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Experience Report

Policy on Open Access to Knowledge: Experience Analysis of the Oswaldo Cruz Foundation / Fiocruz

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ABSTRACT

This article reports on the experience of building and deploying the Oswaldo Cruz Foundation Policy of Open Access to Knowledge, established with the mandatory goal of promoting free, open access to the knowledge the Foundation produces, to preserve institutional memory, provide visibility, and disseminate intellectual production, establish guidelines to register its publicity, and to support the planning and management of research. To achieve it, the institution uses the Institutional Repository named Ark, where, in principle, scientific articles and dissertations are archived. This article presents a contextualization of the movement for open access to scientific literature, emphasizing the origin, dissemination strategies, and major domestic and international initiatives, especially in the field of Health. It then describes the collective process of formulating and validating the policy at the Oswaldo Cruz Foundation, all the way from the work done by the group that initiated the research, the study and learning on the subject, the public consultation that the policy was submitted to, the creation of bodies of deliberation and governance to its approval by the institution's Advisory Board last February. Finally, the article concludes that the democratization and universal access to scientific knowledge is a fundamental condition for the equitable and sustainable development of nations.

Keywords: Information Policy; Open Access; Institutional Repository; Digital Preservation; Scientific Information.

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Introduction

This article aims at reporting the formulation and implementation experience of the Oswaldo Cruz Foundation (Fiocruz) Policy of Open Access to Knowledge, established in February 2014, in order to contribute to the reflection on the critical elements involved in this process at an institution of Science, Technology and Health. The Policy of Open Access to Knowledge is one of the components of the Fiocruz Information and Communication Policy and aims at guiding the practice of making the institutional intellectual production public. In addition, it consolidates the guidelines that they have on the process of its registration and dissemination, through the Ark Institutional Repository.

Fiocruz aims its practices at the fields of information and scientific communication based on the precept that the information is a public good and one of the social determinants of health. The set of guidelines set out in the stated Policy is aligned and reaffirms the mission, vision and values of Fiocruz, with emphasis on its role as a public and strategic health institution. This implies its recognition by the Brazilian society and of other countries by its ability to put Science, Technology, innovation, Education and Technological Production of Services and strategic inputs at the service of health promotion. In this way, such guidelines reaffirm the objectives of reducing inequality and social iniquities, consolidation and strengthening of the Brazilian Public Heath Care System, as well as the development and improvement of public health policies.

In view of those objectives and guidelines, the first section of this article presents the general situation on the global initiatives on national and international levels in favor of open access, especially those in the field of health. Thereupon follows the formulation and validation process of Fiocruz Policy of Open Access to Knowledge and, finally, the aspects deemed crucial to the success of this work is highlighted, from the analysis and learning with global initiatives and with the experience recently deployed at Fiocruz.

Global Movement in favor of open access: origin, progress and strategies

The world movement for open access to scientific literature comes in the beginning of the 1990s to promote open and free access to scientific information. At least two factors were decisive in its advent: the crisis of the journals, which broke out in the middle of the 1980s as a result of the successive increases in the price of subscriptions to scientific journals practiced by commercial publishers, forcing the libraries of various countries to make drastic cuts in hiring those subscriptions; and the creation of the World Wide Web, in the European Laboratory for Particle Physics (CERN), in 1989, by the British scientist Tim Berners-Lee who revolutionized communications throughout the world and in all fields.

The first factor interfered negatively in the movement and development of knowledge, which requires access to a more relevant scientific literature and interfered with both the visibility of the authors and the results of their research which went on to be less read and cited. The second factor which related to the economy of the scientific communication process, shook up the secular structures of the traditional scientific media industry because it enabled new management models of scientific communication[1].

To cope with this hostile panorama, in the beginning of the 1990s there were several scattered initiatives by researchers and managers of information guided by the common interest in promoting free open access without legal barriers to scientific literature. This began to migrate to the Internet, making the best of the information technologies. Among the pioneers was a Physicist from the University of Los Alamos who, in 1991, devised the ArXiv: the repository of electronic preprints of scientific papers in the field of Physics with open access via the Internet, considered the first repository of open access. The importance of Paul Ginsparg is not only due to the creation of a repository but in the virtual design of a new model of scientific communication. More than three centuries after the launch, in 1665, the Sçavant Journal, the first scientific journal of history, yielded in Los Alamos a unique moment in the history of scientific communication, probably in the best sense of the word, a paradigm shift.

Since the advent of the ArXiv until today, several initiatives have been undertaken in order to spread and consolidate the movement by open access. From this mobilization one can highlight the Convention of Santa Fe and three attestations that have become key documents to the movement for open access to scientific literature: the Budapest Declaration, the Declaration of Bethesda and the Berlin Declaration. These and other statements define the movement in its economic, legal, organizational and technical aspects.

