

Challenges to the Support of Bulgarian Open Institutional Repositories

**Juliana Peneva¹, Stanislav Ivanov¹,
Krassimira Ivanova², Peter Stanchev^{2,3}**

1. New Bulgarian University, Department of Informatics, Sofia
jpeneva@nbu.bg, sivanov@nbu.bg
2. Institute of Mathematics and Informatics – BAS, Sofia
kivanova@math.bas.bg, stanchev@math.bas.bg
3. Kettering University, Flint, USA
pstanche@kettering.edu

Abstract: Open access academic archives are the proper instrument to make visible the majority of the works done during the years and to propagate the results of already paid research activities, thus raising their value. This is the way to achieve an improved management of intellectual assets of the whole university and research community. This paper examines the indicators of the success as well as the challenges in the support of Bulgarian institutional repositories. The findings are based on a comparative case study of the six repositories in research institutes and universities and the local repository of the Department of Informatics at New Bulgarian University.

Key words: institutional repositories, sustainability, Open Access, OpenAIRE2020 project, Responsible Research & Innovation, Access to Knowledge

ACM 1998 Classification Keywords: H3.5 On-line information services–Data sharing; H3.7 Digital libraries–Collection

Introduction

In today energetic business environment the proper management of digital resources is vital for any organization in response to the changing business conditions. Nowadays digital resources are increasingly being recognized as a very important organizational asset au par with finance and human resources. For higher education and research institutions digital resources can be strategically used to expose intellectual assets such as learning content and research papers. Because of the very rapid development in information and communications technologies it becomes possible to manage the academic assets more effectively than in the past two decades. Usually digital resources are organized as institutional repositories, including long-term preservation and distribution.

During the last five years different types of repositories ranging from digital libraries through various institutional collections and e-journals up to collaborative learning environments have been built. In this perspective, universities and scientific institutions demonstrate a remarkable activity. The main reason for this perpetual interest is the huge diversity of purposes, deposited resources, services and potential

users. Universities and scientific institutions need to exhibit and deploy different kinds of their intellectual assets. It is a matter not only of user's convenience, but of representativeness and prestige as well. In this plan, it is quite natural that the main share of active repositories belongs to countries with advanced higher education and science - about 20% of them in the North America, 47% in Europe shared among United Kingdom, Germany, Spain, France and Italy.

Six Bulgarian digital archives of open access have been reported in the OpenDOAR Database. New Bulgarian University (NBU) and the Institute of Mathematics and Informatics at the Bulgarian Academy of Sciences (IMI-BAS) were among the first academic institutions in the country that developed and maintain three of the registered open digital archives. These archives represent a cardinal digital environment for long-term preservation of the electronic scientific output of the academic staff. Apart from this, at NBU a departmental repository to assist all non-auditoria activities was developed. This repository was designed to deploy content not covered by the university infrastructure: investigations, learning resources, theses, students' projects and papers.

The success of institutional repositories (IR) depends on different factors and there is no agreement whether these factors are general for all IRs or a local occurrence. This justifies the purpose of our research effort, namely to examine the use and the life cycle of Bulgarian IRs. It appears that the initial verve throws the years. During the last three years no more attempts concerning the creation of new archives have been reported.

The goal of this paper is to study the indicators of the success as well as the challenges in the support of Bulgarian IRs. Our findings are based on a comparative case study [1] of the six IRs in the research institutes and universities and the local repository of the Department of Informatics at NBU. We argue that the success of a repository depends not only on the functionalities for members of the community, content recruitment and interoperability but also it depends on the user acceptance and their voluntary participation as well as of the attitude of the institutional government body.

Overview

Usually digital resources are organized as institutional repositories, ensuring long-term preservation and distribution thus permitting to derive their maximum business value. The collection of digital content into a repository enables research and higher education institutions to support investigations, teaching, learning, and administrative processes.

Institutional repositories are described as „a set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members“. Lynch [2] further notes that essential services include „the management of technology changes and the migration of digital content from one set of technologies to the next as part of the organizational commitment to providing repository services“.

There is no straightforward answer to the question „what it is a successful repository“. In [3, 4, and 5] content recruitment has been outlined as a critical success factor. Blythe and Chachra [6] argue that the IRs „will be successful only when they achieve broad and voluntary participation by individuals in the communities they serve“. Several frameworks for success have also been developed. For example Thibodeau [7] proposes that „a framework for organizing information needed to evaluate the success of digital repositories can be articulated along five dimensions: service, orientation, coverage, collaboration, and state“. Service applies to the functionalities for members of the community, orientation refers to the place between preservation and access where the repository operates, coverage relates to content, collaboration indicates whether the IR works alone or might best collaborate in some IR functions, and state is the maturity in the development of the IR. All of these success factors are internally-driven. Generally speaking the success can be defined and measured in terms of the libraries and institutions larger goals.

