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OAI-PMH COMPLIANCE OF INDIAN INSTITUTIONAL REPOSITORIES

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OAI-PMH Compliance of Indian Institutional Repositories

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Abstract – Open Archives Initiative Protocol for Meta-data Harvesting (OAI-PMH) is one of the key considerations while implementing repositories. It is a HTTP based protocol developed by Open Archive Initiative (OAI) with the objective to achieve interoperability between repositories. The protocol allows service providers or metadata harvesting services to seamlessly harvest metadata exposed by the repositories or data providers. A study of selected functional Institutional Repositories archiving their Institutional research output was conducted to test the compliance of repositories to OAI-PMH. The repositories' base URLs were tested to find out the compliance. It was found that being a crucial component majority of repositories (77.55%) complied to test. Metadata of repositories not fully complying to the conformance standards set by OAI and other harvesting services like OAIster, BASE and CASSIR cannot be harvested. This affects the access and visibility of repositories as well as metadata archived. The Registration of repositories with OAI and other service providers will ensure OAI-PMH compliance and accessibility of repositories.

Keywords: OAI-PMH, Institutional Repositories, Metadata harvesting

INTRODUCTION

Institutional Repositories have emerged as the viable means to achieve the basic objectives of open access the access and visibility. Compliance of Institutional Repositories to OAI-PMH protocol is one of the requirements to achieve these objectives through interoperability of repositories. Interoperability is a relatively broader term defined by the Open Archive Initiative (2013) as "the ability of systems, services and organizations to work together seamlessly towards common or diverse goals." With reference to Institutional Repositories (IRs) interoperability refers to the communication between distributed repository systems for achieving discovery and access to data and metadata. Compliance to OAI- PMH (Open Archives Initiative Protocol for meta-data Harvesting) is primary requirement for ensuring interoperability of IRs.

2.2.8.1 OAI-PMH

The OAI-PMH is a low-barrier mechanism for interoperability between Service Providers and Data Providers (the repositories). The repositories expose their metadata via OAI-PMH and service providers or metadata harvesting services like OAIster, BASE and CASSIR etc. make service requests to harvest the metadata. OAI-PMH provides a mechanism for communication between two systems the Data

Providers or repositories and Service Providers. Repositories are web based servers which respond to the HTTP based request of the harvester in the form of a XML encoded response. It is important for the repositories to expose their meta-data in any of the standard format like Dublin Core (DC). There are rich metadata standards like MARC-21 available but Dublin Core (DC) is almost de facto standard. Metadata is at the core of OAI-PMH.

The Unqualified Dublin Core is easily understandable set of 15 element sets used to describe the bibliographical information of a document. The unqualified Dublin Core Meta-data (oai_dc) is the minimum requirement for the repository to implement OAI-PMH. Some metadata elements are filled by the creator himself at the time of deposit but for implementing the vocabulary control and consistency in the metadata it must be reviewed by the repository managers. This descriptive metadata is used for the resource identification, resource discovery, and indexing of a digital resources. The digital objects are becoming more and more complex, they no longer consists of single file, but have a collection of several interrelated files. Repositories may use parallel more complex metadata schema like e.g. METS (Metadata Encoding and Transmission Standard), MODS (Metadata Object Description Schema), MPEG-21 DIDL (Digital Item Declaration Language), and PREMIS (Preservation Metadata Implementation

Strategies) etc. to describe such more complex digital objects. These schemas are able to combine several metadata schemas into one overall description, lying in several layers mixing bibliographic, structural and preservation metadata as one set.

OAI-PMH Implementation

It is important for the repositories to expose their metadata in any of the standard metadata format which can be encoded in XML but the minimum agreed upon requirement unqualified DC. Following is the minimum requirement for the implementation of OAI-PMH at the Data provider end.

I. Metadata Format

Dublin Core or (DC) metadata standard is the first and foremost requirement for the functioning of OAI-PMH. Repositories may use rich metadata formats like MARC-21 to store metadata but when repositories receive OAI-PMH request the metadata format is dynamically changed to DC / oai_dc format. Unqualified DC is a set of 15 metadata element sets. Though all these elements are optional and repeatable but some harvesters define minimum sets of DC elements e.g. in OVAL (2013) the BASE OAI-PMH Validator, minimal DC elements defined are Date, Creator, Identifier, Type and Title.