The Santa Fé Convention, the first successful meeting on the initiative of open files (Open Archives Iniatitive) was held on October 21-22 of 1999, in Santa Fé, New Mexico. Sponsored by the Council on Documentation and Information Resources, the Federation Digital Library, the Scholarly Publishing & Academic Resources Coalition (SPARC), the Association of Research Libraries and the Los Alamos National Laboratory (LANL), the meeting was attended by Computer Scientists and Digital Librarians[2].

In December 2001, the Open Society Institute (OSI) promoted the Budapest Open Access Initiative3 Conference. The goal was to speed up international effort to achieve open access on the Internet to articles from researches in all academic fields.

The Budapest Declaration, signed in February 2002, which emerged from that conference, presents a very clear proposal: provide free results of scientific research free of charge, without any kind of restriction. Its signatories advocate the abolition of barriers that limit access to the outgrowth of research efforts as a universal good to which everyone is entitled, by providing, in turn, "a new dimension, a new vision, a new impact, and a wider audience to the authors"[3].

In addition to the definition of open access, the Budapest Open Access Initiative has also defined two strategies for the movement propagation of open access to scientific information.

> By open access to this literature (assessed by peers), we believe its free availability in in the public Internet, allowing any user to read, download file, copy, distribute, print, search or make a link to the full texts of those articles, trace them for indexing, passing them down as data to software or use them for any other legal purpose, without legal, technical or financial barriers, except for those concerning the access to the Internet itself. The only restriction on the reproduction and distribution - and the only function of copyright in this area – should be the control given to the author over the integrity of their work and the right to be properly recognized and cited[2],

The first of these is the self-archiving strategy, known as the “green road” which consists of the archive storing, by the authors themselves, of scientific articles evaluated by peers already published or accepted for publication. It takes place upon the authorization (the green road) of editors who have accepted them and have the copyright so that they are arranged in a digital repository of open technology. The second strategy is the so-called “golden road” which consists in the creation of a new generation of electronic journals with open access as well as in the conversion of existing scientific journals into electronic releases of open access. In the “golden road”, the electronic scientific journals holding the copyright of scientific articles do not impose any barrier to the access to scientific literature.

The Bethesda Conference, held in April 2003, at the Howard Hughes Institute, in Maryland, USA, aimed at discussing the procedures required to provide open access to primary scientific literature. The debate resulted in the Declaration of Bethesda which reinforces the results of the Budapest Conference.

Organized by the Max Planck Institute, the Conference on Open Access to Knowledge in Sciences and Humanities, held in October 2003 in Berlin, highlighted the reason for the need to develop an engagement policy from researchers with open access, both through requirements for them to feed a copy of everything they publish into a repository of open access and the commitment to publish their articles in journals of open access. It was initially signed by 19 research and cultural heritage institutions of countries in Europe, in addition to Australia, India, China, among others and it has been signed and translated into 11 languages, including the Portuguese speaking countries, with the initiative coordinated by the University of Minho and the adhesion of Brazil[4].

The field of health has been one of the biggest boosters behind the movement for open access. In 1999, in the United States, the National Institute of Health (NIH) proposed the creation of a site for electronic publications that could offer open access to the literature in the area of Life Sciences as an adjunct to PubMed which today offers this type of access to more than 23 million biomedical literature citations and abstracts from Medline as well as from journals on Life Sciences, in addition to online books. Despite the opposition from publishers and the lobby to cut their funding, in the year 2000 the PubMed Central emerged and it now stores more than three million articles and provides open access to many of them.

This NIH initiative was the embryo of the Public Library of Science (PLoS), another successful project in the field of health and employment of open access as business model. Founded in 2000, PLoS rapidly moved into being the driving force behind the movement for open access. Its founders circulated a letter in which they asked the scientific editors and doctors to make scientific articles with peer evaluation available for distribution through free online public archives, such as the PubMed Central National Library of Medicine of the USA[5].

Another important initiative for the promotion of open access occurred during the opening of the World Summit on the Information Society Forum, a United Nations (UN) meeting performed in May 2013 which addressed issues on communication

and information technologies. On that occasion, the board of directors of the United Nations for Education, Science and Culture (Unesco) announced its new policy of open access to freely make its publications available free of cost and, by doing so, allow the knowledge produced by the institution to be available to the widest possible public[6].

Adding to other initiatives, a new policy of open access to information has been recently discussed at the World Health Organization (WHO). With publication scheduled to come into force in July 2014, the policy will apply to all work by the institution authorship, as well as the publications with results of research funded by the WHO. Even though a considerable part of its publications is available through its institutional repository, this changes the current situation of access to research reports published in foreign journals because, once the barrier of subscription payments or other access fees is removed, these publications will gain greater visibility and impact[7].

In addition to the initiatives mentioned above, in Diagram 1, a time line shows the key milestones of the movement for open access to information on international and national levels. However, on the site Timeline of the Open Access Movement there is a more detailed timeline that was originally put together and maintained by Peter Suber[8], but is now available to be updated collaboratively throughout the community that operates in the movement[9].

