Exposing the Intellectual Assets of a University Department

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Abstract. Works for designing and deploying a university department repository are presented. General considerations about policies and functional requirements are outlined with respect to the institution context. Technical and system issues are briefly discussed. Finally the benefits and usability of the repository are summarized.

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

1 Introduction

The proper management of resources is fundamental for any organization in response to changing business conditions. Many companies are achieving a business advantage by managing successfully their digital resources. Resources include documents, images, video or audio clips, animations, presentations, online courses, web pages, etc. Organizations are of different types and sizes ranging from SME to international corporations. All of them demonstrate an intensive use of digital resources, the resources being stored, distributed, shared and reused without difficulty.

Nowadays digital resources are increasingly being recognized as a very important organizational asset au par with finance and human resources. The business managerial and technical benefits of digital resources are summarized in [1]. In order to examine their value [2] and to consider the opportunities for reuse digital resources are organized in repositories that support the organizations' policy on digital asset management.

For higher education institutions digital resources can be used strategically 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 university assets more effectively than it the past two decades. Digital resources are organized as university-based institutional repositories [3], 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 activity is the huge diversity of purposes, deposited resources, services and potential users. Universities 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.

In the dynamic domain of computer science it appears especially helpful to store many useful products of the educational process itself: the so-called grey literature e.g. case studies, student's research projects, diploma theses, working papers, technical reports, etc. Active learning could be significantly stimulated via a proper repository as well. This determines our decision to develop our own, at department level, digital repository to deploy digital content not covered by the university information structures: LMS Moodle and Scholar electronic repository. Our development should deliver digital materials not offered by these two systems. Ensuring that proper digital materials are long term visible is very important for the department as part of its positioning strategy. The goal of this repository would be to provide added value to the Computer Science Education community, to our students and alumni. Moreover, the university educational policy encourages the shift towards e-learning and a flexible learning process. This implies reducing the face-to-face sessions, disseminating online coursework on a wider basis and training the students any time. So, designing a new infrastructure project and applying a standards-based approach to the management, preservation and access of existing and future digital resources is essential for the department to fulfill its mission as a team of lecturers and researchers.

In the context of the above, the main goal of this paper is to present our work on designing an institutional repository of the Department of Informatics at New Bulgarian University. We discuss what do we need and determine the type of the material to be stored in the repository. Creating a proper digital collection that captures and preserves the department's intellectual output would increase its visibility and public value. This repository will support learning and administrative processes of our department. To build an effective repository the technical set up process is to be planned properly. The paper presents general considerations about policies and functional requirements with respect to the institution context. Technical and system issues are also briefly discussed. Finally the benefits of the repository are summarized and its usability is justified.

2 Institutional repositories in Bulgaria

The Bulgarian research community is aware about the benefits of exposing research content in digital form. Therefore in recent years open access repositories ranging from digital libraries up to e-journals have been built. Large companies are reporting for own repository investigations as well. In addition there are many workshops and annual open repositories [4] conferences that concentrate on important issues concerning repository creation and management. Despite of the disappointments for many organizations due to the resulted greater than expected costs for set up a repository, research effort in this area appears promising. Repositories increase successfully very quickly. In this perspective, universities and scientific institutions demonstrate a remarkable activity. Open access academic repositories marked a boost of 300 during the mid of 2006. Since the beginning of year 2007 the growth of such repositories listed in the *Open*DOAR Database [5] shows a constant increase of 300 repositories per year up to its present number of about 2200 (Fig.1).
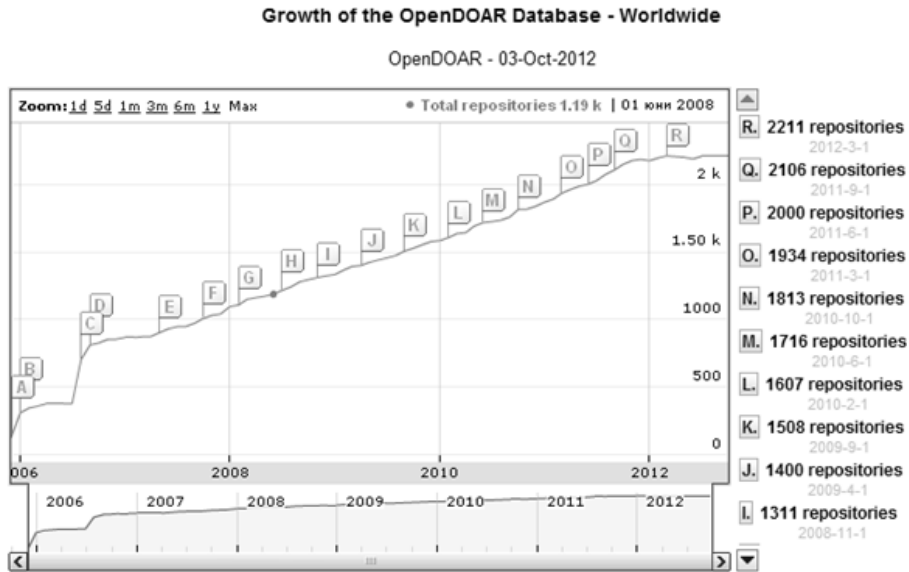
Fig. 1 Growth of the OpenDOAR Database – Worldwide **-** 04-Nov-2012

