Challenged by academic social networks: a case study inside University of Lisbon' institutional repository

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Abstract: This communication reflects on the challenges brought by academic social networks to institutional repositories. The study reveals the practices of academics from the Faculties of Dental Medicine, Psychology and the Institute of Education on the issue of the visibility of scientific information in academic social networks and in institutional repositories. The data were obtained by analysing the profiles of professors and researchers in a professional social network, ResearchGate, crossed with the documents of the Institutional Repository of the University of Lisbon (Repositório.UL), related to the studied schools. Statistical methods and quantitative data were used to compare the behaviours of the teachers and the researchers concerning their preferences on scientific documents dissemination throughout the World Wide Web.
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1. Introduction

"The popularity of academic social networks like ResearchGate and Academia.edu indicates that scholars want to share their work, yet for universities with open access (OA) policies, these sites may be competing with institutional repositories (IRs) for content." (Lovett et al., 2017). Open Science is a concept that emerged in a digital environment and its purpose is to provide data in Open Access, such as results and conclusions of scientific activities developed in the universities and research centres. Institutional repositories of universities and academic social networks are initiatives that form part of these goals. Despite having different objectives, the features shown by academic social networks seem to be gaining supporters with the academy, in detriment to the use of the repositories. This communication reveals the practices of faculty members from the Faculties of Dental Medicine, Psychology and the Institute of

Education on the issue of the visibility of scientific information in academic social networks and institutional repositories. The data was collected by analysing the profiles of professors and researchers in an academic social network, ResearchGate, crossed with the documents in the Institutional Repository of the University of Lisbon (Repositório.UL), related to the schools researched. The University of Lisbon has more than 50,000 students, and about 5,843 employees, making it the largest academic community in Portugal. The Repositório.UL aims to collect, organise, disseminate and preserve the academic and scientific production of the University of Lisbon, one of the largest in Europe. The Repositório.UL includes the collections of the Faculty of Dental Medicine, Faculty of Psychology and Institute of Education. We used statistical methods and quantitative data to compare the behaviours of the teachers and the researchers concerning their preferences on scientific documents dissemination throughout the World Wide Web. These findings are important to find and raise recommendations for best practices.

2. Literature review

Open Science is a concept that emerged in a digital environment and aims to make available the data, results, and conclusions of the scientific activities set of assumptions summarised by FAIR (Wilkinson, et al., 2016): Findable, Accessible, developed in universities and research centres in Open Access. Open Science implies an Interoperable, and Reusable. These principles act as guidelines for all of those who work with scientific information and data, in their production, treatment and curation or dissemination.

The Government and the Ministry of Science, Technology and Higher Education of Portugal have defined the commitment of science to the principles and practices of Open Science as a priority, being engaged in the elaboration and implementation of a National Open Science Policy based on the statement that "Knowledge is from All to All "(Portugal, 2016).

Open Access is free access to scientific information by peer-reviewed scientific journals, as well as other scholarly and scientific publications (conference communications, theses, and dissertations, technical reports, etc.) and research data available on the Internet.

The main advantages of Open Access are (FCT, 2016): it supports and accelerates the progress of research and knowledge; increases the visibility, access, use and impact of research results; improves monitoring evaluation and management of scientific activity; facilitates innovation and maximizes the impact and socioeconomic return; and creates research results accessible to citizens and organisations. Institutional repositories of universities and academic social networks of access to scientific information are initiatives that are part of this design.

The Institutional Repository of the University of Lisbon (Repositório.UL) aims to gather, organise, disseminate and preserve the academic scientific production of the University of Lisbon. It includes the collections of all the schools and institutes of the University of Lisbon, in particular, those of the Faculties of Medicine, Dental Medicine, Pharmacy, and Psychology, which aggregate the health areas and are the subject of the present study. The Repositório.UL is integrated in the RCAAP - Scientific Repository of Open Access in Portugal.

The Social Network ResearchGate was founded by Ijad Madisch, Horst Fickenscher, and Sören Hofmayer, in Berlin, Germany, in 2008. This social network is aimed at professionals, particularly teachers and researchers wishing to share the results of their studies. It is a free platform that allows its members to interact and collaborate with each other worldwide, offering the possibility to communicate and make available their scientific articles under the Open Access regime.

