CHAPTER - 5

EVOLVING IR MODELS

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5.0 Introduction

One of the major barriers faced by scholars and researchers in many countries is lack of access to the current literature in their field especially in the developing world. Library budgets in most developing countries are extremely small and as a consequence the teaching and research in these countries is being performed without the essential input of research being conducted internationally. Even the advent of electronic publishing did not ease out the problem, but definitely lead for open access movement to address this barrier, by arguing for the “free availability of (scholarly) literature on the public Internet”, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Institutional Repositories promise to be extremely advantageous to scientists and scholars everywhere, especially to those in the developing world. The concept of IR is very new and is yet to be studied in comprehensive way. IRs centralize, preserve and make accessible the knowledge generated by academic institutions, and form part of a larger global system of repositories which are indexed in a standardized way and searchable using a common interface. IRs store electronic resources regardless of type or format, for example text, images, sound, data and, being institutionally sponsored, provide ongoing
storage and access beyond the life of an individual computer, research project or organizational unit.

5.1 Characteristics of an IR

The characteristics of an IR are main considerations to build a successful and sustainable IR and are useful ingredients for developing suitable IR models. “The Case for Institutional Repositories: A SPARC Position Paper” (Crow, 2002) describes main characteristics of an IR.

**Digital:**

IRs collect digital material only. In some cases, IRs accept all types of digital material, while in others only certain formats are allowed.

**Institutionally-Defined:**

Institutional repositories capture the research output generated by faculty and scientists of an institution. However an institution in this sense can represent a group, an institution, or a group of institutions.

**Scholarly:**

IRs basically collect scholarly content exclusively. While the main focus for IRs is directed at collecting research output of an institution, an IR may collect any of the other many types of content including classroom teaching materials, the annual reports, video recordings, computer programs, data sets, photographs, etc.
Cumulative and Perpetual:

Institutional repositories commit to preserve and make accessible digital content on a long-term basis. Only the documents technologically obsolescent, no longer get any downloads or has allegation of plagiarism or contains patentable findings can be withdrawn. The cumulative nature of institutional repositories also implies that the repository's infrastructure is scaleable, but does not necessarily mean that all content will be universally accessible in perpetuity.

Open Access:

Another of the key defining features of IRs is that they provide free and open access to their content. In a very few cases the access may be restricted to bibliographic details or password access in case of sensitive documents like defense oriented ones.

Interoperable:

IRs are architecturally interoperable based on the harvesting protocol OAI-PMH (Open Archives Initiative Protocol for Metadata Harvesting), developed by the Open Archives Initiative for exposing multiple forms of metadata. The OAI-PMH supports interoperability via a fairly simple two-party model. At one end are the data providers, who employ the OAI-PMH to expose metadata, in various forms and at the other end are the service providers who use the OAI-PMH to harvest the metadata from data providers and then subsequently process it
automatically and add value in the form of services and facilitate to contribute to a larger global system.

**Self-archiving:**

Most IRs requires the author, or someone associated with the author to deposit the content directly into the archive. This is referred to as “self-archiving” and is an important aspect of an IR.

**5.2 Critical Variables for Development of IR**

Following variables could be used both for the development and to measure success of IRS. CARL has identified these factors as critical for the success of IRs (Shearer 2002/2003).

**Input Activity:**

Input activity, is closely related to perceived satisfaction, and has been cited as one of the most important variable in determining the use of information systems. The number of deposits into the IR indicates the number of “documents” or metadata sets contained in the archive.

**Disciplines:**

This variable is expected to affect both input activity and use. Until now, self-archiving has been very successful in certain disciplines, and much less so in others.
Advocacy Activities:

There is strong indication that the nature and amount of advocacy activities on campus will contribute to the success of an IR. It is speculated that scholarly participation will have an effect on both input activities, as well as use.

Archiving Policies:

Submission barriers may inhibit the input activities of an IR. The major distinction here is between self-archiving, which refers to authors (or author’s representative) depositing their own work and mediated archiving, which refers to authors submitting articles to IR staff for mediated archiving.

Copyright Policies:

Authors are reluctant to submit their papers to open access repositories due to copyright restriction of publisher. Thus, certain copyright policies may positively affect the input activities of the IRs, while others do not.

Content Type:

Content type refers to the type of material (rather than format) that is accepted into the repository. The type of content is likely to have an affect on input activities, the greater the content types accepted, the greater the input activity. If the IR contains too many types of material, such as working papers, conference proceedings, images, datasets, it may become too diverse to be usable.
Staff Support:

The number of staff assigned to manage the IR is likely to affect the visibility and growth of the repository, resulting in greater input, and perhaps greater use. Equally are important the IT staff in maintaining and uninterrupted access to IR contacts.

Quality Control Policies:

The level of quality control of material submitted is likely to affect input activity and use. While quality of format and metadata may have little affected on inputs because it is usually undertaken by IR staff, it may have a positive effect on use. On the other hand, quality control, through peer-review process would surely negatively affect input activity, but increases the quality of content.

Software:

The IR software used should be robust open access confirming to open access standards. The specific software application used for IRs is also likely to have an effect on the input activity and use of the repository.

Use:

Use of the repository is likely to have an effect on input activity. As authors overwhelmingly report that they deposit their works in open access archives in order to more widely disseminate it, the greater an archive is used, the higher the input activity is likely to be. In other words the greater is number of downloads, greater is the motivation for author's to deposit their works.
5.3 Attributes of an Institutional Repository

The following attributes have to be taken into account while developing guidelines and evolving the IR models.

- Administrative responsibility
- Organizational viability
- Financial sustainability
- Infrastructure adequacy
- Software suitability
- Manpower availability
- Legality/IPR compliance
- Metadata standards to suit document types
- System security
- Procedural accountability
- OAIS compliance

5.4 SWOT Analysis

The analysis of answers to a number of IR survey questions both to IR managers/librarians and users helped the researcher to identify the perceived strengths, weaknesses, opportunities, and threats concerned to planning and implementing IR and generating services. The researcher carried out environmental scanning of present scenario and the IR developmental trends by putting various questions to survey respondents apart from interviewing personally a selected few and visiting number of IR sites of different categories,
using different IR software, hosting different types of documents, both in academic and research environment in developed and developing countries.

The SWOT analysis covers various issues and aspects of IR including Open Access Movement, developments in information technology, availability of open access software, publisher’s attitude, institutional policy, IR expertise, users reactions and experience, copyright issues, IR literacy, etc. The below mentioned findings of this analysis of IRs can be used as building blocks and also as precautions at every stage of development of IR including pre-implementation, implementation and post-implementation phase. They have been used in developing various guidelines at different levels and development of important IR models.