Up to now about 2200 scholar repositories all over the world have been reported, about 20% of them in the Nord America, 47% in Europe shared among United Kingdom, Germany, Spain, France and Italy. Other 18% reside in Asia, about 6% - in South America. In Bulgaria there are six open repositories (Fig.2) only [6, 7, 8, 9, 10, 11] in the *Open*DOAR Database [5].

3   The institutional repository of the Department of Informatics

According to the SPARC alliance [12] institutionally defined repositories are scholarly, cumulative, open and interoperable. Generally speaking a departmental repository can be compared to a database with a set of services used to store, index and preserve scholarly materials, research findings etc. in digital formats. The main goal is to manage and disseminate digital materials created by the department and its community members [13].

Organization	Description	Software	Subjects	Content/ Items
Academic research repository at Burgas Free University	research output	DSpace	Computers and IT; Arts and Humanities General; Business and Economics; Law and Politics	Articles; Conferences; Books/ 226
DSpace at IMI	journal output	DSpace	Multidisciplinary	Articles; Conferences; Books/ 1652

Bulgarian OpenAIRE Repository	peer-reviewed publications FP7 projects	DSpace	Multidisciplinary	Books/ 107
Electronic Repository-Central Medical Library-Sofia	Research output	DSpace	Multidisciplinary; Health and Medicine	Articles; Theses; Books; Learning Objects/ 155
New Bulgarian University Scholar Electronic Repository	Research output	EPrints	Multidisciplinary	Articles; Conferences; Books; Learning Objects/ 899
Research at Sofia University	Research output	DSpace	Multidisciplinary	Articles/ 555

Fig. 2 Open Repositories in Bulgaria **-** 04-Nov-2012

The repository will be used for electronic publishing and housing of different digitized collections concerning the knowledge management of the department. The final goal is to offer open access to scholarly research. So, the departmental repository is designed to deploy content not managed via university learning facilities: investigations, learning resources, theses, students' projects and papers. The goals are twofold:

- to store and represent the department's intellectual production;
- to prevent the student's plagiarism making visible the majority of the coursework done during the years.

We follow the guidelines given in [14] for each stage of building the repository bearing in mind the requirements of our institution about copyrights, access rights etc.

Steps in building the repository:

1.   Determination of the content type.

We will accept bachelor, masters and doctoral theses, student's research materials and original learning content from the department of Informatics. The user will not be allowed to download copyright protected content.

2.   Service definition

Repository services concerns the management of corpora i.e. annotated collections of digitized objects. Making visible the stored content to the user groups can be defined as a top service priority. The service's mission is to raise the visibility of the Department of Informatics at New Bulgarian University. It will facilitate our students, extending their access to properly collected and organized additional learning materials. Key users of the departmental repository are going to be students and faculty.

3.   Policy framework

A policy framework is very important to determine the operational boundaries within which the repository will deliver its services. This framework contributes for an easier use of the repository, permits for it support and facilitates the decision-making processes. Some

policies need legal agreements i.e. definition of a deposit license and usage license that user agree to.

Policies can be classified as strategic and operational. Strategic policies reflect the wider strategic policies of the institution. New Bulgarian University has a high- profile vision statements [15] and defined procedures concerning research, teaching and theses. Following them the repository can be easily embedded within the university. Administrators will survey the deposit of diploma theses and other research output. As learning and teaching materials are deposited within Moodle, their store in the repository is optional.

Operational policies deal with day-to-day operations. They comprise:

- Submission policies – only administrators will be allowed to deposit submitted materials after approval.
- Collection policies – the repository will focus on computer science and mathematics. Final reviewed/assessed versions will be accepted only.
- Preservation policies – different policies will be set for different type of materials. We will keep theses as deposited whilst teaching materials, because of the dynamics in the computer science area more likely will be updated. Regular backups will be made, the frequency being adjusted upon the intensity of use.