The focus of this platform is the fact it is a social network, which also works, in addition, as a repository, that is, it allows the provisioning and retrieval of digital documents. Despite the obvious advantages - related to interactions between researchers and the internationalisation of research - some doubts have arisen regarding its good use, namely in the appropriate format for filing, copyright infringement or breach of deposit policies, and studies have already been made about this (Jamali, 2017; Laakso, Polonioli, 2017). Regardless of these factors, and in line with world trends, the faculty and researchers of the University of Lisbon have joined this initiative.

Borrego (2017) reports that there is a large increase in the number of institutional repositories worldwide, but in most of them, researchers are underrepresented. At the same time, scientists make available and share copies of their publications on academic social networks. In his work, he compares the availability of academic production in the institutional repositories of 13 Spanish universities with the one in the ResearchGate platform. One of the reasons for an underrepresentation of authors in institutional repositories may correspond to the lack of author profiles in some institutional repositories, which, if implemented, will clearly be a competitive advantage of these in relation to social networks. Genovés (2017) even considers that for an institution that has an institutional repository, the benefits of a public profile for authors are demonstrable in terms of added value, increased visibility, and ease of retrieval and access to scientific output. Other studies were carried out in territories such as Portugal, Brazil, Argentina, Galicia, India or others (Dafonte-Gómez, Míguez-González, & Puentes-Rivera, 2015; Ribeiro, Oliveira & Furtado, 2017; Singson & Amees, 2017; Miguel, González And Ortiz-Jaureguizar, 2018; Liu & Fang, 2018) that focus on the use of the ResearchGate platform by the scientific and academic community, or in comparative terms with the Repositories, evidence that it is an added value for the recognition and

visibility of faculty members, as well as the extension of the peer-to-peer communication process in scientific communities, highlighting the advantages that authors recognise in the dissemination of their scientific output and the creation of research networks. Lovett, Rathemacher, Boukari, and Lang (2017) question competition or complementarity between academic partner networks and institutional repositories in a study conducted at the University of Rhode Island in the United States, urging librarians not to academic social networks as a threat to Open Access, but rather as an opportunity for clarification and better training of researchers, in order to adequately comply with the Open Access policies, as well as on the possibility for authors to share and promote their work in a legal way, with the support of libraries. According to a Finnish study on this same scope, although researchers perceive repositories more as administrative tools than as a tool to their benefit, they will always have the advantage of long-term archival reliability, which social networks for researchers do not guarantee. However, the authors say, repositories will be more successful if they can keep up-to-date, fostering more friendliness, interoperability, and integration, like other tools navigators navigate (Laakso, Lindman, Shen, Nyman, Björk, 2017). ResearchGate has become one of the most popular and largest academic social networks in the World Wide Web. In a study about the effective altimetric indicator of ResearchGate, Min-Chun et al. (2016) referred that "altimetric indicators such as ResearchGate score gaining more popularity". Altimetry is a method or technique for measuring altitudes. This issue has a strong correlation with "bibliometric, which indicates that the researchers who have greater academic impact can usually enjoy better social impact among research sharing similar research interests." For the urgency of the subject in the area of Information Sciences (Manca, 2018), and inspired by these works, the authors try to describe, in a circumscribed universe, three schools of the University of Lisbon, the trends of the researchers with regard to self-archiving of their publications. Do they opt for the Institutional Repository, the social network ResearchGate or are they looking for both platforms? Only the knowledge about these data can reveal the options of the researchers, in the future, depending on the results, if it tries to act on the reality, stimulating the active participation of these actors in the Institutional Repository. Thus, the main objective of this communication is to present the activity developed in the scope of self-archiving and the impact of the collections of the Faculties of Dental Medicine and Psychology and the Institute of Education, in the Repository of the University of Lisbon and in the social network ResearchGate.

3. Institutional context

The year 2011 marked the beginning of the Auto-Archive in the Faculty of Psychology and in the Institute of Education of the University of Lisbon. Both organic units were already active, albeit to a limited extent, in the institutional Repository of the University of Lisbon. In this repository, previously housed in the Digitool platform and under the name Digit.UL, it was possible for the Documentation Division to introduce, in 2010, approximately two hundred

documents, consisting mainly of master's dissertations. In the transition to 2011, the data collection platform became associated with the Open Access Scientific Repository of Portugal (RCAAP), with the UL becoming the client of the Institutional Repositories Hosting Service (SARI), which guarantees the management and maintenance of infrastructure. Thus, with a new presentation and other national and international visibility, it was important to feed the new Repositório.UL.

