THE U.PORTO OPEN REPOSITORY: THE ROLE OF THE INFORMATION SYSTEM

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ABSTRACT

The creation and the dissemination of knowledge are nuclear to the mission of universities. As John Newman anticipated in his work "The Idea of a University"[1]] *Knowledge is capable of being its own end*.

We all know and experiment the influence of the new information and communication technologies (ICT) in our daily work and in the way we live in society. These technologies are having a tremendous impact on production and diffusion of knowledge. The open access movement for scholarly communication bears on the possibilities of Internet technologies, and institutional repositories on the Web are seen as new ways to support that primary constituent of the universities' mission.
In this work we will present the institutional repository of the University of Porto (U.PORTO) from its creation to the present moment, emphasizing its goals and the key factors that influenced most the adhesion of the academic community to self-archiving, allowing that from November 2007, when the repository was created, to present days the number of publications registered increased by an order of magnitude, the University of Porto now being the higher education institution in Portugal that offers more open access full text publications, over 11.000 documents. To achieve these results, the connection between the U.PORTO Information System, SIGARRA, to the DSPACE platform, that supports the University repository was decisive, and we will address its implications as well as the main directions for future developments.

Key words: open access, institutional repositories, information systems, information management.

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[1] http://www.newmanreader.org/works/idea/discourse5.html

1. THE UNIVERSITY OF PORTO

The University of Porto (U.PORTO)[2], the origins of which date back to the 18th century[3], was created on 22 March 1911, by decree of the Provisional Government of the Republic[4]. Nearly 100 years later, when the institution is approaching its one hundredth birthday, the legal system of the University of Porto was changed by Decree-Law 96/2009, of 27 April: from a public institution it is now a public foundation with legal personality under private law, according to the Legal System Applicable to the Higher Education Institutions [5], the statutes of which are published in the Official Gazette, 2nd Series, no. 93, of 14 May 2009, establishing its statutory, pedagogical, scientific, cultural, administrative, financial, heritage and disciplinary autonomy.

Formed by 14 Faculties, a Business School[6], 69 research units, 31 of which have been classified as Excellent or Very Good by a panel of international experts that are part of the evaluation process of research units in Portugal, about 30 Libraries and 12 Museums, the U.PORTO provides an exceptional variety of courses, covering all levels of higher education and all major areas of knowledge. There are over 670 training programmes – such as undergraduate degrees, masters and PhDs that are adapted to the Bologna process, and continuous training and specialization courses.

The U.PORTO is gradually becoming a national and international reference for both the qualification level of its students and the production and dissemination of knowledge. Internationalization is part of its objectives. The number of foreign students has increased significantly over the last few years. The current number of students under mobility programmes represents 8.3% of the total number of students at the University.

With a university population of about 30,000 students, 2,280 teachers and researchers (1,895.8 FTE (Full Time Equivalent) – 75% PhDs) and 1,689 non-teaching staff (1,685.3 FT), the University of Porto assumes itself clearly as a Research University, and has established as target for its 100th anniversary (2011) to rank among the top 100 higher education European institutions.

2. RESEARCH AT THE U.PORTO

One of the missions of U.PORTO is the creation of cultural, artistic and scientific knowledge, the promotion of economic and social value of that knowledge and the active participation in the advancement of the community in which it is established. Taking into account the last 10 years, the teaching and research staff at the U.PORTO was responsible for more than 1/5 of the scientific articles indexed in the *ISI Web of Science*, making it the biggest producer of Science in Portugal.

Between 2003 and 2008, the U.PORTO contributed with 20.9% of the total national scientific production, with an average annual variation rate of 16%. In 2009, the analysis carried out (but not yet completed) shows that the ratio between document and FTE PhD is of at least 1.5.

