@DCE: knowledge sharing in an engineering institute-a case study

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Abstract

Engineering Institutions in India are being ranked by various surveys conducted every year by magazines like India Today, Outlook etc, which give importance to parameters like placements, brand value and intellectual capital. Intellectual capital of an Engineering Institution is the published scholarly material of its faculty consisting of articles presented in conferences and seminars , papers published in journal, case studies, books written and edited, etc. Use of tools like Institutional Repository softwares for capturing the intellectual capital and enabling knowledge sharing in academic institutions especially in developing countries like India are need of the hour. The purpose of this paper is to describe the results of a survey conducted to ascertain different considerations for implementing an institutional repository and the creation of an Institutional Repository at Delhi college of engineering using the Open Source DSpace Institutional Repository Software.

Methodologyï *The survey was conducted at Delhi College of engineering to ascertain the need of an institutional repository and the different aspects associated with the setting up of an institutional repository. The phases involved in the development of the Institutional Repository using open source Institutional repository software to capture the intellectual capital and enable knowledge sharing are also described.*

Findings ï *setting up of the Institutional Repository was found to be a very complex issue, requiring technical know-how of different software. Creation of communities and collections, archiving of documents into the Repository, enriching them with metadata are some of the essential activities for efficient retrieval of information. Some knowledge of computers and DSpace software was essential.*

Limitationsï *Once the Institutional Repository is created it needs to be maintained. Faculty and staff need to be trained for proper uploading of documents and submitting metadata into the repository as it is a cumbersome job for library staff to upload and submit metada as DCE library is running short of staff.*

Practical implications ï *Knowledge sharing of the papers contributed in conferences and*

eses etc., among the faculty of the Institute is possible ry. The intellectual capital of the Institute is available at one centralized location facilitating easy information retrieval and providing global visibility .

Originality ï *The Institutional repository provides DCE with a central facility for systematic archiving of its "intellectual capital" – the scholarly material of its student, faculty and research staff. Awareness and availability of the scholarly material of peer faculty enables knowledge sharing. The Institutional Repository is useful to the faculty, research staff and the institution. Engineering Institutions, especially in India, should be encouraged to develop Institutional Repositories of their intellectual capital and share knowledge.*

Keyword(s):

Intellectual capital; Knowledge sharing; India. Digital Library

Introduction

ñA university-based institutional repository is 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 membersò (Rajashekar, 2005). Institutional repositories may include pre-prints, post-prints, technical reports, working papers, thesis and dissertations, books or chapters of books, research databases, conference proceedings, text, video recordings, teaching materials, digital research materials, etc.

Knowledge management systems are defined as ñIT-based systems developed to support and enhance the organizational processes of knowledge creation, storage/retrieval, transfer and applicationò (Alavi and Leidner, 2001). The elements of a knowledge management system consist of the organization, intellectual capital, information management and technology.

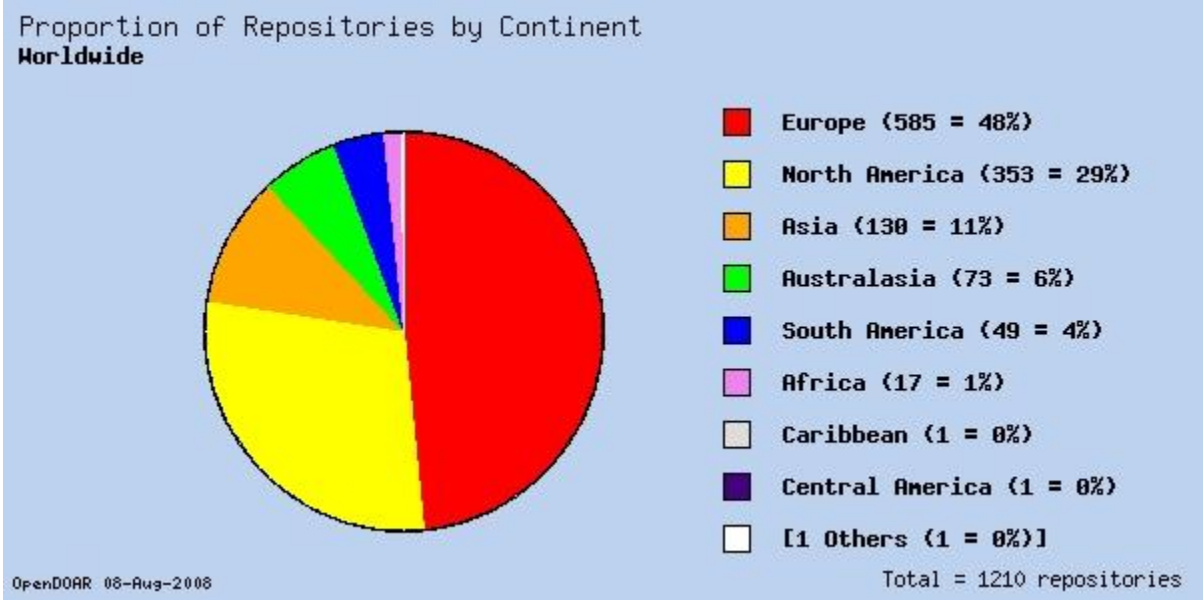
In context of academic institutions, Branin argues that ñmore and more faculty and students in a university utilize information technology not only to access information but also to create new intellectual output in digital formò (Branin, 2005). He suggests that the approach to knowledge management is relevant to the implementation of Institutional Repositories that manage a wide range of digital information created in a university.