With the development of this stage, the objectives set for most of the Repositories were achieved; and expressed and regulated, as early as 2010, by the University of Lisbon's Auto-Archive Policy (Universidade de Lisboa, 2010) in particular:

- "Systematically gather and organise the intellectual, academic and scientific production of UL;
- Disseminate, give access and greater visibility to the research developed at UL;
- Improve the monitoring, evaluation, and management of research and teaching activities at UL;
- Promote the valuation and preservation of the intellectual and cultural memory of this University ".

In this way, combined with the material and technical conditions and the political will, as well as the involvement of the management bodies of the two organic units - FP and IE, it was possible to continue the full implementation of the Repository, this time with a particular focus on Auto-Archive, which had never been done before. It was in fact in these two organic units - the Faculty of Psychology and the Institute of Education - that there was a pioneering, articulated and continuous work among the teachers and researchers so that this process could have been developed during the year of 2011.

At the Faculty of Dental Medicine, the process was similar, but took place later. Only with the previous direction, and with the improvement of the library, which began to articulate the policies of the University's repository at the local level, it was possible to continue with these tasks.

One of the main concerns in the management of an institutional platform is the standardization, consistency, and interoperability. These procedures are essential in the management of information and metadata, for future recovery. Thus, the institutional affiliation at the time of scientific production must be respected when depositing in the UL Repository, and the structure presented resembles a map of the resource itself, not conditioning the searches by author, title, subject, etc.

Following this decision, the document Structure of Communities and Collections was created and presented to the Directors, which, after some

adjustments, presented the configuration that represents the organic organizations of the investigation groups.

With the consolidated structure, it was possible to continue the production of other important technical documents. In accordance with the Regulations of the Publications Deposit Policy of the University of Lisbon (approved by the Rector on June 2, 2010), two documents were made, one for each of the organizational units: Internal Policy of the Faculty of Psychology for the Self-archiving and Internal Policy of the Institute of Education for Self-archiving. In these two important documents, the technical guidelines for the better application of procedures during the implementation and management of the Repository were defined. For the Faculty of Dental Medicine, an internal policy, in an official document, was not made.

At present, the services of the library of the Faculty of Dental Medicine are disseminating, promoting and implementing Self-archiving policies in the academic community of this institution, concerning the best practices of the Faculty of Psychology and the Institute of Education.

It was also necessary to make official all the communities and collections, fulfilling the respective terms of agreement, signing both the responsible for the respective substructures and the Head of Documentation Division. After completing these documents, they could be sent to the Repository Working Group, at the Rectory, after formal adhesion and validation of the structure proposed.

At the same time, all institutional e-mails and associated substructures and collections were collected and checked to ensure the assignment of permissions to depositors, reviewers, and validators. It should be noted that all deposits have to be made by authenticated depositors, with registration on the platform that uses the confirmation through the institutional email.

It should be noted that in terms of the workflow for deposits in the Auto-Archiving mode, the following options can appear:

1) In the first option, more simplified, the process of filing by the author of the document implies: to make the previous procedures (verification of the rights of publication in auto-archiving); introduce the descriptive information metadata of the document (title, author, date, and others) and submit the electronic file. The library then validates the metadata of descriptive information, allowing immediate access to its search on the platform.

2) In the second option, the workflow follows a more complex form, which includes reviewers and coordinators, before the library metadata is validated. In the latter case, the author submits the file and it is pending approval from the validation hierarchy. The reviewer is responsible for verifying the scientific relevance of the document in

that collection and for the coordinator to approve the document entry in the Repository. Only after these two extra steps, which run virtually in conjunction with institutional e-mails, will the library team be able to validate the descriptive document metadata.

3) In the third option, the deposit of documents is entirely carried out by the library, being the author exempt of these tasks. The library has to control and keep emails dedicated to each of the authors and carry out the whole process in order to keep the structure approved.