**Strengths:**

- Digitally born documents
- Reduction of publication delay
- Showcase for all institutional research
- Enhancement of prestige of institution
- Preservation of heritage of intellectual output of institute
- IR Software - Open Access – interoperability – visibility
- An IR can host digital documents on any subject - anatomy to zoology, but still can provide an effective means of search both directly and through harvesters and general search engines.
• Software based on International Standards
• Metadata harvesting by Internet search engines and specialized harvesting services
• Metadata skills provided by Information community
• Promotes inter-institutional collaborative research
• Supports Citation analysis and metrics for research funding and personal promotion
• IR a good reputation to build on
• Retention of copyright by authors to use it the way they like, if originally presented to IR
• One source for all kinds of documents including thesis, journal articles, technical reports, course material, conference papers, etc.
• Facilitates searching current research

Weaknesses:

• The rapid growth of IRs resulting in some uncertainties and misunderstandings.
• IT infrastructure intensive; a reason for worry for small institutions
• Lack of institutional policy on IR
• Non-availability of access to 100% full texts of bibliographic records of IR
• Non-availability of trained staff for IR development
• Rigid attitude of publishers’ copyright policy
• Software not designed to cope with types of documents not defined
• IRs do not quality control content
- Apathy of Creators/authors for depositing content
- Poor penetration of instruction services
- Storage – Preservation (all media types)
- OA culture not yet practiced at all levels in all research councils to mandate deposit of research output emanating from funding
- Apex body / national level IR is difficult to realize
- Tedious document deposition procedure
- Many a times customization of open source software is a bottle neck
- Non-availability of born digital items of earlier research output
- Need for making the contributions mandatory in some institutions
- Diversity of content and the language used in the full texts
- Reservation of institute management to make the IR content available only on their LAN.

Opportunities:

- Acts as one of the open access channel
- Location independent access
- Access to dormant grey literature
- Brings new IT culture in the library
- Provides additional communication channel
- Opens a new channel for collaborative research
- Contributes to the design of an IR metadata module not available
- Offers a research output archive
- Enhancement of IR staff skills
Showcase of all research output in one digital repository

An opportunity for library staff to take new initiative towards professional image building

Forms a platform for new role for libraries in science communication.

Means of getting IT infrastructure for library automation and other activities.

May result in nomination for award based on download statistics

Boosts use of old and less used research output.

Additional tool for resource sharing and ILL.

Enthuse authors for depositing documents by innovative marketing techniques

New avenues to work with faculty/scientists to further build library reputation

Additional Funding opportunities from e-Research projects

Collaboration between disciplines.

Opportunity to keep track of downloads country wise even location wise also

Digital documents harvesting from IRs to harvesters and general search engines

Technical support for library hardware and software

Although there is feeling that IRs will reduce the revenue of publishers, but surveys reveal the other way effect.

Free availability of research output and thereby possibility of making more literature with less cost

A break for commercial publisher's monopoly

Threats:

Continuous up gradation of IR software and required support

Uninterrupted funding for IRs some time not available
• No migration/preservation policy
• Rigid IPR policy of publishers
• Technological obsolescence of file formats, etc
• IRs will reduce publishers revenue
• Unless care is taken, possibility of giving access to sensitive information
• Disputed claims of library and IT staff for their role in IR development
• May result in providing access to low quality research output unless reviewed after submission.
• Non-cooperation of publishers as IRs are threat to their income.
• May result in less usage of traditional library.

5.5 Guidelines for Proposed IR Models

Journal crisis triggered the open access movement which further was augmented by the pressure of academic and research community for making the scholarly output freely available on the Internet. The need for preserving the heritage of research output of an institute further encouraged the revolutionary idea of setting up of institutional repositories. The need and role played by different stake holders formalized the structure of IR and the need for harvesting by different services including general search engines lead for development and adoption of metadata standards. The term ‘Institutional Repository’, though technically sounds high, egoistically is poor and needs support of hosting institution in terms of funds, infrastructure, manpower and clear collection development policy and above all removal of copyright related hurdles.
Based on the literature search, analysis of survey responses, discussion with IR managers and experimenting with select IRs in operation, following guidelines have been evolved as an aid for development and adoption of important IR models.

### 5.5.1 Governance Guidelines

- The foundation of IR governance depends upon leadership, common purpose, commitment from the management, IR plan, progress through action, regular communication, and assured funding

- Good governance ensures availability of good infrastructure interims of servers, computers, networking and Internet with broad bandwidth

- Good governance should save the cost, increase the efficiency and optimize resource utilization

- Skills and professional development should be integral part of IR development

- Governance structure should be with minimum three levels namely policy making body (top management), executive committee, task force and operation level supported by coordinating committee in case IR is a co-operative venture
• The governance bodies should comprise of library administrators, IT professionals, faculty/ scientists and representation from top management

• The governance should ensure the quality of documents added by adopting appropriate peer-review process and ensure that copyright of any sort including publishers is not violated

• Apart from research output, IRs may host administrative documents. Even the research output may be sensitive in nature. Governance should ensure appropriate access control

• Plan document should include road map for achieving set objectives of IR

• Well defined bylaws, Memorandum of Understanding, resource sharing agreement and strategic plans help for good governance

5.5.2 Management Guidelines

• Regular, ongoing, meaningful formal and informal communication and direct interaction among members should become the culture of IR management

• Sharing of the responsibility both at operational AND management level is essential part of IR development

• Supervision plan including persons responsible, schedule and availability of supervisions both technical and training be prepared and circulated
• Information literacy program covering content deposition and advantages of IR should become basis for success of IR

• Preparation of official documentation covering planning and implementation of IR followed well defined responsibility including maintenance is critical

• Adopt appropriate management techniques that save time and money, increase efficiency, build rich content and overcome the problems

• Using the collective management principle equal attention should be given to technology management, content management, user satisfaction, training, legal and IPR aspects

• In line with the operation research effective use of usage statistics and feedback system should become part of decision making activity of the IR

• Adopt appropriate advocacy programs both within and outside the institute including operation of discussion lists and web pages

5.5.3 Management Attributes

• Leadership become the focal point for troubleshooting and dealing with feedback by users

• Preparation of official documentation relating to the IR and post-implementation support need to be defined and allocated
• Technical support, funding arrangements and product development are to be specified

• Post-implementation depending technological development and institutional policy

• Manage centrally, with ongoing centralized support

• Develop online discussion lists and Web pages for continuing the dissemination of information

• Monitor developments and keep in touch with each other's libraries

• Apply proper project management processes that will save time, money and problems

• Try to manage with guidelines, tools and technique

• Performance depends on the better leadership and fulfilling the expectations

• Realistic roadmap for IR leads to good planning and accomplishing goals

• Effective management depends on the organization and ICT infrastructure

5.5.4 Budgetary Guidelines

The establishment of an IR needs large investment, although the level of staffing, amount of equipment and other associated costs vary depending upon
the size of the organization and variety and number of intellectual output
documents.