Open Source Institutional Repository Software help collect, preserve, index and distribute the research material and scholarly publications, that is, the intellectual output of the Faculty and Academic Institution. Some of the popular Open Source Software available for creating and designing institutional repositories are DSpace, Fedora, EPrints, etc. A detailed description of these softwares is given in the Open Software Initiative (OSI) Guide (Crow, 2002).

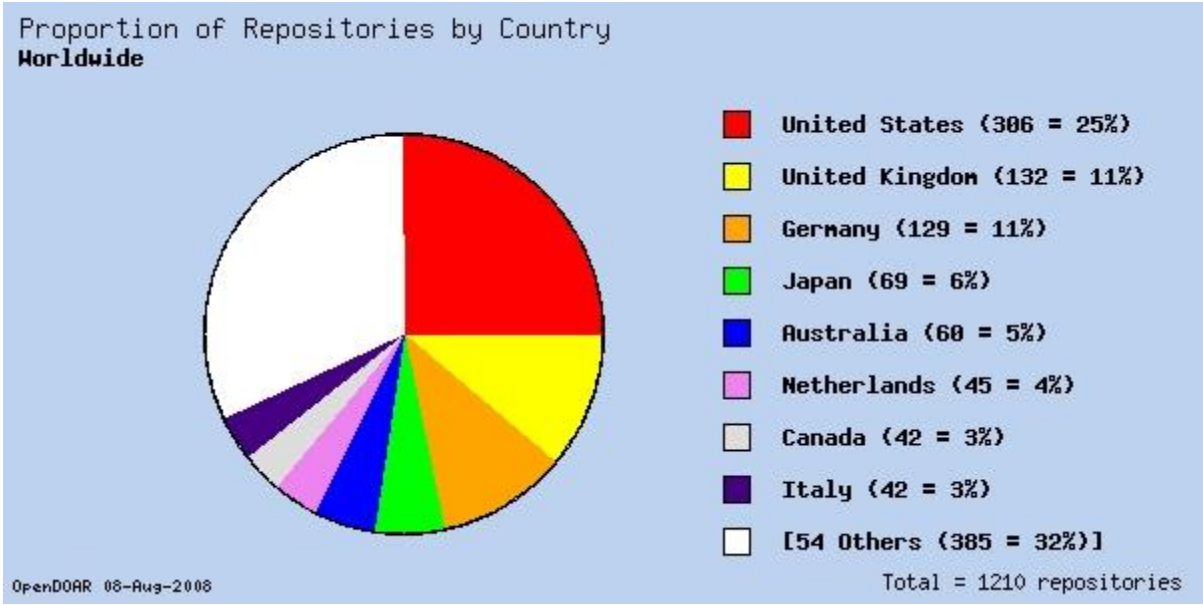
The Directory of Open Access Repositories (OpenDOAR)5 lists the institutional repositories worldwide according to the software used, content available, countries etc. The Directory of Open Access Repositories (Open DOAR) lists 306 Institutional Repositories in the USA, 132 Institutional Repositories in UK, 129Institutional Repositories in Germany and 30 Institutional Repositories in India (Directory of Open Access Repositories (Open DOARas on 8.8.2008). The

es in India is still in its infancy as compared to other tories listed in India, 25 are created using DSpace Digital Repository Software, indicating its popularity as a system software for creation of Institutional Repositories in India.

Proportion of Repositories by Continent -Worldwide



Proportion of Repositories by Country -Worldwide



These charts are based on the number of repositories in each Continent/country. However, some organisations have two or more repositories - over 20 in some cases - and this arguably skews the results.

Need to capture the intellectual capital in engineering institutions

Faculty and students in any academic institution contributes to the development of research and scholarly publications. Their research material consists of articles published in magazines, papers published in journals, papers presented at conferences, book reviews, case studies, edited and compiled books project reports and theses etc. These research materials and scholarly publications are knowledge intensive and should be captured and maintained in an Institutional Repository, to enable knowledge sharing and learning.

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In India, every year a large number of engineering institutions are coming up to cope up with the demand of trained engineering man power. There is a growing demand to evaluate the quality of these engineering institutions. Various organizations along with some magazines like India today and outlook etc rank the engineering institutions in India on different parameters through market surveys. Some of the recent surveys are the -, Outlook ï Cfore Survey of India's Top Engineering Institutions and one by India todayï The list below shows a comparison of the commonly used parameters in the Outlook ï Cfore Survey. It can be observed that the parameter ñIntellectual Capital and Facultyò is given the highest weightage. Thus, there exists a need for a mechanism to capture, preserve, retrieve and make visible this intellectual capital of the engineering institute and enable knowledge sharing.