II. Sets

Implementation of Sets provides a method to define groups of metadata within a repository. It is optional to define sets. Therefore sets are defined only when required to fulfill the needs of specific communities e.g. departments in a university. The sets may or may not be hierarchical depending upon the requirements. Both Data providers and Service providers support provisions of sets and their hierarchy.

III. Base URL

The Base URL of repository is the unique identifier for repositories required for the implementation of OAI-PMH. All the OAI compliant repositories have a OAI base URL (e.g. <http://oar.icrisat.org/cgi/oai2>) for machine to machine communication. Repositories provide valid XML response to http request in the form of OAI-PMH verbs through this Base URL.

IV. Datestamp

OAI-PMH has provision of Datestamp for incremental harvesting. Metadata records have the Datestamp for each metadata record when record is created or modified and response date for OAI-PMH requests. Datestamp has granularity of days and seconds. The repositories are expected to have seconds granularity. Datestamp is expressed with seconds granularity is expressed as 2013-09-16T09:05:50Z

V. Flow Control (Resumption Token)

Repositories consist of large number of records and OAI-PMH provides mechanism for harvesting data from repositories without losing any data or changes in data during to incremental harvesting. During incremental harvesting from repositories for any incomplete harvest repositories issue a Resumption Token so that a Service Provider can resume harvesting from last harvest using Resumption Token without harvesting the already harvested records. A Resumption Token may consist of following optional elements.

- **ExpirationDate** (date after which resumption token does not work)
- **CompleteListSize** (Size of result)
- **Cursor** (records already disseminated)

VI. Compression

OAI-PMH has the provision of compressing data to enable lengthy harvesting of metadata. It is optional provision expressed by repositories in Identify response (without compression). Both service provider and data provider should support the defined compression gzip, compress or deflate etc.

VII. Error Messages

Each time if valid XML response is not received from a repository in six OAI-PMH verbs the error generator issues error messages according to the errors incurred. Sometimes if these verbs are missing or its syntax is incorrect the request results in error message bad Verb. If the required parameters (arguments) are missing or syntax is incorrect the request results in error message bad Argument. Other error messages are bad Resumption Token, no Records Match, no Metadata Formats, and no Set Hierarchy.

VIII. OAI-PMH Verbs

There is a set of six standard requests "OAI-PMH Verbs" a harvester or service provider can send to a repository or data provider. These requests in proper syntax and with required arguments are sent over the web using HTTP protocol. Once the HTTP request is received by the data provider its base URL responds with a valid XML response according to OAI-PMH Verb used and specified in the protocol. A service provider may any one verb or all the verbs but repositories are required to implement all the Verbs.

Table : OAI-PMH Verbs

Sr.	OAI-PMH Verbs	Functions	Parameters (Required)	Parameters (optional)
1	Identify	Retrieves full description of repository	None	None
2	List Metadata Formats	Retrieves metadata formats supported by repository	None	
3	List Sets	Retrieves defined sets	None	None
4	List Identifiers	Abbreviated form of List Records retrieves header only	Metadata prefix	From, Until, Sets
5	List Records	Retrieves records from repository	Metadata prefix	From, Until, Sets
6	Get Records	Retrieves individual metadata records from repository	Identifier and Metadata prefix	None

Required parameters are compulsory to be used as an argument with the verbs while optional parameters may be used as optional arguments with verbs to limit the results. Use of set parameter will limit the results to specific sets. Use of 'from' and 'Until' parameters will limit the results to specified time periods only.

i. Identify

Identify request retrieves important information about the repository like repository name, its base URL, version of the protocol supported by repository, the e-mail address of the repository administrator and rights information. All this information is stored in the database of OAI. The valid response to identify request shows that repository is configured for OAI-PMH protocol. e.g.

Request: <http://oar.icrisat.org/cgi/oai2?verb=Identify>

Response:

Datestamp of response	2013-10-25T03:58:48Z
Request URL	http://oar.icrisat.org/cgi/oai2

Request was of type Identify

Repository Name	OAR@ICRISAT
Base URL	http://oar.icrisat.org/cgi/oai2
Protocol Version	2.0
Earliest Datestamp	2011-06-10T08:35:26Z
Deleted Record Policy	persistent
Granularity	YYYY-MM-DDThh:mm:ssZ
Admin Email	m.madhan@cgia.r.org

AI-Identifier

Scheme	oai
Repository Identifier	oar.icrisat.org
Delimiter	:
Sample OAI Identifier	oai:oar.icrisat.org:14

EPrints Description

Content

<http://oar.icrisat.org/policies.html>

Submission Policy

No submission-data policy defined. This server has not yet been fully configured.