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[2] Cf. http://www.up.pt
[3] Cf. http://sigarra.up.pt/up_uk/WEB_BASE.GERA_PAGINA?p_pagina=122251
[4] Decree / Ministry of the Interior. Directorate General for Secondary, Higher and Special Education. Creation of the universities of Lisbon and Porto.
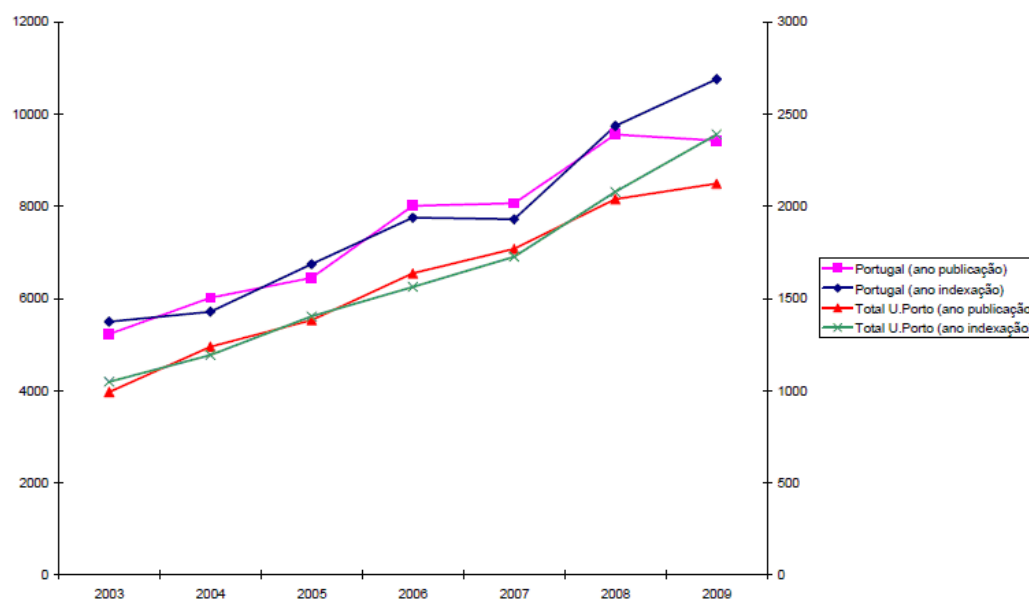[5] Law 62/2007, of 10 September.
[6] http://www.egp-upbs.up.pt/

Figure 1 – Growth in the number of ISI-WoS documents – Portugal and U.PORTO – 2003-2009 (year of publication *versus* year of indexation)

There are several factors that contribute to the growth of scientific production. First of all, we have to mention that the target to place the U.PORTO among the top 100 European higher education institutions mobilized the academic community significantly. Nonetheless, other factors have also contributed to these results, such as the conditions set up to facilitate applications to funding programmes, through the creation of an Office at the University Rectorate dedicated to the Promotion of Funding of RD&I activities, merit recognition for scientific production at some faculties by awarding scientific excellence prizes and incentives, and the stricter rules applicable to the public notices announcing top teaching positions, for instance the case of applications for associate professors and full professors.

There is also a number of specific actions regarding the dissemination of scientific production at the University, in particular the recommendations made to the authors to register and enable the availability of all publications developed in the scope of their teaching and research activities, if possible with the full text version, through the University's information system (SIGARRA)[7]; suggestions to use, whenever possible, the "*SPARC Author Adendum*"[8] in contracts signed with publishers, so that they can preserve the self-archive rights of their works in institutional open repositories, and advice to present their affiliation in authorial documents properly. Lastly, the facilities provided by SIGARRA and its link to the U.PORTO Repository have helped to facilitate and stimulate the registration and publication of the intellectual works produced by the academic community, which then become accessible, in an open and unrestricted way, to those who wish to consult them, in Portugal and abroad.

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[7] Azevedo, Ana, Ribeiro, David, Gabriel, Ribeiro, Lígia M., & Santos, J. C. Marques dos (1997). Developing an Information System at the Engineering Faculty of Porto University. Proceedings of the EUNIS 97 - European Cooperation in Higher Education Information Systems, 282-287. https://www.fe.up.pt/si/publs_pesquisa.FormView?P_ID=8835; http://hdl.handle.net/10216/606 (accessed February 11, 2010).
[8] http://www.arl.org/sparc/author/addendum.shtml

3. THE SIGARRA INFORMATION SYSTEM

The U.PORTO is a vast and complex organizational macro-system with an exponential growth of information produced in the course of its activities, in terms of academic, scientific, technical, cultural and administrative information.

The management of this systemic universe has relied on SIGARRA – Information System for the Aggregated Management of Resources and Academic Records –, an integrated information system, developed to facilitate production, circulation, storage, access and the dissemination of relevant information of the U.PORTO, to favour internal cooperation and cooperation with external academic communities and companies, as well as to contribute to the cohesion of the community itself, encouraging good practices and compliance with procedures[9]. The SIGARRA system, used to manage information at the U.PORTO, interacts with other applications and systems within the University, such as library and e-learning management systems, academic and financial management systems.