The Top 100 Engineering colleges in India									
Rank	**Name of Institute**	**City**	**G/P**	**IC**	**I&F**	**PS**	**II**	**P**	**T**
				/30	**/20**	**/15**	**/15**	**/20**	**/100**
1	IIT Kanpur	Kanpur	G	28	19	14	13	19	93
2	IIT Kharagpur	Kharagpur	G	28	19	14	14	18	92
3	IIT Bombay	Mumbai	G	27	19	13	14	19	91
4	IIT Madras	Chennai	G	27	18	13	13	18	89
5	IIT Delhi	Delhi	G	26	19	13	13	18	89
6	BITS Pilani	Pilani	P	26	18	14	14	17	88
7	IIT Roorkee	Roorkee	G	26	19	13	12	16	86
8	IT-BHU	Varanasi	G	24	18	13	12	16	83
9	IIT Guwahati	Guwahati	G	25	18	13	11	15	81
10	College of Engg, Anna University	Guindy	G	25	17	12	13	14	81

y	Calcutta	G	25	16	12	11	15	80
12	Indian School of Mines	Dhanbad	G	25	16	12	12	15	79
13	NIT	Warangal	G	25	17	12	12	14	79
14	BIT, Mesra	Ranchi	P	24	14	12	12	14	76
15	NIT	Trichy	G	24	17	10	11	14	76
16	Delhi College of Engineering	New Delhi	G	22	16	13	11	14	76
17	Punjab Engineering College	Chandigarh	G	22	18	10	9.3	16	75
18	NIT	Suratkal	G	24	17	10	10	13	75
19	Motilal Nehru National Inst. of Technology	Allahabad	G	23	17	11	9.9	14	75
20	Thapar Inst of Engineering & Technology	Patiala	p	22	16	12	12	12	74

- **IC: Intellectual Capital**
- **I&F: Infrastructure and Facilities**
- **PS: Pedagogic systems (***the art or science of teaching; instructional methods***)**
- **II: Industry Interface**
- **P: Placements**

Institutional Repositories are emerging technologies for capturing intellectual capital, knowledge sharing and management in academic and research institutions. There are many engineering institutions in India with varied infrastructure, Library facilities, access to e-resources, access to quality scholarly and teaching material. Thus there is a need to share the resources primarily within and amongst the engineering institutions.

The Indian Institute of Technology ,some NITs and a few more selected Institutes in India have Open Access Institutional Repositories showcasing the intellectual output of their faculty and students. A list of institutional repositories in india as retrieved frm DOAR(8/8/2008) is given below

- **Delhi College of Engineering** - http://www.dce.edu/
    1. ***Delhi College of Engineering Repository***-http://202.141.12.109/dspace
- **ICFAI Business School** - http://www.ibsindia.org/
    1. ***DSpace at IBS Ahmedabad (DSpace@IBSA)***-http://202.131.96.59:8080/dspace
- **Indian Institue of Technology, Bombay (IITB)** - http://www.iitb.ac.in/
    1. ***DSpace at NCRA***-http://ncralib.ncra.tifr.res.in:8080/dspace/
    2. ***DSpace@IITB***-http://dspace.library.iitb.ac.in/dspace/
- **Indian Institute of Astrophysics** - http://www.iiap.res.in/
    1. ***Indian Institute of Astrophysics Repository (DSpace@IIA)***-http://prints.iiap.res.in/
- **Indian Institute of Management Kozhikode (IIMK)** - http://www.iimk.ac.in/
    1. ***DSpace at Indian Institute of Management Kozhikode (DSpace@IIMK)***-http://dspace.iimk.ac.in/

Sc) - http://www.iisc.ernet.in/

2. ***tions at Indian Institute of Science*** *(edt@IISc)*-http://etd.ncsi.iisc.ernet.in/
2. ***Open Access Repository of IISc Research Publications*** *(ePrints@iisc)*-http://eprints.iisc.ernet.in/