4. Choice of an infrastructure

Taking into account that flexibility among the different collections is a key feature the goal of the department repository is to offer a proper infrastructure with a well defined range of services. A high level archival model to act as a framework is necessary. We adopt a well established model in this area – OAIS (Reference Model for an Open Archival Information System) [16] –see Fig.3.

The OAIS environment is made up of the OAIS, i.e. the digital library system, the producers and consumers of its content and services, and the management and strategic input into the system. Within the OAIS are six main functions: ingest (submit), data management, storage, access, administration and planning. Common services e.g. operating system and networking services are assumed to be available. Evaluations concerning the usability of OAIS to build different kind of digital repositories are given in [17].
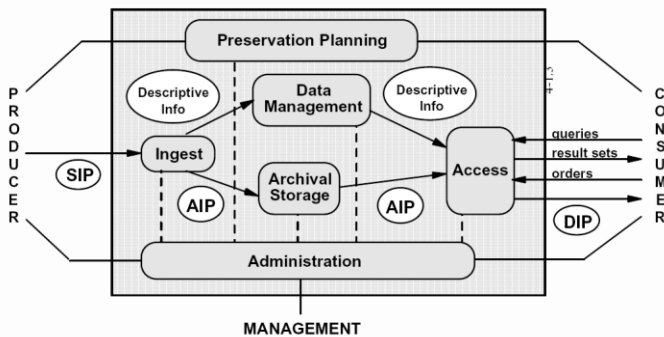

Fig.3 OAIS Functional Entities (from Reference Model for an Open Archival Information System - OAIS, 2009, Fig 4-1)

5. Investigation of possible repository solutions

Taking into account the requirements we can make decisions concerning the repository infrastructure. To set up a repository three approaches can be followed: do-it-yourself; use standard packages and outsourcing (external hosting). With limited staff resources for long-term maintenance and support we have chosen to apply the most popular approach i.e. to use a standard package nevertheless that external hosting becomes recently more popular. A wide variety of available software with different features and strengths exists. Recently the more commonly adopted software solutions fall into two broad groups: open source and commercial software. Our investigations show that there are over 316 repositories using the EPrints software, about 901 – DSpace,95 – Digital Commons. The rest of the software exhibits a limited application. EPrints is an open source platform for building repositories of documents like research literature, scientific data, and student theses. DSpace preserves and enables easy and open access to all types of digital content including text, images, moving images, mpegs and data sets. It is applied for accessing, managing and preserving scholarly works. Digital Commons offers external hosting for institutional repositories. It can include pre-prints and/or final copies of working papers, journal articles, dissertations, master's theses, conference proceedings, and a wide variety of other content types.

6. Pilot testing

The next stage of the process of implementing a digital repository for the needs of our department was to select a system, which could be the most suitable for our needs. So, following the local policies and practices we have decided to run an open source repository platform. This choice reflects the good will and the IT expertise of the department's staff. Running open source software appears to be the cheapest solution as the installation and the customization of the repository require a relatively short list of intensive activities. The skills required depend on specific repository platforms i.e. the programming language they are written in. There are common skills such as HTML, Web page design, SQL applicable to all choices. In order to justify the choice of the software, pilot installations of some open source packages has been undertaken. These were used as test beds for the overall repository development. A pilot system was used to tune the software parameters.

We made a short-list, where the exclusionary criteria were popularity and price. Even with a short-list consisting of only three systems, Dspace, Eprints and Digital Commons, the list of criteria we considered relevant for evaluating these systems was too long. Thus in order to make a more quantifiable and formal judgment we decided to formulate the problem as a multiple criteria selection problem and to use a decision support system to solve it. The details of the overall process are presented in [18] and lie beyond the scope of this paper. The departmental repository has been implemented using EPrints because the system is customizable and branding-friendly. Respecting the university policy about the diploma theses visibility the repository is accessible at http://infdep.nbu.bg, but only at local level from the university buildings.

4 Conclusion

The department repository provides thematically oriented texts – results of our students' work during various educational activities. The decision to create one more repository to manage proper digital content is challenging. One could argue that organizational digital assets already are stored in many types of systems e.g. locally

developed closed systems, virtual learning environments, portals, etc. However the storage of students' scholar work facilitates the control on plagiarism. It is up to the department to track a direct borrowing of texts and in a broader sense the plagiarism of themes, ideas, methods and approaches. In addition active learning is stimulated.

Summarizing the benefit is:

- overcoming temptation for cheating
- availability of quality examples of students' achievements
- a comparative analysis of students' work can be performed

As a result, we expect a significant increase of the quality of students' paper work: theses, research projects, surveys, etc.

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