Study on Building Institutional Repository and Exploring Innovative Services in Universities under the Background of Big Data

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Abstract: Under the background of big data universities should make full use of Institutional Repository to actively explore innovative services, and promote the effectiveness and the sustainability of the service of Institutional Repository. This paper analyzes uses of Institutional Repository for the different user groups, introduces the main building platforms of Institutional Repository currently, and discusses the innovative services that can be explored in progress of buliding Institutional Repository.

1. Introduction

The arrival of the era of big data has made the value of scientific research data and educational data of universities more and more prominent. How to effectively preserve and manage, especially use these information resource efficiently, is particularly important. Institutional Repository (IR) is an important mechanism for institutions to manage scientific achievements, disseminate academic knowledge, and support innovation in society. It has quickly become an important part of the knowledge infrastructure of organization. With the rapid development of digital science research and digital education, the increasing form of digital knowledge content and scientific achievements, and the increasingly active application forms and application methods of knowledge content, various levels of universities and research institutions have put forward more requirements for Institutional Repository. Institutional Repository is not only a "knowledge storage platform", but also an active,direct and indispensable knowledge service platform in the scientific research and education process[1] [2]. As of November 2017, according to the survey, there are 472 institutional repositories in China that have been built and under construction. Among the 325 institutional repositories in the mainland, there are 166 colleges and universities, and 159 research institutes, because the number of mainland universities is far more than research institutes, there is still a great potential for promotion in building institutional repositories. From the state of construction, the number of accessible institutional repositories in the mainland has doubled and the development momentum is rapid; however, the average annual growth rate of accessible institutional repositories in the mainland is only 25.3%, which is much lower than the international total growth rate.So building institutional repositories in the mainland is still in the initial stage of promotion, the

timeliness of building institutional repositories needs to be improved[3].

Under the background of big data, universities should make full use of the rich information of Institutional Repository and its rich links with the entire information environment, actively explore innovative services, and promote the effectiveness and sustainable development of Institutional Repository.

2. Main Functions of Institutional Repository

2.1. Collecting Outcome Information

Based on relevant technologies, such as machine learning, intelligent indexing, automatic classification, data collection and other technologies, the collection, cleaning, and attribution of results are completed, and combined with manual check to ensure the accuracy and integrity of data construction.

2.2. Update Outcome Information

The management background automatically pushes the update information to the academic or department home page. The user-owned outcome information can be uploaded through the batch import function, and the information information can be tested and validated by related tools, and the copyright is assigned according to the institution,department and scholar dictionary.

2.3. Display Outcome Information

Scholars' outcome information can be displayed in the individual and departmental interface, scholars' academic resumes, team academic catalogues, and internal or external academic cooperation networks can be automatically generated.

3. Uses for Different User Groups

Universities can use Institutional Repository to carry out a variety of work and explore more value-added services to promote the university to enhance academic influence and improve quality of talent training. The uses of Institutional Repository can be considered from the following aspects.

3.1. For Universities

Long-term centralized management and preservation of academic outcome resources, will ensure permanent disclosure and acquisition of information, accelerate the academic communication.And it will facilitate the integration of information within the university, increase the visibility of outcome information, facilitate to communicate and share academic achievements among scholars at home and abroad. It can support the management and evaluation of scientific and educational outcome, and provide decision-making support for discipline construction and talent training in the university.

3.2. For Scholars

3.2.1. Expand the Visualization of Outcome Information and Enhance Academic Influence

Institutional Repository is inclusive in archiving the outcome information, it can archive the publicly published journal articles, conference papers, patents, theses, research projects , etc.It can also archive unofficial publications which play an important role for academic exchanges and

knowledge innovation.They are the so-called gray literatures such as research reports, work summary, meeting minutes, data sets, conference presentations, etc. Institutional Repository applies interoperability protocols and standards to create a global network of cross-search and search for scientific information through the Internet, reducing barriers to acquisition due to price barriers and technical constraints, and providing the widest possible dissemination of scholarly research outcome information; Providing a scholar business card, scholars can edit their research direction and academic history, and can display their academic achievements to the persons of the same occupation through their business cards.

3.2.2. "Once Submission, Repeatedly Enhanced Use" will Simplify Administrative Statistics

In addition to archiving individual scientific achievements and teaching resources, Institutional Repository provides scholars with a base for long-term centralized management of individual scientific achievements and teaching resources, and is open and permanent for use. Scholars do not have to submit repetitive data to different functional departments each year, only need to submit their own academic esources or claimed esources, such as performance appraisal, departmental outcome statistics and other data. Institutional Repository can carry out data harvesting and determine the attribution of academic outcome. Scholars only need to claim a small amount of uncertain outcome data. The data that cannot be collected can be uploaded by the scholars themselves and updated by the relevant departments which have checked the data [4].

3.2.3. Tracking Academic Trends, Promote Exchanges and Cooperation among Scholars

Nowadays, scholars are no longer limited to the research perspective of this institution and the field. Cross-institutional and interdisciplinary research has become the most popular phenomenon in scientific information innovation. Scholars can understand the research dynamics and research fields of peers through Institutional Repository, understand the academic achievements and cooperative relations of peers, be able to understand the utilization rate of individual achievements, promote the exchanges between scholars and peers, and seek suitable cooperation partners [5].

3.3. For Functional Departments

3.3.1. Development Planning and Discipline Construction Office

Institutional Repository can be used to analyze the development of the subject, including the analysis of the subject development trend, the analysis of the subject competitiveness, the analysis of the subject contribution, etc..The assessment of existing dominant disciplines, the exploration of potential advantages of the university, and even the analysis of subject competitive intelligence,which can make Institutional Repository become one of the decision-making support for discipline construction[4].