- **Indian Institute of Technology, Delhi** (IITD) - http://www.iitd.ernet.in/
  1. ***EPrints@IITD***-http://eprint.iitd.ac.in/dspace/
- **Indian Statistical Institute, Bangalore Centre** (ISI) - http://www.isibang.ac.in/
  1. ***Digital Library at Indian Statistical Institute, Bangalore*** *(ISI Library)*-http://library.isibang.ac.in:8080/dspace/
  2. ***Librarians' Digital Library*** *(LDL)*-https://drtc.isibang.ac.in/
- **Indira Gandhi Institute of Development Research** (IGIDR) - http://www.igidr.ac.in/
  1. ***Kautilya Digital Repository at IGIDR*** *(Kautilya@igidr)*- http://oii.igidr.ac.in:8888/dspace
- **Indira Gandhi National Open University** (IGNOU) - http://www.ignou.ac.in/
  1. ***eGyankosh***-http://www.egyankosh.ac.in/
- **Information and Library Network Center** (INFLIBNET) - http://www.inflibnet.ac.in/
  1. ***DSpace@INFLIBNET***-http://dspace.inflibnet.ac.in/
- **Information Centre for Aerospace Science and Technology** (ICAST) - http://www.icast.org.in/
  1. ***National Aerospace Laboratories Institutional Repository*** *(NAL Repository)*-http://nal-ir.nal.res.in/
- **Madurai Kamaraj University** (MKU) - http://www.mkuniversity.org/
  1. ***Eprints@SBT MKU***-http://eprints.bicmku.in/
- **Management Development Institute** (MDI) - http://www.mdi.ac.in/home/home.asp
  1. ***Management Development Institute - Open Access Repository*** *(DSpace@MDI)*- http://dspace.mdi.ac.in/dspace
- **National Centre for Catalysis Research** (NCCR) - http://www.nccr.iitm.ac.in/
  1. ***Catalysis Database*** *(ePrints@NCCR)*-http://www.eprints.iitm.ac.in/
- **National Chemical Laboratory** (NCL) - http://www.ncl-india.org/
  1. ***DSpace at National Chemical Laboratory*** *(DSpace@NCL)*-http://dspace.ncl.res.in/dspace/
- **National Informatics Centre** (NIC) - http://home.nic.in/
  1. ***OpenMED@NIC***-http://openmed.nic.in/
- **National Institute Of Oceanography** (NIO) - http://www.nio.org/
  1. ***DRS at National Institute Of Oceanography*** *(DRS@nio)*-http://drs.nio.org/
- **National Institute of Technology, Rourkela** (NITR) - http://www.nitrkl.ac.in/
  1. ***Dspace@NITR***-http://dspace.nitrkl.ac.in/dspace/
- **OWSA** (OneWorld South Asia) - http://www.southasia.oneworld.net/
  1. ***OneWorld South Asia Open Archive Initiative***-http://open.ekduniya.net/
- **Pandit Deendayal Petroleum Univeristy** (PDPU) - http://www.pdpu.ac.in/
  1. ***Petrospace - PDPU Open Repository***-http://203.77.192.116:8080/dspace/
- **Raman Research Institute** - http://www.rri.res.in/
  1. ***RRI Digital Repository*** *(Raman Research Institute Digital Repository)*-http://dspace.rri.res.in/dspace/
- **Sardar Vallabhbai National Institute of Technology** (SVNIT) - http://www.svnit.ac.in/
  1. ***ePrints@SVNIT*** *(Sardar Vallabhbai National Institute of Technology EPrints)*-http://eprints.svnit.ac.in/
- **Thapar University** (TU) - http://tiet.ac.in/
  1. ***DSpace@TU***-http://dspace.tiet.ac.in/dspace/

https://www.imsc.res.in/

.imsc.res.in/eprints

- **University of Delhi** - http://www.du.ac.in/
    1. ***DU Eprint Archive***-http://eprints.du.ac.in/

- **University of Mysore** - http://www.uni-mysore.ac.in/

DSpace at Vidyanidhi-http://dspace.vidyanidhi.org.in:8080/dspace/

Implementing an Institutional Repository as a tool to capture the intellectual capital and enable knowledge sharing at an Indian Engineering Institute was to be explored. A Pilot Institutional Repository was thus to be implemented at the Delhi College of Engineering

Delhi College of Engineering(DCE)

With a long history stretched over 67 years, Delhi College of Engineering has been in the fore front of providing technical education in an environment with infrastructure and well qualified and experienced academic staff. Various surveys conducted during last decade ranked it among top engineering college in India. Its researchers produce hundreds of documents in the form of project reports dissertations theses and journal papers every year . The Library system of DCE consists of Central Library and 10 Departmental Libraries .It has a collection of over 1600000 books and 1800 e-journals.

Methodology

A survey was conducted at DCE to ascertain the need for an institutional repository and different aspects associated with the setting up of institutional repository. Data was collected through an informal personal interviews of 100 faculty members and 100 students of ME and Ph.D.The surveyed sample consisted of faculty and students from different academicdisciplines

Findings

Need for an institutional repository

During informal survey it was observed that majority of the faculty members are not very experienced. Availability of the research work and teaching material of the experienced faculty would provide valuable guidance to the less experienced faculty for their research work.

d for and use of an institutional repository at the DCE. is a need to have an institutional repository, and that they would use it. The strong agreement for the need and usage of institutional repository suggests that the creation of repository will be helpful for the faculty to share their knowledge and give visibility to their intellectual output.

Type of contribution to the institutional repository

Respondents were asked about the different type of documents which they would like to contribute to the repository. Options include published articles , published journal papers, presented conference/seminar papers, written or edited scholarly books, teaching materials, presentations, technical reports/papers, photographs/images, audio/video materials,etc. It is observed that respondents indicate a preference to contribute published material like articles, journal papers and conference papers. Contributing unpublished material like teaching material, presentations, technical reports is less preferred.

Managing the institutional repository

In the current context of the engineering institute, in order to promote knowledge sharing, usage of the repository and building the seed collection, managing the repository involves converting print formats to digital form, assigning keywords, uploading documents, etc. Responsibility of managing the repository has to be assigned to either the information technology (IT) or computer staff, the library staff, faculties or contributors, or should be a joint venture of IT staff, library staff and the contributors. In some cases, special staff are recruited for this by institutions.. A joint effort implied that existing staff would be loaded with extra work, in addition to their usual workload. Having special staff being recruited and trained for the purpose of managing the repository meant more manpower and costs. If rapid development of the repository and continuous updates are a priority for the institution then recruitment of special staff is to be considered.Accordingly a proposal was framed for extra manpower and a wor study was conducted for the purpose by Govt NCT of Delhi and a post of Dy Librarian and Assistant Librarian were got created .