- IR establishment costs in the following areas are to be planned:
  - Staffing
- project management
- technical support
- repository coordination
- data coordination
  - Hardware: Server capacity
  - Software: Operating system, Database set-up
  - Staff development and training
  - Advocacy and marketing
  - Licenses and certificates
  - Registration with other services
  - Marketing expenses and supplies
  - Attending meetings and conferences

- All staff positions may not be full-time. Staff requirements might be different in
  the initial developmental and production phase compared to IR already
  established
- Travel budget for staff training
- External help for customization and updation of software
The IR budget could be part of library budget or part of publication budget or as a separate project

- Provision for long time archiving costs
- Costs for incentive scheme for users' deposition and also IR staff
- Cooperation with other IRs under the same R & D agency or different academic institutions

5.5.5 Infrastructure Guidelines

- The infrastructure required for development of IR basically include the server to manage IR, storage space for archival purpose and sufficient internet bandwidth for providing access
- Suitable operating system for hosting selected IR software.
- The server should be a dedicated one for hosting IR, preferably managed by library personnel with the help of IT staff.

5.5.6 Guidelines for Software Selection

Good number of software both commercial and open source are available for the development and maintenance of institutional repositories. The software should be capable of:

- Capturing digital content directly from the creators or digital document submitted through mediation of library staff
- Ingest Methods: Standard submission, batch import, harvesting
- Allows descriptive, technical and rights metadata
- Assigns persistent identifiers searches metadata and full text
• Delivers content over to web
• Reserves content in supported formats for archival purpose

While selecting the software the following factors are to be taken into account:

• Whether the IR software is open source for all
• An institution or group of institutions involved in the continuous development and updation of software
• Training facilities available for handling the IR selected
• The software compliance for different open source standards including metadata standards like DUBLIN CORE, MARC 21, etc.
• Ease of document submission procedure
• Facility for quality control of both full text review and metadata
• Modular moderation procedure
• Support of full text file formats
• Different level access control
• Metadata support for different types of documents
• Eases updation and migration to other software
• Templates and styles, using language standards (e.g. HTML/CSS, XML/XSLT)
• Web services protocols for data retrieval: OAI-PMH, Z39.50, SRW/U, SOAP, OpenURL
• Authentication methods
• Authorisation methods
• Granular, distributable administration
• Public Application Programming Interface
• Coherent internal data structuring
• Written documentation
• Stable and appropriate database system
• Adoption by other institutions related
• Compliance with OAI-PMH to ensure harvesting by harvesters and internet search engines
• Native Browse: Hierarchical browsing, filtering by structure and metadata; aids indexing by search engines
• Native Search: Constrained search locations, using browse functionality to display results
• Policy and community issues need to be addressed.: Metadata support, Interoperability, Version control and revision, User Interface, Digital preservation
• Common Popular Open-Source Packages
  - DSpace (http://www.dspace.org/): MIT, HP, DSpace Federation
  - EPrints.org (http://www.eprints.org/): University of Southampton
  - Fedora (http://www.fedora.info/): University of Virginia, Cornell Univ.
  - ETD-db (http://scholar.lib.vt.edu/ETD-db/): Virginia Tech

A detailed procedure for selection of IR software has been dealt in RUBRIC Toolkit: Repository Software
(http://www.rubric.edu.au/repositories/choosing_a_repository.htm) accessed on 9-3-2008).
5.5.7 Copyright Guidelines

- Journal publishers generally insist authors to sign copyright transfer agreement prior to the publication of articles. Content of agreement varies publishers to publishers and usually address the right to: reuse an article as a chapter in a book; revise or adapt an article; distribute an article to colleagues; reproduce copies of an article for teaching purposes and self-archive/make available an article in an online repository.

- Some publishers permit authors to make their articles available on a personal web site or on a departmental site but not on institutional repositories.

- Advise staff on general and specific copyright issues

- Check publishers’ copyright agreements before full text of articles is added to repository

- Assigning copyright to a publisher does not generally mean that one cannot deposit in a repository

- If a publisher does not permit the author to retain these rights then one has to seek permission from the publisher.

- Some publishers (particularly “open access” publishers) do not require authors to sign a copyright assignment form. Instead they ask authors to sign a non-exclusive license to publish and allow authors to retain copyright.

- Authors need to check the copy of the agreement signed. If the copy of agreement is not available, one has to check the publishers’ site for authors guidelines/instructions. If the copy signed is old one, author need check the present policy of publisher.
Most publishers now permit authors to deposit a copy of their articles in repositories.

This is a right granted to authors over and above any copyright agreement author has signed.

However, most publishers will only allow authors to deposit 'author final version' of author's work.

Some publishers have embargo periods, e.g. an article can only be deposited in a repository 6 months after publication.

Author final versions is the paper following refereeing and editing, not the pre-print version and should not include publisher logos, formatting etc.

Repository staff will check this for all publications submitted to the repository before they are made publicly available.

Either authors or IR staff can refer Database of publisher policies available at SHERPA's Romeo site (http://www.sherpa.ac.uk/romeo.php)


5.5.8 Advocacy and Marketing Guidelines

- Populate the IR
  - Encourage authors to deposit their works
  - Incentive scheme for deposition
  - Mandate if required
  - Mediated deposition
Maximize the exposure to both academic and scientific community

Generate value added services

Register IR with metadata harvesters

Submit IR to search engines like Google, Google Scholar, Yahoo, Scirus, etc.

Training authors in deposition process using quicker and easier method

Promotional events including conducting workshops and departmental presentation

Bring out leaflets and brochures

Identify target audience and develop outreach programmes

Provision of budget for advocacy and marketing activities

Website advertising

Formal and informal networks, discussion forum

5.5.9 Archiving Guidelines

In the context of IR, archiving is an important activity for posterity of Institutional research output and its continued access ever after. The following factors are to be taken into account

Who should archive – Librarian, IT Professional or Archivist.

Costing of archive as a part of IR Management.

Expertise development among IR.

Time to time updation of technological and user interface on internet has to be undertaken.
• Technical/technology back up or mirroring facility has to be worked out properly.