Diagram1. Time Line with milestones in favor of open access to information

American Policy on Open Access through the OSTP – 2013

Declaration on Open Science for the 21st century – 2012

Declaration in favor of Open Government – 2011

The Alhambra Declaration – 2010

Rome's Agenda – 2009

Harvard researchers in favor of information free access – 2008

Draft Bill No: 1.1201 - Free Access Policy to Brazil – 2007

The Florianopolis Declaration

The Driver Initiative Launch by the European Commission

The OPENDOAR Official Launch – 2006

The São Paulo Letter

The Salvador Declaration on Open Access

Brazilian Manifest supporting free access to scientific information – 2005

Publication of the British Parliament Committee Report on scientific publishing

Washington DC Principles for Information Free Access

The OECD Declaration on access to research data financed by public funds

The Valparaiso Declaration – 2004

The World Summit Principles Declaration on the information society

Positioning of the Interacademy Panel on access to scientific information

The Wellcome Trust Declaration of Principles supporting the free access publishing

The Berlin Declaration on Knowledge Free Access

Association of Learned and Professional Society Publishers (ALPSP)

The Bethesda Declaration – 2003

The ECHO Letter

The Budapest Initiative for Open Access - 2002

The Public Library of Science (PLoS) Open Letter – 2001

PubMed Central – 2000

The Open Archive Initiative launch – 1999

The SPARC launch by ARL – 1998

The SciELO launch – 1997

Source: SILVA[10]

In Brazil, the project SciELO (Scientific Electronic Library Online) is probably the most representative initiative of the movement for open access. Packer and collaborators11 describe it as a virtual library of Brazilian scientific journals in electronic format which organizes and publishes full texts of journals on the Web, in addition to producing not only indicators of its use but also some impact. Access to hundreds of electronic publications that it houses is open, absolutely free of cost and without any barrier. It was launched in 1997 and resulted from a partnership between the Research Support Foundation of the State of Sao Paulo (Fapesp), the Latin American and Caribbean Center on Health Sciences Information (Bireme) and the National Council for Scientific and Technological Development (CNPq). Since 2002, it has counted on the sponsorship of that Council. It has recently launched the SciELO Books with the online publication of national collections and themes of academic books, both in open access and marketed.

Launched in 1998, the 4TH Regional Congress on Health Sciences Information (CRICS4) in San Jose, Costa Rica, the Virtual Health Library (VHL) promotes technical cooperation with Latin American countries as well as with the Caribbean and it is aimed at responding to the demands for scientific and technical information on health in that region. Under the coordination of the Bireme, the Pan-American Health Organization (PAHO) and the World Health Organization (WHO), many of their sources of information and associated networks are available in open access on the Internet, thus allowing integration and interoperability. It is comprised of 115 bodies in regular operation in 31 countries in Latin America, the Caribbean, Spain and Portuguese-speaking countries. The BVS counts on the following sources of information on Health Sciences and in general: Latin American and Caribbean Literature on Health Sciences (Lilacs), Spanish Bibliographic Index of Health Sciences (Ibecs), Medline, Cochrane Library and SciELO. Its operations in Brazil began in September 2008.

The movement for open access to scientific information in Brazil has in the Brazilian Institute of Information Science and Technology (Ibict), linked to the Ministry of Science Technology and Innovation, a prime mover. In 2003, Ibict created the Brazilian Digital Library of Theses and Dissertations which integrates in a single portal for open access, the information systems of theses and dissertations in the country. In that same year, it translated, adapted and distributed the Magazine Publishing Electronic System (SEER) free of cost, a management and electronic journal publication software package developed by the Public Knowledge Project (PKP) of the University of British Columbia. In 2005, it launched the Manifesto of Support Movement for Open Access in which there are recommendations for its deployment in Brazil12. In 2009, it led a project of open access to institutional repositories in 30 Brazilian public universities in partnership with the Studies and Projects Financier (Finep).

Ibict actions are aimed at a national policy of scientific information in the country. For this purpose, it has influenced in the presentation of the current Draft Bill No 387/2011, by Senator Rodrigo Rollemberg who seeks to establish a national policy for the technical-scientific self-archiving production financed by public resources at public institutions repositories25.

One of the first demonstrations involved in the movement in favor of open access happened at the International Seminar on Open Access for developing countries, carried out by Bireme in Salvador, Bahia, Brazil, in September 2005. In the Declaration of Salvador, the signatories urged the governments to give priority to science public policies, in which the research with public funding is required and made available in open access. In the same document, it has been proposed that the cost of publication be built into the cost of research and to promote integration of developing countries with the scientific information in the world knowledge scope.

The Portal of Coordination for the Improvement of Higher Education Personnel Journal (Capes), a relevant Brazilian initiative which consolidates as a complementary strategy for open access to scientific knowledge, was created by the foundation of the Ministry of Education (MEC) in 1990. In order to strengthen the post-graduation studies in Brazil, it offers access to international scientific production, thereby reducing costs of national libraries. It is a virtual library that brings together 37 thousand titles with full text, 130 reference bases, 12 databases exclusively dedicated to patents, in addition to books, encyclopedias and reference papers, technical standards as well as statistics and audiovisual content.