Implementing the pilot institutional repository DSpace@DCE

Creation of a pilot institutional repository (DSpace@DCE) at DCE was initiated as the survey indicated a strong agreement for the need and usage of an institutional repository. As in any academic institution, funding, infrastructure and manpower were always the initial bottlenecks. Hardware made available for the pilot institutional repository server was a machine with a minimum configuration. A Pentium IV @ 2.4 GHz with 256 MB RAM, 40 GB hard disk was to be used as the pilot server.

Though there was no restriction on funding, the availability of Open Source Software for creation of institutional repositories was considered for the pilot institutional repository. The software considered were the Open Source Linux Operating System, Open Source pre-requisites required for installation and Open Source DSpace Digital Repository system which is being used by majority of the libraries.

onal repository with the capture of Master of Engineering
ingly a mandate was issued by the Director of the
institute making it compulsory to deposit these documents in the institutuinal repository.

Later on it is extended to the journal articles, conference papers teaching materials and other documents, however these are still optional . Responsibility of management of the repository was to be a joint venture between the library, contributors .This institutional repository would emphasise the intellectual output of the individual and the institute.

DSpace@DCE is being developed with the following objectives:

- *Purpose*: To collect, preserve the intellectual capital and enhance institutional visibility.
- *Content*: Contributions of faculty students and other documents created by the instituteand related to the institutes.
- *Users*: Faculty, research scholars sand students.
- *Culture*: Promote a knowledge sharing

Phase I: Installation … getting started with DSpace

DSpace is an open source software developed jointly by MIT Libraries and Hewlett-Packard (HP) for building and managing Digital Repositories. Institutions worldwide use DSpace to meet a variety of digital archiving needs like Institutional Repositories (IRs), eTheses, Digital Preservation, Learning Object Repositories (LORs) and more.

Implementation began according to the best instructions that were found on the DSpace site and the experience gained during two worshops attended by DCE library staff at JUITT and IIT Bombay. The open source development model provided definite advantages. DSpace files could be downloaded from SourceForge. The prerequisites for Dspace installation like Postgres, Ant, Apache Tomcat, and Java are also available for free download. Knowing which files to download, which version have the correct compatibility was difficult to figure out, Hence the software provided during the worshops were used

There was a struggle trying to install *Dspace*. Others had also been down this route and advised on the configuration, versions, installation procedures for *DSpace*.A team of students were formed who were familiar with LINUX

Eventually, with some help, *DSpace* installation was successful. The installation was finally successful using Red Hat Enterprise *Linux2.6.9*, Jakarta *Tomcat 5.0.30, Apache Ant 1.6.2, J2 SDK 1.4.2_03 Java platform, Postgres SQL 8.1.3, Dspace Version 1.2.2.*

Phase II: Configuration

DSpace contents are organized into communities; which correspond to a department, research centrean activity or person. These communities can be organized into a hierarchy, and within each community there can be an unlimited number sub-communities and an unlimited number of collections.

nmunities of the Institutional Repository at DCE is

DSpace@DCE has been configured to include the DCE logo, a welcome message and news updates of the institute. As the repository development is in its initial phase, data are, as of now, being entered by library staff, who have been trained with the use of DSpace Institutional Repository Software. DSpace@ DCE in its initial phase of development was available only on the institute intranet.

Phase III: DSpace @ DCE on the internet

DSpace@DCE is currently available at: http://202.141.146.149/dspace and a link is provided in the DCE Library home page. A screenshot of the homepage is at Figure 1.

The pilot institutional repository is Open Archive Initiative (OAI) enabled and can be harvested by search engines like Google. It is registered at DSpace Instances worldwide (DSpace Instances, n.d.), Directory of Open Access Repositories (OpenDOAR), Cross Archive SearchServices for Indian Repositories (CASSIR) (Cross Archive Search Services for IndiaRepositories (CASSIR) (n.d.).ROAR etc (Figure V,VI,VII,VIII)

As on 8August 2008, the total collections number325. The status of various collections now available at DSpace@DCE is depicted in Figure II, III, IV.

As the implementation is still in its initial phases and some areas that need to be addressed are populating and maintaining the repository, faculty training, awareness, self archiving and usage of the repository. With the wide range of disciplines available in engineering and technology, new communities and collections like teaching materials, audio-video resources can be added to enrich the content and visibility of the Institutional Repository.

Future plan

Developing DSpace@DCE is a continuous learning experience and involved many challenges. Workflow management, Handle Registration (Registry of Open Access Repositories (ROAR) (n.d.), Faculty self-archiving are some of the areas that are slowly being initiated at the pilot Repository. Policies regarding copyrights, acknowledging authorship need to be addressed.

