized in particular deliverables, which are listed below. The deliverables derived from each objective constitute a series of 38 works, of which the present one represents volume 16.

| 38 WORKS RESULTING FROM THE PROJECT "*ACESSO ABERTO ANGOLA*". |
| --- |
| 1. Key stakeholders report to undertake an Open Access strategy in Angola |
| 2. Qualitative Analysis on Open Access and Open Data in Angola |
| 3. Demoscopic study on Open Access and Open Data addressed to the Angolan academic-scientific community |
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*Table 1 Compliance of the objectives for undertaking an Open Access strategy in Angola*

## II. Breakdown of completed tasks per objective

### Objective 1. Preparation of a status report on Open Access and Open Data for Angola

#### 1. *Key stakeholders report to undertake an Open Access strategy in Angola*

A central part of the work strategy of the "*Acesso Aberto Angola*" project and of the diagnosis prior to it, was the identification of the key stakeholders that could participate in the project and/or have an incidence, at any range, in the development of the work in their different objectives. Work is done together with the Universidade Óscar Ribas to identify the key stakeholders in Angola's academic-scientific and political spheres, distinguishing them into three categories: 1) Academic authorities; 2) Outstanding researchers and/or professors from universities, research centers and higher education institutions; 3) Political authorities and diverse stakeholders with political incidence in the educational, scientific and technological context.

The identification of these stakeholders was accompanied by an invitation to participate in two objectives of the project: the series of focus groups that took place in the months of September, October and November 2021 (Qualitative Analysis on Open Access and Open Data in Angola), and the digital survey distributed during the month of November 2021 (Demoscopic study on Open Access and Open Data addressed to the Angolan academic-scientific community), both with the objective of knowing the needs and perceptions of Angola around Open Access and Open Science. In addition to academic authorities, research-professors and political authorities, the focus groups and survey was considered the Angolan higher education and postgraduate student community.

As a result, the report presents the key stakeholders identified in each category, as well as information regarding their institutional affiliation and means of contact.

The recommendations of this report are:

1. The report presented can be considered as information input for the construction or strengthening of a formal network of stakeholders in the field of Education, Science and Technology, for example, in the constitution of formal research networks by area of knowledge or in the constitution of any collaborative network according to the needs identified by Angola.

2. Diversify the stakeholders in each category according to gender, geographical space, field of knowledge, racial origin, diversity of academic trajectories, etc.

3. Strengthen the identification of stakeholders in the most important fields of knowledge according to the needs identified by Angola, specifically those related to access to knowledge, Open Science and Open Access.

The corresponding work is available at: https://doi.org/10.5281/zenodo.6349494

## 2. *Qualitative Analysis on Open Access and Open Data in Angola*

Through focus groups, 4 segments involved in higher education and scientific research in the Republic of Angola were interviewed separately: 1) Governmental Authorities in education, 2) Higher Education Authorities, 3) Higher education teachers and researchers, and 4) Higher education students.

The group interviews were conducted under 4 objectives:

1. To define the behavior of access and consultation of scientific articles by graduate and postgraduate students.

2. To know how professors and researchers proceed in accessing, consulting, producing and publishing scientific articles.

3. To identify the position of students, professors, researchers and authorities on institutional repositories and total Open Access vs. the commercial system.

4. To identify the support policies and benefits of governmental and educational authorities on Open Access.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) together with the Scientific Information System REDALyC and the Oscar Rivas University of the Republic of Angola conducted a qualitative analysis through 4 Focus Groups to identify Open Access and Open Data in the educational, scientific and student community in Angola.

Southern countries, as well as the Republic of Angola, as indicated by Angolans themselves, encounter similar problems in the publication and consultation of scientific research both globally and locally. The incipient scientific research in the Republic of Angola, agree the interviewees, requires a boost and coordination, both from governmental and educational authorities, researchers and professors, for the publication and access to research works that do not represent economic and agenda limitations.

A strong example that summarizes the current situation of scientific research in the Republic of Angola was expressed by a governmental educational authority who stressed that it is not only that abroad there is a charge for publishing, and that it cannot be consulted by the author himself, other researchers, students or any other person without payment; but abroad the local issues, the own agenda, is not of interest, such as malaria, a problem of the African country, of which it indicates there is no knowledge of the research being carried out, no results are known, it is not known who are the researchers, professors and students who analyze the issue, which slows down its eradication. In 2021 "Forty percent of perinatal deaths in Angola are caused by malaria,

whose overall incidence in the country's population increased in 2021, the government confirmed today." (Prensa Latina, 2021).

The progress in scientific research, which will benefit the African country itself, can be achieved, according to the focus groups assistants, through the publication in the "Diamond Open Access" system and with the promotion of a "National Repository", which will allow the publication and access, without economic and agenda limitations of the scientific research of the Republic of Angola. But this will be achieved, the interviewees indicated, with the joint work of all those involved, governmental and educational authorities, researchers, teachers and also students, such as that already carried out by UNESCO.

In the focus groups it was also agreed that "Our country continues with very low rates of scientific production, it is internationally recognized that Angola produces little science", so the joint work actions will increase the country's scientific research.

The corresponding work is available at: https://doi.org/10.5281/zenodo.6349497


### *3.    Demoscopic study on Open Access and Open Data addressed to the Angolan academic-scientific community*

The goal was to identify the awareness of the Government of the Republic of Angola, its academic authorities, teachers and students about Open Access and the production and publication of scientific articles, for legislation on the matter. Particularly, the objectives of the survey were to:

- Define the behavior of consulting scientific articles by higher and graduate students.
- Know the procedure in the consultation and publication of scientific articles by professors and researchers, as well as their position on total and restricted Open Access.
- Identify the policies and norms in the consultation and publication of scientific articles of the governmental and educational authorities on Open Access.

The demoscopic work was developed in two phases: 1) Opinion surveys, quantitative study. 2) Focus groups, qualitative study.

1) Opinion surveys, quantitative study:

3 surveys were conducted with different target groups: 1) Students, 2) Professors and researchers, and 3) Government and academic authorities.

The quantitative study was carried out in the first place with students and professors and researchers, to gather information from the main generators and users of scientific research. Subsequently, in the second term, the survey of government and educational authorities was carried out.

The surveys were carried out through the Google platform. As they are defined population segments, not an open population, conducting the demographic study through a digital platform does not generate over or under representations of the sample population.

The student survey allowed identifying 4 sections: A) General data of the students, B) the consultation of databases and scientific journals, C) Non-Commercial Open Access System Vs Commercial System, and D) Benefits of the Open Access System No Commercial Vs Commercial System.

  2) Focus groups, qualitative study:

The demoscopic study of teachers and researchers consists of 6 sections: A) General data of teachers and researchers, B) Consultation of databases and scientific journals, C) Publication of scientific research, D) Non-commercial Open Access System vs. Commercial System, E) Educational and governmental support policies, F) Institutional repositories, G) Benefits of the Non-commercial Open Access System Vs Commercial System.

With the survey to the authorities, 6 sections will be identified: A) General data of professors and researchers, B) Consultation of databases and scientific journals, C) Publication of scientific research, D) Non-Commercial Open Access System vs Commercial System, E) Educational and governmental support policies, F) Institutional repositories, G) Benefits of the Non-commercial Open Access System vs. Commercial System.

The corresponding work is available at: https://doi.org/10.5281/zenodo.6349500

## 4. Visibility and impact of Angola in commercial circuits of scientific communication

This analysis starts with the objective of characterizing the scientific performance of Angola in the diversity of scientific communication channels that exist; the study was carried out from two databases: Scopus (Elsevier) and Web of Science (-WoS- Clarivate Analytics), to identify the visibility of Angola in mainstream databases, a bibliometric analysis was accomplished in two directions: 1) on the scientific production published by authors with ascription to Angola; 2) on publications with topics related to Angola as subject of analysis.

The main results are:

1. Between 1906 and 2021, Angola has published 1,706 documents in Scopus (83.5% as of 2005) and its production has received 22,823 citations (87.2% as of 2003).

2. Between 1862 and 2021, 8,165 papers related to Angola have been published in Scopus (81.2% as of 2000) and these have received 107,605 citations (80.9% as of 2000).

3. Between 1967 and 2021, Angola has published 1,544 papers in WoS and these have received 20,242 citations.

4. We identified 5,952 documents published between 1901 and 2021 in WoS with Angola as a research subject. Such documents have received 71,329 citations.