3.3.2. Scientific Research Management Department

Institutional Repository can provide objective data support for scientific research assessment and evaluation on Scientific Technology Department and the Social Science Department. Since the data is collected, claimed, and checked, the information in Institutional Repository can be both comprehensive and accurate. As a result,the basic information of scientific research projects can be effectively managed.Through Institutional Repository the correlation between the output of scientific research projects and projects and the relationship among project members can be realized. We can analyze the development change relationship between scientific studies and professional

titles,and the relationship between scientific studies and age etc..

3.3.3. Human Resources Office

It can provide data support for the talent introduction decision of the university.The human affairs system can be connected with Institutional Repository to realize the synchronous update of data, eliminating the need for teachers to enter the human affairs system and repeat the academic information in the assessment and professional titles review, so that the functional departments can quickly and effectively perform statistical work.

3.3.4. Education and Teaching Management Department

For example, the Academic Affairs Office, the Graduate School, the Student Work Office, the Youth League Committee, etc. can use Institutional Repository to collect and manage the various achievements obtained by teachers and students, and conduct multi-dimensional analysis of the achievements of teachers and students, to provide decision-making support for innovating talent training mode and improving the quality of talent training.

3.4. For the Library

For libraries, Not only the academic outcome information of the institution can be archived and managed long and centrally, but more importantly, it can analyze and evaluate the research direction, process, trends and results of the organization, and help to improve the core competitiveness of the library through Institutional Repository. The library participates in the establishment and management of Institutional Repository, the librarians participate in the creation of metadata, coordinate with the members of the organization and the administrative department, the department, participate in the management of the repository content data, solve difficult problems, etc., so that the library is integrated into the communication system of the academic, the library management function has been expanded to make its information service function more prominent.

4. Main Building Platforms

4.1. Chinese Version of DSpace

DSpace is one of the most widely used open source software in the world's Institutional Repository. According to ROAR statistics, 44% of registered warehousing currently uses DSpace, which has long been the most popular IR software system in the world. Three different Chinese versions are Taiwan University's Chinese version of DSpace NTU, the Chinese Academy of Sciences's Chinese version of CSpace and Peking University's Chinese version of DSpace CALIS. The launch of these three products benefited from the promotion and efforts of the three major IR alliances (Taiwan Academic Institutions Collection, Chinese Academy of Sciences Institutional Repository Service Grid, and Chinese University Institutional Repository Knowledge Alliance).

Among them, the Institutional Repository Service Grid of the Chinese Academy of Sciences has collected and archived more than 780,000 scientific studies, and the rate of the open access to the full text have reached more than 80%. It is the largest one of systems sharing public funded scientific studies among international scientific research institutions. And the system has played an important role in demonstrating and promoting the open sharing of public scientific studies in China. In terms of software utilization, the Chinese Academy of Sciences is uniformly deployed and gradually promoted. Therefore, the software used by each organization is based on the Dspace of the Chinese Academy of Sciences to develop the CSpace system according to its own requirements.

CSpace has been widely promoted and applied in scientific research institutions, universities and technological innovation enterprises.

4.2. Other Commercial Software

In recent years, the mainland universities have shown diversified needs, and more and more commercial software is selected,such as Zhixian, Zhiwang, Chaoxing, WEDO Information, Weipu, Power Data and Aiqinhaiyuezhi. One of the most important reasons for the popularity of commercial platforms is the growing trend of SaaS (Soft As A Service) in institutional repositories. Since many organizations are unable to establish an effective self-storage mechanism and rarely provide OA (Open Acces) services, data services (such as automatic collection and data processing) that ensure the contents construction of Institutional Repository and the value added on this basis Services (such as statistical analysis) have become an important consideration when construction organizations choose software platforms. Customized development and data services for commercial software have lowered the technical threshold, shortened the retrospective construction cycle, met the needs of current Institutional Ropository builders, and became the construction guarantee for more and more organizations[3].

5.   Innovative Services

Universities can use Institutional Ropository to automatically generate the scholer's academic resumes, team academic catalogues, internal and external academic cooperation networks. On this basis, the knowledge map of the institution is generated, which visually shows who is doing what, where is the direction of the feature, and who cooperates with it, and uses the map of the institution and the knowledge map of the whole domain to compare and analyze with the knowledge map of the competition organization,identify Competitive advantage and gaps, discover potential competitors, seek cooperation opportunities, and find out who has the ability to do what, who has high knowledge productivity, who has strong cooperation foundation, which teams can team up and what to do, and discover the development context of subject knowledge to discover the knowledge base, research fronts, and research hotspots of the disciplines, and guide the scholars to conduct academic research. Through knowledge map clustering, a large number of sudden literatures can be found. These documents are the hotspots in the research, and some of them have high Betweenness centrality, the literatures with high betweenness centrality represent the breakthrough progress in this discipline.

6.   Conclusions

Decision-making support and value-added services will become a new functional development point in building Institutional Repository in colleges and universities. Especially with the construction of "Double First-Class" in Chinese universities, how to use the advantages of the Institutional Repository information resource and its rich links with the big data environment to explore and provide innovative services. To transform the Institutional Repository into a direct and indispensable knowledge service platform for the discipline, scientific research and teaching management process in universities. Promote knowledge innovation, enhance the academic reputation and academic influence of universities and academics, and improve the quality of students training in universities.

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