PILOTING AN INSTITUTIONAL REPOSITORY AT A RESEARCH-INTENSIVE UNIVERSITY: 
STRATEGIES FOR CONTENT RECRUITMENT AND THE ROLE OF THE LIBRARY

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ABSTRACT

Objective: This paper describes how a research group at a research intensive university, whose vested interest is in increasing the accessibility of the university’s research output to the world literature, develops a self-sustainable and expandable open access institutional repository (IR). It also reports on how the university recruits content for its institutional repository, and how the roles of librarians would have changed in the process.

Design/methodology/approach - This paper describes the background on how institutional repositories have developed in response to the open access movement. The case of the University of Malaya’s Institutional Repository is described, showing the strategies that the digital library research group employed in recruiting content.

Findings - The paper illustrates the strategies to populate the IR which include encouraging researchers to self-archive papers and capturing pre-existing collections of theses and dissertations. It also describes how the roles of academic librarians would change in the process of building the institutional repository. There are extensions of existing roles in terms of system evaluation, advocacy and reference services. New roles include content recruitment and interpreting policies. It also points out possible directions which can make the repository sustainable.

Practical implications - The paper provides a useful case study to which other academic libraries may refer when they plan to develop their own institutional repositories.

Originality/value - This paper provides descriptions on the changing roles of librarians not covered in previous literature. Discussions on policies, strategies, barriers and challenges will have reference value for academic libraries who want to embark on a similar project.

Keywords: Institutional repositories; Open access digital libraries; Academic libraries; Roles of librarians; Malaysia

INTRODUCTION

Institutional Repositories (IRs) are now becoming a component of the technical infrastructure in research intensive institutions and a favoured option for providing open access to research output. Universities and research institutions throughout the world are investigating, piloting, and developing systems for building collections of digital resources and learning materials in
the shape of open access repositories (Rothery and Bell 2006). Foster and Gibbons (2005) define an institutional repository as “an electronic system that captures, preserves and provides access to the digital work products of a community”. Crow (2002) and Ware (2004) characterise the following features of an IR: (a) It is institutionally defined and it captures only the intellectual property of the host institution such as purely scholarly work, or administrative, teaching and research materials, both published an unpublished; (b) it is open an interoperable and the primary goal is to disseminate the institution’s intellectual output; (c) It is cumulative and perpetual and this carries with it a long term obligation on the host institution to preserve IR content; and (d) it contributes to the process of scholarly communication in collecting, storing and disseminating the scholarly content. As such authors and researchers can deposit materials in IRs, subject to copyright, with the host institution providing the infrastructure for these materials to be properly organized, archived and disseminated.

This infrastructure has emerged since 2002 when major research universities in the U.S.A (such as MIT and Cornell University, using DSpace), and the U.K. (Southampton and Oxford University using E-print) launched their own IR systems. Over the past 4 years, an increasing number of research universities has implemented or plans to implement an IR (Markey et al. 2007). Lynch and Lippincott (2005) found that in the USA, out of the 97 universities categorized as "doctoral universities", 40% already operated IRs. Among non-implementers, 88% were found to be in the planning stage of IR implementation. A survey in 2005 was undertaken at universities in ten European countries – Belgium, France, the United Kingdom, Denmark, Norway, Sweden, Finland, Germany, Italy and the Netherlands (van Westrienen and Lynch 2007). It was found that the number of IRs varies from as low as 1.5% of universities in Finland to as high as 100% in Germany, Norway and the Netherlands, with the focus on acquisition of content almost exclusively on collecting faculty publications. By mid 2006, all Australian universities had established IRs, for the purpose of giving researchers a vehicle to enhance the availability of their publications by making them available via open access (Henty 2007). On the other hand, studies on IRs in Asia revealed that open access repositories are not widespread in China (Fang and Zhu 2006) and that universities in India are at present lacking in infrastructure for establishing IRs (Fernandez 2006).