5. The main sources of publications from Angola, included in both Scopus and WoS, correspond mainly to scientific journals that charge APC and from the area of Natural and Fine Sciences.

The recommendations in this work are:

1. Investigate qualitatively the structural conditions that impact Angola's capacities to generate scientific knowledge.

2. Increase the scientific publication of researchers attached to Angola, with the long-term objective of matching the volume of production by Angolan authors with the volume of production related to Angola.

3. Develop collaboration agreements and research projects with the institutions identified as those that most contribute to the production of Angola, to consolidate scientific production and its projection / visibility at the national and international level.

4. Attract prolific researchers to participate in collaborative projects, to obtain as a result the increase of co-authorship, the training of researchers or to initiate / reinforce / consolidate the edition of national publications.

5. Identify in the main sources those that use the Diamond Open Access publication system and encourage publication in them to guarantee the accessibility of future publications without restrictions.

6. Generate publication sources (self-sustaining and in Open Access) that cover the main research topics identified, to generate communication channels with nationally relevant approaches as well as with academic and research communities in other regions.

7. Consolidate Open Access publication through the generation of institutional and national scientific policies, creation of open knowledge offices.

The corresponding work is available at: https://doi.org/10.5281/zenodo.6350435

## 5. *Visibility and impact of Angola in Open Access scientific communication circuits*

The objective of the analysis was to characterize the presence of Angola in a set of platforms that, in a generalized way, are conceptualized as Open Access. The analysis took as empirical reference the scientific production contained in Redalyc, DOAJ, AJOL and SciELO, as they are scientific communication circuits recognized for giving free access to scientific knowledge, a central aspect that was of interest in the diagnosis made. To identify Angola's visibility in Open Access platforms, a two-way bibliometric analysis was carried out: 1) on the scientific production

published by authors affiliated with Angola; 2) on publications with topics related to Angola as the subject of analysis.

The main results are:

1. The production of Angolan authors in Redalyc consists of 241 documents, which have been published in 102 journals from 13 publishing countries. 314 authors from 78 Angolan institutions have participated in the construction of this production.

2. The production related to Angola (as an object of study) identified in Redalyc, is made up of 5,052 documents published in 941 journals.

3. In DOAJ, 344 articles published by authors with affiliations to Angolan institutions were identified. Such documents were published in 155 journals from 34 countries. The production was contributed by 577 authors assigned to 306 Angolan institutions.

4. For its part, the scientific production related to Angola that was identified in DOAJ amounts to 1,064 scientific articles published in 568 journals from 49 countries by 3,441 author forms from 1,278 institutions from 34 countries.

5. 71.2% (245) of the total articles published by Angolan researchers were published in journals without APC; while 73.4% of the scientific production related to Angola corresponds to the publication in journals without APC.

6. The AJOL production of Angolan authors consists of two published articles.

7. A total of 134 articles published in 51 journals from 12 countries corresponds to publications related to Angola found in AJOL.

8. In the SciELO database, 212 publications were identified in 105 journals from 9 countries. By comparison, the production related to Angola is made up of 440 articles published in 186 journals from 11 countries.

The recommendations in this work are:

1. The main communication channels identified on the platforms are journals that do not charge APC, so it is recommended to protect and encourage publication in this publication model.

2. Analyze the publication policies of the author institutions with the greatest participation in Angola to implement incentive programs or policies to publish in non-commercial Open Access.

3. Encourage panels, discussions and / or conferences among researchers on issues related to copyright and non-commercial Open Access (such as Creative Commons licenses) to promote a better-informed choice in the choice of publications according to the different OA models and copyrights.

4. Request Angolan authors to use Open Access author-level production identifiers (such as Orcid, Google Scholar, Redalyc Authors), so that the production is easier to find and its evaluation is more transparent.

The corresponding work is available at: https://doi.org/10.5281/zenodo.6350449

## 6. *Diagnosis of the editorial quality of Angolan scientific journals for their consolidation and strengthening*

The purpose of this diagnosis was to identify the scientific journals held and belonging to Angola to know their editorial characteristics. This report is intended to be a useful information input for the design of strategies that lead to the editorial strengthening of the journals, with the ultimate aim of enhancing the scientific communication that takes place from them.

The characterization carried out took as a reference framework the Evaluation Criteria of the Redalyc Consolidated Journal Index (Redalyc Scientific Information System, 2021), a series of parameters that seek to identify certain formal practices of journals that are generally considered desirable in the field of scientific communication.

The following starts from the principle of characterizing Angolan scientific journals based on their formal editorial practices, and not based on their indexing and position in world rankings structured based on citation metrics. Instead, a diagnosis of Angolan journals is presented based on their own editorial practices, which, ultimately, offer the possibility of identifying their quality, their consolidation, and their ability to promote and enhance exchange in a subject area and in a specific academic community.

The main results are:

1. Basic criteria Report: It was integrated a general report of the results obtained from the diagnosis made to the scientific journals of Angola, where the unfulfilled criteria were identified in order to present an overview and specify the areas of opportunity presented by the majority of journals

2. Highly valued Criteria and Desirable Criteria Report: A diagnosis is made on the following topics: Scientific content, Periodicity, Open Access, Editorial management and Use of technology. The number and titles of journals that fail to meet each of the criteria are indicated.

3. Individual report of the diagnosis for each one of the journals: The diagnosis made for each journal is shown, indicating the non-fulfillment of the different criteria in order to indicate the areas of opportunity for each of the scientific journals in Angola. This perspective is completed with a qualitative synthesis of its distinctive features.

A series of recommendations are made for the editorial professionalization of journals, assuming a binding role with editors to give them an adequate base from which to start making changes and improvements in their editorial policies, perceive their strengths and, from there, work towards higher editorial quality.

The corresponding work is available at: https://doi.org/10.5281/zenodo.6350467

## *7. Internationalization of publication and collaboration of Angolan scientific journals*

The report shown below aims to present an analysis of the internationalization of Angola, specifically, based on the scientific communication that takes place in Angolan scientific journals. Internationalization is considered as the diversity of stakeholders that participate in the generation and communication of scientific knowledge that is published in journals.

From this perspective, the internationalization of Angolan scientific journals was analyzed from three elements: 1) the identification of scientific production from countries other than Angola, 2) the identification of the countries which have published in Angolan journals, and 3) the characterization of international co-authorship networks with scientific production published in Angolan journals.

The main results are:

1.  The scientific journals of Angola show a balance between scientific production of foreign and national authorship. In their internal publication tendencies, there is a balanced publication flow between national and institutional production.

2.  Angolan scientific journals show a relative balance between individual authorship (54%) and co-authorship (46%). In co-authorship production, the national co-authorship stands out (34.8%).

3.  In the internal scientific Collaboration, it is identified that this responds mainly to collaboration of institutional scope (29.8%). From this it stands out that Angolan scientific journals are primarily oriented as scientific communication forums of Angolan scientific collaboration networks.

4.  In the external scientific Collaboration, a collaboration is mainly identified between Latin American authors and authors from other regions (5.1%) and, in second place, between Latin American authors from different countries (4.5%); for its part, the scientific production generated under a co-authorship scheme between authors assigned to non-Latin American countries has a relative weight of 1.5%.

5.  Angolan scientific journals show an internationalization from the perspective of publication: they show a significant flow of publications from abroad, mainly from Latin America.

6.  From the perspective of scientific collaboration, the journals have not consolidated a global presence that attracts publication by international collaboration networks, but rather they are mainly communication forums for Angolan scientific networks.

The main recommendations are:

1. The internationalization documented in the scientific journals of Angola from the perspective of international publication and international collaboration (and in general, the diversity of publication tendencies and scientific collaboration that was identified), shows the limitation of having information with significant restrictions regarding its availability, recoverability and reuse, given that scientific journals and platforms do not have adequate metadata management that allows comprehensive and exhaustive bibliometric analysis to be carried out. In this way, it is suggested to establish strategies that allow the retrieval of information at the metadata level of Angolan scientific journals. One possible way to do this could be their inclusion in Redalyc and AmeliCA.

2. A formal and permanent effort of tracking and monitoring Angolan scientific journals is suggested, first of all, to have an exhaustive knowledge of their profiles and of the stakeholders and communities that participate in them following publication.

3. It is recommended to comprehensively promote the consolidation of Angolan scientific journals with regard to their editorial practices and their visibility, so that the internationalization practices that were documented enhance their global recognition as consolidated communication bodies in their respective fields of knowledge.