5.5.10 IR Sustainability Guidelines

Sustainability is an important ongoing issue for IR Managers. The main sustainability considerations include continued management support, permanency, technology developments, content development and concerned changes in document formats and necessary precautions to be taken over time for storage and retrieval, persistent identifiers and disaster recovery (RUBRIC Toolkit: Managing a Repository http://www.rubric.edu.au/packages/RUBRIC_Toolkit/docs/Managing_a_Repository.html#id10). The main sustainability concerns are:

• **Continued Management Support**
  - IR managers/administrators should ensure the long term management support
  - Main factors for convincing the management
  - IRs showcase the intellectual output of the institute
  - IRs increase the citation counts of publications
  - IRs facilitate collaboration with other institutions in the world
  - IRs preserve the heritage of the institute
  - Presenting the IR as a solution to organisational needs
• **Permanency with the Support of Management**
  - Long term IR policy
    - Assured funding
    - Availability of skilled manpower
    - Documents deposition policy, mandatory if required

• **Technology Developments**
  - IRs should adopt new technologies
    - Compatibility with new platforms, new servers
    - Scope for migration to better IR software if need arises
    - Compatibility with developments in web technologies

• **Preservation**
  - Preservation activities may include: storage, replication, transformation
  - A preservation statement in the Collection Development policy should define:
    - Responsibility for preservation activities
    - The extent to which preservation is guaranteed
    - The kinds of activities to ensure an item deposited remains accessible on continuous basis

• **Software Obsolescence**
  - There are two aspects of software obsolescence to consider:
    - The repository software itself
    - The document software at the item level of documents stored in the IR
  - IR Managers can minimize their risk exposure to obsolescence by ensuring:
• Use of up to date repository software
• Method to export and migrate data from their current repository
• Adaptability to new documents being evolved over a period of time
• Keep updated about new documents with the help of:
  • AONS II (Automatic Obsolescence Notification Service)  
    (http://www.apsr.edu.au/aons2/index.htm)
  • Library of Congress Digital Formats Web Page
  • PRONOM
  • Global Digital Formats Registry

• **Persistent Identifiers**
  • Broken web links cause frustration. Broken links may be caused by:
    • A software upgrade and/or file restructure
    • A change of domain name
    • Author initiated or management changes to a document
    • Removal of a document

• Sustainable global identifier infrastructure to deal with the vast amount of digital assets
• PILIN website makes available guidance documents and best practice on identifiers
• ‘Handles’ technology provides “efficient, extensible, and secure identifier and resolution services for use on networks
• **Disaster Recovery**

  - Possible disasters:
    - Withdrawal of IR software due to reasons like breach of copyright
    - Destruction of server
    - Backups not compatible with new servers

  - A disaster recovery plan should be developed as part of the risk management process. This plan should go beyond a sound backup strategy.

  - Always have a system-wide backup if possible, giving a way to get a Backup operational quickly.

  - Export data in a standardized format,

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5.5.11 Evaluation Guidelines

The evaluation is a main tool for continuous development and sustainability and end user satisfaction. It also develops system manager/ librarian – user interaction, which serves both formative and summative purposes. Formative evaluation helps IR managers to monitor and adjust their professional development effort where as summative evaluation provides evidence of effectiveness to those who fund IR development and management. Process evaluation focuses on professional development services and trainers strategy. Impact evaluation focuses on user satisfaction, their assessment and confidence building.
There are various factors required for evaluation like –

- Intended audience
- Scope and cautions
- Case studies of success stories
- Study of monitoring team
- Study of entire program
- Study on impacts on end users

5.5.12 Documentation Guidelines

- A well documented assessment of IR structure, systems and process including operations should become a core document.
- IR should have good record of well-defined goals and objectives with identified activities.
- Project conception proposals and evaluations including use of overall standards, characteristics and resources documented for decision support systems.
- Development, maintenance and periodical evaluation of training material is to be documented.
- Time to time change in technology both in providing access, archival and training has to be tabulated.
5.5.13 Statistical Measures

IR needs to have different kind of statistics to ensure the provision of usage of documents held and their services generated.

- Number of documents held by IR and uploaded time to time
- Different kinds of documents held
- Analyses the IR logs to generate a set of statistics on how IR is being used
- Number of visits by others against full text downloads
- Country wise download statistics
- Access/delivery mechanisms/report formats
- Metrics collected:
  - Number of item visits
  - Number of collection visits
  - Number of community visits
  - Number of OAI requests
  - Number of logins
  - Most popular searches

5.5.14 Information Literacy Guidelines

The information literacy program should become a document and learning material for the professional development. Librarian should develop following feedback material for users –
• To develop rating scale observational studies about usage and technology literacy.

• To access user-friendly retrieval tools, time saving skill, downloading efficiency and familiarity about the IR.

• The IR should have good training curriculum addressed to various level of functionaries and users.

• Serious training program to develop the skill for the operational staff is necessary.

• The training needs of IR are of two types (a) Information literacy (b) Technology literacy. Predominantly information literacy is imparted by the senior library staff. Technology literacy is imparted by IR system manager or IT savvy library staff.

5.5.15 Sources of Information on IR Development

There are many blogs and discussion lists about new developments in the open access and institutional repository movement (RUBRIC Tool Kit), including:

• Open Access News blog
• archives of JISC-REPOSITORIES Discussion List
• AuseAccess
• InstitutionalRepositoryCommunity-ANZ (Google group for Australian IR Managers)

• del.icio.us, a community bookmarking system used to tag sites of interest and share links; useful for keeping your local community informed about your IR project. The RUBRIC Project participants made extensive use of this tool to reduce the number of emails and make references easily retrievable

• JISC CETIS News Feed

• Lorna Campbell's blog

• Phil Barker's blog

• Neil Fegen's blog

• John Robertson's blog

• The SPARC Open Access Newsletter is a good place to start to gain an overview of the Open Access IR movement internationally and provides links to very useful information.

• SPARC Open Access Forum mailing list archive

• Open-Access Movement timeline

• Conferences and workshops related to the open-access movement

• Ideas for promoting open access

• Peter Suber’s Free Online Scholarship Newsletter, usually includes a “Round Up” of recent developments in the global IR movement.
5.6 Development of IR Models

Evolving IR models should be based on needs, institutional policy, content types, scope of IR, infrastructure available, functionality of software, metadata standards, access control, etc. The model adopted should absorb changing technologies, newer file formats and demanding needs of user both as depositor and research seeking information. Librarians as leaders create environment, spread substantial benefits to users and provide scope for expansion in all aspects. Users as followers influence the direction, create, deposit and access the knowledge, integrate and aggregate the benefits. More importantly they set the new standards through feedback system.