A few research universities in Malaysia have established, or are partway to establishing IR services with the aim to enhance the visibility and the impact of the research generated within that university. The development of the IR services is related to the open access movement in Malaysia, which seeks to make valued research outputs openly available by encouraging academics to place their publications into repositories, enhancing their availability and visibility to the global academic community and increase the chances for use and exchange of ideas among scholars within similar disciplines (Abrizah et al 2007). At the same time, university research increasingly involves the use, generation, manipulation, sharing and analysis of digital resources. However, not every institutional repository in Malaysia adopts the principle of open access and it is possible for the institution to restrict the access to its member (www.opendoar.org). The University of Technology Malaysia (UTM) and the National University (UKM) for example allows access to some theses and dissertations to members of the institution only. This characteristic fits Clifford Lynch’s framework of institutional
repositories - ‘a set of service that a university offer to the members of its community for the management and dissemination of digital materials created by the institution and its community members’ (Lynch 2003). Three out of the 15 Malaysian archives that have joined forces in the open access movement in Malaysia (Figure 1) and registered with the Registry of Open Access Repositories (ROAR) (http://roar.eprints.org) have been initiated by the research-intensive university focused in this paper – the University of Malaya.

This research is concerned with understanding the strategies that advance and influence institutional repository (IR) development. The aim was to learn about the conditions that facilitate and challenges of IR initiative at the University of Malaya, and understanding the role of the academic library in providing this research infrastructure. There are some research studies which are close to this goal. In order to understand the requirements to provide an IR that will preserve and disseminate research materials created by or associated with a research intensive university, the present study began with an extensive search for information concerning content recruitment through faculty’s contribution towards open access publishing and institutional repositories. It was apparent from this review that there has been research which focused on the needs and potential contribution of faculty, as well as the librarians’ roles in this area.

Figure 1: Malaysian Archives, initiated by the University of Malaya (DSpace@UM, Malaysian Abstracting & Indexing System and MyManuskrip), registered with the Registry of Open Access Repositories
LITERATURE REVIEW

In research universities, IRs are predicated on contributions by their stakeholders which include both academic and non-academic staff; those involved in teaching and research; and both postgraduate and undergraduate students. Each of these groups contains potential authors and readers of the materials in IR, and the contributions of authors, are critical to the success of an IR. As such whether or not IRs become a part of the intellectual infrastructure depends on the extent of the university’s community contribution. Shearer (2003) argues that the success of an IR should be determined by its use, and one of the measures of usefulness is contribution of content. Faculties are typically best at making a major contribution to an IR, by creating, not preserving, new knowledge, because they are becoming so involved in producing scholarly works and participating in the evolving scholarly communication process. As IRs are flourishing to preserve scholarly output and to make it openly accessible, more and more faculty members are in favour to provide open access to the universities’ research output, maintained either institutionally or on a subject basis. Faculty contribution is considered one of the success factors for an IR even though several studies have found low rates of faculty submission (Chan 2004; Foster and Gibbons 2005; Pelizzari 2005; Davis and Connolly 2007). These studies found that the challenges for an IR are not in the technical implementation but in affecting the culture changes necessary for it to become an integral part of activities of the research institution. Cultural rather than technological factors limit the use and development of IRs. Literature suggests that ingrained behaviours, inertia, indifference and resistance to change hamper the adoption of the working practices needed to support the IR (Ware 2004).