The corresponding work is available at: https://doi.org/10.5281/zenodo.6350471

## 8.     Diagnosis of Open Access institutional policies in Angola as a background for a proposed Law for the country

This report presents a diagnosis of Open Access Policies in Angola, in order to identify the initiatives formulated from the institutional frameworks regarding access to publicly funded research, and the practices implemented on Open Data in this country.

The diagnosis made an approach to the governmental sphere related to the field of S&T, based on which the Ministerio de Educación Superior, Ciencia, Tecnología e Innovación (MINCYT) was approached. The analysis also sought an approach to the main institutions of higher education in Angola.

To carry out the diagnosis, the websites of the Angolan Institutions were consulted in search of the Operational or Regulatory Framework in digital version and regulatory documents.

The main results are:

1. It was identified that research and development are promoted by the Government of Angola, through the National Development Plan (PDN by its Spanish initials), which highlights the National Platform for Dissemination, Exchange and Access to Data.

2. The need to guarantee access to research funded by the State has been identified; moreover, the National Science Policy considers the dissemination of science as part of its objectives.

3. The policies developed by the Government of Angola have made efforts aimed at supporting scientific research, obtaining Open Access to databases, facilitating openness to the knowledge and information society, seeking lifelong learning, maintaining the principles of scientific autonomy, promoting scientific research, its dissemination and the application of its results.

The main recommendations are:

1. Maintain the alliances established with institutions and stakeholders with whom the objective of implementing Open Access policies is shared (UNESCO, the Ministerio de Educación Superior, Ciencia, Tecnología e Innovación, Redalyc/AmeliCA, among others).

2. Higher education institutions can generate institutional Open Access policies based on the mentions identified in official documents related to Science and Technology of the Angolan Government and the strategies identified in the National Development Plan.

3. Use institutional domains to host online resources (documents with operational or regulatory information of the institution, as well as the various digital platforms) that are generated to increase visibility, ensuring access and preservation of content from official sites.

4. The main Open Access policies suggested are: creation of mandates or regulations to publish and disseminate research in Open Access, create bodies or appoint people responsible for supporting this purpose (with Open Knowledge Committees or Offices), implementation of Diamond Open Access (both for authors and journals), it is suggested to develop a platform that hosts all publications of the institution (journal platform or digital newspaper library), interoperability, XML JATS tagging, signing the HELSINKI, DORA initiatives and the Declaration of Principles for Open Access in scholarly communication in Africa and on it, use of Creative Commons licenses; obtaining registrations on sites specialized in monitoring Open Access policies (ROARMAP, OpenDOAR, Sherpa Romeo or Aura).

The corresponding work is available at: https://doi.org/10.5281/zenodo.6350473

## 9. *Diagnosis of university presses in Angola*

The objective of this report is to identify and diagnose Angola's publishing activity, Angolan university publishers and the publication of scientific, informative and educational books and journals. The analysis focuses on the identification and characterization of university publishers.

The present report seeks to be an input of information that allows the identification of the diversity of Angolan publishing houses and to diagnose which scientific products they publish, under which scheme (Open Access or restricted), through which channels, publication formats and the period of activity of the scientific production. This report provides relevant information on the current

situation of the publishing process in Angola to enhance scientific communication through Angolan communication channels.

The universe of analysis is composed of 15 public and private institutions whose main objective is research and teaching, and 4 private publishing houses with national circulation in Angola. The method of data collection was from the website of each institution.

The main results are:

1. A publishing infrastructure in its initial phase was identified and characterized in Angola, in which the management of Open Access journals owned by Higher Education Institutions and Universities predominates, as well as the publication of dissemination books under a restricted scheme and in printed format.

2. The private publishing sector is characterized by the scarce availability of electronic resources in Open Access; the editing and publication of printed and restricted books predominates.

3. Eight scientific journals owned by 6 Higher Education Institutions (IES by its Spanish initials) were identified, of which 5 are published under an Open Access scheme and communicate scientific contributions in PDF and HTML formats. Conversely, 3 journals are published under a restricted scheme and communicate scientific contributions in printed format.

The corresponding work is available at: https://doi.org/10.5281/zenodo.6350477


## 10.  Comprehensive diagnostic synthesis on Open Access and Open Data in Angola

The work presents a synthesis of the activities undertaken to produce the Open Access and Open Data Report for Angola.

The synthesis presented here aims to show succinctly the aspects addressed in the comprehensive diagnosis of the open scientific and publishing activity approached in Angola; the objectives were defined around different axes: the knowledge generation tendencies of Angolan scientific communities and their circulation channels (mainstream and Open Access platforms), the editorial practices of their journals and the internationalization they have built, the instrumental infrastructure of Open Access in Angola based on institutional policies, the condition of university publishers and publishing books; as well as the perspectives of academic, scientific and student communities and government authorities on Open Access and the needs they identify based on two participatory and integrative mechanisms: a series of focus groups and a digital survey.

The corresponding work is available at: https://doi.org/10.5281/zenodo.6350479

## Objective 2. Development of an Open Access Policy

### *11.    Draft roadmap for the development and adoption of an Open Access policy in Angola*

The work constitutes a roadmap for the development and adoption of an Open Access policy in Angola. The proposal that is made derives from the comprehensive diagnosis of Angola, which addresses the field of scientific communication in this country from different axes and synthesizes a strategy that takes up the findings encountered in the areas of opportunity and the strengths identified.

The proposed roadmap has different components: first, the Human Right to science is synthesized as the central axis of any policy aimed at promoting Open Access, Open Science and artificial intelligence, for which central instruments are retaken in its defense from a global scope, particularly those proposed by UNESCO. A second component is represented by the contextualization of Africa and Angola in different areas related to the generation of scientific knowledge and Open Science; in this way, the perception of Africa is taken up in the global consultation carried out within the framework of the UNESCO Open Science Recommendation (2021) and Angola's research, editorial and technological performance in the global context. A third component that arises in the roadmap for the development and adoption of an Open Access policy in Angola is the relevance of a non-commercial Open Access route in the global scientific communication system; the relevance of including this element in the roadmap is that it represents a solid and sustainable alternative with a view to structural inclusion, collaboration and multilingualism. To this it must be considered the construction of an Open Access policy in Angola, a modification of the current academic evaluation systems where the diversity of scientific communication channels is considered according to the local practices and needs of each context, given that, in opposition to this, the presence of scientific production in mainstream databases (of a private nature) has been prioritized, where the global South, the social sciences and the humanities, as well as the different languages other than English, are underrepresented.

The proposed roadmap sets out a series of principles and steps to consider in the development and, subsequently, in the adoption of an Open Access policy in Angola. Among the guiding axes outlined is the inclusion, under a helix model, of the diversity of stakeholders in the Angolan academic, political and social context, in parallel with ongoing training strategies and the establishment of strategies that result in the construction of long-term sustainable Open Access, Open Science and artificial intelligence technological infrastructures. In all of this, time and relationship guidelines are suggested for an adequate achievement of the proposed ends and means.

The corresponding work is available at: https://doi.org/10.5281/zenodo.6350459

## 12. Stakeholders consultation plan for the development of an Open Access policy in Angola

The work represents a consultation plan around the roadmap for the development and adoption of an Open Access policy in Angola where general lines of diagnosis, dialogue, action and lobbying are established in the Angolan and the global context with the objective of laying the foundations for an inclusion of stakeholders and diversity of perspectives in the construction of an Open Access policy for Angola.

The proposed consultation plan considers meetings with relevant stakeholders in Angola such as government agencies, higher education institutions, universities and other initiatives organized in the Angolan scientific-academic context. Likewise, the consultation plan considers meetings with stakeholders from other geographical contexts with incidence in the field of Open Access from a global scope such as promoters of open scientific communication within the academic environment, civil organizations and organized efforts of academics and researchers from Latin America, Europe, The United States and Africa.

In the construction of the consultation plan, the activity of the Consultative Committee of the "*Acesso Aberto Angola*" project, constituted by UNESCO, the Ministério do Ensino Superior, Ciência, Tecnologia e Inovação of the Government of Angola, the Scientific Information System Redalyc of the Universidad Autónoma del Estado de México, AmeliCA and the Universidad Óscar Ribas, is considered to carry out the different consultation activities, given the incidence and communication that each one has established.