When explaining these processes to the faculty responsible for the organic units, and after a period of reflection, decision making led to different options. The Faculty of Psychology opted for the simplified process of workflow, placing in the depositor who carries out the self-archiving the total responsibility for the deposit. In the case of the Institute of Education, the option was the more complex process. The Faculty of Dental Medicine selected the last option, assigning to the library all deposit responsibilities, including the so called "self-archiving".

These three options mirrored the organic reality of the several institutions. If it is a fact that both Faculties, more focused on teaching, conduct research, although they have groups and themes that aggregate, a formal research structure in the organization is not noticeable, having a great autonomy of the researchers. In the case of the Institute of Education, the whole structure is based on research groups constituted around three major thematic areas that aggregate projects, research, resources and of course, research production. Thus, it was the mirroring of these realities that gave rise to different options in the submission structure for self-archiving. As we shall see, this choice underlies the development of a different internal work for each of the organizational units and the corresponding differentiation of the structure of communities and collections. In a study of the authors' practices regarding self-preservation in a Portuguese higher education institution (Rodriguese & Rodrigues, 2014), it was revealed that the deposit of documents is carried out in a mediated manner by the library staff, showing the teachers / researchers the reasons for not making a self-archive if they are affected by lack of time, doubts and difficulties with copyright and even their own negligence.

In our institutions, over the years, several e-mail contacts from the libraries were established with the faculty and researchers, in order to maintaining an informed communication about the entire implementation process of the Institutional Repository, appealing to its indispensable collaboration, clarifying doubts and making available to us for collaboration in this field.

There was an opportunity to collaborate periodically in the Open Access Week. It is an international event that gives faculty and researchers the opportunity to realise the potential benefits of Open Access. As an objective, it sought to foster

the sharing of experiences among colleagues and the inspiration for broader participation. In the occasion, it is always possible to recall the concept of "Open Access" as Access to information freely, immediately, online for the results of academic research and the right to use and reuse those results. It is emphasised in the disclosure that it has the power to transform the way scientific research and research in general is carried out, yet have direct and widespread implications for universities, medicine, science, industry, and society as a whole. Open Access has the potential to maximise research investments; increase exposure, use, and citation of published research; facilitate the ability to conduct research across available literature; and improve the overall advancement of studies in a number of areas.

However, with the emergence of collaboration platforms, such as academic social networks, the authors found that some teachers and researchers published their scientific productions there. This finding, along with different behaviours by different professors and researchers, led us to question the preferences on the use of both platforms: the institutional repository and the social network ResearchGate.

In this article, we try to reflect upon the impact of both platforms, which can be verified through the use of statistics of the deposited resources, which we will do likewise. This description thus seeks to contribute to an evaluation of scientific information dissemination from the experience of these three organizational units.

4. Methods

The research is based on the collection of information regarding the deposit of documents of researchers with affiliation in the studied schools and registered in the observed platforms.

On each of the platforms, the registration of researchers, deposits, and downloads of this universe were observed. The data were collected automatically from the institutional repository of the University of Lisbon. Table 1 shows Downloads and Readings of each year in the Repository.UL. For data obtained from ResearchGate, these were collected via direct research on the platform.

This study took place in three schools of the University of Lisbon – the Faculty of Dental Medicine (FMDUL), the Faculty of Psychology (FP) and the Institute of Education (IE). The academic universe under investigation is formed by a population of around 600 students, 128 teachers and researchers and 63 staff members of FMDUL; 959 students, 58 teachers, 5 researchers and 27 staff members of FP; and 827 students, 61 teachers, 4 researchers and 27 staff members of IE.

Table 1 shows the global use (downloads and readings) of the Repository of University of Lisbon which collects the scientific information produced in seventeen institutions of the University of Lisbon.

Repository.UL Downloads and Readings		
Year	**Downloads**	**Reads**
2010	70.005	52.670
2011	506.854	304.693
2012	1.053.789	544.400
2013	1.828.896	886.356
2014	3.141.495	1.599.655
2015	2.537.322	1.580.602
2016	1.101.931	486.180
2017	1.122.901	498.527
2018	1.642.161	575.311
2019	1.709.002	655.077
Total	14.714.356	7.183.471

Table 1. Downloads and Readings each year of the Repository.UL
Source: Data obtained from https://repositorio.ul.pt/

Table 2 shows the universe of the UL academic members, benefitting from the resources of the libraries under study.