Once the pilot testing is satisfactorily completed atDCE, there is an ambitious plan to set up institutional repositories of the intellectual capital at all the different Engineering Institutes of Government NCT of Delhi. All the proposed repositories would be using Open Source Digital Repository Software and be OAI compliant. This would provide visibility to the intellectual capital of all the individual Institutes

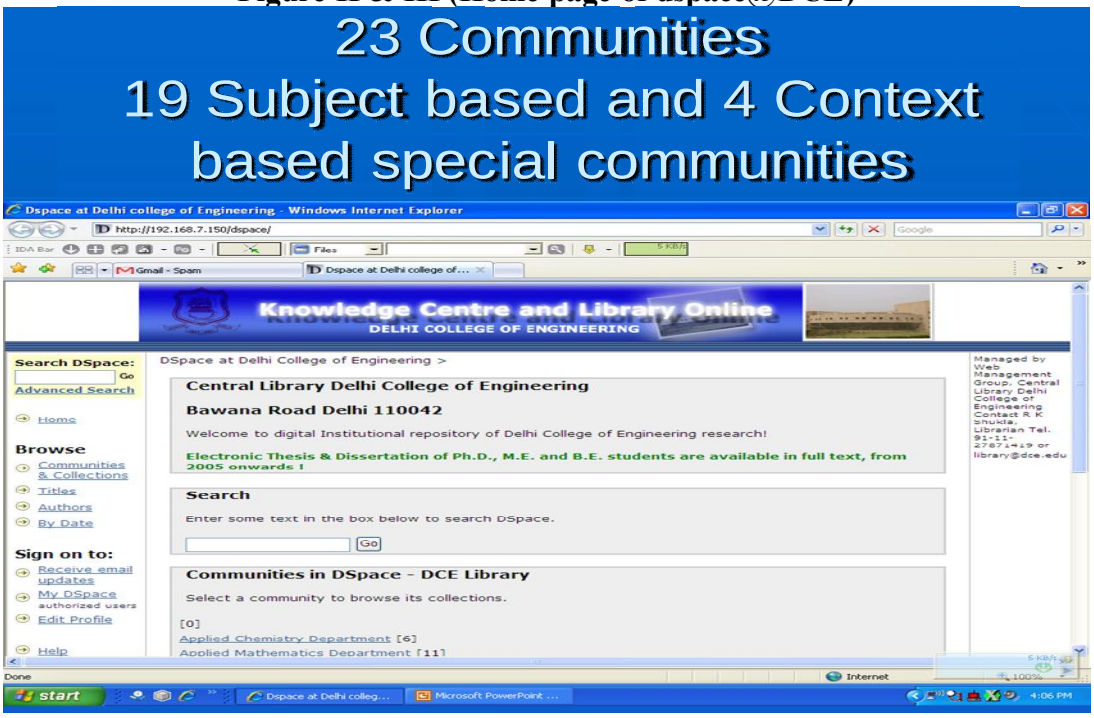
Although the capture of IC is important for Engineering Institutes it can be observed from OpenDOAR that only a few Engineering Institutes in India have Open Access Institutional Repositories available and are showcasing the intellectual output of their faculty and student

ry provides a means for the Institution to create archives
wledge, increase visibility and prestige through exposure
to its digital scholarship e It is hoped that Engineering Institutions in India will initiate the creation of IRs and promote information sharing within and among the institutions.

Figure I

Home page of the DCE Library

Figure II & III (Home page of dspace@DCE)