In turn, the establishment of the consultation plan mainly considers the formal work period established by the Collaboration Agreement between UNESCO and the Scientific Information System Redalyc of the Universidad Autónoma del Estado de México that gave rise to the original project "*Acesso Aberto Angola*": between June and December 2021; although it is proposed that work strategies will have continuity and, based on this, the possibility of consultations in the medium and long term is considered. The consultation plan proposed takes as a central axis not only the participation of stakeholders, but also the integration of knowledge and trajectories of relevant stakeholders for the development and adoption of an Open Access policy in Angola.

The corresponding work is available at: https://doi.org/10.5281/zenodo.6350463

## 13. Stakeholders consultation plan report for the development of an Open Access policy in Angola

Based on the Stakeholder Consultation Plan for the development of an Open Access policy in Angola, the work constitutes a report of the activities carried out between June and December 2021. The report specifies the activities aimed at diagnosis, dialogue, action and lobbying involving the Consultative Committee of the "*Acesso Aberto Angola*" project, constituted by

UNESCO, the Ministério do Ensino Superior, Ciência, Tecnologia e Inovação of the Angola Government, the Scientific Information System Redalyc of the Universidad Autónoma del Estado de México, AmeliCA and the Universidad Óscar Ribas, aimed at establishing a dialogue with different relevant stakeholders for the establishment of the critical Open Access roadmap.

Specifically, it is made a synthesis of the activities carried out in two main areas of action: 1) Activities in the Angolan context, where activities were established with relevant Angolan stakeholders such as government agencies, higher education institutions, universities and other initiatives organized in the Angolan scientific-academic context; 2) Linkage-related activities with global Open Access initiatives, where activities were carried out with stakeholders from other geographical contexts with an impact on the field of Open Access from a global scope such as promoters of open scientific communication within the academic field, civil organizations and organized efforts of academics and researchers from Latin America, Europe, United States and Africa.

The activities made it possible to identify the perspectives of different stakeholders on Open Access in Angola. In total, 26 activities were carried out involving more than 50 organizations, institutions, communities and government agencies, academic and social bodies. At the same time, the realization of such activities led to the identification of different communities and areas that should be included in this consultation strategy in the future, which is developed in the document by way of recommendations.

The corresponding work is available at: https://doi.org/10.5281/zenodo.6350482

## 14. Additional support activities for the development of an Open Access policy in Angola

Based on the consultation plan around the roadmap for the development and adoption of an Open Access policy in Angola, the work proposes a series of consultation activities that are suggested to be carried out in the medium and long term, including organizations, institutions, communities and government agencies, academic and social bodies from Angola; as well as relevant stakeholders in the global field of open scientific communication such as organizations that defend scientific knowledge as a common good (for example, UNESCO) and promoters of Open Access from a non-commercial model (for example, the Consejo Latinoamericano de Ciencias Sociales and the Scientific Information System Redalyc).

The proposed route to be followed considers consultations that give rise to a permanent listening of the relevant stakeholders in the Angolan context. Likewise, a permanent accompaniment by global instances is considered, with the purpose of strengthening the work that Angola will continue to develop in the construction of a social and technological ecosystem of non-commercial Open Access. This work represents a synthesized effort to give continuity to the consultation plan established in Stakeholders consultation plan for the development of an Open Access policy in Angola, taking as a central axis not only participatory mechanisms, but also the

integration of knowledge and trajectories of stakeholders in the development and adoption of an Open Access policy in Angola.

The corresponding work is available at: https://doi.org/10.5281/zenodo.6350493

## Objective 3: Development of a policy monitoring framework

### 15.    Report on the results of the comprehensive diagnosis on Open Access and Open Data in Angola and video-summary

This work represents a synthesis of the diagnostic stage carried out in the framework of the "*Angola Open Access*" project and of the main activities accomplished in each one.  The paper presented here seeks to show, by way of synthesis, the analyses undertaken to diagnose Angola from different axes in relation to its scientific and publishing activity by carrying out different documentary analyses (analysis of scientific production in the following databases: DOAJ, Redalyc, AJOL, SciELO, Web of Science and Scopus) and from qualitative approaches (a series of Focus groups and a digital survey aimed at identifying the perceptions and needs in relation to Open Access identified by Angola from the political, academic, scientific and student sectors. A second part is a summary video which seeks to briefly, clearly and precisely show the main objectives of the project as well as to facilitate the dissemination of the initiative to the interested community within the various digital platforms. This video is available at: https://youtu.be/oyaE9juCz6s

The corresponding work is available at: https://doi.org/10.5281/zenodo.6350495

### 16.    Documentation of the activities carried out to undertake an Open Access strategy in Angola

A final report was prepared to report on the activities completed in the *"Acesso Aberto Angola"* collaborative project. This report includes an executive summary that describes in general terms the results achieved during the project, as well as the impact obtained in the region as a result of the project. To complement this report, an explanation of what was accomplished in each of the seven objectives covered by the project was included. This explanation shows the activities carried out, the methodology used to build each of the products that are part of the project's results. Finally, some recommendations are mentioned that will serve as a guide to continue in Angola the process to guarantee Open Access to the results of scientific research financed with public funds.

The corresponding work is available at: https://doi.org/10.5281/zenodo.6354625

## 17. Design of performance indicators for Angola's scientific and publishing activity in Open Access

This work constitutes a conceptual, methodological and operational proposal of indicators to characterize Angola's scientific and publishing activity in Open Access. The proposal of indicators presented here is articulated with the draft roadmap for the development and adoption of an Open Access policy in Angola, where the relevance of a legal, operational and instrumental framework to promote, regulate and enhance scientific communication in Angola from a non-commercial Open Access model is proposed.

The proposed characterization indicators refer to two general areas of performance: A) the research activity carried out by the Angolan scientific communities and resulting in the publication of various scientific products (e.g., scientific articles, pre-prints, books, book chapters, theses) and B) the publishing activity carried out by the Angolan scientific-publishing institutions and communities (scientific journals published). Furthermore, in considering these areas, the technological infrastructure is used both in Angola (e.g., institutional repositories and a National Repository of Angola) and in different global areas (e.g., the Redalyc Scientific Information System, ROARMAP, ORCID, etc.).

The indicators presented here constitute only a first frame of reference for their adaptation and implementation in Angola, based on a conceptualization of the diversity and heterogeneity of axes from which the academic-scientific and editorial work of a scientific community can be characterized. One of the components of indicators that are proposed is the Methodology for the evaluation of science in Diamond Open Access, which considers a set of indicators that account for trends in publication, scientific collaboration, peer review time, internationalization, editorial effort and use of scientific production and editorial production. Added to that, there are indicators that seek to address, for example, Angola's scientific communication that takes place from Open Access circuits, specifically, a non-commercial Open Access: Diamond.

In addition to the above, the paper makes a series of recommendations in this regard:

1. The conceptual, methodological and operational proposal of indicators for the characterization of Angola's scientific and publishing activity in Open Access constitutes only a first approximation to a referential framework of Angola's performance in the field of Open Access. It should be discussed among the stakeholders in the Angolan context to establish its relevance, pertinence, redesign and implementation.

2. It is suggested to include in future horizons the indicators that the Angolan academic, student and civil communities consider relevant for the framework of indicators to characterize the Angolan scientific and publishing activity in Open Access.

3. The discussion of the framework of indicators should be accompanied by standards of measurement and periodicity relevant to the scientific, social and political context of Angola.

The corresponding work is available at: https://doi.org/10.5281/zenodo.6354647

## 18. Observatory for monitoring the performance of Angola's scientific and publishing activity in Open Access in GOAP

Based on the diagnosis on the situation of Open Access and open data in Angola shown in objective 1 of the project "*Acesso Aberto Angola*", it is necessary to build a conceptual, methodological and operational proposal of indicators to characterize the Angolan scientific and publishing activity in Open Access. In order to monitor and make available the results and progress in the adoption of a National Open Access Policy for Angola, an observatory was created.

This platform will be a space of transparency that will allow to evaluate, discuss, question and suggest relevant changes in the Open Access adoption strategy, in addition to informing the community about the findings that occur in this process.

This space is available within the Global Open Access Portal (GOAP) https://www.goap.info/ as one of its main sections and in which any reader can have free access without the need to register.

Details on the construction of the microsite are available at: https://doi.org/10.5281/zenodo.6354652

## Objective 4: Capacity building for Angola and beyond

## 19. Capacity building to undertake an Open Access strategy in Angola: adequacy of a training plan on Open Access and scientific communication

An evaluation of the main existing curricula on Open Access topics was carried out, the most relevant topics were selected according to the stage of adoption of Open Access in Angola and finally a study plan was adapted for the various actors involved in the Angolan scientific publication and dissemination process, such as publishers, librarians, researchers and graduate students.