Examination of Bulgarian Open IRs

The number of the digital repositories worldwide increases successively very quickly. Open access academic repositories exhibited a boost of 300 during the mid of 2006. Since the beginning of year 2007 the growth of such repositories listed in the OpenDOAR Database [8] shows a constant increase of 100 repositories per year up to its present number of over 2900 (Fig.1).

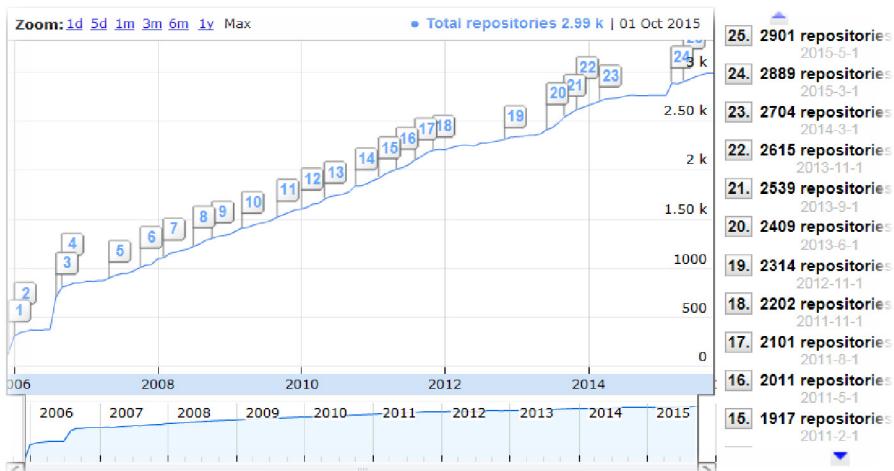


Fig.1 The changing size of the OpenDOAR Database over time

Fig.2 represents the shares of different types of repositories worldwide. Repositories are:

- Institutional or departmental – 84%;
- Disciplinary (a cross-institutional subject repository) – 10%;

- Aggregating (collecting data from several subsidiary repositories) – 3%;
- Governmental – 3%.

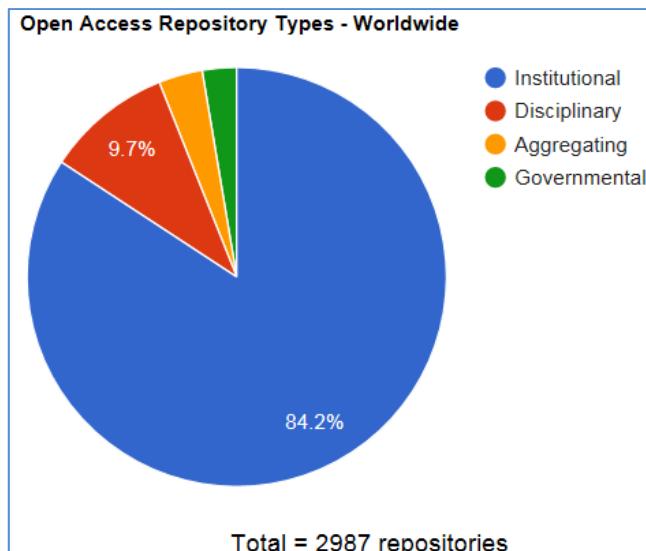


Fig.2 Open access repository types worldwide

In Bulgaria there are six open repositories listed in the OpenDOAR Database [8]:

- New Bulgarian University Scholar Electronic Repository with 1775 items consisting of the research output of the institution. The subjects are multidisciplinary; the content comprises articles, conferences, books and learning objects [9].
- BulDML at IMI with 2115 items consisting of the journal output of the institution. The subjects are multidisciplinary; the content comprises articles, conferences and books [10].
- Academic research repository at Burgas Free University with 483 items consisting of the research output of the institution. The subjects are multidisciplinary; the content comprises articles, conferences and books [11].
- Electronic Repository - Central Medical Library - MU, Sofia with 576 items consisting of the research output of the institution. The subjects are multidisciplinary; the content comprises articles, theses, books and learning objects. Broken and not accessible.
- Research at Sofia University with 877 items consisting of the research output of the institution. The subjects are multidisciplinary; the content comprises articles [12].
- Bulgarian OpenAIRE Repository with 118 items consisting of all peer-reviewed publications resulting from ERC funded FP7 projects in Bulgaria. The subjects are multidisciplinary; the content comprises articles [13].