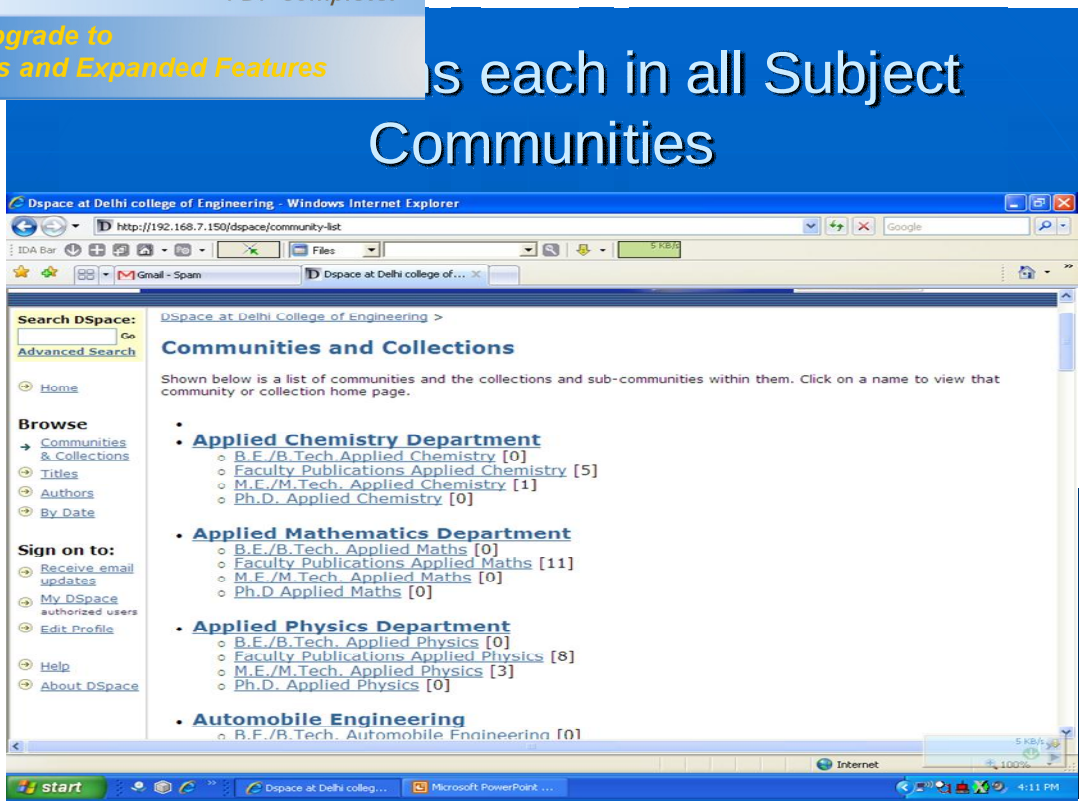


Figure IV

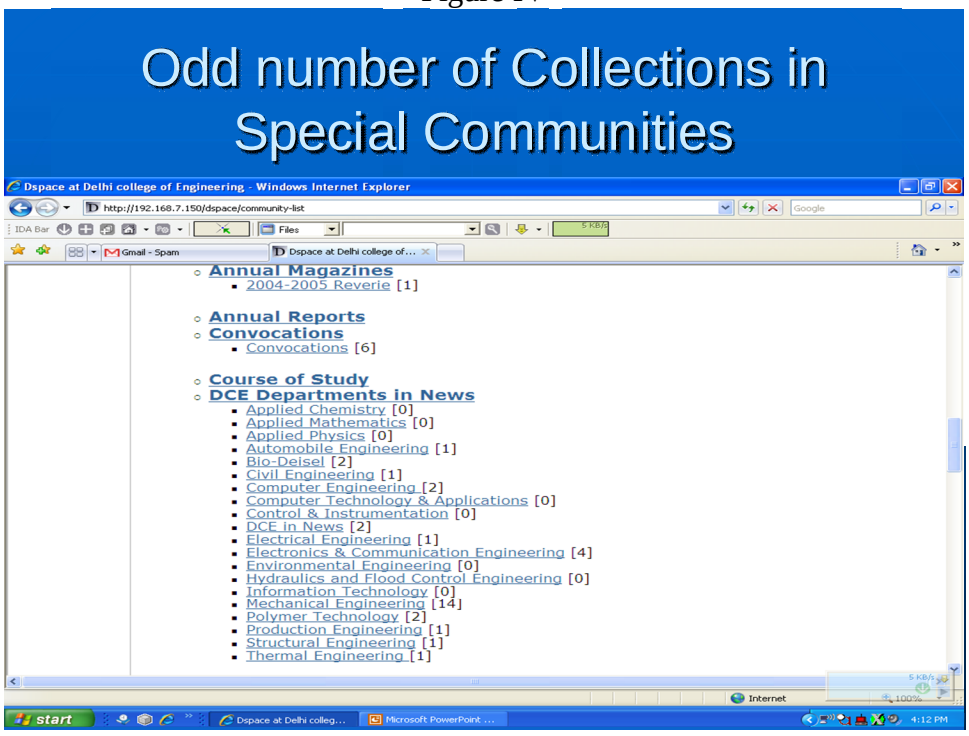
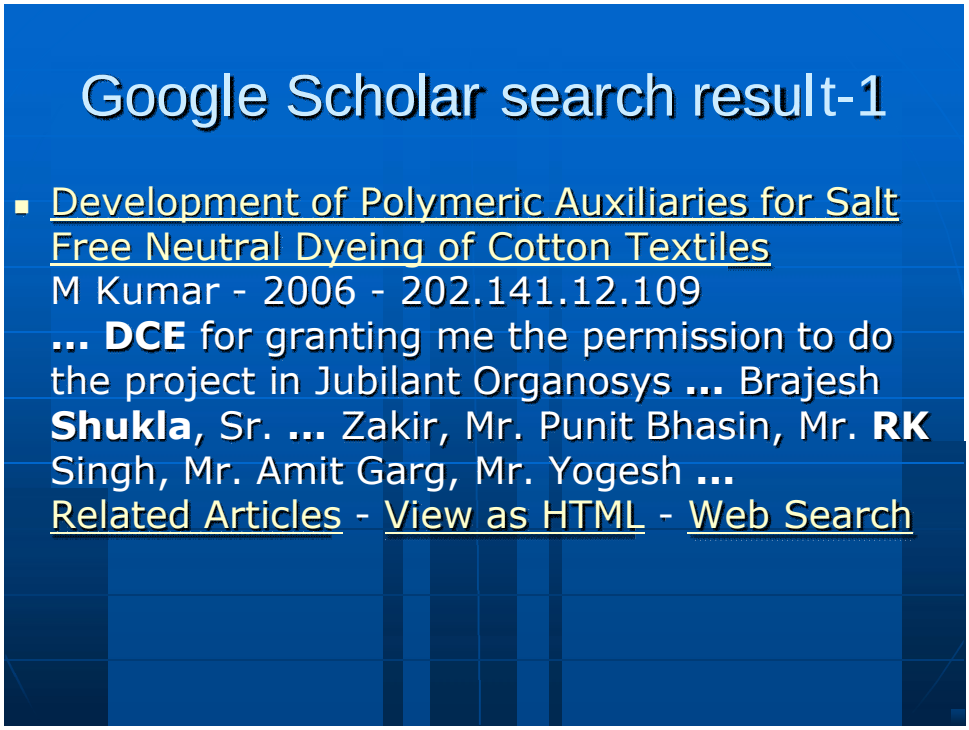