As a result of the previous work, a seminar entitled 'Seminar on the professionalization of scientific communication in Open Access for Angola' was developed. This seminar was the result of collaboration between Universidade Óscar Ribas, the Ministerio de Educación Superior, Ciencia, Tecnología e Innovación de Angola and the Universidad Autónoma del Estado de México (UAEM) through Redalyc and AmeliCA. It was held in an online modality in the month of November 2021, the seminar was attended by more than 200 researchers, students, librarians and journal editors from more than 100 Angolan institutions.

The detailed description of the program, the materials of each of the seminar sessions, as well as the recording of the sessions can be found at: https://doi.org/10.5281/zenodo.6354664

## *20.    Training Angolan librarians in Open Access and scientific communication: capacity building to undertake an Open Access strategy in the country*

An evaluation of the main existing curricula on Open Access topics was carried out, the most relevant topics were selected according to the stage of adoption of Open Access in Angola and finally a training program was developed for librarians on the use and benefits of Open Access resources.

The training program created consists of four sessions:

- Session 1: Science communication.
- Session 2. Open Access as a model of science communication.
- Session 5. "Diamond Open Access".
- Session 9. Non-commercial OA in libraries

The objective and content of each session is shown in: https://doi.org/10.5281/zenodo.6354671

## *21.    Training young researchers and postgraduate students from Angola in Open Access and scientific publishing: capacity building to undertake an Open Access strategy in the country*

An evaluation of the main existing curricula on Open Access topics was carried out, the most relevant topics were selected according to the stage of adoption of Open Access in Angola and finally a training program was developed for young researchers and graduate students on the use and benefits of Open Access resources and publications.

The training program created consists of five sessions:

- Session 1: Science communication.
- Session 2: Open Access as a model for science communication.
- Session 3: Writing and structure of a scientific article.
- Session 4: Science and Researcher Evaluation Systems.
- Session 5. "Diamond Open Access".

The objective and contents of each session are shown in: https://doi.org/10.5281/zenodo.6354695

## *22.  Training of Angolan scientific journal editors on international Open Access standards and editorial quality criteria: capacity building to undertake an Open Access strategy in the country*

An evaluation of the main existing curricula on Open Access topics was carried out, the most relevant topics were selected according to the stage of adoption of Open Access in Angola and finally a training program was developed for Angolan publishers on international Open Access standards and quality criteria. about international Open Access standards and editorial quality criteria.

The training program created consists of four sessions:

- Session 1: Science communication.
- Session 2. Open Access as a model of science communication.
- Session 6. Science 2.0. For the use of new technologies in the generation and dissemination of knowledge.
- Session 7. Good publishing practices
- Session 8. XML-JATS

The objective and content of each session is shown in: https://doi.org/10.5281/zenodo.6354708

## *23.  Development of a micro-learning platform with Open Educational Resources for Angola*

Micro-learning Platform of Open Educational Resources on Open Access was created to offer digital materials in Open Access, for free consultation or download, with the guarantee that the resources available on it are of high quality.

This platform is part of the National Repository of Angola, with more than 80 resources available, at the time of its launching, and with the capacity to increase its collection over time; in addition to having content in different languages.

*Figure 1 Micro-learning Platform of Open Educational Resources on Open Access*

For detailed information on how to access this platform and what to find on it, go to: https://doi.org/10.5281/zenodo.6354712

## 24. *Summary of Open Educational Resources to build capacities to undertake an Open Access strategy in Angola*

It was determined the need for a platform where information on the benefits of Open Access, experiences of the authors who implement it and where it could be disseminated without profit and without legal limitations is compiled.

We searched for information in search engines specialized in academic material and in different formats, we found several posters, articles, comics, books, presentations and videos, all in Open Access for their consultation.

The information presented in these documents is about the Open Access that exists in the world, with scientific research which speaks of the need to share knowledge through legal and freeways, as well as the experiences that have been had in approaching this new way of disseminating science and its results to society to build new knowledge.

After this, the resources were organized by classifying them according to their nature in order to gather information on each of them, such as type of document, title, authors, language, link to be located, abstracts, date of publication, ISSN, among others.

Once this information was collected, we began to transfer it to the Micro-learning platform of Open Educational Resources on OA, capturing each of the points mentioned above in its respective field, in order to achieve a database that allows the creation of filters for a better search in specialized information search engines thanks to the summary given for each of the documents.

This database is a fundamental element for the search of information nowadays thanks to the new technologies.

Its usefulness is presented in the access of resources that informs and promotes science in thousands of countries in different languages using multiple data, facilitating efficient access for its analysis and creation of new knowledge.

The Micro-learning platform of Open Educational Resources on OA will give visibility to all quality information about scientific research from around the world as long as it is Open Access, it will create searchable pathways to problem solutions with clear and accurate data always available for non-profit use.

Angola has a lot of ground to cover as it is encouraged to expand its engagement in Open Access scientific participation.

The participation of Angolan teachers in national and international scientific events is required to improve the quality of presented projects and resources to stimulate the growing database presented in different areas of knowledge, publishing results of research projects.

The cooperation with different international institutions will help the creation of new resources and the process of scientific publications will be more and more remarkable as their results will be part of this platform.

For detailed information on Open Educational Resources on OA see: https://doi.org/10.5281/zenodo.6354734

## 25. Long-term Open Access strategy for Angola: raising awareness of its benefits

This plan aims to continue to raise awareness of Open Access among the academic and scientific community and government entities in Angola. It is proposed that this plan be carried out in three stages, which can be carried out in the year following the Open Access law.

In the first stage it is proposed to carry out a series of activities such as seminars, meetings, training and provision of Open Access material, with the objective of raising awareness and making Open Access known to the Angolan community. The lines of action of the second stage are focused on producing and disseminating Open Access research products. Finally, the third stage aims to consolidate the adoption of Open Access in Angola.

The detailed description of this plan can be found in: https://doi.org/10.5281/zenodo.6354739

## Objective 5: Development of the National Repository of Angola

### *26. Design and implementation of the information architecture for the development of the National Repository of Angola*

An evaluation of the main software options for the creation of digital repositories was undertaken. From this analysis it was determined that Dspace was the most used option for institutional digital repositories and it was chosen as the software from which the National Repository of Angola is built, since among other things it is open source and easy to install and configure. To better understand the structure and operation of digital repositories, some successful cases of some national and institutional repositories were analyzed, such as the Institutional Repository of UAEMEX, the Repository of the Universidad Nacional de Colombia and the Repositorio Nacional Digital de Ciencia, Tecnología e Innovación ALICIA in Peru.

The information architecture will allow us to group and organize the documents stored in Angola's national repository in a hierarchical and orderly fashion. Based on the logic in which Dspace organizes the information, on the experience of other national and institutional repositories and on the organizational structure of the Angola project, it is suggested that the documents in the Angola national repository will be organized through communities > subcommunities > collections. Communities can be divided into subcommunities that reflect a typical university structure. Communities in turn contain collections, which are groupings of related content. A collection can appear in more than one community. Each collection is composed of items, which are the basic elements of the archive. Each item belongs to a collection.

An ideal information architecture for a national repository is based on content providers and a central aggregator (national repository). Content providers are understood as the institutional and/or thematic repositories developed in the various organizations, institutes, universities and other entities that are part of the project. Each organization is responsible for implementing its repository based on a series of national guidelines and recommendations for institutional repositories. The connection of the institutional repositories with Angola's national repository is proposed to be made through metadata harvesting to the institutional repositories that are part of the project and that have enabled the OAI-PMH protocol (Open Archives Initiative - Protocol for Metadata Harvesting) and that act as data providers.

However, given the current conditions in the Angolan institutions, it is proposed that the Angolan national repository will house the production of all the institutions that join the project, thus, a community will be created per each institution, which may have sub-communities, which may be designed based on the organizational structure of the institution. Thus, the sub-communities could be the departments, faculties, departments and/or research centers of each institution.

With regard to collections, given the type of content available in the country, it is proposed that institutional repository collections be structured by type of document and/or subject of interest: Scientific Products, Institutional and/or Administrative Products, and Learning Objects.