Compared to an earlier review [14] the findings are similar – no new attempts to build repository have been reported.

The repositories of NBU

The Scholar Electronic Repository of the New Bulgarian University is governed by a supervising board called Evaluation Commission. The Head of Library and Information Services Department is acting as a repository editor thus enforcing compliance with certain rules when an item is going to be deposited. Academic staff and university PhD students are allowed to deposit their documents that might be not published or published via electronic or traditional means. In the case of documents published elsewhere, the depositing author has to hold the copyrights. If the copyrights belong to a publisher or other organization, permission has to be granted. Academic staff can submit unpublished documents as well. In this case authors should respect ethical standards and ensure quality content. The document types are listed in the user interface of the software. The repository is build using E-Print [15], which allows depositing articles, books, conference items, theses, artifacts, images, compositions, audios, videos etc.

In addition we consider the local repository of the Department of Informatics at NBU used to deploy content not covered by the university infrastructure i.e. the repository and the LMS of the university. That content comprises unpublished gray and supporting material: investigations, learning resources, theses, students' projects and papers. Key users of the departmental repository are students and faculty. In this way the department's intellectual production is stored and represented. The open access is encouraged, so publishing students' works could restrain mutual plagiarism.

The repositories of IMI-BAS

The BulDML at IMI becomes a part of the global EuDML aggregator. Currently, BulDML contains more than 1500 publications from six journals and several proceedings. BulDML is based on the DSpace [16] version 1.52, with slightly modified source code for practical reasons to keep consistency with future software releases and make more easily migration from old to new software versions. Mainly for submitting content and metadata in BulDML, DSpace native web interface without any difficulties is used. The repository fulfills minimal metadata requirements for its content to be presented in the unique framework of the European Digital Mathematics Library.

IMI-BAS is the contact point for the European Commission Projects OpenAIRE, OpenAIRE+ and OpenAIRE2020. One of the main goals of those projects is to create infrastructure focused on open access publications and scientific data deposited in institutional repositories, thus creating a common scientific platform for the everyday research life of European scientists. OpenAIRE2020 continues and extends OpenAIRE's scholarly communication infrastructure to manage and monitor the outcomes of EC-funded research. It combines its substantial networking capacities and technical capabilities to deliver a robust infrastructure offering support for the Open Access policies in Horizon 2020, via a range of pan-European outreach

activities and a suite of services for key stakeholders. It provides researcher support and services for the Open Data Pilot and investigates its legal ramifications. The project offers to national funders the ability to implement OpenAIRE services to monitor research output, whilst new impact measures for research are investigated. OpenAIRE2020 engages with innovative publishing and data initiatives via studies and pilots. By liaising with global infrastructures, it ensures international interoperability of repositories and their valuable open access contents.

Benefits of the Institutional Repositories

The benefits of publishing in an institutional archive of open access can be summarized from different points of view:

For the university as an educational and research institution

- access to the intellectual output is provided;
- enhanced scholar communication becomes possible;
- shared learning and teaching materials otherwise locked in Virtual Learning Environments.

The institutional repositories represent the intellectual product created by the community members thus increasing the institution's visibility and its public value. The open archive, by capturing and preserving collective intellectual capital, increases the overall institution's academic quality. There exists organizational support towards dissemination of innovative research results. Open archives become a feasible way to share ideas and know-how's and to communicate the research activities. This way collaborative research is promoted. In addition an easy access to faculty papers is achieved. The demonstration of value can attract tangible benefits including project funding from both public and private sources. Documents are searchable via the Internet as they are indexed by search engines and made accessible to a wider audience. Finally, the production of the individual authors and the institution as a whole is promoted.

In the traditional system of scholarly communication much of the research findings are dispersed through different journals. However nowadays scholars use Internet intensively to disseminate their achievements. There is growth in the open access availability of research publications, both gold (author pays for publication) and green (self-archiving by the researcher). Approximately 30% of all articles are thought to be available as open access, two-thirds in green and one-third gold [17]. The institutional repository preserves and make accessible the staff intellectual output in a straightforward manner. This is a lightened publishing model. Journal published articles can also be placed in the repository to attain a larger audience, thus enforcing completed publications. Global access to research literature is achieved.

