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Institutional Digital Repositories: a selective study of review of literature

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Abstract

Conducting literature review on open access (OA) institutional digital repositories (IDRs) is a challenging task as it is a new concept and started to develop rapidly throughout the world. The paper aims to place the current investigation within the existing scholarly research literature regarding some key policy issues. There are so many barriers in developing IDR specially developing different policies such as preservation policy, interoperability policy, and metadata policy as all are related to technical matter. All these issues need to to be properly formulated for smooth functioning of any IDR system. Here, the following three policy issues viz. a preservation policy, interoperability policy and metadata policy included in technical part have been discussed.

Keywords: open access, institutional digital repositories, preservation policy, interoperability policy, metadata policy, self-archiving

Preservation

Long-term preservation of scholarly objects is an essential role of any IDR as suggested by Lynch (Lynch, 2003). Digital Preservation is a technical issue and has been a major concern for the information management, technological and scientific communities in all domains. The issue is about accessing objects for long-term period due to technological obsolescence. Initiatives to support digital preservation of content have been discussed by several authors (Pinfield & James, 2003; Smith & Moore, 2007; Weenink, Waaijers & Godtsenhoven, 2007; Wheatley, 2004; Gibbons, 2004). The other key key initiatives are SHERPA (http://www.sherpadp.org.uk/index.html) and the Digital Preservation Coalition (DPC). The DPC (http://www.dpconline.org) has provided sufficient information and practical guidance on digital preservation of objects deposited to IDR. Digital Curation Centre launched by JISC's Digital Preservation and Records Management Programme has developed many approaches to achieve long-term preservation of content (Carpenter, 2005). Another initiative is LOCKSS (Lots of Copies Keeps Stuff Safe), developed by Stanford University that offered networking technology to maintain electronic publications (Eaton, 2005). The

CLOCKSS initiative (joint project of Library of Congress and Stanford University) aims to build a trusted, large-scale, dark archive and provides a decentralized and secure solution to long-term archiving, for perpetual access of digital content (http://www.lockss.org/clockss/). PADI (Preserving Access to Digital Information) supported by the Australian National University, offered a number of digital preservation techniques such as migration, encapsulation, emulation (http://www.nla.gov.au/padi/about.html). PALS report described different current techniques of preservation of digital objects (Ware, 2004). Another initiative taken by Portico (http://www.portico.org/) aimed to preserve e-journals only in this context.

There are many unknown and unsolved approches have not yet been solved and discussed by many experts (Jones, Andrew & MacColl, 2006; SPARC, 2002a; Bradley, 2005; Yakel, 2007; Cordeiro, 2004; Lin, Ramaiah & Wal, 2003). Some authors (Hockx-Yu, 2006; Lor, 2005; Patel & Simon, 2007) elaborately discussed some other issues such as technical, organisational, economic, political, legal & ethical related to digital preservation. Another important issue such as technological obsolesce has been covered in literature (Pinfield & James, 2003; Jones & Beagrie, 2002).

Selecting file format of digital objects is more complex issue because a file format which is good for access today may not be accessible tomorrow or that is easy to migrate may not be easy to migrate in future. This vital issue has been described in many studies (Abrams, 2004; Rosenthal, 2010; Thompson, 2010; Hitchcock & Tarrant, 2011; Jones, Andrew & MacColl, 2006; Bailey et al., 2006a). Some other authors (Curtis, 2006; James et al., 2003; Weenink, Waaijers & Godtsenhoven, 2007; Morgan & Team IDR, 2006) recommended following different file format for different types of objects for long term preservation. A group of other experts (Aschenbrenner & Kaiser, 2005; Pinfield, 2002; Cervone, 2004) emphasized on PDF as preferred format as it is followed by many repositories.