The Green Road – the self-archiving open access process in digital repositories - has gradually been the most widespread and implemented strategy to consolidate the open access to scientific literature, in spite of the lobby by the commercial publishers against it.

The institutional repository of open access to scientific literature is a scientific information service in the digital and interoperable environment, dedicated to the management of intellectual output of an institution. It encompasses the gathering, storage, organization, preservation, recovery, and wide dissemination of scientific information produced by an institution.

Eloy Rodrigues, a Portuguese researcher who led the deployment of the RepositoryUM, from the University of Minho, Portugal, reinforces the need for mandatory policies and believes that in order to be closer to

> [...] 100% of the literature produced and stored in their repositories, institutions should establish policies or mandates of self-archiving. That is exactly what a growing number of institutions around the world have been doing (there are currently 40 institutional mandates). Last year, major reference institutions such as MIT, various Colleges of the University of Harvard and Stanford, have adopted policies that include the mandatory publication storage in Open Access by their members13.

In their studies on the deployment of digital repositories, Guimarães, Silva and Noronha conclude, upon the force with which it is being driven, that

.

> [...] the Institutional Repository (IR), summarily understood as an online *locus* for the collection, preservation and dissemination of intellectual output of a (research) institution, comes forth as a fundamental part in the puzzle of iniquity in the access to scientific information. What began in the field of area of study, within the scientific community as a strategy for preprints exchange in the 1990s of the last century, has reached the twenty-first century with aspects of inevitability.

The open access to research results has been seen as a factor which maximizes access to research itself. Thus, it increases and accelerates the impact of research and, consequently, their productivity, progress and rewards[15-16]. It is shown that articles that are freely available receive between 2.5 and 5.8 more citations than offline articles. Likewise, Lawrence[17] has examined 119,924 papers presented at conferences in the area of information technology and has shown that the average number of citations to offline articles has been 2.74. On the other hand, the average number of citations to publicly available articles on the net has been 7.03, corresponding to an increase of 156,56 %[13.14].

The University of Manchester, through its institutional repository creation project (http://www.irproject.manchester.ac.uk), has listed a number of benefits for the researcher; namely:

- It increases the visibility of their scientific discoveries, since the organization, retrieval, and dissemination of scientific production are facilitated;
- It facilitates the management of scientific production often available on personal web pages on the Internet or institutional portals.
- It offers a safe environment in which the papers are permanently stored.
- It reduces the possibilities of plagiarism because, when disseminating the paper, it favors the record of authorship;
- It spreads throughout all the gray literature.
- It offers a single point of reference to one´s papers which are accessible 24 hours by means of any Web device at work, from home or while at a conference abroad.
- It improves the understanding of copyright through the awareness of researchers;

Finally, it is worth highlighting that the movement in favor of open access covers other types of intellectual production, in addition to the scientific articles. With a decade of existence, the movement called the Open Educational Resources (OER), despite being considered a new movement, is reaching many institutions as it points out to the implications in education systems, both to students and educators. One of these pioneering initiatives, known as Open Courseware, has the Massachusetts Institute of Technology (MIT) as its base of development.

The Unesco, in an event known as The Forum on the Impact of Open Courseware for Higher Education Institutions in Developing Countries, coined the term Open Educational Resources with the following understanding: "provision of open educational resources enabled by information and communication technologies for consultation, use and adaptation by a community of users for non-commercial purposes"[18].

The report by the Organization for Economic Cooperation and Development (OECD), entitled Giving Knowledge for Free, presents a broad perspective to the Open Educational Resources in a way it can be discussed and understood. The document expands such concept as it highlights the fact that the OER includes the learning content, the software packages, the tools for its development, the use and distribution of content as well as the utilized resources to deploy it as an open access[19].

Policy Development on Open Access to Knowledge at Fiocruz

Since its creation in 1900, the Oswaldo Cruz Foundation has sought to implement structures that could foster a network of data flow between the activities of research, technological development, education and production. In the early years, the library, the museum and the scientific collections, along with the weekly meetings known as "The Table of Wednesdays", the journal "Memories of the Oswaldo Cruz Institute" and the Course of Implementation, formed a set of structures of data management driven by the atypical institutional model at research institutions in Brazil at that time[20,21].

One can state that the open access to knowledge has been a guiding principle of the practices of information and communication at Fiocruz since its origin, barring the differences between the historical context then and the current debate about the issue. It is needless to say one cannot ignore the lack of knowledge, methods, technical terms and specialized field of information at that time. However, it is noted that, as a general principle, the understanding that the access to information and scientific and technical knowledge, which is crucial to the development of health and to the citizen's right, has always been present in the institution.