The following diagram summarizes the information architecture proposed for Angola's national repository, based on the structure of Communities > Subcommunities > Collections.
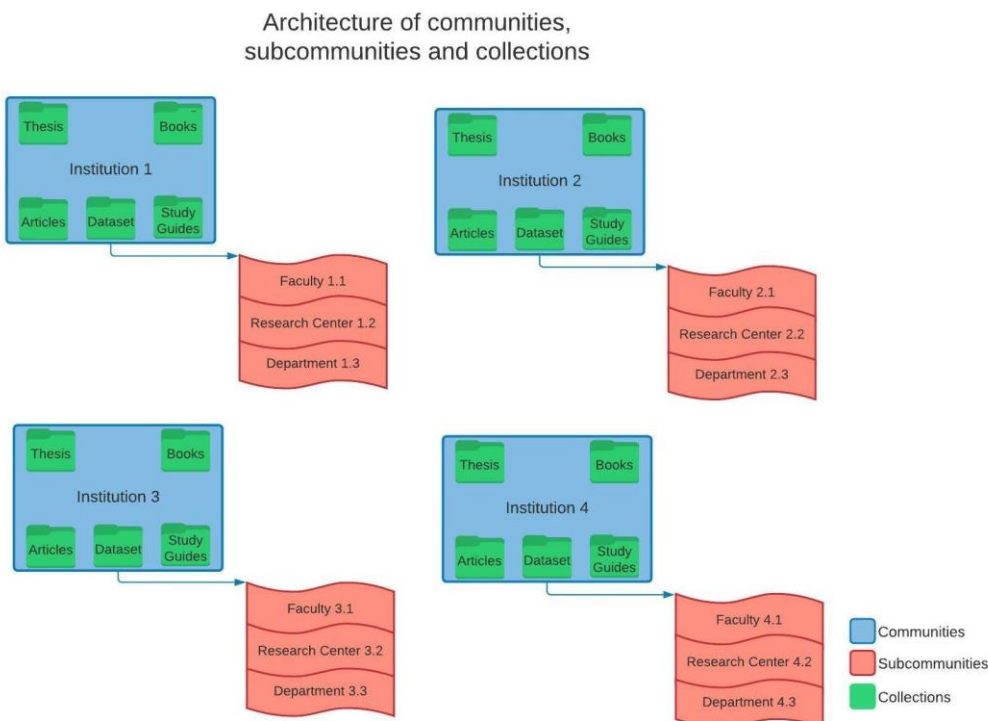


*Figure 2 Architecture of Communities, Subcommunities and Collections*

The theoretical basis, the analyses carried out and the detailed description of the information architecture for the Angolan National Repository can be found in the following website: https://doi.org/10.5281/zenodo.6354741

## 27.    Design and implementation of the users and roles architecture for the development of the National Repository of Angola

Previously we talked about how to structure a repository with digital content of scientific information, in which communities, subcommunities and collections can be created, however, to manage their use, it is necessary to have an architecture that allows the administration of users, which in turn can be organized through groups for the assignment of permissions.

Based on the basic architecture of users, roles and permissions in Dspace, which as mentioned above is the software of choice for the creation of digital repositories, it is proposed that for the management of users and roles in the national repository of Angola, two types of users are managed:

- Visitor users, these are the people who will be able to navigate in the existing communities, sub-communities and collections and who will have access to consult the stored items through the search filters, as long as they are available publicly or anonymously and registered users.

- Registered users are those who can browse and search for information in the same way as a visiting user; however, they have the characteristic of having a registered account in the repository, which allows them to carry out different processes such as the creation and entry of items, review to authorize or reject these entries, edit the metadata of the items, among other permissions.

For the proper administration of the Angola national repository, it is suggested that should there be registered users with the following roles:

- Institutional Administrator
- Community Administrator
- Author
- Repository
- Reviewer

The following diagram summarizes the functions and/or permissions of each of the above roles.
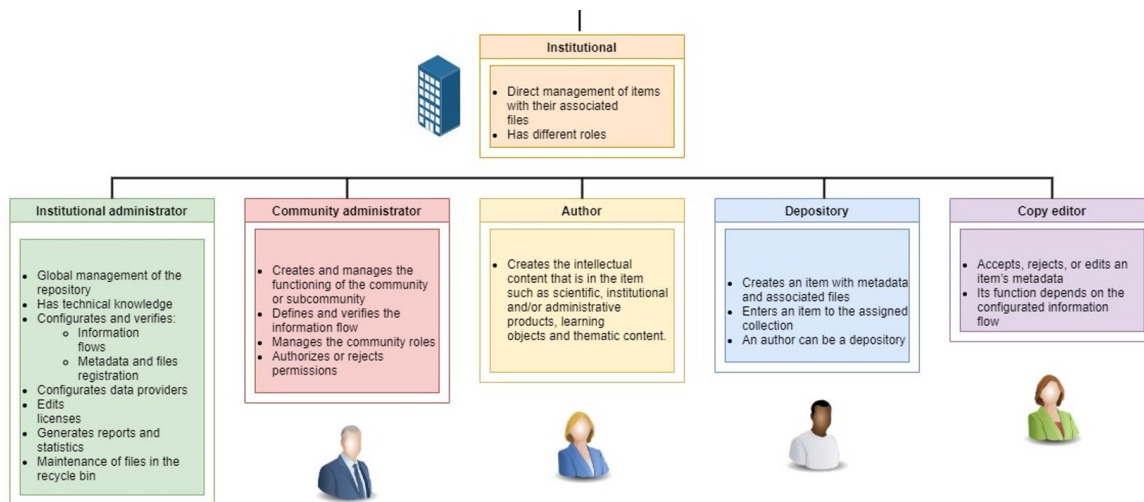


*Figure 3 Description of roles in a repository*

Detailed information on the user architecture and role design for the Angolan National Repository can be found at: https://doi.org/10.5281/zenodo.6354750

## 28. Technical infrastructure requirements for the development of the National Repository of Angola

An analysis was carried out to determine the recommended infrastructure to host the Angola repository. The analysis consisted of evaluating different scenarios in which the repository could be housed, including the purchase of virtual servers or dedicated servers with different hardware resources such as operating systems, memory, processors and storage space. The purchase of a virtual server or a dedicated server implies having knowledge in administering servers since with this scenario all the administration falls on Angola's personnel. The administration would be both at the operating system level to monitor the aforementioned resources and the administration of the repository itself. The difference between a dedicated server and a virtual server is that the dedicated server is a completely independent and exclusive environment for the project which implies a higher cost, the virtual server is an environment designated for the project but the hardware is possibly shared with other environments.

The second scenario was to purchase a complete installation of Dspace, which is the software that allows to create institutional repositories easily and quickly. This scenario consists of purchasing the service with Duraspace, a company dedicated to provide this service where you already have a fully functional Dspace environment to host a repository. In this scenario Angola's staff is only in charge of the administration of the repository, forgetting completely about the administration of the server, as part of the purchase Duraspace commits itself to carry out this administration, forgetting about monitoring the operating system, memory, CPU and storage. In addition, if in the future more resources are required, they can be increased without any problem.

This option was determined to be the most feasible scenario for the Angola project because it reduces the complexity of the administration, only worrying about the repository administration.

Detailed information on the estimated technical infrastructure requirements for the Angolan National Repository is shown in: https://doi.org/10.5281/zenodo.6360882

## 29. Design of information flows for the development of the National Repository of Angola

The workflow in a digital repository indicates the way in which items are entered and accepted to be visible in the collection, community and/or subcommunity to which they belong.

This section explored and documented the process of entering the various types of documents in a repository created with the Dspace software, which as mentioned above these documents are classified into: scientific, institutional or administrative products, learning objects, and thematic collections. In addition, the most feasible possible ways for sending, receiving and publishing documents in digital repositories were investigated.

Based on this and considering the organizational proposal of Angola's national repository, the stakeholders involved and the nature of the Dspace flow for the entry of items into a repository, it is proposed to use two types of information flows, which are configured in the process of defining collections, involving users with the roles defined in the previous section, author/depository, reviewer and administrator.

The information flows proposed for the Angola national repository are:

● **Accept/Reject:** It is proposed to use this flow for collections where the material must be strictly controlled to avoid modification, such as scientific products, learning objects and thematic collections.
When an author/depositary creates an item with metadata and associated files, it is registered in a list of pending submissions for verification in the profile page of the reviewer assigned to the collection, in this way the reviewer can accept or reject the submission before it is published, if it is accepted, it will automatically be visible in the collection, otherwise it is returned to the author/depositary who includes a comment indicating the cause of the rejection.