Universe				
Type	**FMD**	**FP**	**IE**	**Total**
Teachers & Researchers	128	65	67	260
Students	600	959	827	2386
Staff	63	27	27	2646
Totals	791	1051	921	2763

Table 2. Constitution of the population
Source: Data obtained directly from the institutions

We state that the documents of the repositories were articles, communication, chapters of books, books, and posters. In the Repository.UL it was possible to obtain reliable statistical data since the metrics are associated with each research community and its institutions. Data were extracted on the number of total deposits, to which the theses and dissertations were subtracted. Later, the number of downloads related to these collections was also observed.

In ResearchGate it was observed that the metrics are incongruent, in different ways of research. This is likely due to the different affiliations that authors choose to define their community of belonging. In this case, since it is not possible to obtain data automatically, that is, per school, it was necessary to do the research name by name, from the complete list of researchers and professors from each of the institutions (see table 2). Similar data were obtained corresponding to the number of Research items and Readings (table 1).

5. Results

Using statistical methods of quantitative analysis, the results on the use of the collections in the institutional repository are shown (Table 3) and, using the ResearchGate platform, corresponding and comparable statistics, i.e., a number of deposits and downloads are revealed (Table 4), seeking to extrapolate the impact of scientific articles of teachers/researchers on one platform and another. The analysis thus describes, in relation to both resources, the behaviours of teachers/researchers.

Schools	Researchers	Documents	Downloads
FMD	129	65	414
FP	21	81	22.314
IE	61	1049	343.635

Table 3. Repository Data on researchers, documents and downloads

Schools	Researchers	Research items	Reads
FMD	24	1296	121869
FP	46	1901	257504
IE	48	3033	333122

Table 4. ResearchGate Data on researchers, research items, and reads

To study the data, we will disaggregate them and verify, in each figure, the comparisons between the uses of the two platforms.

A first, very remarkable analysis found that researchers appear more in the institutional repository, but the number of documents and downloads, on the contrary, is higher on the ResearchGate platform.
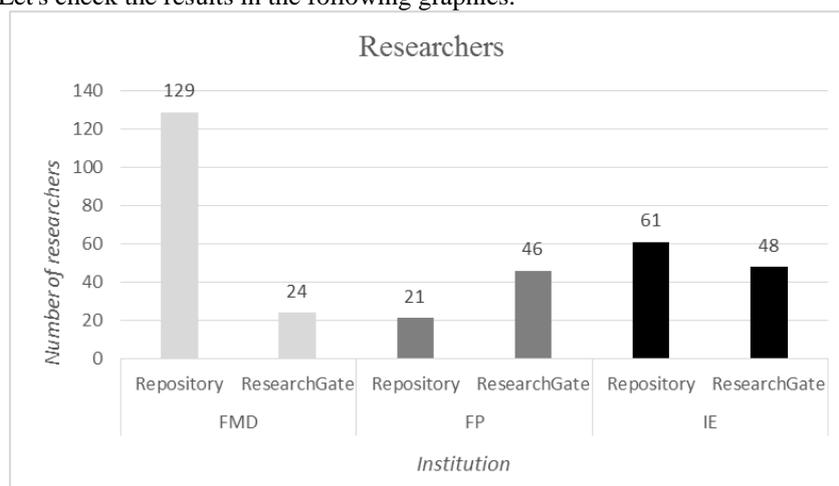Let's check the results in the following graphics.

Figure 1. Comparative graphic on the use of Repositório.UL and ResearchGate – Researchers

In this first graph, we found a common tendency in the three schools analysed: there are more researchers registered in the Repository than in the ResearchGate. In all cases, the register of professors or researchers in the Repository corresponds to the totality of the researchers existing in the respective institution. This issue indicates also that researchers are supervisors of master's theses and doctoral dissertations that are deposited in the Repository by the libraries services of the faculties.