The awareness on the importance of information as input for action is relevant to all the players in health care, be it by subsidizing the managers in the formulation of public policies, the users of the Brazilian Public Heath Care System in the adoption of healthy behaviors and in defense of the right to health, the researchers in the production of knowledge, the professionals in their practice or the process of training human resources in health. The dissemination of scientific knowledge is, therefore, an essential prerequisite to enable actions and effective changes in the policies and practices in health.

From this perspective Fiocruz has participated in different initiatives over the time, in which information is treated as a public good, trying to establish links between the production and the use of knowledge, thus strengthening the relationship between Science and society. In this scenario, one can highlight its role in the Network of Virtual Libraries on Health (BVS): a cooperative network between institutions and professionals that aim at data management with open access on the Web. Consolidated as a strategy for technical cooperation in scientific information in the Latin America and the Caribbean region, the BVS is coordinated by the Pan American Health Organization/World Health Organization through the Latin American and the Caribbean Center on Health Sciences Information (OPAS /OMS/Bi -reme), as previously mentioned. The Fiocruz participation in the network is quite expressive, from the 33 BVS bodies that shape the Brazilian network, Fiocruz is responsible for the development and maintenance of 13.

Another important initiative of open access Fiocruz is part of is the SciELO Books whose online publication of thematic collections of academic books aims at maximizing the visibility, accessibility, usage and research impact, essays and studies. The books published by SciELO Books are available in digital format in open access on the Web and are also accessible on e-book readers, tablets and smartphones. The SciELO Books is part of the Fapesp SciELO Program and its development is led and financed by a consortium made up of The Julio de Mesquita Filho Paulista State University (Unesp), The Federal University of Bahia (UFBA) and The Oswaldo Cruz Foundation.

The recent global movement toward open access to knowledge has strengthened the historical perspective adopted by Fiocruz. It has contributed to institutionally define the creation of an infrastructure for the systematization of its scientific production through the Ark Institutional Repository as well as for the formulation of a set of guidelines that follows an institutional policy which leads this process.

One of the milestones of the institutionalization of open access at Fiocruz took place in 2010, with the debate and the inclusion of strategic objective: "Prioritize the policy of open access to information and knowledge management produced at Fiocruz" in the 6th National Congress Report. It is the responsibility of the Internal Congress, as the highest component of institutional representation at the Oswaldo Cruz Foundation, to act on strategic issues related to institutional macro-project, internal rules, statute amendment proposals and issues that may interfere with the course of the institution.

After setting that guideline, two important initiatives focused specifically on the systematization of scientific production were implemented in the institution, with emphasis on the creation of the Institutional Repository Ark, launched in 2011, created and supported by the Office of Communication and Scientific and Technological Information on Health (Icict) by Fiocruz. Its

role is to host, both share and give visibility to the intellectual production of the institution, by bringing them together in a single point of access. It is all about stimulating the widest possible circulation of knowledge in order to strengthen the institutional commitment to the free access to scientific information on health, in addition to providing transparency as well as to encourage scientific communication among researchers, educators, scholars, managers, post-graduate students and the civil society as a whole. The Ark is the main instrument for implementing the Policy of Open Access to Knowledge by Fiocruz.

In 2012, the Thematic Repository of the National School of Public Health Sergio Arouca (Ensp) was created. It is a technical-scientific research unit by Fiocruz which has the purpose to store, preserve, maximize visibility and use of the scientific production on health published by the school. The Ensp Repository is not to be confused with the Fiocruz Institutional Repository, since its orientation and scope are targeted at the scientific production on the theme of Public Health by the school researchers. This initiative is part of an institutional debate started in 2011, when the Ensp stated its adhesion to the International Movement of Open Access. It is also part of previous experience with the development of its Multimedia Library, in 2004 – a pioneering initiative to ensure access to educational and interactive materials as well as lectures[25].

Within this institutional context, this article aims at reporting the experience on the formulation of the Policy of Open Access to Knowledge – a process coordinated by the Vice-Presidency of Education, Information and Communication (VPEIC) according to the model of participatory management of the institution. Fiocruz adopts in its management model, bodies of collective decision of which the most important ones are the Internal Congress, cited above, that validates its Four-Year Plan and the Technical Chambers, responsible for advising the Presidency and the Board of Trustees in their specific areas of expertise. Coordinated by the Vice-Presidency of Education, Information and Communication, the Technical Chamber of Information and Communication is responsible for the analysis and propositions concerning the field of institutional activities. The need for an institutional policy that guided the practices related to open access was assessed by the Technical Chamber of Information and Communication at its meeting in 2012. It was then suggested the creation of a working team made up of experts in order to formulate the document-proposal on the Policy of Open Access to Knowledge by Fiocruz, formalized by Decree 795/2012-PRv[26]. The team defined as major lines of action (1) the study on the subject, considering the context of global and national initiatives; (2) the definition of the structure and scope of the Policy of Open Access and (3) the development of the Policy.

The analysis and the study of national and international initiatives, made by technical visits, literature review and promotion of scientific events with the participation of experts, enabled a broad organizational learning. Allowances for conceptual issues and definition of strategies that should be included in this Policy - incentives and financing, governance mechanisms, mandatory nature, technological infrastructure, human resources and copyright have all been generated.