The SIGARRA project is based on a successful information system model developed by the Faculty of Engineering of the University of Porto since 1996, entitled SiFEUP.[10] The success of the project, associated to a much needed intranet, made it the favourite choice for the global management of the U.PORTO. Indeed, the SIGARRA project was implemented in a transversal way within the University from 2003 on, aiming to play a crucial role in facilitating decision making processes and in the promotion of organizational quality. At the end of 2004, twelve faculties were already using the system, and at the moment the SIGARRA is used by the 14 U.PORTO faculties, as well as the Rectorate and Social Services and some research and development entities.

The implementation of the information system covers the entire U.PORTO and has contributed significantly to strengthening the standardization of administrative processes and procedures. At the present moment, SIGARRA is an essential instrument for its regulation and monitoring, and the Organic Units are thus able to share the same procedures. Furthermore, there has been a significant reduction of burocracy and a qualitative improvement in administrative modernization and transparency. In fact, SIGARRA is used widely by the University of Porto and has an aggregating instrument – the SIGARRA of the U.PORTO – which collects and processes information from all other bodies.

3.1 THE PUBLICATIONS MODULE

One of the modules offered by SIGARRA, since its early development stage, is the publications module. This module, which has been upgraded over time, allows the authors to register all their published works. An author just needs to register a publication and the bibliographical record becomes available to the other co-authors diminishing thus the effort involved. Publications are classified as books, conference proceedings, articles in international and national journals, book chapters, articles in international and national conference proceedings, theses, technical reports and pedagogical publications. Abstracts and full texts may be registered also. Besides being available for the authors, bibliographies may thus be automatically produced per department or course, or even organized according to other criteria.

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[9] Cunha, António, David, Gabriel, Machado, Manuel, Ribeiro, Lígia M., & Silva, Filipe (2004). Upgrading an Academic IS From a Prototype to a Product. IT Innovation in a Changing World. EUNIS 2004. http://hdl.handle.net/10216/200 (accessed February 11, 2010).
David, Gabriel, & Ribeiro, Lígia M. (2001). Impact of the Information System on the Pedagogical Process. The Changing Universities: The Role of Technology. EUNIS 2001. http://hdl.handle.net/10216/465 (accessed February 11, 2010).

[10] http://www.fe.up.pt/si/web_page.inicial

When an author registers a publication, it can choose to associate to it the respective full text version. In this case, the author defines the levels of access of the document: restricted to the author (and to juries, for example), accessible within the institution, or public. If the record includes the full text version of the document, and if the author chooses to make it accessible to the public, then the publication is transferred automatically to the Open Repository. The connection between SIGARRA and DSPACE, the technological support platform of the U.PORTO Repository[11], guarantees that the publications entered by the academic community through the publications module are transferred immediately from the SIGARRA to the Open Repository.[12] The intention was that direct access to the repository was not granted so that the academic community register scientific productions through the SIGARRA. As SIGARRA is also connected with the integrated Library management system, ALEPH, of Ex-Libris – in use at the U.PORTO –, the descriptive meta-data of the publications is also transferred to ALEPH which allows professionals to intervene in the verification process of records created and in validating the meta-data entered by the information producers.

The information recorded in the publications module is retrieved to produce the Curriculum Vitae of the author and its Activity Report, available in SIGARRA. In fact, the Curriculum Vitae and Activity Report are both part of the same instrument that collects information from various sources from within the SIGARRA, such as biographical data, professional status, academic qualifications, posts, teaching work schedules, publications, projects, supervision of theses and dissertations, further to other information that can be added by the author. All items, either from other modules or the registered locally in this instrument, can be made visible or concealed, rated in terms of relevance and can be commented. The difference between the Curricula and the Activity Reports facilities lies in how items are presented and the fact that Activity Reports are related to a year-period.

Figure 2 – SIGARRA form for the registration of Publications

The bibliography of each author is available in its personal institutional page in the SIGARRA and can likewise be retrieved for the production of other semi-automated reports within the system.

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[11] http://repositorio.up.pt/
[12] http://repositorio-aberto.up.pt/

Currently, the development of a module to support the evaluation of teachers is in progress, which also makes reference to the publications module.