● **Accept/Reject/Edit metadata:** It is proposed for the case of collections of institutional and/or administrative products, where the content when reviewed, may be subject to editing in certain necessary metadata directly related to the department or sub-department and therefore the institution, as they may contain information that can be modified by a reviewer.
In addition to having the options of accept or reject the submission, the reviewer in charge will have the possibility of making changes to the metadata before finalizing the process; in the same way as in the Accept/Reject flow, if the submission is accepted it continues its flow until it is published, otherwise it is returned to the author/depositary with a comment indicating the cause of the rejection. The reviewer performs this task in the same way through his/her profile page with the list of pending submissions.

In both flows the administrator intervenes to ensure the correct functionality, periodically verifying the procedures carried out, having the possibility of seeing their list and being able to intervene in the event of a technical problem.

Detailed information on the design of the information flows for the National Repository is shown in Angola: https://doi.org/10.5281/zenodo.6360913

## 30. Technical information on the installation and configuration of the software for the National Repository of Angola

The software used for Angola's institutional repository is Dspace. Dspace is a software for the creation, administration and configuration of institutional repositories in an easy and fast way, several repositories use this software such as: UAEMEX Institutional Repository, the Repository

of the National University of Colombia and The National Digital Repository of Science, Technology and Innovation ALICIA in Peru.

Dspace was installed and configured for the moment in a Redalyc server while the purchase of the service is being carried out with Duraspace, the company that provides this service.

For the installation it was necessary that the server complied with the necessary requirements that come in the software documentation such as the installation of jdk 8 or greater, apache maven greater than 3.0.5 in its version, apache ant greater than 1.8 in its version, install a database which could be oracle 10g or postgres greater than 9.4 and an apache tomcat server 8 or greater. For the installation of these requirements it is also necessary to take into account the libraries at operating system level.

Once the requirements were met, the software was downloaded, configured and compiled for later installation.

In the configuration it is specified to enable Mirage2, a component that works in order to be responsive on mobile devices, which means that it adjusts to any screen resolution.

The installation was successfully completed and ready to be made available. As part of this installation it was customized with the colors and styles designated for the Angola national repository.

Detailed information on the installation and configuration of the software for the Angolan National Repository is shown in: https://doi.org/10.5281/zenodo.6350497

## 31.     Metadata and full text structuring (Dublin Core NISO Z39.85-2012, XML JATS NISO Z39.96-2019): recommendations for their implementation in the National Repository of Angola

Metadata includes extensive information describing the data generated in the research. In other words, it is data about the data. Its importance is great, since it is essential in tasks such as search, retrieval, transfer and preservation of information. In addition, they are fundamental for the interoperability of information between repositories.

In this section, the origin and importance of metadata were theoretically based, and a research on the main existing international standards for the structuring of metadata in digital repositories was carried out. To help us determine which was the most appropriate standard to structure the metadata of the different types of documents in the national repository of Angola, an evaluation of some national and institutional repositories was carried out, identifying the most used, flexible and scalable standard(s) in those repositories. This will facilitate future interoperability with these or other repositories.

As was seen in the institutional and national repositories evaluated in this document, most of the repositories choose to use the Dublin Core metadata standard, owing to its versatility as well as

its simplicity, syntactic independence (integration in XML/RDF data structuring) and compatibility with the OAI-PMH protocol (Open Archive Initiative-Protocol for Metadata Harvesting), protocol used for the transmission of metadata on the Internet. This indicates that the same scheme is used internationally for working with and using metadata.

Therefore, and based on the type of documents that will be managed in the Angolan national repository, Dublin Core is considered the most convenient option for the structuring of metadata, because it provides the broadest level of common elements, flexibility, application among institutions and because it is the default standard in which metadata is structured in Dspace, which as mentioned above is the software from which the Angolan national repository was built. In addition, Dublin Core allows seamless integration with the OAI-PMH protocol, which will have a greater impact on the dissemination and visibility of Angolan scientific production, as well as making it possible to integrate the resources of the Angolan national repository with other national or regional repositories. The metadata structure of this standard will also allow, at some point, to link the metadata of the repository within the great metadata cloud offered by the semantic web, which will complement and enrich even more the data and information available on the resources.

The detailed document on the Recommendation on metadata and full-text structuring for the Angolan National Repository is shown in: https://doi.org/10.5281/zenodo.6350500

## 32. Interoperability recommendations for the National Repository of Angola: OAI-PMH, following OpenAire guidelines

Interoperability refers to the ability of an information system to communicate with one or more other information systems to share data, documents and digital objects effectively, with minimal or no loss of value and functionality, through an open, automatic and transparent interconnection while using the system's own interface.

The importance of interoperability lies in 3 main axes, being the increase of information visibility, the access to information obtained from different systems in a single place and the creation of quality services from the exchanged information. With these axes, the information stored in a repository can be shared to expand its coverage and reach a larger number of users, institutions or organizations with the same purposes.

In this section, the main interoperability guidelines and protocols were described, which make it possible to define the standards and regulations to be followed for the definition of metadata, as well as the way in which information can be shared; based on this, different case studies were analyzed to know how interoperability has been applied and to serve as a basis for its implementation in the National Repository of Angola; among which we can mention the REMERI repositories, LA Referencia, the National Repository of Mexico and even the current and future panorama according to COAR.

Thus, the interoperability application was proposed using the set of OpenAIRE guidelines in its version 4, which is compatible with the platform of the National Repository of Angola by means of

DSpace 6.x. The different standards and recommendations to be followed for the management of the metadata corresponding to the documents to be stored in the repository were described, taking into account that the Dublin Core standard is used, since it is practically the universal format for sharing Open Access information.

It should be noted that to complete the interoperability process, the use of the OAI-PMH protocol was defined for its great versatility in the handling of metadata, and also, in its implementation in the National Repository of Angola, it is possible to have both a service provider to collect information from external sources such as associated repositories, and a data provider to be able to share the stored collection with other external entities, such as other organizations and institutions related to the Angola project, achieving a high global visibility to have access to the information at all times and with a high range of compatibility for the exchange of knowledge.

The detailed document on the interoperability recommendations for the Angolan National Repository is shown in: https://doi.org/10.5281/zenodo.6353917

## 33. *Digital Preservation Recommendations for the National Repository of Angola*

The goal of a digital preservation system is that the information contained in it remains accessible to users for a long period of time. "Efforts to preserve digital objects do not end with the technical, but there are other challenges: legal (permission of the authors), economic and institutional (permanent commitment) to reach the result of durability".

In this section the importance of digital preservation was theoretically founded, the most frequent threats to digital content were listed. Research was conducted on the main digital preservation strategies used by digital repositories as well as existing international preservation guidelines. To help us determine the most appropriate standard for structuring the metadata of the different types of documents in Angola's national repository, an evaluation of some national and institutional repositories was carried out, identifying the preservation strategies most used by these repositories. In order to guarantee the access and durability of the digital content.

According to the information seen throughout this document, it is essential to establish a set of good practices to implement a digital preservation plan and to protect against threats, within the mentioned good practices are:

- Write and implement a preservation policy for each digital collection.

- Identify which collections will be maintained over time.

- Preservation of old technology that is still functional or that is not feasible to change, maintaining the hardware and software that created the necessary digital objects.

- Controlling the material using structured metadata and other documents that facilitate access and help throughout the preservation process, such as the use of metadata in XML formats.

- Use preservation architectures, storage formats, metadata standards.

- Choose appropriate means to provide access despite technological changes.

- Make use of the DSpace features for digital preservation mentioned in document: Digital Preservation Recommendations for the National Repository of Angola

Regarding the accessibility of hardware, software and communication devices, the use of open protocols ensures the interoperability of the repository and, therefore, the exchange and transfer of information.

In summary, following the recommendations outlined above, it is suggested to use the following file formats for the documents in Angola's national repository.

Text

- PDF

Video

- Flash
- QuickTime

Images

- TIFF (preservation)
- JPEG
- PDF

Audio

- MP3

In addition to the above formats, it is recommended to include the XML file containing the document metadata, preferably structured with the Dublin Core standard, which will further guarantee the permeability of the content.

The detailed document on digital preservation recommendations for the National Repository of Angola is available at: https://doi.org/10.5281/zenodo.6353952

## *34.     Usability recommendations for the National Repository of Angola*

Usability is a measure of the quality of the experience a user has when interacting with a product or system, considering the effectiveness, efficiency and satisfaction with which the product or system allows to achieve objectives in a specific context of use.