Publication of educational resources in addition to the management of the curriculum is particularly important for dynamic areas of human knowledge. Provision of copyright curriculum in such areas is also a kind of advertising on campus. Making a learning content visible (open courses) increases the potential reuse of the materials.

For the academic staff

- improved research knowledge management;
- broad dissemination of published research findings;
- increased citation of some papers;
- indexing.

Sharing of research outputs, unpublished ideas and know-how facilitates their public visibility. In fact researchers manage and store digital content connected with their investigations including research data. Thus collaborative work on institutional projects is promoted. Community members have a place where their scholarly works are permanently exposed. The available scientific results give rise to the preparation of new joint projects. Knowledge sharing and reuse is facilitated.

Because of the short period after uploading the document, authors could achieve a fast dissemination of their results and a greater impact. In rapidly developing areas of scientific knowledge e.g. computer science or communications researchers can offer preprints via the open access archive in order to claim priority and to get a fast feedback.

Open access favors the dissemination of published research in the archives and contributes to the growth of citing of the scientific production. Citation analysis demonstrates that research papers that are freely available are easier to cite.

Open access archives are indexed by search engines, which promote both the production of the individual authors and the institution as a whole. This allows for the creation of personalized publication lists and increases the citation. Via the usage of different metrics the researchers obtain hit rates on specific papers. The impact factor is also derivable.

Challenges in Sustaining Institutional Repositories

There are different factors that contribute for the success or the decline of an IR.

1. The population of IRs

The answer of the question „how to achieve staffs' participation in a repository?“ concerns the contents' acquisition of any IR. There exists a psychological resistance of users to deploy the content in the digital archive. The staff doesn't see the value of depositing their work or it is not eager to learn yet another tool that seems to be used rarely. To overcome this opposition different incentives are to be proposed. The new role of IRs as an alternative to publishing i.e. the content recruitment is to be clearly stated.

2. The cost

Building an institutional repository is not a cost free activity. Costs are influenced by different factors e.g. the chosen technology, the provided services, the price of data preservation, the expenses for digitizing content etc. One of the first decisions for an institution is to choose the type of hardware and software for the implementation of the archive. The choice of open source software reduces cost and allows for customization. The use of commercial software cuts the maintenance costs but also can limit the system tuning to the proper needs. Once the software platform

is chosen, the institution has to determine the personnel needed. Generally 2-3 employees are sufficient for metadata management, advertisement activities and community members' induction. In addition, some operational costs e.g. for hardware replacements, for scanning materials, are to be considered. Nevertheless that open access institutional repositories represent an alternative to the purchase of expensive scholarly journals, repositories come with their own price.

3. The copyrights

Usually it is assumed that the depositor possess the rights on digital copy of a completed manuscript or other own work to be exposed in the repository. This makes sense when preprints, not yet published articles, and working papers are considered. However, when institutions decide to post published content, copyright permissions have to be respected. Reasonably, the depositors are often unaware of whether or not they can post an article in an institutional repository. Authors (and IR managers) are confused by the diversity of publisher permissions policies. Some publishers allow deposit of the final published version of the article, others allow the deposit of the author's pre-copyediting version, and some allow no deposit at all. Investigations show that about 80% of publishers allow some version to be used.

4. The quality of the deposited materials

The quality of documents submitted to the open access archives are estimated by the supervisors following formal criteria. The author's contributions might appear obsolete and/or disputable. It is the author's personal responsibility for the flaws in the content e.g. plagiarized texts, faults or junk. Author's produced digitization can also be a quality problem, e.g. badly scanned texts or images. Another concern is that depositors may not know how to describe their work in a way that will increase the chances of the article to be discovered by search engines. It is the institution liability to take care such materials to be improved and to ensure a quality repository that others will use.

5. The strategic vision of the governing board

Most of the repositories are created via targeted projects which execution takes the mainstream of efforts and resources. After acquiring some critical mass of deposited items and opening for public use, the repository is said to be functional. Projects concerning the development of IRs after their ending cannot further provide for a stable business plan. Our experience shows that the initial enthusiasm associated with the creation and accumulation of repository content decreases. Meanwhile expenditures persist as well as organizational support should do. Therefore, a continuous attention from the institution governing body is needed to ensure a long-term life of any IR, here included a stable framework for use and maintenance.

Conclusion

Open digital archives are of great importance for the public visibility and recognition of research institutes and universities. By allowing an improved management of intellectual outputs and freeing up the process of dissemination, their main purpose is to rise up the representativeness of the institution. The rationale

behind the implementation of an institutional repository is to preserve the intellectual assets of members' community.