Figure 3 – Bibliography of an author, associated to its institutional page in the SIGARRA

The U.PORTO SIGARRA system is accessible at www.up.pt, and collects data on publications from all faculties, offering nowadays a total of 27,008 publications[13].

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[13] https://sigarra.up.pt/up/u_publs_geral.pesquisa (accessed February 23, 2010)
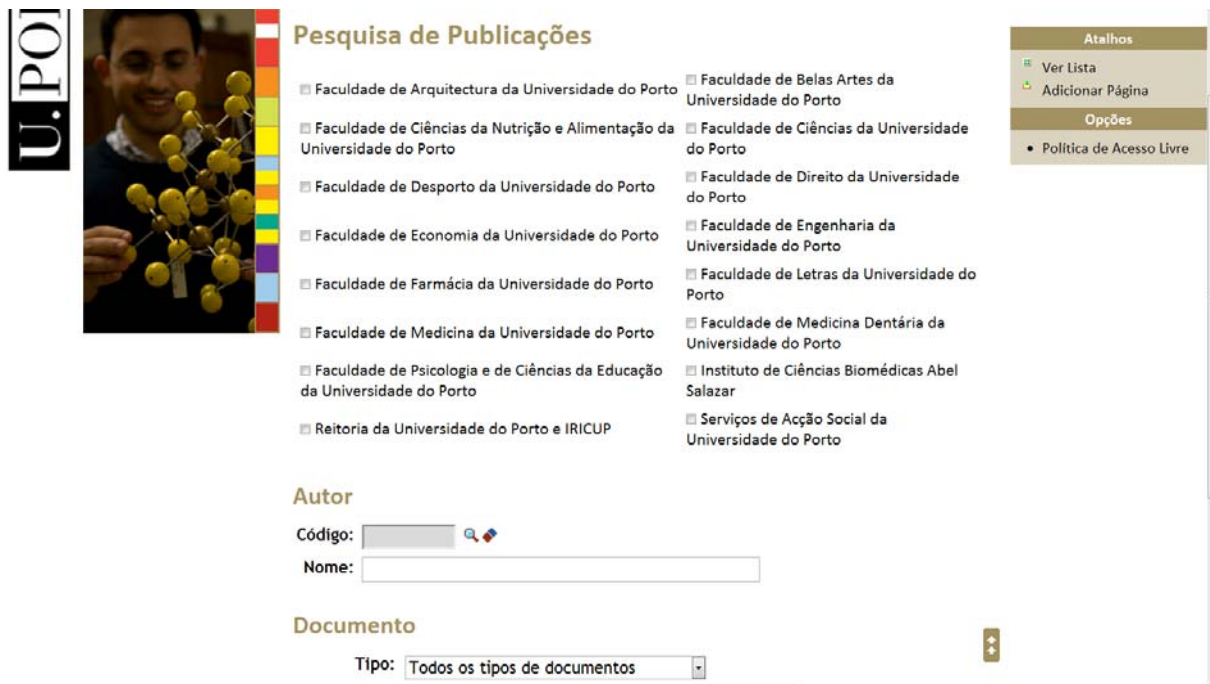
Figure 4 – Aggregated search of publications in the U.PORTO SIGARRA system.

The fact that the author is required to register its publications once only, which will then be accessible in its Curriculum Vitae, Activity Reports and other institutional reports thereof, is relevant for the increasing support shown by the academic community to this procedure.

3.2 DISSERTATIONS AND THESES MODULE

The Dissertations and Theses module, currently being upgraded, will soon be linked to the publications module, ensuring, within the scope of the pedagogical process, the registration of information on such academic works in SIGARRA. Dissertations and theses will be automatically available in the personal institutional page of supervisors and their students. This information is also retrieved to the Curriculum Vitae and Activity Reports supported by SIGARRA.

The Academic Services of each faculty registers the dissertations and theses of students who submit them as part of the requirements leading to a degree. The record includes the text of these works and the level of access is defined as public unless the student does not allow it for reasons he will have to provide. Whenever the level of access is defined as public, the academic work is transferred to the Open Repository, similarly to what has been said for publications by teachers and researchers.