Another issue covered in existing scholarly literature is sustainability and long term preservation of digital content (Bullock, 1999; Harmsen, 2008; Hockx-Yu, 2006; Stanescu, 2005; Wheatley, 2004). Jones, Andrew & MacColl (2006) reported that '*one objective of many repositories is to provide items in perpetuity*'. The APSR's (Australian Partnership for Sustainable Resources) discussion paper discussed sustainability issues along with different steps to achieve this goal (Bradley, 2005). The SPARC (2002b) Position Paper also supports this view and has discued it in more detail. Pinfield & James, (2003) described the sustainability issue in case of e-prints preservation. Some other experts (Calanag, Tabata & Sugimoto, 2004; Dondorp & Meer, 2003; Ware, 2004) put emphasis on different techniques along with different standards and best practices related to the preservation of digital objects. Another survey report (Li & Banach, 2011) also covered the same issue along with the challenges and opportunities of implementing digital preservation and current practices and standards.

Some other studies (Eden & Feather, 1996; Calanag, Tabata & Sugimoto, 2004; Patel & Simon, 2007) recommended for a national preservation policy for long term sustainability of digital data. In the same line, Besek et al. (2008) recommended for drafting copyright and related laws in this

regard. Branin (2005) recommended for following existing standards for preserving digital content. For example, Open Archival Information System (OAIS) reference model and the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH). These two standards provides a comprehensive framework for digital preservation including ingest, storage, retrieval of digital objects and offers a mechanism for harvesting metadata from other repositories.

Some other experts (Calanag, Tabata & Sugimoto, 2004; Chilvers & Feather, 1998; James et al., 2003; Cantara, 2006) provided guidelines for creating standard metadata for repositories. Lavoie & Gartner (2005) provided standard definition and also reviewed a number of existing initiatives in this ontext. A group of studies (Day, 1997; Groenewald & Breytenbach, 2011) suggested how the concept of metadata could be extended to provide sufficient information in the specific field of digital preservation. Pugin, Hankinson & Fujinaga (2012) introduced Web-enabled cataloguing system for the global music heritage materials. Goh et al. (2006) put emphasis on using quality control mechanism for refinement of metadata to ensure integrity, and persistent documentation identification for migration purposes.

Some other studies discussed different preservation methods used for digital preservation. Smith (2002) mentioned several preservation techniques such as migration; technology preservation; emulation; and persistent object preservation. Kuny (1997) highlighted different gaps of the three methods of preservation viz. technology preservation, technology emulation and information migration. Granger (2000) described in details "Emulation" whereas Wheatley (2001) on "Migration" as another technique. Han (2004) suggested using of software for this purpose. Other experts (Jantz & Giarlo, 2005; Chen, 2007) put focus on different architectural and technological aspects along with new methods, policies, standards, and technologies of digital preservation. Another group of authors (Hitchcock et al., 2005; Ferreira, Baptista & Ramalho, 2006) specifically described preservation service architecture. Stanescu (2005) described methods of implementing models for achieving preservation keeping in mind objective analysis of risk trends (for file types, software and hardware) rather than on individuals' opinions and experiences. A project by the University of Michigan reported the development of its own preservation plan and described a set of best practices applicable for different file formats (Deep Blue, n. d.). Ferreira, Baptista & Ramalho (2006) proposed a set of components necessary for building a Service-Oriented Architecture (SOA) to enable cultural heritage institutions to carry out digital preservation with minimum human intervention.

Another group of authors (Hitchcock et al., 2005, 2007; Dondorp & Meer, 2003; James et al., 2003) proposed different OAIS preservation models. Another blue book (Consultative Committee for Space Data Systems, 2002) has made detailed recommendations about best practice and appropriate work flows for each stage of the preservation process. Some other literature reported that it should be supervised by two stakeholders - publishers and librarians (Cervone 2004). Whereas. The SPARC proposed to lay the task in the hands of librarians, those professionally prepared (Crow, 2002a).