While institutional repositories are becoming more prevalent in academic life, the disappointingly small number of materials in them reflects worldwide trends. Davis and Connolly (2007) reported that Cornell's IR is largely underpopulated and underused by its faculty as the Cornell faculty have little knowledge of and little motivation to use the repository. Van Westrienen and Lynch’s (2005) European survey also reported low faculty participation in IRs. Their article identified several reasons for non-participation from faculty, including: (a) Difficulties informing faculty and convincing them to participate; (b) Confusion and uncertainty about intellectual property issues; (c) Scholarly credit and how the material in IRs would be used; (d) The perception of Open Access content being of low quality, and (e) A lack of mandatory policies for depositing manuscripts. Correspondingly, Swan and Brown (2005) who investigated author self-archiving behavior found that there was a substantial proportion of authors unaware of the possibility of providing open access to their work. Only 30% of the 1296 respondents using specialized OAI search engines to navigate the open access repository and only 10% of authors knew of the SHERPA/RoMEO list of publishers’ permissions policy with respect to self-archiving. More people opted for putting their work on a website than have used institutional or subject-based repository. However a vast majority of authors would willingly comply with a mandate from their employer or research funder to deposit copies of their articles in an institutional or subject-based repository. Swan and Brown (2005) found that authors’ reluctance to self-archiving their work were due to the perceived time required and technical difficulties in carrying out the activity.
Although a number of studies have investigated the attitudes of authors with respect to open access publishing and institutional repositories (IRs), none have however viewed other institutional stakeholders. Academic libraries, in particular, are a group that can make a major contribution to an IR. Academic libraries are becoming so involved in managing electronic scholarly products and participating in the evolving scholarly communication process. They do not only acquire electronic resources, but also create them. Libraries are being funded to digitize valuable parts of their special collections especially theses and dissertations, both to preserve the original and make the content readily accessible. As IRs are flourishing to preserve scholarly output and to make it openly accessible, more and more academic libraries are in favour to provide open access to the universities’ research output, maintained either institutionally or on a subject basis.

Open access and IRs may result in considerable savings for libraries besides the potential benefit for authors of greater exposure to their works. Although the future shape of scholarly communication in IRs remains unclear due to its lack of contribution by the stakeholders, what is clear is that library and information professionals have key roles to play (Chang 2003; Allard, Mack and Feltner-Reichert 2005; Chan, Kwok and Yip 2005). Chang (2003) proposes that it is necessary for librarians to be conversant with digital collection management and open archive information system management skills. Library staff need to be trained to prepare documents in an acceptable format and to submit content to the repository. Allard, Mack and Feltner-Reichert (2005) found that IRs provide librarians with new challenges because self-archiving makes the authors more active partners in collection development, and because the librarian may become the steward of unique collections that grow rapidly because of author contributions. In her analysis of 30 scholarly literature on IR, the author found that nearly one-third of the articles did not mention how a library is involved in the IR effort. Even those who did note that libraries had a role in the process did not always explicate how the library would be involved. The areas that were mentioned as involving the library included IR creation and maintenance. Chan, Kwok and Yip (2005) on the other hand, illustrate how the roles of reference librarians are changed in the process of building the institutional repository. There are extensions of existing roles in terms of system evaluation, advocacy and reference services. Brand new roles include content recruitment and interpreting publishers’ policies.

Librarians are in an ideal position to act as change agents in the promotion of their own university’s IR as well as other IRs as potentially valuable sources of information for their clients. Bauer (2005) points out that marketing the IR is critical and that marketing it to the librarians should be the first step in promoting the IR on campus because without their support, it will be difficult to achieve broader acceptance on campus. One responsibility of academic library reference team is to show the academic staff and students in their university how to find and use information. Hence, librarians are ideally placed to act as change agents promoting the IR as an information source (Revell and Dorner 2009).
OBJECTIVES AND METHOD

The objective of this research project was to identify strategies and conditions that advance and influence IR development. The aim was to learn about the conditions that facilitate and challenges of IR initiative at the university that had made substantial commitments to developing and sustaining an IR. Questions to be answered are: (a) What does faculty think about making their intellectual output available through an Institutional Repository?; b) What are the strategies that the university can employ to populate the IR with its research output?; and (c) How do librarian intermediaries contribute to the IR development process?