4. THE REPOSITORY OF THE U.PORTO

Despite the potential already supported by SIGARRA, the U.PORTO decided to create an Open Repository for its scientific production, available online since November 2007. The feasibility of coordination between the software used to support the U.PORTO Repository and the existing applications and systems within the *campus* was one of the project's requirements. The choice fell on the DSPACE platform. Once the interconnection between SIGARRA, ALEPH and DSPACE had been guaranteed, and the channels used

by the information had been defined, the consistency of data in the various systems was secured, thus avoiding additional work for those that intervene in the process, and facilitating the quality control of meta-data.

The reasons underlying the creation of this repository by the University are related to the acknowledgement that free access to scientific literature is advantageous, and particularly important for the advancement of science and the increase of visibility and impact of scientific works produced by the academic community. It was therefore crucial to aggregate the full text publications in a single "portal", allowing the integrated retrieval of documents from meta-repositories, in both Portugal and abroad. On 2 December 2008, the Open Repository of the U.PORTO was certified as being compliant with the directives contained in the *Digital Repositories Infrastructure Vision for European Research* (DRIVER)[14], and became part of the repository Directory of this European project. A few days later, on 16 December, it became part of the Repositório Científico de Acesso Aberto de Portugal (RCAAP - acronym for Portuguese Open Access Scientific Repository)[15], publicized at the 3rd Conference on *Open Access* that took place at the University of Minho, on 15 and 16 December.

From the moment it was created, the U.PORTO Repository has increased the number of publications available. At the beginning of 2008, the repository totalled about 1,000 open access and full text documents. Two years later, the number of records is well over 11,500, split into the various U.PORTO *Communities* and various *Collections*, each of which corresponds to a specific type of information.
The propitious growth of the number of publications available at the U.PORTO Open Repository is responsible for the 1st place it achieved in the national repository rankings from October 2009 on.
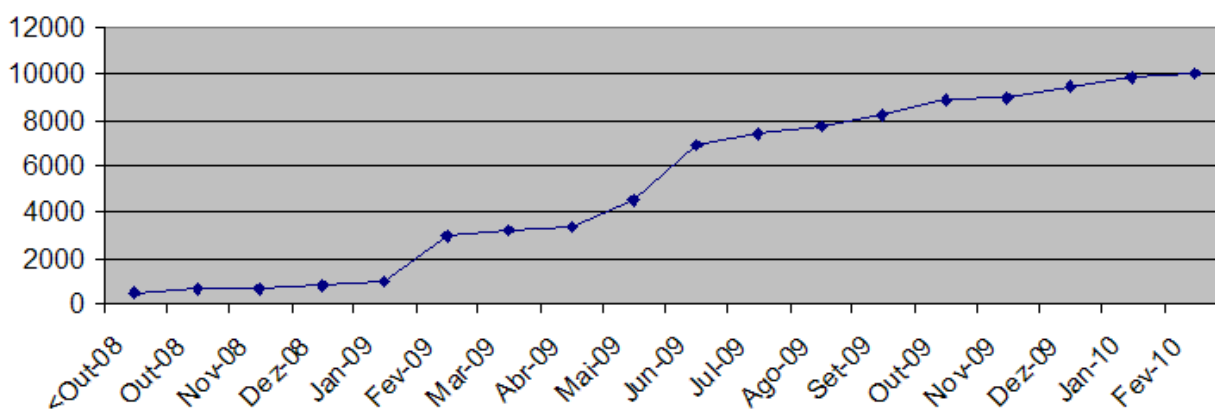

Figure 5 – Growth in the number of Publications at the U.PORTO Open Repository

It was clear from the start that the academic community wholly supported the university repository, greatly contributed by the SIGARRA information system and its articulation with the repository, as we have already mentioned.

By way of example, figure 6 shows the percentage contribution of the Faculty of Engineering Community of the University of Porto to the Open Repository, whilst figure 7 shows the percentage distribution of the different information categories offered by that community.
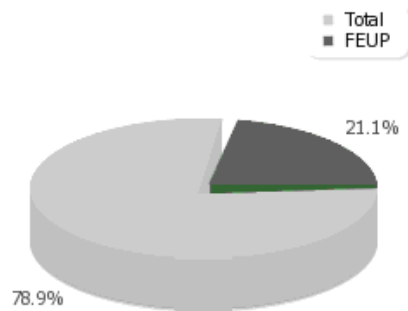