After the conclusion of the proposal drawn up by the Working Team, considering that the issue of open access is transverse to the areas of activity of the institution, with direct impacts on research and teaching activities, the Policy was assessed by the Technical Chambers of Information, Communication, Research and Teaching. In July 2013, it was the object of a joint meeting, with the participation of around 150 Fiocruz employees, members of the three Technical Chambers.

The Policy assessment by the Technical Chambers represented an important step to ensure the topic was brought in an organized and purposeful way to the managers and professionals in the areas of Teaching, Research, Information and Communication thus creating an institutional conducive environment to deepen the debate at the Fiocruz technical-scientific units. In order to broaden the discussion to the entire community, the institutional Policy entered Public Consultation through the Fiocruz intranet. A wide-range campaign to raise awareness and communication was established with the aim at encouraging the participation of all servers and collaborators in that debate. The Fiocruz units put different forums and meetings together to discuss and organize their contributions to the document at Technical Chambers, Cooperative Networks, Deliberative Councils or Board Meetings.

Issues with greater degree of need for policy guidance, such as the Policy governance bodies and the Institutional Repository, the composition and the responsibilities of each one of them; the mandatory nature and the preservation of free choice of journals to publish scientific articles, even if they are not in open access, were raised in the public consultation and widely discussed. However, an expressive part of the issues raised by the units, were about operational aspects for effective implementation of the policy, not being predominant substantive and content issues, such as copyright concession or the mandatory character. The postponement of the Policy initial validity date was suggested, aiming at a longer period of time to define the participation model of the units in the repository; to determine the operational processes for the insertion of scientific production, especially the description of responsibilities to store articles, among other aspects.

The process of policy formulation by the working team and the assessment of Policy by the Technical Chambers and Public Consultation ensured greater consistency of the proposal that was forwarded to the Fiocruz Board of Trustees, with greater degree of alignment and representativeness.[vi]

At its ordinary meeting of October 2013, the Board of Trustees adopted the guiding principles of the Policy for Open Access to Knowledge. In order to carry out with the process, it appointed a Committee with the objective of analyzing the issues

and contributions raised in the Public Consultation and other forums of the institution and propose its incorporation in the Policy final text. On the occasion, the director of the Oswaldo Cruz Institute (IOC), Wilson Savino, as the draftsman, observed that, given the degree of complexity of a policy of open access at an institution such as Fiocruz, it has to have institutional bylaws and win compulsory character. He highlighted the need to strengthen the electronic documentary management along with the definition of specific office and the capillarity model at the units, with intake of human resources, information technology (IT) and definition of information security levels.

The committee of Open Access to Knowledge Policy was coordinated by the Vice President of Education, Information and Communication, Nísia Trindade Lima, and consists of the following directors of Fiocruz technical and scientific units: Research Center Gonçalo Moniz (CPqGM), Manoel Barral ; National School of Public Health Sergio Arouca (ENSP), Hermano de Castro; Polytechnic School of Health Joaquim Venancio (EPSJV), Paulo Cesar Ribeiro; Institute of Communication and Scientific and Technological Information (Icict), Umberto Trigueiros; Fernandes Figueira Institute (IFF), Carlos Mauricio Maciel; and Oswaldo Cruz Institute (IOC), Wilson Savino. In addition to the unit directors, the committee had an executive secretariat linked to the VPEIC Information Coordination and Communication. Its role was to prepare the final document of the Fiocruz Open Access to Knowledge Policy, to be assessed again by the Fiocruz Executive Council in February 2014. Besides the final document, the Commission also defined the strategies for the implementation of this Policy.

In February 2014, the board approved the full document and the composition of the Regulatory Policy Committee, the body responsible for supervising and monitoring the implementation of this Policy. The director of the Research Institute Evandro Chagas (IPEC), Alejandro Hasslocher, rapporteur of the agenda, stressed the impact of such policy on the institution routine and its role in institutional strengthening as the Ark repository, once it will allow greater visibility of the scientific production as a result of Fiocruz work. The director also stressed the importance of structuring the Technological Innovation Centers (NITs) to act in alignment with the new policy. The scheduled beginning of the effectiveness and implementation of the policy predicted its publication in the Presidency Decree in April 2014; the implementation of the Ark Institutional Repository Operational Plan and the installation of management bodies in May 2014.

The Fiocruz Open Access to Knowledge Policy is structured into eight general principles, 32 articles divided into the following chapters: Chapter 1. Definitions and objectives, Chapter 2. Bodies and governance mechanisms, Chapter 3. Ark Institutional Repository Operating Guidelines, Chapter 4. Rights and duties of the authors, Chapter 5. On stimulus and funding, Chapter 6 – Final provisions[27].