As for ResearchGate, it is noted that the researchers of the Faculty of Psychology and Institute of Education schools have significantly adhered to the ResearchGate platform. It turns out that there are about two thirds of the total, registered in ResearchGate. The most significant difference is that of the Faculty of Dental Medicine, where this adherence is not so widespread, representing only one fifth of the existing researchers.
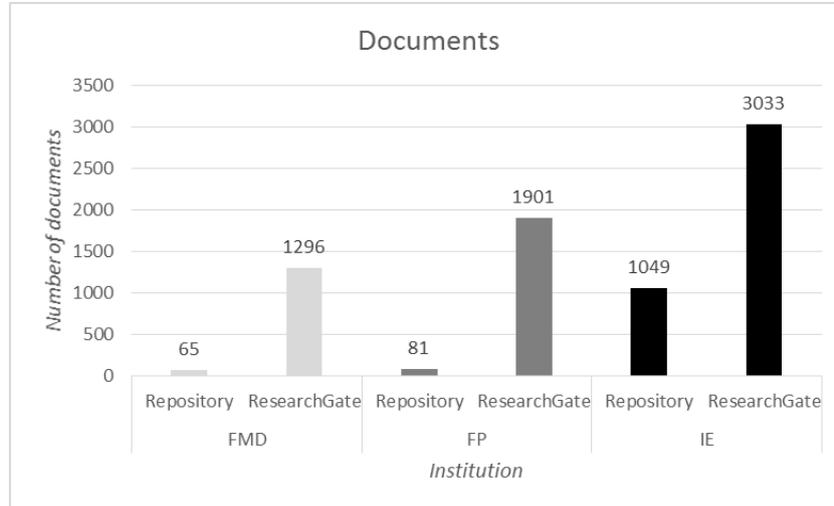
Table 2. Comparative graphic on the use of Repositório.UL and ResearchGate – Documents

In regards to the documents deposited, a significant difference is evident. This time the preferred platform for the dissemination of scientific work is clearly ResearchGate, especially in the schools of Dental Medicine and Psychology. In fact, the deposit of documents in the Institutional Repository is practically residual.

The Institute of Education appears here with outstanding figures: against the values that appear in ResearchGate, nearly a third of the documents appear also in the institutional Repository.
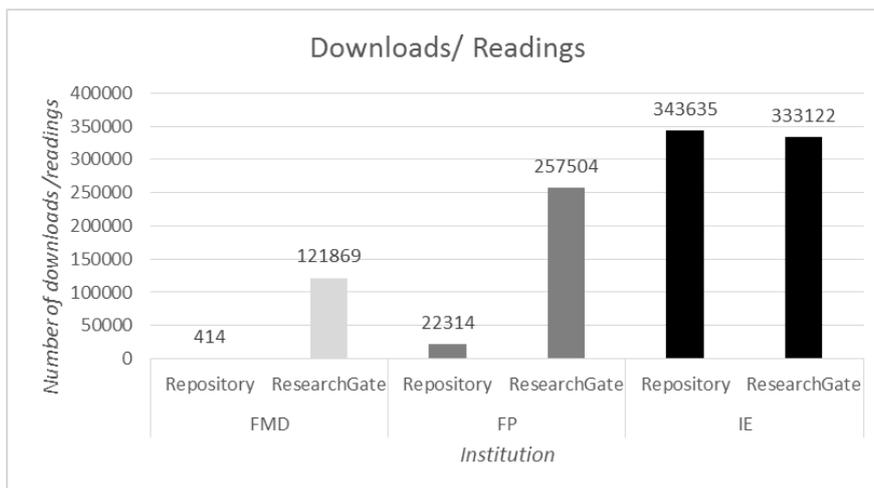
Table 3. Comparative graphic on the use of Repositório.UL and ResearchGate – Researchers

Regarding the readings or downloads, we noticed trends compatible with the number of documents on each of the platforms. While in the Faculty of Psychology and Dentistry, access to documents measured by the number of download and readings is exponentially higher in the ResearchGate platform, the Institute of Education surprises with more readings from the institutional repository, even if they are related to a third of the documents! This may mean that this platform, in comparative terms, receives greater visibility in the Internet search engines, thus achieving very significant results in terms of the impact of scientific and technical documentation produced and available on the Internet.

6. Discussion

The Repositório.UL is the institutional repository of the University of Lisbon.
It constitutes the collection of documents that form the intellectual, academic and scientific production of this university community. Its purposes are to collect, organise, disseminate and preserve UL's scientific production. In the Repositório.UL you can find different types of documents, in digital format, resulting from the research activities developed at UL, that is doctoral theses, master's dissertations, articles of national and international scientific journals, communications to congresses and conferences, among others, of all scientific areas in UL. The UL Repository is globally accessible. However, the deposit of documents is restricted to UL members (teaching staff, researchers, from 2nd and 3rd cycle students, non-teaching staff) and only in the context of their activities at the University of Lisbon. The Repositório.UL is integrated in the Project RCAAP (Scientific Repositories of Open Access of Portugal (Universidade de Lisboa, 2010).