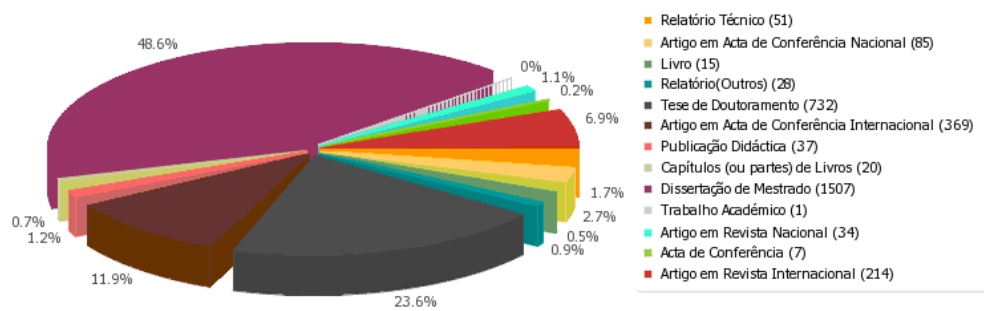Figure 6 – Contribution of the Faculty of Engineering of the University of Porto to the Open Repository

Figure 7 – Distribution of Publications sorted by type at the Open Repository (Faculty of Engineering Community of the University of Porto)

5. PROJECTS IN PROGRESS AND FUTURE WORKING GUIDELINES

The Digital Era has set up special and unprecedented conditions and opportunities for the dissemination of all types of organizational information and scientific knowledge. The universities, in particular, are quite aware of the value of digital repositories to manage digital resources, to foster collaboration and development and to obtain international recognition. Even though, the complexities that feature the current work environments require syncretic approaches and better ways of linking users to knowledge.

In fact, digital repositories are proliferating, the information available is frequently replicated and scattered and users may experience difficulties in accessing quickly the exact information they need. In addition, the speed of technological advancements threatens long term preservation.

At the University of Porto we are implicated with the management, the preservation and the continuous access to the information produced and accumulated in the context of the different organizational activities: pedagogical, scientific, technical, administrative, cultural and others.

We have mentioned the importance of the SIGARRA Information System as the main infrastructure for registering and organizing the information produced by the academic community. Specific systems are connected with SIGARRA in order to offer to the users an integrated environment that facilitates their daily work. For instance, the U.PORTO Open Access Repository receives automatically from SIGARRA the metadata and the digital objects of the authors' scientific production if they decide to allow open access to the full text of their works. Another example is the connection between SIGARRA and the Digital Archive system allowing, for instance, the Academic Office to access online academic records of U.PORTO alumni.

Recently, the development and implementation of a new SIGARRA module - Electronic Documents Management -, for the registering and processing of the incoming and outgoing institutional mail (postal mail, faxes and e-mail) allowed to reinforce the integrated strategy we are pursuing.

Despite what we have remarked, there is yet a lot to be done at U.PORTO to manage in an integrated way the several components of such a complex and huge organizational system, as well as to contribute to the improvement of information sharing, usage and retrieval, and, as important as this, to guarantee the long term preservation of the relevant one.

In view of this, the Department for the Digital University is focused on the development of an *organizational repository* which will store, after a triage, an appraisal and a validation process, the relevant information that should be preserved in the long term for future reference. The registration of information in this repository will be varied due to the diverse information sources. The organizational repository will include information transferred automatically from SIGARRA, as we have already shown in this article, and will also provide for a self-archive, to be done by the members of the academic community and the organic and functional units of the U.PORTO.

Authors and producers of information may directly access the repository to make the deposit of digital objects and the metadata contextualizing and describing them. The access to these collections that will later be validated by the organic sector responsible for managing the respective information will be done according to the different access profiles previously defined. In some cases, access will be limited to specific users; in other cases, access will be free and with no restrictions. For these reasons, the study in progress includes the compliance of the organizational repository with the authentication and authorization infrastructure (AAI) of U.PORTO, which is wholly part of the national AAI architecture, under development, coordinated by the National Foundation for Scientific Computation[16], which manages the National Research and Education Network (RCTS).

We believe that the acquired experience, the investigation in course and the partnerships established will provide the U.PORTO with sufficient *know how* to find solutions that better fit the integrated management of day-to-day information, which represents the institution's knowledge base and future memory.

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[16] http://www.fccn.pt/