5.6.1 Implementing an IR: Step-by-Step Procedure

There are various characteristics, attributes, issues and possible solutions to be taken into consideration while setting up of an Institutional Repository. Various steps to be followed in the form of a workflow would fall at different phases like Orientation phase, Planning phase, Implementation phase and Operational Phase. They can also be grouped differently like Pre-implementation, Implementation and Post-implementation phases. Important steps are given below:

- Conceptualization of IR
- Define Mission, Vision, Values and Goals
- Carryout Environmental scanning and assess Institutional/Library preparedness for setting up of IR
- Plan and document timeline
• Define the Organizational structure including Governing body, Management Committee, various Task Forces and Executive committee

• Define policies and procedures

• Obtain clear commitment from the institution and management

• Get sanction for sufficient funding

• Define the scope of IR
  - Type of documents
  - Subjects to be covered
  - Communities
  - Starting year

• Study the capability, IR skill set and availability of existing library staff

• Seek the cooperation and commitment of IT staff for handling technological aspects of IR

• Hire staff both permanent and temporary for implementing and maintaining IR

• Market the concept of IR, its advantages to individuals and institution

• Policy on IR Model: Centralised Vs Decentralised

• Set up the infrastructure required: Server, Internet, etc

• Select suitable IR software after careful evaluation to suit IR policy of the institute

• Policy on technological platform

• Install the suitable operating system and IR software

• Customize the software to suit the scope and types of documents to be added to IR
- Adopt quality policy including peer review
- Workout a detailed submission procedure
- Promote authors for self archiving
- Carry out batch ingestion if required using authors Refmanager/Endnote database or bibliographical databases if required
- Help authors with mediated deposition if required
- Define types and file formats
- Policy on Version Control Genre
- Adopt suitable metadata standards
- Adoption of suitable OA protocols including OAI-PMH
- Develop suitable user interface
- Interfaces to other Systems including library
- Develop value added services
- Policy on access control at different levels
- Adopt suitable authentication methods
- Policy on legal issues including copyrights
- Keep informed about publishers copyright policies using SHERPA’s RoMeo project at http://www.sherpa.ac.uk/romeo.php
- Adopt suitable advocacy and marketing strategy
  - Internal users
  - Outside the organization
- Register the IR with harvesters like OAIster and directories like Open DOAR, ROAR, etc. and submission to General Internet Search Engines like Google, Yahoo, Scirus
- Adopt robust backup mechanisms
- Policy on digital preservation, archival strategy: Persistent Identifiers, Migration, Viewers
- Prepare a detailed documentation covering policies and procedures
- Evolve suitable evaluation and statistical methods
- Training and professional skill development
- Policy on migration to new software
- Absorbing new file formats evolving time to time and necessary precautions to be taken
- Provision for disaster management like server breakdown

5.6.2 IR Development: A Collaborative Model

While setting up of an IR a number of decisions are to be taken such as policies, systems architecture, software scope and purpose of repository, standards, copyrights, access control, etc.

IR development demands collaborative work of faculty/ scientists/ users, librarians, IT professionals and archivists, coordinated by a management committee under the broad guidelines of institutional policy using appropriate technologies and resources. (Figure- 18)
All these four professionals are pillars of IR and need proper understanding of each other’s responsibilities. Each group should recognize and appreciate the expertise, creativity and responsibilities of others listed below and work collaboratively towards common goal of developing a successful and sustainable IR.

**Faculty/ Scientists/ Users:**

- Responsible for academic and research output
- Deposit their documents to IR
- Search and access the content

**Librarians:**

- The users to submit documents
- Metadata quality
• Advocacy and marketing
• Copyright issues
• Mediated deposition
• Training and Professional development

**IT Professionals:**
• Infrastructure development
• Software installation
• Maintenance of IR
• Customization
• Migration of software
• Design the interface

**Archivists:**
• Archival policy
• Costing of archive as a part of IR Management.
• Time to time updation of technological and user interface
• Working out proper back up or mirroring facility
• Maintenance of archive

**5.6.3 IR Governance and Management Model**

IR Governance pyramid (Figure - 19) represents down top input for policy development and top down flow for executive guidelines. The model has five layers top down: Policy Level, Management Level, Task Force Level, Executive Level and Operational Level.
Figure 19: IR Governance and Management

Policy
✓ Funding
✓ Content
✓ Model

Management Committee

Infrastructure Evaluation

Content evaluation

Excellent Committee
✓ Legal - IPR
✓ Quality
✓ User feedback

IR - Management
✓ Main Power Training
✓ Advocacy
✓ Content development
Liaison
• Department
• External
• Moderation

IR Administration
✓ Technology Support
✓ Metadata management
✓ Customization
✓ Quality Control
✓ User reports
✓ Maintenances
• **Policy Level:**
  - Planning documents are to be prepared covering project charts and project goals based on potential repository functions.
  
  - Readiness of the institution for implementation of IR should be assessed using methods like survey of local environment.
  
  - An assessment for IR audience has to be carried out if required using marketing techniques.
  
  - Funding sources are to be identified and see if it could be a separate funding or part of the library budget.
  
  - IR content policy to be adopted for only intellectual output or other business and administrative documents.
  
  - The scope of the IR is to be decided whether centralized covering intellectual output of entire institution or set up different IRs for different communities/ departments.

• **Management Level:**
  - The management committee is responsible for over all administration of IR. The day to day operations are carried out by coordinating the activities of task force level groups and executive level committees.
  
  - If the IR is a cooperation of group of institutions there shall be separate management committees for each institutions participating.
• **Task Force Level:**
  - The task force committee is responsible for infrastructure evaluation and development.
  - Software evaluation and adoption.
  - Content evaluation and development.

• **Executive Level:**
  The executive committee is responsible for
  - Adoption of technology standards
  - Legal / IPR issues
  - Quality control
  - User feedback

• **Operational Level:**
  The operational level activities are executed mainly by two IR functionaries i.e. IR Manager and IR Administrator with the help of library staff, IT staff, cataloguers, indexers, classifiers, marketing people, etc with the following responsibilities:

**IR Manager**

- Manpower training
- Advocacy
- Content development
- Liaison
  - Departmental
  - External
- Moderation
**IR Administrator**

- Technology support
- Metadata management
- Customization
- Quality control
- User reports
- Maintenance

Although this model identifies five layers there could be some overlap of activities/responsibilities between these layers depending upon the nature and the objectives of the IR and also institutional background. The decisions/activities at each level become input for the next level both for top down and down top layers. A consorted effort and attempt directed by IR policy by different layers leads for successful development of IR and its sustainability.