The discussion of these data reveals the visibility, the impact of some collections have presented over time and in the national and international scientific community and the behaviour of the teachers/researchers regarding the preference of dissemination of their work.

Also noteworthy is the importance given to the Repository in the Rector Order 23/2011, of June 14, 2011, which regulates the evaluation of teachers. According to this document, based on the decree law (Portugal, 2011), the article 33 clarifies that the evaluation of teachers may, in one of its components, have as object of analysis the registration of works produced in the Institutional Repository:

"2. The model report referred to in Article 20 (1) and the assessment sheet   provided for in   Article 19 (3), documents to be approved by the Rector, may   establish recourse to the electronic databases, as well as the need for are registered   in the institutional repository of the University   of Lisbon."

These actions, widely publicised among the faculty and researchers, contribute greatly to sensitise faculty and researchers and consequently contribute to continue the investment made in this platform, particularly in the Institute of Education, where the teachers' evaluation takes in account the deposits of their scientific work.

These analyses are useful to verify the scientific activity performed in the institutions and the impact of these on a national and international level. It is also possible to obtain some indications and suggestions for future procedures with the aim of improving future actions, monitoring the evolution resulting from possible interventions at the level of the Institutional Repository and as a way of giving visibility to this platform.

In fact, there is a tendency for professors and researchers, in the case of two schools (FP and FMD), to use the ResearchGate, and in a school (IE) to participate in the Institutional Repository. This significant difference is essentially due the policy of the institution in this last school (IE), which associates the evaluation of professors with the research work component, with a confirmation of evidences through the Institutional Repository and, we believe, therefore encourages participation in the Repository. In the case of other schools, there is no regulation of the use of the repository, either through mandatory policies or incentives. Thus, researchers are attracted by the visibility, at least apparent, conferred by the academic social network ResearchGate.

Only with the participation of the entire academic community, especially teachers and researchers, will we be able to maintain the growth of the deposits, allowing a greater comprehensiveness of the collections made available in the repository and therefore a greater reach and academic influence of the University of Lisbon with the international partners.

7. Conclusions

The University of Lisbon Repository took the first steps of its implementation in 2010, and 2011 can be considered the year of consolidation. 2011 was also a very productive year because it brought with it the beginning of the Auto-Archiving process. The main message we draw from this intense process is that cross-cutting work is possible, combining the efforts and desires of technicians, teachers and researchers, and students. The Repository project is this: the complex result of individual efforts combined to revert to a common and exponentially greater good. The main challenge is to bring more and more participants to this goal and to find strategies to demonstrate them that this participation will benefit them. Nonetheless, for the future, we anticipate a growth of deposits and self-depositions of digital documentation, a gradual and secure increase of the participation of teachers and researchers, and an

amplification of the international impact of the scientific production of our academic community. The data show a clear fixation in the research communities of the Portuguese-speaking countries, with Brazil in the spotlight, but also Angola, Mozambique, and Cape Verde. They also show that it is possible to go further, with the United States, the United Kingdom, Russia, Japan, Ukraine and others within reach. We find here an additional motivation to continue this project. The first steps are taken and the results are frankly positive. May this study help to sensitize the most diverse stakeholders for the participation and contribution in a consequent sustainability and growth of the University of Lisbon.

On the other hand, it is concluded that the ResearchGate do not remove visibility to institutional repositories. Both complement each other and do not really have the same objectives nor overlapping in their functions. Our recommendation is that institutions should ensure self-archiving policies with a view to preserving the scientific information produced by their researchers. At the same time, there are advantages in establishing cooperation networks, which are enhanced by the use of academic social networks, so it is convenient for the authors to continue to use them. However, this does not give the necessary guarantees to institutions to comply with conservation and digital preservation requirements.

Case studies such as this one, with several libraries of the same University, or with other national or foreign higher education institutions, are standards to be deployed in order to analyse better standards and carry out improvements.

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