Interoperability

Many authors advocated that IDR must be OAI-compliant in order to extract data from other system. Many studies (Hunter & Guy, 2004; Horwood et al., 2004; Ginsparg, Luce & Van de Sompel, 1999; Van de Sompel & Lagoze, 2000; Mazurek et al., 2006; Eaton, 2008; Alipour-Hafezi et al., 2010; Khazraee et al., 2011; Miller, 2004; Westell, 2006) suggested that system should be OAI-PMH compliant and explained the necessity of OAI Protocol for Metadata Harvesting (OAI-PMH). Alexander & Gautam (2004) opined IDR as a tool by which interoperability could be achieved. Crow (2002a) suggested that IDR should be OAI compliant to link up with other similar archives. Reitz (2006) advocated that it should be interoperable to communicate and work effectively and efficiently with other system in the exchange of data. Westell (2006) reported that it indicates openness on behalf of the institution or the library willing to contribute to national and international scholarship. Interoperability could be achieved in various ways and on various levels. Suleman (2001) opined that the success of making interoperability depends on vigilance in specification of the protocol as well as standardization of implementation. Peset et al. (2007) reported the current situation of the development of repositories that use OAI protocol for data collection.

Jerez et al. (2004) described multi-faceted application of the OAI-PMH protocol in IDR architecture. Bell & Lewis (2006) described OAI-PMH compliant IDRs as a part of automated export/import process of software components. Whereas, some other authors discussed its metadata formats (Van de Sompel et al., 2004; Van de Sompel, Young & Hickey, 2003). Lagoze & Van de Sompel ((2001) explained its origins in promoting E-Prints including details technical standard for metadata harvesting. Some studies shared practical experiences of implementing OAI-PMH protocol in IDR environmrnt. Warner (2001) showed practical implementation through Perl code to expose and harvest metadata from archives. Prom (2003) described a method for exposing deep, hierarchical metadata from encoded archival description (EAD) files along with different theoretical and practical issues. Kaczmarek & Naun (2005) described the construction of a Meta search service model based on the Z39.50/OAI prptocol. Van de Sompel & Lagoze (2000) described the Santa Fe Convention of the OAI, a set of relatively simple but potentially quite powerful interoperability agreements to facilitate the creation of mediator services in IDR environment. Pieper & Summann (2006) reported the practical activities of Bielefeld University Library in establishing OAI based repository.

Metadata

Selecting standard metadata following global standard for any IDR is essential to describe the content. It describes, explains, locates content for easy access (National Information Standards Organization, 2004). Weibel (1995) provided first major introductions to the basic concepts of metadata usage in the digital library environment. Creating standardized metadata is important as it supports effective search, find and retrieve information from the repository (Pinfield, Gardner & MacColl, 2002; Jones, Andrew & MacColl, 2006; Jones, 2007). Several authors (Burk et al., 2007; Dunsire, 2008; Simeoni, 2004) have explained different key issues, principles and methods of metadata creation and harvesting metadata in digital repository. Other experts (Chilvers & Feather,

1998; Calanag, Tabata & Sugimoto, 2004) explained the necessity and role of metadata in preserving digital objects. A few other studies (Robertson, 2005; Ochoa & Duval, 2009; Park, 2009) put emphasis on good quality of metadata essential for describing content. Currier (2008) has sited an example of current initiatives and standards used in the field of educational metadata. Zschocke & Beniest (2011) introduced methodology of creation of quality educational metadata based on the ISO/IEC 19796-1 standard to describe the agricultural learning resources.

Gibbons (2004) reported that existing IDR systems differ widely in using metadata. Some repositories have implemented additional or extended metadata schemas for domain specific datasets. Although, most of the IDRs follow existing schemas, such as Dublin Core or MARC. A UKOLN article outlined a checklist of guidelines to assist organizations in choosing a metadata schema for a repository (http://www.ukoln.ac.uk/qa-focus/documents/briefings/briefing-63/html/). Park & Richard (2011) discussed the different metadata element for electronic theses and dissertations (ETDs) used at Canadian academic institutional repositories. Day (1999) reviewed recent activities related to the development of metadata schemes for digital preservation. Groenewald & Breytenbach (2011) investigated the awareness of users towards the digital preservation. Dappert & Enders (2008) described practical experiences of combining METS, PREMIS and MODS to represent e-journal Archival Information Packages in a write-once archival system and reported the use of METS structural, PREMIS preservation and MODS descriptive metadata for the British Library's e-journal system.

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