### 5.6.4 CONTENT DEVELOPMENT MODEL

The nature and the type of content of IR depends upon the academic, research and other activities of the institute concerned. A review of a number of existing repositories shows that institutional policies regarding content vary substantially. Institutional repositories accept a wider range of content types, such as post-prints (copies of already published journal articles), conference papers, technical reports, etc. While there is a provision to add any kind of documents including research output, administrative and marketing documents, most of the IRs cover research output, teaching materials, data sets, PowerPoint presentations, etc.
The proposed IR content management model (Figure - 20) has four layers with concerned activities –

- Deposition level
- IR level processes
- Access level
- Archival level

- **Deposition Level:**

  The depositor is responsible for creation, revision and submission of the document to IR. The submitted document could be a fresh one without being published in any journal or conference proceedings, etc or already a published one. Usually the author submits his paper to the publisher who in turn gets it reviewed and sends back to the author for necessary corrections to be incorporated then only the paper is published. If the author is depositing the paper not published elsewhere
he may get it reviewed and then submit to the IR. However majority of the authors need library / IR staff mediated deposition as they find the process of submission cumbersome. If the document to be submitted to IR is an old one without the soft copy, in such case one has to scan the document and convert it into appropriate file format. If it is a thesis usually entire document is scanned by repository staff and stored as image in TIF format and then converted into PDF format using Adobe Acrobat. Many IR softwares facilitate batch ingesting either to from a bibliographic database or reference manager / endnote database of individual scientists. However these ingested records are to be adopted properly by the IRs administrator and full text document is to be added taking care of copyright issue. The depositor is also responsible for the creation of metadata that will help the document management.

- **IR Level Processes:**

  Once the document is submitted the IR administrator/ the moderator has to carryout series of processes. The IR administrator has to ensure that the scope of the document category is as per the policy adopted as the document added may be intellectual output or marketing / admin record or a presentation. If the document submitted is not within the scope define the same will be returned to the author. The next step is to check the subject scope of the document. The IR could be a centralized one for the institute or the decentralized with many depositors concerned to the topic of different communities in the institute. In view of this the IR administrator has to check whether the document submitted falls within the subject scope of the IR and if not
and same would be returned to the author. The next step would be to check the copyright permission of the document submitted in this connection author has to check whether the document submitted. In a fresh one or already published one either to a journal or to a conference proceeding or a chapter of a book. In such case one has to verify whether the document submitted is the PDF document of the publisher or refereed final preprint. The IR administrator or another person designated for this purpose has to check with the publishers policy with the help of SHERPA's RoMEO Project. If it violates the copyrights of publisher either he has to take the permission from the concerned publisher or send it back to the author for further action in the matter. The next most important activity is to edit the metadata submitted by the author, add/modify/delete from the point of view of confirming to the metadata standard adopted. Once this process is complete the IR administrator has to decide on the level of access to be given depending upon the nature of the document as it could be restricted one with the facility for access only to the bibliographic level or password access to the identified users only. In most of the cases the access would be open and free for all. Once the appropriate access control is assigned to the document the IR administrator / moderator uploaded.

As the years pass the downloading of few documents may be negligible. The IR administrator may like to withdraw the document from IR and send it to the permanent archival.
- **Access Level Process:**

  Researchers or information seekers all over the world may search for the information or document of their interest directly from the IR of their choice or search harvests like OAlstar or internet search engines like Google, Google Scholar, Yahoo, Scirus, etc. and the researchers request through harvest is directed to the concerned IR for downloading full text of the document requested.

- **Archival Level Process:**

  The IR policy should take special care for setting up of separate storage space for archiving documents. The archival level activity should make a note of technological obsolescence due to changes in the file formats and adopt new file format for the concerned documents. The archival group can also send this sort of the document to the author for necessary updation or the revision both from the point of view of the content as well as the format.

### 5.6.5 IR Staff and Skill Development Model

Setting up of Institutional Repositories needs the expertise with different backgrounds to carry out different aspects of their development. The key staffing issues to develop a model include:

- Governance
- Operational management
- Training and development
Based on the objectives of the IR one has to identify the tasks to be carried out and services to be generated. The skills set required can be basically grouped under library and information science, information technology and management sciences. The skills set for both library and IT staff of IR and users should cover at least the following broad aspects:

- **Broad goals and objectives**
- Distributing responsibilities and decision-making process
- Developing system for defining needs and review periodically
- Define the scope of the IR
- Set the criteria and operation plan for various tasks
- Set the time frame
- Derive the feedback system

The key staff involved could be designated as IR managers and IR administrators besides other staff like cataloguers, classifiers, subject librarians, IT staff, editor, software administrator/technical support, marketing/support officer, teaching and admin staff. Common repository roles and skill sets needed for the development and management of an institutional repository have been compiled by SHERPA. (Robinson 2007). The schematic diagram of proposed IR staff and skill management model is shown in Figure – 21.
Figure: 21
Staff and Skills Management Model

Institutional Repository

Objectives

Identify Tasks, Services

Skills set Required

Recruit/Transfer

Matching Existing Staff

Yes

Deploy for IR Development

Continuous Training / Updation

No

Responsibility/Ability for

- Management
- Infrastructure Development
- Software
- Content Development
- Metadata
- Storage & Archiving
- Advocacy / Marketing
- Training & Professional Development
- Documentation

- Management Techniques
- Interface Design
- Knowledge of Suitable OS, Database system, Scripting languages, Web Technologies
- IR Software
- Metadata Standards
- Cataloguing/Classification
- Motivation Techniques
- Self archiving
- File formats
- Public relation
- Teaching Methods
- Testing Methods
- Creativity
- Communication Techniques
Once the tasks and the services are identified the responsibilities or the ability to carry out different tasks are to be identified. The development and the maintenance of IR need different skill set for different categories. The responsibilities to be carried out are to be matched with the skill set of the existing staff. If it matches the concerned staff could be deployed for IR development and if there is no match the management has to take necessary step to recruit fresh staff or transfer the staff with suitable skill set from other division for IR activity. The IR development and maintenance is highly technology and technique oriented which gets updated every now and then. This insists the continuous training program and updation of skills of IR staff.

Below is list of the tasks to be carried out with the concerned responsibilities or abilities to carry out the job and concerned skill set required.