In a brief presentation, the following articles are highlighted: Article 6 which determines the mandatory character of data storage in the Ark Institutional Repository of dissertations and theses defined at the Fiocruz Postgraduate Programs as well as the articles produced within the Fiocruz scope and published in scientific journals. Article 9 which has the following governance structure: The Policy Regulation Committee of Open Access to Knowledge; The Ark Institutional Repository Steering Committee and The Open Access Centers to Knowledge (NAACs). Article 16 which states that The Ark Institutional Repository operational management is Icict's responsibility, jointly with all units. Article 23 which states that the scientific articles published in journals with access restriction should be stored in the Ark Institutional Repository and will be embargoed for a period of time defined in the contract by the journal. After the embargo period, the scientific articles stored in the Ark will be made available in open access.

After approval of the Policy agenda, three work fronts are carried out. The first refers to the Ark Institutional Repository Operating Plan deployment. As set out in the Open Access to Knowledge Policy, the Ark Institutional Repository is the main achievement tool of open access instituted by it with the function of hosting, providing and giving visibility to the intellectual production of the institution. The Ark has a Steering Committee responsible for the coordination, management, operation, participation and adherence to the institutional repository in conjunction with the Open Access to Knowledge Center (NAAC) of the units, defining lines of action, work plan and operation, ensuring alignment among the units. The operating plan aims at itemizing the roles, responsibilities, infrastructure as well as the operation and maintenance flows of the Ark, initially with regard to theses, dissertations and scientific articles, as set forth in the cited Policy.

A new work team has also been put together, coordinated by the VPEIC and made up of the Icict and the Coordination of Social Communication, responsible for the preparation and implementation of communication strategies and awareness of that Policy. The GT has defined the following strategies:

1. Propagation of the open access culture at Fiocruz and encouragement to join the Policy by the Fiocruz authors as well as the storage of intellectual production of the institution in the Ark Institutional Repository;

2. Wide dissemination of the Policy on the agenda not only at Fiocruz, contemplating all its Units, such as in partner, teaching, research and government institutions as well as in Health related institutions, C&T and to society;

3.Campaign preparation on the Open Access Policy and institutional repository for different audiences and vehicles - institutional e-mail, social networking, Fiocruz Portal, Fiocruz News Agency, Fiocruz scientific journals, communication consulting of the Units, WebTV Press, among others.

Finally, there follows the compliance of the central core legal instruments of the Institution and Institutional Policy of Open Access Units, particularly the edicts and regulations and the identification and development of copyright transfer instruments necessary for the implementation of the Policy agenda.

Critical elements for the open access consolidation

From the mapping and analysis of national and international experiences in favor of open access and the construction of this policy at Fiocruz, we point out some elements that seemed critical in this process. The synthesis of these elements aims at contributing to the implementation of open access policies and institutional repositories under other institutions in the field of science, technology and innovation which, like Fiocruz, have in the scientific knowledge their strategic asset.

The first aspect is the understanding that the success of open access policy depends on different dimensions that must be considered in its design and implementation. These dimensions refer to the formulation of macro and micro policy guidelines on open access: State policies, institutional policy and funding agencies policies. The macro policies refer to State policies that determine the mandatory publication of scientific production of public institutions in institutional repositories, such as the existing ones in Latin America (Argentina and Peru) which have gotten further than the ones in Brazil.

As macro policy, the definition of mandatory character on the publication of research results funded by development agencies should be noted, such as the National Institute of Health in the United States, and the Welcome Trust in the UK, to name only initiatives in the health field. These policies are complementary and should act in alignment. The establishment of macro policy facilitates and creates conditions for institutional policies, since the mandatory character is defined by a larger entity to which public institutions are subject. Notably, the mandatory aspect has proven far more effective than voluntary register in the scientific production of the institutions. The experience of other countries has shown that repositories with voluntary data storage tend to achieve lower levels of coverage, from 15 to 20% of institutional production, which fails to substantially increase the impact and institutional visibility, contrary to what occurs with institutions that adopt mandatory policies. After the mandatory policy of the University of Minho came into force in January 2005, membership has expanded significantly over the five following months. The number of self-archiving documents jumped nearly ten-fold from 128 to 1,111, while the number of communities increased from 7 to 25, nearly a 300% increase[22].

One aspect to be highlighted is the coexistence of open access policies and intellectual property. Apart from certain legal aspects, the open access policy is fully implemented in academic institutions recognized as leaders in the technological area, as the Fraunhofer-Gesselschaft ("*When FG employees publish articles, they are "expressly required to demand" the "right to further use of their own works."... FG "wholeheartedly supports" publishing in peer-reviewed Open Access (OA) journals. FG managers are "urged to take a proactive stance" to help FG researchers make use of green and gold OA. ... FG "is committed to providing the necessary financial, organization and non-material support" to implement its policy.")* and the *Zurich Federal Institute of Technology* (ETH Zürich) *("The ETH Zürich requires of staff and postgraduate students to post electronic copies of any research papers that have been accepted for publication in a peer-reviewed journal (post-prints), theses and other scientific research output (monographs, reports, proceedings, videos etc.), to be made freely available as soon as possible into the institutional repository ETH E-Collection, if there are no legal objections*.")