Metadata Policy

No metadata policy defined. This server has not yet been fully configured. Please contact the admin for more information, but if in doubt assume that NO rights at all are granted to this data.

Data Policy

No data policy defined. This server has not yet been fully configured. Please contact the admin for more information, but if in doubt assume that NO rights at all are granted to this data.

Comment

This system is running eprints server software (EPrints 3.3.10) developed at the University of Southampton. For more information see <http://www.eprints.org/>

Therefore the response to OAI-PMH Verb "Identify" gives valuable information regarding the OAI-PMH protocol version implemented, date granularity, earliest timestamp, metadata-schema and rights information stored in repository database.

ii. [ListMetadataFormats](#)

ListMetadataFormats request must retrieve at least one metadata format supported by the repository. The oai_dc metadata format is the minimum is the minimum result retrieved. e.g.

Request:

<http://oar.icrisat.org/cgi/oai2?verb=ListMetadataFormats>

Response: (Sample Metadata Formats)

Metadata Format

Metadata Prefix	oai_dc
Metadata Namespace	http://www.openarchives.org/OAI/2.0/oai_dc/
schema	http://www.openarchives.org/OAI/2.0/oai_dc.xsd

Similarly other supported Metadata Formats: Mets, Rdf, open biblio, didl, uketd_dc

iii. List Sets

List Sets request retrieves information about the sets of records defined in the repository.

Request: <http://oar.icrisat.org/cgi/oai2?verb=ListSets>

Response: (Sample Sets)

Set

Set Name	Subject = Others: Soil Science
Set Spec	7375626A656374733D7332E3131 Identifiers Records

Set

Set Name	Type = Article
Set Spec	74797065733D61727469636C65 Identifiers Records

All the defined sets are retrieved as above.

iv. List Identifiers

List Identifiers request may be used to harvest record headers rather than complete metadata records as in List Records. This request is issued with a date range from and until arguments. e.g.

Request:<http://oar.icrisat.org/cgi/oai2?verb=ListIdentifiers&metadataPrefix=oai&from2012-12-01until2013-10-10>

Response: (Sample Identifiers)

OAI Record Header

OAI Identifier	oai:oar.icrisat.org:1 oai_dc formats
Date stamp	2013-09-16T09:04:10Z
Set Spec	7374617475733D707562 Identifiers Records
Set Spec	7375626A656374733D7332E31 Identifiers Records
Set Spec	74797065733D61727469636C65 Identifiers Records

All the OAI Record headers are retrieved depending upon the number of records and batch size.

v. List Records

List Records request is used to harvest metadata records. This request is issued with a date range from and until arguments. e.g.

Request:

http://oar.icrisat.org/cgi/oai2?verb=ListRecords&metadataPrefix=oai_dc

Response: (Sample Record)

OAI Record: oai:oar.icrisat.org:1

OAI Record Header

OAI Identifier oai:oar.icrisat.org:1 [oai_dc formats](#)

Datestamp 2013-09-16T09:04:10Z

setSpec 7374617475733D707562 [Identifiers Records](#)

setSpec 7375626A656374733D7332E31 [Identifiers Records](#)

setSpec 74797065733D61727469636C65 [Identifiers Records](#)

Dublin Core Metadata (oai_dc)

Title	Use made of open access journals by Indian researchers to publish their findings
Author or Creator	Muthu, Madhan
Author or Creator	Subbiah, Arunachalam
Subject and Keywords	Information Science
Description	Most of the papers published in the more than 360 Indian open access journals are by Indian researchers. But how many papers do they publish in high impact international open access journals? We have looked at India's contribution to all seven Public Library of Science (PLOS) journals, 10 BioMed Central (BMC) journals and Acta Crystallographica Section E: Structure Reports. Indian crystallographers have published more than 2,000 structure reports in Acta Crystallographica, second only to China in number of papers, but have a much better citations per paper average than USA, Britain, Germany and France, China and South Korea. India's contribution to BMC and PLOS journals, on the other hand, is modest at best. We suggest that the better option for India is institutional self-archiving.
Publisher	Indian Academy of Sciences
Date	2011
Resource Type	Article
Resource Type	PeerReviewed
Format	application/pdf
Resource Identifier	http://oar.icrisat.org/1/1/1297.pdf
Relation	http://www.ias.ac.in/cursci/10may2011/1297.pdf
Resource Identifier	Muthu, Madhan and Subbiah, Arunachalam (2011) Use made of open access journals by Indian researchers to publish their findings. Current Science, 100 (9). pp. 1297-1306. ISSN 0011-3891
Relation	http://oar.icrisat.org/1/

Resumption Token: metadataPrefix%3Doai_dc%26offset%3D108 Resume

There are more results depending upon the number of records and list

VI. Get Records

Get Records request is used to retrieve single record using record identifier. The repository must return a record in minimum oai_dc format. e.g.