<table>
<thead>
<tr>
<th>AREA</th>
<th>RESPONSIBILITY/ABILITY</th>
<th>SKILL SET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>- Define IR subject scope</td>
<td>Management Techniques:</td>
</tr>
<tr>
<td></td>
<td>- Decide on budget and carryout costing</td>
<td>- Marketing Strategies</td>
</tr>
<tr>
<td></td>
<td>- Choose suitable IR module – centralized v/s decentralized</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Services to be generated based on the goals of IR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Stock development plan</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Content development: Mediated deposition v/s self-archiving</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Usage statistics and feedback system</td>
<td></td>
</tr>
</tbody>
</table>
| Infrastructure Development | - Choose the hardware for storing and archiving the IR content  
- Choose suitable operating system to run the IR software chosen lia with software staff | - Server technologies  
- Knowledge of operating systems like LINUX & UNIX  
- SQL Server and MySQL  
- Scripting languages  
- Storage devices |
|-----------------------------|---------------------------------------------------------------|
| Software Management         | - Deploy suitable IR software preferably open source one  
- Customize the software to suit local requirements  
- Develop user interface  
- Generate value added services  
- Develop suitable communities and collections  
- Interface with existing website of library / institute  
- To cope up software obsolescence  
- Exporting data to upgraded or migrated IR system/software  
- Maintenance of persistent identifier over time  
- Suitability of content for harvesting by harvesters and search engines  
- Software migration plans | - Thorough knowledge of one of the software like DSpace, GNU & GNU E-Prints  
- Knowledge of operating systems like UNIX & LINUX  
- SQL Server, MySQL  
- HTML, XML, JAVA & PERL  
- Software upgrades |
<table>
<thead>
<tr>
<th>Metadata Management</th>
<th>System authentication</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Identify / develop metadata standards</td>
<td>- DUBLIN CORE</td>
</tr>
<tr>
<td>* DUBLIN CORE, MARC 21, etc.</td>
<td>- MARC</td>
</tr>
<tr>
<td>- Cataloguing</td>
<td>- MET</td>
</tr>
<tr>
<td>- Edit metadata supplied by depositor</td>
<td>- MODS</td>
</tr>
<tr>
<td>- Compliance and managing metadata quality</td>
<td>- OAI-PMH</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Content Development</th>
<th>Knowledge concerned to IR subject scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Identify content to be deposited</td>
<td>- IR registration technique</td>
</tr>
<tr>
<td>- Types of document</td>
<td>- Document deposition process</td>
</tr>
<tr>
<td>- Scope of the content</td>
<td>- Knowledge of workflow of IR</td>
</tr>
<tr>
<td>- Submission type: batch ingest, mediated submission, self-archiving</td>
<td>- Familiarity with green copyright problems of ROMEO project</td>
</tr>
<tr>
<td>- Content quality and review</td>
<td></td>
</tr>
<tr>
<td>- Digital v/s print content</td>
<td></td>
</tr>
<tr>
<td>- Copyrights of publishers</td>
<td></td>
</tr>
<tr>
<td>- Embargoed documents</td>
<td></td>
</tr>
<tr>
<td>- Withdrawal of deposited items</td>
<td></td>
</tr>
<tr>
<td>- Motivate authors to deposit the documents</td>
<td></td>
</tr>
<tr>
<td>- Conversion of file formats suitably</td>
<td></td>
</tr>
</tbody>
</table>
| Storage and Archiving | - Define long term archival policy  
|                      | - Identifying persons responsible  
|                      | - Facilitate storage requirements  
|                      | - Proper backup facility  
|                      | - Adoption of new technologies before the existing one becomes obsolete  
|                      | - Replication/ transformation  
|                      | - Liaison with institutional record keeper and archivist  |
| Copyright            | - Include copyright clause as a part of deposition process  
|                      | - Check the copyright status of the document deposited  
|                      | - Familiarity with the copyright policies with the help of tools like SHERPA's, RoMEO Project  
|                      | - If the document submitted is not free from publishers restriction ask for refereed final pre-print  
|                      | - Liaison with publishers for getting copyright permission  |
| Advocacy and Marketing | - Project IR as the showcase of institutional research output outside  
|                       | - Information literacy programs  
|                       | - Persuade eminent scientists to deposit for motivating others to do so  |
|                       | - Reservation techniques  
|                       | - Familiarity with backup devices  
|                       | - Best archival practices  
|                       | - Copyright laws of different countries  
|                       | - Copyright policies of publishers  
|                       | - Specific IPR issues like patentable disclosures  
|                       | - Marketing techniques  
|                       | - Public relations  
|                       | - Creativity  
|                       | - Communication techniques  
|                       | - Editorial skill  |
- Advocate, promote and market IR outside the institute

- Register with ROAR, OPENDOAR, OAI, OAlster, etc.

- Develop advocacy program to address all stock holders

- Publicity material: posters, leaflets, guides, FAQs and web pages

- Bring out exclusive weekly newsletter listing the items added and top ten items in terms of downloads and listing very old publications still in demand

- Publicize through institutional newsletter

- Presentation to academic departments

- Quick presentations on different institutional functions such as Foundation Days, Seminars, etc.

- Special lectures on Open Access

- Involve other library staff for advocacy program

- Lis-Forum announcement
| Training & Professional Development | - Identify all stock holder to be trained |
| - Develop suitable training programs for different groups involved in IR |
| - Train IT staff for installation, customization and up gradation of IR system |
| - Train library staff for management of IR and content development |
| - Train users / authors for deposition process and also IR search technique |
| - Familiarize users on availability of different IR harvesters and search engines like Google, Yahoo and Scirus |
| - Conduct workshops and training programs covering different aspects of IR development and maintenance |
| - Proper documentation and guides both online and print |
| - Time to time refresher course for new / migrated / upgraded IR system |
| - Trainers training program for addressing user community |

|  | - Teaching methods |
| - Communication skills |
| - Upgrades of IR development |
| - Familiarity with multimedia kits |
5.6.6 Creator-IR-Harvester-Search Engine-Researcher Chain: Institution To
International Level

More than 1100 institutional repositories have been registered in
OpenDOAR with the major share by developed countries like US, UK, Germany,
etc. Even the developing countries have picked up the momentum. The creator/
author deposits his work to the institutional repository on which the IR staff
carries out a series of operations before accepting the document. IRs being OAI-
PMH compliant metadata of the documents is harvested by harvesters like
OAIster, ARC and general search engines like Google, Yahoo, etc. The
proposed model advocates two streams of harvesting the subject based and the
general. Most of the research institutions and the universities are funded and
governed by one or the other apex bodies or research councils like CSIR, ICAR,
ICMR, DRDO, ISRO, IITs, UGC, etc. in India. Each of these apex bodies can set
up harvesting services on its headquarters or any other institute under its control
covering the entire research output and other kinds of documents produced and
hosted the IRs at institutional level.

The metadata of contents of IRs setup in various universities could be
harvested by a service set up by country level university authority like UGC in
India.

Usually a chain of labs and universities produce research output covering
humanity, social science, true science, technology and medicine. The apex
bodies like CSIR or UGC can also think of setting up of subject based e-print
archives in line with aRXIV which covers basically physics research output. This move needs little more careful planning and execution of metadata harvesting service as it needs selective subject based harvesting across IRs.

Metadata harvesting facility could be set up at country level covering contents of IRs of all research institutions and academic setups following under all apex bodies or research councils. Here again one can think of harvesting the entire metadata or setting up of many subject based harvesters at country level.