In this paper we discussed the academic use of open digital archives. An attempt to summarize the benefits and to analyze the usability and the factors leading to the success of Bulgarian IRs is presented. The IR is an open e-space which provides long-term preservation of electronic documents and assists in the dissemination of research findings both at public and local level. However staff is not necessarily interested in depositing their work and it is up to the managerial board to stimulate proper supporting activities. The presence of well configured framework and the allocation of sufficient cash resources for maintenance are often neglected. The success of an IR also depends on the integration with the overall librarian collection of books, journals, digital files, etc.

Based on analysis of current state of open access, made here, as well as in [18], we suggest some recommendation for further work:

- To be defined clear policies for the dissemination of and open access to scientific publications resulting from publicly funded research. It should be on the basis of the green model, within which quality is ensured by scientific publications. This should embrace all research institutions which perform and/or disseminate fully or partially state-funded research. Access to the results of state-funded research should be provided to the greatest possible extent;
- To be ensured that research funding institutions responsible for managing public research funding and academic institutions receiving public funding implement the open access policies.

References

1. Goodrick, D. (2014). Comparative Case Studies, *Methodological Briefs: Impact Evaluation 9*, UNICEF Office of Research, Florence.
2. Lynch, C. 2003. Institutional repositories: Essential infrastructure for scholarship in the digital age. ARL Bimonthly Report, 226: 1–7.
3. Shearer, K. (2003). Institutional repositories: Towards the identification of critical success factors. *Canadian Journal of Information and Library Science*, 27(3): Available: <http://hdl.handle.net/1880/43357>, accessed on October 4, 2015.
4. Bell, S., Foster, N. F., & Gibbons, S. (2005). Reference librarians and the success of institutional repositories. *Reference Services Review*, 33(3), 283-290.
5. Ferreira, M., Rodrigues, E., Baptista, A. A., & Saraiva, R. (2008). Carrots and sticks: Some ideas on how to create a successful institutional repository. *D-Lib Magazine*, 14(1/2). Available: <http://www.dlib.org/dlib/january08/ferreira/01ferreira.html>, accessed on October 4, 2015.
6. Blythe, E. & Chachra, V. (2005). The value proposition in institutional repositories. *EDUCAUSE Review*, 40(5), 76-77.
7. Thibodeau, K. (2007). If you build it, will it fly? Criteria for success in a digital repository, *Journal of Digital Information*, 8(2). Available: <http://journals.tdl.org/jodi/article/view/197/174>, accessed on October 4, 2015.
8. www.opendoar.org, accessed on October 4, 2015.
9. <http://eprints.nbu.bg/>, accessed on October 4, 2015.

10. <http://sci-gems.math.bas.bg/jspui/> accessed on October 4, 2015.
11. <http://research.bfu.bg/>, accessed on October 4, 2015.
12. <http://research.uni-sofia.bg/>, accessed on October 4, 2015.
13. <http://www.bg-openaire.eu/>, accessed on October 4, 2015.
14. Simeonov, G. & Stanchev, P. (2011). Open Access and Institutional Repositories in Bulgaria. *Proc. of the 1st Int. Conf. „Digital Preservation and Presentation of Cultural Heritage“*, V.Tarnovo, Bulgaria, 165-170.
15. <http://eprints.nbu.bg/>, accessed on October 7, 2015.
16. <http://www.dspace.org/>, accessed on October 7, 2015.
17. Poynder, R. (2011). Open Access by Numbers, Open and Shut, <http://poynder.blogspot.com/2011/06/open-access-by-numbers.html>, accessed on October 7, 2015.
18. Stanchev, P. (2014). Business Models for Open Access. Copyright and Licensing under Open Access. *Proc. of UNESCO Conf. „Digital Presentation and Preservation of Cultural and Scientific Heritage“*, V.Tarnovo, Bulgaria, p. 324.

Предизвикателства към поддръжката на институционалните хранилища с отворен достъп в България

**Юлиана Пенева, Станислав Иванов,
Красимира Иванова, Петър Станчев**

Резюме: Академичните архиви с отворен достъп са подходящо средство за представяне и популяризиране на научните постижения на университетите и изследователските институти. По този начин се постига по-добро управление на интелектуалните активи на научната общност. Настоящата статия изследва изградените български институционални хранилища и анализира факторите, допринасящи за техния успех както и предизвикателствата, свързани с поддържането им.