However, it is not only in relation to the mandatory character that the benefits of a macro policy should be highlighted, but mainly by the consolidation of the movement when it reaches national level, creating a positive setting for open access, **from** the theme of incorporation in institutional agendas including further clarification of the researchers in this regard and the training of human resources for repositories management, **to** the inclusion of national production in the global flow of scientific information. In this sense, institutional repositories can increase their visibility by participating in initiatives to facilitate access to their collection. The Registry of Open Access Repositories (ROAR), for example, is an international database that informs about the creation, location and growth of institutional repositories and their contents, in addition to cataloging more than 300 institutional and multi-institutional repositories.

Another important aspect for the adhesion to open access is the creation of infrastructure through the developments of technology platforms free for network collaboration. Countries in which the open access was regulated by law or even

institutions that have set up their policies, but have not created an infrastructure that gave support for the effective implementation of those conditions, have not been successful in the implementation of such policies. The ideal approach is that such infrastructure is shared by all the institutions that adhere to open access, making it easier to work on the net through the creation of methodological and technological standards.

In addition to the macro and micro policies and the creation of appropriate infrastructure, a policy of open access requires a cultural change in the field of research; the authors need to be sensitized and made aware of this policy, especially in relation to copyright. The open access, even if mandatory, does not, in its principles, conflicts with the interest of the author that, in relation to scientific knowledge, does not operate in the order of business, but the gain of visibility of their work and its recognition.

An effective community adhesion to the storage of their production in institutional repositories heavily depends on factors related to its operation. In the internal environment, the central element is the easy downloading. Among the elements that influence the external public, one can highlight the quick access and an efficient search of the acquis. The effective use by the external community has clear reflexes on the adhesion of the internal community, because it shows the role of the repository in the dissemination of institutional production.

Finally, it is noteworthy that a policy of open access and institutional repositories should contribute by means of Science and Technology indicators to the management and development of research policies and technological development. The mapping and systematization of the scientific production of public institutions enable the generation of quantitative and qualitative indicators that lead and express the research activities and technological development at science, technology and innovation institutions and the positioning of those institutions in the national and international rankings. These indicators should be developed based on a comprehensive approach, in which the processes of knowledge production and technological development are considered and not only the generated products, such as the scientific articles and patents. This includes the social impact achieved by the funding of projects and the implementation of innovations.

Conclusion

By adopting a policy of Open Access to Knowledge, Fiocruz reaffirmed its mission of knowledge production to the Brazilian Public Heath Care System. One of the main results of the studies is the new knowledge, which must undoubtedly be published in quality journals recognized both nationally and internationally, subject to the best practices of peer evaluation. In a complementary fashion, Fiocruz has argued that the most effective way to ensure that the results of research are accessed, read and incorporated in the science and practice of health occurs when one diversifies the ways of free access to information. In the perspective of sustainability, the institution shows that all the results of its research, current and future, should be preserved and kept available for future generations.

The debate and the initiatives around the access to scientific literature have been growing in recent years. This situation has led to further discussions and several questions: Are we facing a new system of science communication? What is the role of repositories in scientific dissemination? Do the articles in open access on the Internet have more impact than the others or not? How to solve the problem of copyright and publication in journals? It also leads the discussion to other areas: How do all issues on open access relate to education and the provision of courses on the Web?

One must reinforce the idea that the open access should consider issues relevant to open technologies, which facilitate collaborative, flexible learning as well as the sharing of educational practices[23]. We are witnessing a bold statement of the Open Access Movement and its entry in the political and social agenda beyond the borders of the scientific world. There is no denying that this motto leads us to some difficulties which need to be dealt with in a proactive action so that they are overcome. The Policy of Open Access to Knowledge by Fiocruz is a dynamic instrument, in constant updating and should monitor issues such as:

* Strengthen the culture of knowledge and products sharing;

* Broaden the debate on the storage of books and chapters in the repositories.

* Strengthen political incentives for researchers to store data;

* Establish joint policies between institutions and development agencies;

* Break the barriers with respect to the opening of educational content.

* Encourage the use of REA

* Strengthen the access expansion to educational materials, through educational resource repositories[23].

When adopting the Policy on Open Access to Scientific Knowledge, Fiocruz acknowledged the respect for copyrights, be them moral or property, in relation to the knowledge produced. It also understood that it is the obligation of public institutions to ensure that society has access to the knowledge they produce. The democratization and universalization of access to knowledge in the Sciences and Humanities is a fundamental condition for the equal and sustainable development of nations. As an institution of Science and Technology on Health, the institution has therefore strengthened the principles of a just, equitable and supportive society, aiming at the promotion of health and life quality of the population. It is not only about strengthening the preservation mechanisms and visibility of institutional scientific production and the increase of its impact, but also contributing to the development of science by means of a new method of scientific communication.

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