A number of metadata harvesters like OAIster cover the contents of most of the IRs in the world. Here again one can think of setting up services for selective subject based harvesting covering world over IRs. However there is a need to set up the harvesting services in more organized way at different hierarchical level internationally.

The general search engines like Google, Yahoo, Crawl provide search facility on any topic and also provide links to the full text of the documents held by different IRs world over. However the general search engines failed to provide field based and specialized searching based on database structure.

The researchers or the information seekers have freedom to search through general search engines or metadata harvesting services setup at different levels starting from institutional, apex body, country and international level following either the general stream of metadata harvesting services or subject based ones. Thus a chain is established from institution to international
level linking the creator of the document, institutional repository, metadata harvesters at different level, general search engines and the researcher/information seeker and the same has been represented schematically in the figure – 22.

Figure - 22
Creator – IR – Harvester – Search Engine – Researcher:
Institution to International Level Chain

creator / contributor

institutional repositories

general

metadata harvesting

general search engines

researcher / information seeker

subject based

subjects

biology
chemistry
physics
mathematics
engineering
economics
medicine
geography
history

countries

usa, uk, german, japan, france, india,

international metadata harvesters

apex bodies / research councils

csir, icar, icmr,
dae, drdo, isro,
iiits, iisce, ugc,

general

researcher / information seeker

google, yahoo, scires
5.7 IR Models for India

The IR development in India is still in initial stage both in policy and implementation level. We need to declare and adopt OA at all levels starting from individual institutions both academic and research to apex bodies, professional societies and more importantly at national level in line with Budapest and Bethesda declarations. OA is to be enforced by legislation in line with US and UK. Funding agencies should put a clause of making the research output open access especially when the fund sources are from tax payers kitty. There is no uniformity in guidelines, standards and various IR models adopted by Indian initiatives already in operation. Each one has followed their own guidelines, many a times without having any documentation of step by step of workflow, guidelines, content development and manpower policy. Majority of IRs are funded as a part of library budget or separately sanctioned for IR from institutional sources. Very rarely funds are received by government/ external agencies. IR is a mindset, which is yet to become part and parcel of institutions in India.

Although more than 47 Indian IRs are in operation only 29 of them are accessible through Internet and listed by ROAR. Among these IRs, some are those of CSIR laboratories, IITs, IIMs and few universities and other research establishments. The Indian research output gets scattered among various resources like journals, conferences, etc. A lot of grey literature available very rarely gets exposed to outside world. Some of the institutions although set up
their IRs, have not made their contents available on internet due to various reasons. This results in failure of the very purpose of open access movement.

The guidelines developed and evolved IR models described earlier are based on survey findings (both IT managers and users), literature review, visits to various IR sites and above all the culmination of imagination and innovative ideas of the researcher. The survey covers maximum number of Indian IR managers / librarians and only Indian users community and there by the IR guidelines and the IR models developed specifically suit Indian IR requirements.

5.7.1 IR Consortia Model for India

The earlier described "Creator – IR Creator – IR – Harvester – Search Engine – Researcher Chain: Institution to International Level" has been developed based on Indian academic and R&D setups taking into account of hierarchies from individual institution to country and international level. However this model describes the workflow and not the governance and management structure. The schematic diagram (Figure - 23) gives a broad governance and management structure for the IR consortia models in India. Example of CSIR as an apex body and CSIR labs as individual institutions have been used for developing this model.
The faculty / scientists / users, librarians, IT professionals and archivists work collaboratively to setup an institutional repository under the leadership of an IR manager under the overall guidance of IR management committee. This exercise takes place at an individual institution level like NAL, NIO, NCL, etc.
Metadata harvesting facility is to be created using OAI-PMH protocol at an apex body level like CSIR covering all institutions under its control. However the search results should point to individual IRs for giving access to full text. Schematic diagram of such a harvesting facility taking CSIR Laboratories as an example has been given in Figure - 24. The harvesting facility could be set up at head quarters of the apex body or at a designation laboratory or at a third part site. This harvesting facility at an apex body level like CSIR can be lead by a Project Coordinator under the overall guidance of Steering Committee having representations from all the participating institutions.

**FIGURE - 24**

**Harvesting CSIR IRs**

- Tech Reports
- Pre-prints
- Journal Articles
- Presentation
- Thesis, etc

Deposit (Metadata + Full Pub)

Digital Repository

Access & Dissemination

NAL  |  NCL  |  NIO  |  NPL  |  SERC  |  Etc

Metadata OAI-PMH

Service Provider
ICAST, NAL

Local Intranet access

Remote Internet access
At national level there are number of apex bodies like CSIR, ICAR, ICMR, DAE, ISRO, DRDO and UGC. In order to give one point access to the entire country's research output, one can think of setting up of a metadata harvesting service at national level. The harvester at national level can either harvest the metadata from apex body level harvesters or directly from individual IRs. Searching the harvester should lead to individual IR for full texts. This operation is governed by an IR Director under the overall supervision of a national level Coordination Committee, whose goals and objectives are given below:

**National Coordination Committee for IR:**

**Goal:**
To provide free access at national and international level the intellectual output of public funded academic and R & D activities in the country.

**Objectives:**
- To evolve suitable guidelines and standards with working documents to initiate and develop IR.
- To work in liaison with academic and research bodies like UGC, CSIR, ICAR, ICMR, DAE, etc. as influential group to initiate and establish IR at various levels.
- To prepare and lobby for bringing legislation for adopting and practicing OA.
- To work as a focal point for expertise and guidance.
• To work in liaison with schools of LIS and IT Schools to build high quality HR manpower for IR development.

• To establish good collaboration with international organizations who have not only developed IRs but expertise in terms of technology and other nuts and bolts of IR development.

• To undertake continuing education program to develop and operate IR for in-service professionals.

• To set up review committees for evaluation and consolidation of time to time developments in the field.

• To conduct annual event to motivate and train professionals and set the trend.

5.7.2 Creating a Shared Institutional Repository

One can also think of creating shared IRs in India. Sharing could be between two or more institutions:

• Under the same apex body
• Dealing same subject under different apex bodies
• Different institutions handling projects funded by single agency

Sharing has different meanings in different contexts like:

• Single IR covering research output of at least two institutions
• Single server hosting more than one IRs
• Hosting mirror IR sites on each other's server
• Subject based multiple IRs covering research outputs of more than one institute

**Advantages:**

• Shared software installation and technical support.
• Pooled financial resources
• Shared policies and documents
• Shared manpower and expertise
• Demonstrates cooperation between partners.
• Can capitalize on an established “brand” or collaborative model

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