Request: http://oar.icrisat.org/cgi/oai2?verb=GetRecord&metadataPrefix=oai_dc&identifier=oai:oar.icrisat.org:1

Response: (Retrieves above mentioned record)

OAI-PMH Compliance

All the OAI compliant repositories have a OAI base URL (e.g. <http://oar.icrisat.org/cgi/oai2>) for machine use besides the URL (e.g. <http://oar.icrisat.org/>) for human users which are commonly known. When http request is send in the form of OAI-PMH verb and other arguments appended to the URL the OAI base URL return XML response. Repositories responding with valid XML response and Error messages to the OAI-PMH verbs are called AOI-PMH compliant. The repositories providing OAI base URL may be tested directly for the compliance to OAI-PMH verbs directly through http requests. OAI conducts conformance tests on the repository before registering a repository. The OAI also validates the Base URL before registration. Following type of response is received while testing the validation of base URL of Eprints@CMFRI (<http://eprints.cmfri.org.in/cgi/oai2/>).

Request: GET
<http://eprints.cmfri.org.in/cgi/oai2?verb=Identify>

Administrator email address madhan@nitrl.ac.in

[PASS] Correctly reports OAI-PMH protocol version 2.0

[PASS] baseURL supplied matches the Identify response

[PASS] Datestamp granularity is 'seconds'

[PASS] earliestDatestamp is 0001-01-01T00:00:00Z

[PASS] oai-identifier description for version 2.0 is being used

[PASS] namespace-identifier (repositoryIdentifier element) in oai-identifier declaration is generic.eprints.org

Retrieved October 25, 2013 from
<http://www.openarchives.org/data/registerasprovider.html/>

OAI Repository Explorer is a tool provided by OAI for testing the compliance of repositories to OAI-PMH through an interactive user interface. University of Illinois maintains a database of OAI-PMH compliant repositories, the OAI-PMH Data Provider Registry (<http://gita.grainger.uiuc.edu/registry/>). In the OVAL the OAI-PMH Validator of BASE (Bielefeld Academic Search Engine), following result is retrieved for testing the base URL of Eprints@CMFRI (<http://eprints.cmfri.org.in/cgi/oai2/>).

Validation Results:**Repository Information**

Name: CMFRI

Admin: madhan@nitrkl.ac.in

Server communication

SUCCESS: Server supports both GET and POST requests.

SUCCESS: OAI-PMH version is 2.0

XML Validation

SUCCESS: Identify response well-formed and valid.

SUCCESS: List Records response well-formed and valid.

Harvesting

SUCCESS: Deleting strategy is "persistent"

SUCCESS: List Records batch size is 100.

SUCCESS: Resumption requests work

RECOMMENDATION: resumption Token should contain expiration Date information.

RECOMMENDATION: resumption Token should contain complete List Size information.

SUCCESS: Incremental harvesting (day granularity) of List Records works.

SUCCESS: Incremental harvesting (full granularity) of List Records works.

UNVERIFIED: dc:language conformance to ISO 639 could not be checked: no dc:language element found

SUCCESS: dc:date elements conform to ISO 8601.

SUCCESS: Minimal DC elements (date, creator, identifier, type, title) are present.

Explanation of message categories:

- INFO: Potentially interesting information
- RECOMMENDATION: Deprecated protocol feature or content-related issue
- WARNING: Protocol violation or malformed content data

- ERROR: Serious protocol violation that will affect the harvesting process
- UNVERIFIED: Feature could not be checked for some reason

Retrieved October 25, 2013 from <http://oval.base-search.net/>

The validation criterion set by the OAI-PMH validators may vary but it was observed that very few repositories were conforming to complete validation test. Therefore the response to OAI-MH was tested directly with base URL using OAI-PMH Verb "Identify".