Usability for a website or web platform, a website can be measured by studying the relationship between the tools (navigation system, functionalities and the contents offered) and those who use

them, to determine the efficiency in the use of the different elements offered on the screens and the effectiveness in the task accomplishment that can be carried out through them.

In software systems, usability is characterized by ease of learning, efficiency of use, retention over time, offering error rates, as well as visualizing user satisfaction.

According to document Usability recommendations for the National Repository of Angola, the importance of the use of standards is commented, since they allow regulating the development of a software system, that is why a standard is defined as a document determined by consensus and approved by a recognized institution, which establishes rules, guidelines and characteristics for activities or their results for common and repeated use, with the objective of reaching an optimal degree of definition in a given context.

This section also described the types of standards applicable, formal and informal, focusing on the formal ones, since they are defined by international organizations widely accepted for their experience in their use and verification, such as the International Organization for Standardization or commonly known as ISO, from which process-oriented standards and product-oriented standards are established.

The document describes that, for the case of the National Repository of Angola, several standards were chosen for the process of its implementation and usability. In terms of process-oriented standards, ISO 9241 was considered because of its recommendations for using software with the appropriate hardware; ISO 13407, which maintains the User-Oriented Design to ensure good interaction, as well as ISO 14915 additionally for the management of multimedia resources.

Finally, for product-oriented standards, ISO 9126 establishes the parameters for measuring software quality, as well as ISO 14598 which defines the appropriate evaluation procedure; however, the use of ISO 2500 (SQUARE) is recommended since it merges the best of both standards to specify the necessary requirements to define the quality and evaluation of software in the measurement process. The application of this standard allows following the entire development process of the Angola National Repository until the final product is achieved, which serves as input for the evaluation process, minimizing the possible appearance of errors and, if so, solving them in an organized and efficient manner.

The detailed document is available at: https://doi.org/10.5281/zenodo.6353963

**Objective 6: Development of a microsite for the adoption of Open Access for Angola on UNESCO GOAP**

*35.    Structure and design of the GOAP sitemap of the microsite for the adoption of Open Access in Angola*

The Microsite for the adoption of Open Access in Angola is integrated within the Global Open Access Portal (GOAP), whose purpose since its creation has been to offer a wide range of Open Access resources from all over the world. The Angola Microsite contains, among other things, information on the current situation of Open Access in Angola, such as the policies to be implemented, access and theoretical support of the National Repository of Angola, access to materials and training events on Open Access issues. This microsite also aims to gather all the information about the collaboration between the different agencies and institutions that are participating, besides informing us, it will serve to monitor and evaluate the path to achieve the implementation of Open Access in Angola.

In this objective, the information architecture of this microsite was designed, defining the sections it will contain as well as its hierarchy and relationships. As a result, a site map was created that graphically shows the distribution and grouping of the aforementioned information.

The information and design of the sitemap, as well as the graphical and conceptual prototype of the Microsite for the adoption of Open Access in Angola, are available on the website: https://doi.org/10.5281/zenodo.6353977

*36.    Development of a GOAP microsite for the adoption of Open Access in Angola*

At this point, the technological development of the microsite platform for the adoption of Open Access in Angola was carried out, which, as previously mentioned, is integrated within the UNESCO Global Open Access Portal (GOAP). Consequently, this microsite inherits the technological architecture proposed in GOAP.

From the prototype made in Structure and design of the GOAP sitemap of the microsite for the adoption of Open Access in Angola, the microsite was implemented within the Drupal installation previously made in GOAP. As a support to understand the information contained in the microsite, a description of each of the sections that compose it, as well as some images that illustrate this website, are shown in a general way in the document referred above.

The corresponding work is available at: https://doi.org/10.5281/zenodo.6353991

## 37. Integration of the microsite for Open Access adoption in Angola with GOAP

The Angola Microsite was integrated to the Global Open Access Portal (GOAP) since both projects have a common goal which is to promote, disseminate and share Open Access through educational resources and training courses on the importance and good practices of Open Access. This Microsite is located within the GOAP main menu at the top.

This space will ensure free access, dissemination and promotion of Open Access in Angola, hoping that in the future this project and this country will represent a model for other countries in the process of adopting OA.

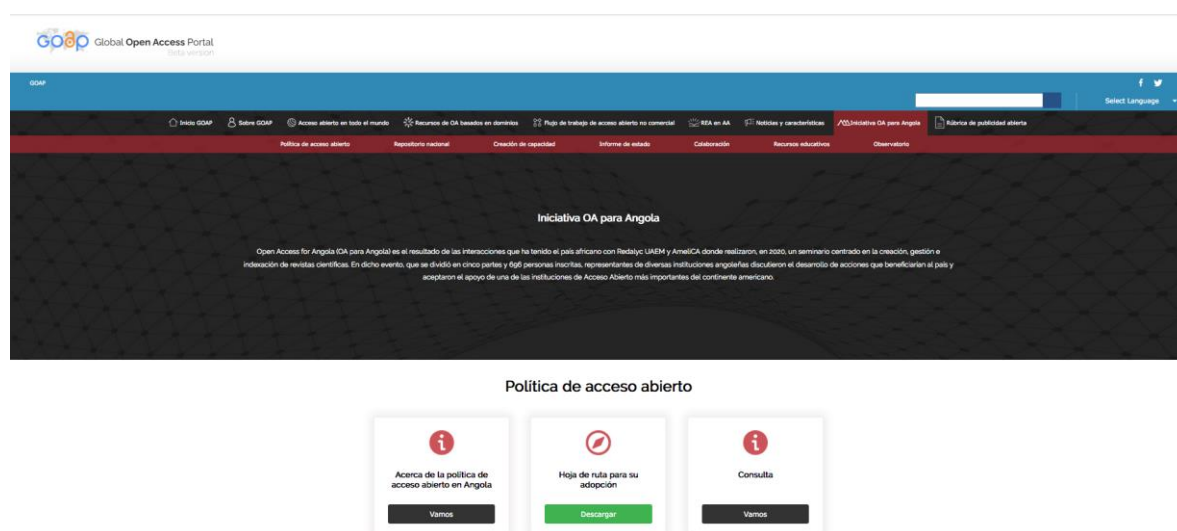This microsite can be accessed from the following URL: https://www.goap.info/



*Figure 4 Microsite in GOAP*

Detailed information on the results obtained on that subject is available at: https://doi.org/10.5281/zenodo.6354009

# Objective 7: documenting the process of implementing the activities carried out to undertake an Open Access strategy in Angola

## *38. Elaboration of a video-documentary on the activities carried out to undertake an Open Access strategy in Angola*

A documentary video was produced on the Open Access project for Angola, showing the stages of the project, the institutions involved and a brief reflection on the importance of promoting knowledge as a common good in the Angolan community and the world.

During a meeting with the production team members, the objectives of the documentary were defined along with a research structure to obtain information on the different processes of the project. Subsequently, a general schedule of activities was drawn up to facilitate the distribution and execution of the objectives with agreed deadlines.

With the information obtained from the interviews, a step outline was drawn up describing the content and main ideas of the future footage, resulting in a technical script that was reviewed by the objective team and some of the members of the project.

The technical script specified the duration and the audiovisual material that illustrated the ideas of each sequence and a shooting plan that would facilitate the production of the documentary video.

During the development of the project, photographic records were taken to compile the processes generated by the Redalyc team within its facilities and in its remote work modality. In addition, project processes were staged with the help of Redalyc personnel.

We also created 2d animated resources to support the narration of the documentary, produced in Adobe After Effects 2021.

The editing of the documentary was done with Adobe Premiere CC 2018 video editing software.

Documentaries are memory containers that help both viewers and producers to create awareness and reflection on their environment and put the facts of a certain event in perspective.

From the experience of this audiovisual design and production team, for the realization of an information resource of this format it is important to take into account:

1. Define the objective(s) of the documentary that will be carried out.
2. Create a schedule of activities.
3. Collect all available information on the subject and extract the essential information from it.

4. At the moment of recording it is advisable to make sure that your recording equipment is in good condition (have full and spare batteries, have enough memory space in our devices).

5. Recognize that the script is only a guide to start your project. One must learn and adapt to the changes that the story itself encourages.

6. Before starting to record, make sure that the lighting is adequate and avoid as much as possible the filtration of outside noises and visual distractions, in order to reduce editing and correction time in post-production.

7. Always save and back up all audio-visual material.

The work about the Open Access project in Angola is available at: https://doi.org/10.5281/zenodo.6354018

## References

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