Figure V & VI

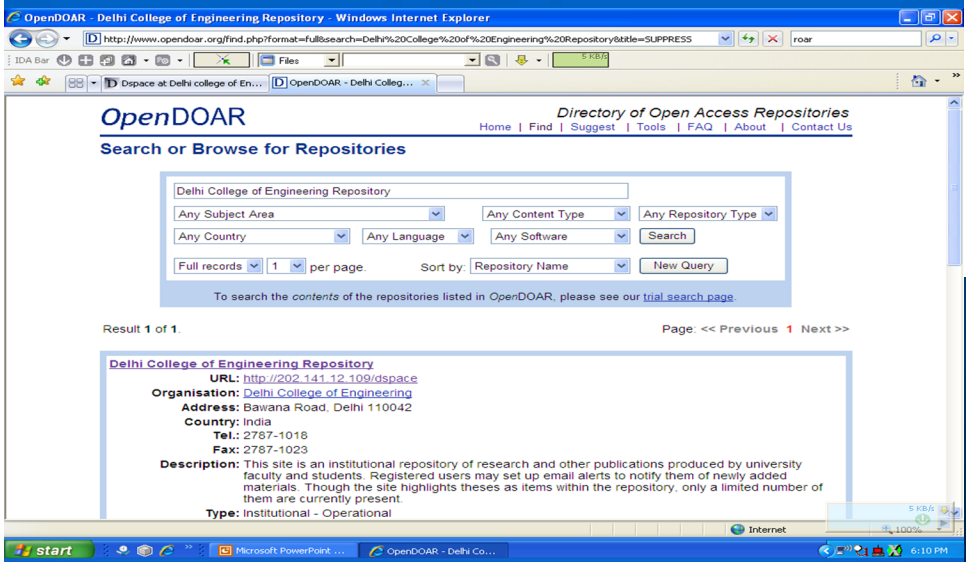


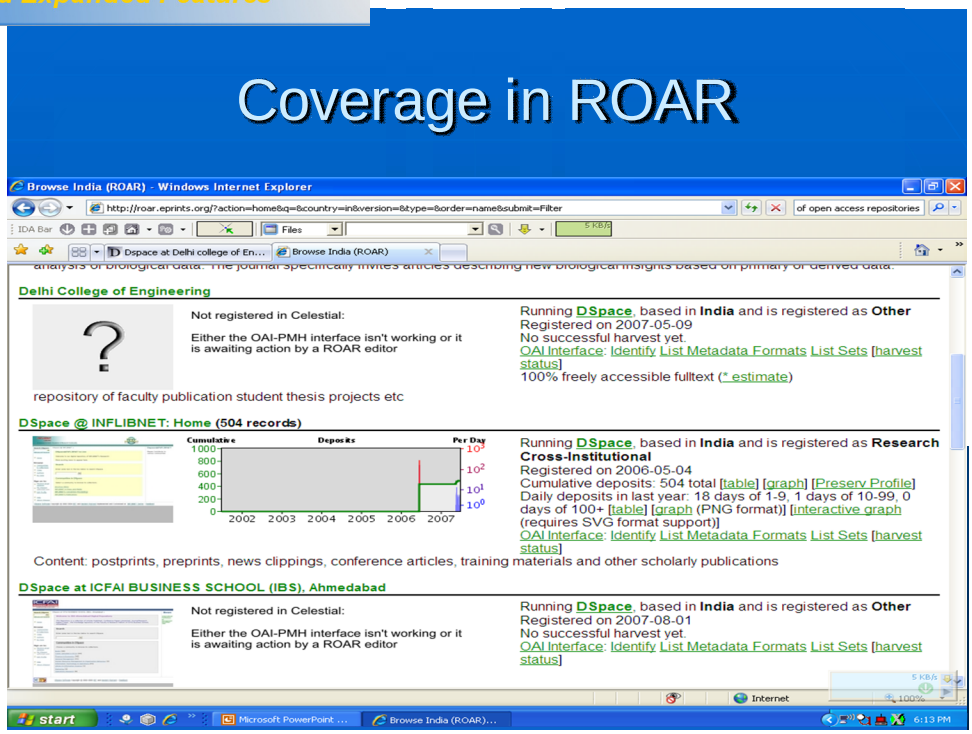
Google Scholar search result-2

- FPGA Based Supervisory Control and Data Acquisition System
  S Sharma - 2006 - 202.141.12.109
  ... Acquisition System I am thankful to Mr. **RK Shukla**, Librarian, **DCE**, for facilitating
  me unconditionally with various literary resources. I **...**
  Related Articles - View as HTML - Web Search

Figure VII & VII

Coverage in Open DOAR





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ssed 8 August 2008).

7.www.scholar.google.com(accessed on 8 August 2008).

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in the paper entitled **Digital Repository@DCE: knowledge sharing in an** ublication in the conference on digitization and digital preservation is an original one and has not been submitted for publication elsewhere. I further certify that proper citations to the previously reported work have been given and NO data table figure have been quoted verbatim from the other publications without going due acknolegement and without permission of the author(s). The consent of all the authors of this paer has been obtained for submitting the paper to NCDDP

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