RESEARCH METHOD

The repositories being web based Open Access archives of digital contents were easily accessible through internet. The 49 functional Institutional Research Repositories were selected from various sources like OpenDOAR, ROAR and "CSIR-CENTRAL" Central platform for CSIR repositories. Compliance to Open Archives Initiative Protocol for meta-data Harvesting (OAI-PMH) is one of the important requirements for the Open Access Institutional Repositories. The OAI-PMH verb "Identify" was used to test the implementation of OAI-PMH in the repositories. It was important to know the correct base URL of the repositories to run the "Identify" command in the repositories. The base URL information available in OpenDOAR OAI Registry has been taken as the reference point for the base URL of the selected repositories. The base URLs were directly tested with OAI-PMH Verb "Identify" to see the response.

DATA COLLECTION

The base URLs of only 19 repositories were registered in OpenDOAR while 10 repositories were registered in OAI Registry. The OAI-PMH version 2.0 is the stable version of the protocol released in 2002. The 26 repositories under study were using OAI-PMH version 2.0 while rest of the 23 repositories were using version 1.0 of the protocol. As depicted in the Table the repositories using OAI-MPH version 2.0 depicted as oai2 in the base URL and repositories using version 1.0 were depicted as oai in the base URL. The following checklist depicts the base URL of selected repositories tested for valid XML response to OAI-PMH Verb "Identify" along with source (OAI Registry / OpeDOAR) where the base URL was listed. The repositories properly responding to responding to HTTP request have been depicted as compliance (√) .

Table: OAI-PMH Compliance of Institutional Repositories (as on 16.09.2013)

Sr.	Repository	Base URL Tested (Registered in OAI Registry / OpenDOAR)	Compliance
1	Eprints@CMFRI	http://eprints.cmfri.org.in/cgi/oai2 (OAI Reg.)	✓
2	KR@PDP	http://spmlib.pdp.ac.in:8080/oai	✓
3	Dyuthi@CUSAT	http://dyuthi.cusat.ac.in/dspace-oai (OAI Reg.) - Bad verb http://dyuthi.cusat.ac.in/oai (OpenDOAR)	✓
4	DigitalLibrary @CUSAT	http://dspace.cusat.ac.in/oai	✓
5	DIR@IMTECH	http://crdd.osdd.net/open/cgi/oai2	✓
6	DRS@NIO	http://drs.nio.org/oai (OAI Reg.)	✓
7	DSpace @ GGSIPU	http://14.139.60.216:8080/oai (OpenDOAR)	-
8	DSpace at IITBombay	http://dspace.library.iitb.ac.in/oai (OAI Reg.)	✓
9	DSpace at IIMK	http://202.131.96.59:8080/dspace-oai (OpenDOAR)	✓
10	DSpace at IUCAA	http://www.iucaa.ernet.in:8080/oai (OpenDOAR)	✓
11	Dspace@NITR	http://thesis.nitr.res.in/cgi/oai2 (OAI Reg.)	✓
12	Eprints@NML	http://eprints.nmlindia.org/cgi/oai2 (OAI Reg.)	✓
13	Eprints @MDRF	http://mdrf-eprints.in/cgi/oai2 (OAI Reg.)	✓
14	Eprints@NIRT	http://ethesis.nitr.res.in/cgi/oai2 (OAI Reg.)	✓
15	OAR@ICRISAT	http://oar.icrisat.org/cgi/oai2 (OAI Reg.)	✓
16	IIT Roorkee Repository	http://bhagirathi.iitr.ac.in/dspace/oai	-
17	IASc: Publications of Fellows	http://repository.ias.ac.in/cgi/oai2	✓
18	IAP Digital Repository	http://prints.iap.res.in/oai	✓
19	IR@CSIO	http://csioir.csio.res.in/cgi/oai2	✓
20	IR@NAL	http://nal-ir.nal.res.in/perl/oai2 (OAI Reg.)	✓
21	Eprints@IISc	http://eprints.iisc.ernet.in/cgi/oai2	✓
22	Osmania University Digital Library	http://oudl.osmania.ac.in/oai	✓
23	RRI Digital Repository	http://dspace.ri.res.in/oai	✓
24	EPrints@UoM	http://eprints.uni-mysore.ac.in/cgi/oai2	-
25	Kautilya@IGDR	http://oi.igdr.ac.in:8080/oai	-
26	E-Repository@IIHR	http://erepo.iihr.ernet.in/oai	-
27	Dspace@IISR	http://220.227.138.214:8080/oai	✓
28	DSpace@IMSC	http://www.imsc.res.in/xmlui/oai	✓
29	DSpace@INFLIBNET	http://ir.inflibnet.ac.in/oai	-
30	DSpace@NCAOR	http://14.139.119.23:8080/oai	-
31	Dspace@CBRI	http://krc.cbri.res.in/oai	-
32	ePrints@CFTRI	http://ir.cftri.com/cgi/oai2	✓
33	IR@IGIB	http://openaccess.igib.res.in/cgi/oai2	✓
34	EPrints@ICB	http://www.eprints.icb.res.in/cgi/oai2	✓
35	IR@IICT	http://203.199.182.84:8080/oai	✓
36	CSIR-CMMACS	http://cir.csir4pi.in/cgi/oai2	✓
37	Eprints@MU	http://eprints.manipal.edu/cgi/oai2	✓
38	CSIR-SERC	http://14.139.176.62:8080/oai	✓
39	IR@CECRI*	http://cecri.csircentral.net/cgi/oai2	✓
40	IR@CGCRI*	http://cgcri.csircentral.net/cgi/oai2	✓
41	IR@CIMFR*	http://cimfr.csircentral.net/cgi/oai2	✓
42	IR@IHBT*	http://ihbt.csircentral.net/cgi/oai2	✓
43	IR@IIIM*	http://iiim.csircentral.net/cgi/oai2	✓
44	IR@NCL*	http://ncl.csircentral.net/cgi/oai2	✓
45	IR@NEIST*	http://neist.csircentral.net/cgi/oai2	✓
46	IR@NPL*	http://npl.csircentral.net/cgi/oai2	✓
47	IR@AMPRI*	http://ampri.csircentral.net/cgi/oai2	✓
48	IR@CLRI*	http://clri.csircentral.net/cgi/oai2	✓
49	KNOOR**	http://dspace.uok.edu.in/oai	✓

*Repositories hosted on CSIR-CENTRAL a platform for hosting repositories of CSIR Labs

** Aggregating Repository of 3 constituent Institutions of University of Kashmir

FINDINGS & SUGGESTIONS

Altogether the base URLs of 41 repositories (77.55%) were responding to verb "Identify", rest of the repositories were not responding to OAI-PMH requests as their correct base URLs were either not known or the repositories were not OAI-PMH compliant. It is suggested that the repository administrators should register latest base URL of the repository with OAI registry to ensure OAI-PMH compliance. Only 10 repositories (20.40%) were registered in the OAI registry. The registration of repositories in the depositor's database of metadata harvesters like OAIster, BASE or Indian harvesters CASSIR will also

ensure OAI-PMH compliance. Only 10 repositories (20.40%) under study were registered with OAIster while 13 repositories (26.53%) under study were registered with CASSIR. Therefore it is not a common practice among the repository administrators to get their repository registered with OAI or other harvesters like OAIster or Indian repository harvester CASSIR. Visibility of repositories in the OpenDOAR and ROAR is also important for locating a repository. Only 28 repositories (57.14%) under study were listed in the ROAR and OpenDOAR. It is therefore suggested that minimum implementation of OAI-PMH and registration with various registries and metadata harvesting services like OAIster, BASE, Scientific Commons and CASSIR etc. should be a necessary condition for the implementation of Open Access Institutional Repositories. The policy statements of various institutions and organizations implementing repositories may also make such provisions to ensure access and visibility of repositories.

REFERENCES:

1. CSIR Central (2013). Central Platform for Open Archive Repositories and Harvesters. Retrieved September 16, 2013 from <http://www.csircentral.net/>
2. OAR@ICRISAT (2013). Open Access Repository of [International Crops Research Institute for the Semi Arid Tropics](http://www.icrisat.org/). Retrieved October, 25 2013 from <http://oar.icrisat.org/>
3. Open Archives Initiative (2013). Open Archives Initiative Protocol for Metadata Harvesting; Registering as Data Provider OAI-PMH Version 2.0. Retrieved October 25, 2013 from <http://www.openarchives.org/pmh/>
4. OpenDOAR (2013). Directory of Open Access Repositories. Retrieved September 16, 2013 from <http://www.opendoar.org/>
5. OVAL (2013). OVAL: BASE [OAI-PMH](http://oval.base-search.net/) Validator Retrieved October 25, 2013 from <http://oval.base-search.net/>
6. ROAR (2013). Registry of Open Access Repositories. Retrieved September 16, 2013 <http://roar.eprints.org/>