The study has provided fruitful territory for exploring this question, with data collected directly from the experience of the repository developers, the faculty and librarians associated with IR efforts. Data-gathering techniques employed to answer the research questions are from:

a) A web-based survey to investigate (a) the issues in establishing a facility to provide open access to research materials such as level of knowledge, motivation, participation, partnership, ownership and management, and (b) the potential of an IR and the requirements of a good digital repository in allowing faculties to cooperatively develop and upload the resources to the institutional repository. An e-mail invitation to participate in the survey was sent out internally to all academics (around 800 of them) within the university, which has piloted an IR in 2008. The e-mail, which contained a hypertext link, enables the participants to link to the survey database hosted by SurveyPro (www.surveypro.com). The survey instrument consisted of 6 sections: (a) awareness and knowledge of IR as well as current IR contribution; (b) usefulness and importance of IR; (c) self-archiving experience; (d) future IR contribution; (e) reasons and concerns for contribution; and (f) demographic.

b) Interviews and discussions during formal and informal meetings with groups of people have played important roles in building the IR. Information on the additional features that the IR should have and the roles that librarians would want to play in an IR service was obtained through a library workshop on IR collaborative content development.

c) Personal observations and experiences through formal and informal encounter with individuals who are potential users and submitters of the IR. Information on issues such as access and copyrights was obtained through telephone calls and e-mails from these people.

As a case study, the study was designed to be illustrative and to capture a range of development approaches and experiences to suggest areas for further research. The results presented here are not intended to be representative of the full range of IR development activities; however, the analysis does provide a useful base of findings that can inform and guide academic libraries as they make decisions about priorities and approaches to development for their own IR initiatives.
SETTING UP THE INFRASTRUCTURE

The university’s IR started with the basic premise that the scholarly output of researchers is an institutional intellectual asset, one that should be carefully guarded and preserved for posterity. Although in most cases, researchers have transferred the copyright of their publications to the publishers, they may still exercise their self-archiving rights to make their scholarly work openly accessible if all publishers’ requirements are complied with. Once this principle has been agreed upon, gathering university and library-wide support for the project was easy. The following groups of people have played important roles in building the IR. They have been engaged in all stages of its development: the definition of goals and scope, evaluation of system and content, forming strategies and procedures, interpreting submission policies, contacting and servicing faculty:

a) The Digital Library Research Group: The Digital Library Research Group (DLRG), positioned under the Library and Information Science Unit, Faculty of Computer Science & Information Technology, University of Malaya (http://www.fsktm.um.edu.my), is committed to research and provision of information infrastructure for digital resources to be properly organized, archived and disseminated. Some of its ongoing research projects are the Malaysian Abstracting and Indexing System (MyAIS) (http://myais.fsktm.um.edu.my), the Digital Library of Malay Manuscripts (MyManuskrip) (http://mymanuskrip.fsktm.um.edu.my) and the university’s Institutional Repository (UMDSpace) (http://dspace.fsktm.um.edu.my) (Figure 1). The research group leader, Professor Zainab Awang Ngah, spoke about the need for universities and research institutions to handle their own digital repositories in her inaugural lecture in 2006 entitled “Scholarly Skywriting: E-print Archives and E-Journals, Panacea or Problem?” The idea of establishing an IR at the university then grew from a funded research in 2008 to investigate the issues in establishing a facility to provide open access to research materials such as level of knowledge, participation, partnership, ownership and management, and (b) the potential of an IR and the requirements of a good digital repository in allowing faculties to cooperatively develop and upload the resources to the IR. An outcome of the research is an IR to support for a new pattern for scholarly communication, apart from surfacing UM’s 'hidden resources' (which have not been tapped on large scale so far) and low cost interoperability among various faculties’ web portals. It is expected that this IR will increase the accessibility of scholarly works, which exist in digital format and make UM’s contributions to world literature more visible. Materials can be accessed more widely and also exploited for purposes different from those that originally motivated the creation of the repositories. An additional incentive is the potential for cost-saving inherent in new models of the scholarly communication process that could be supported with this approach. Such a system is becoming necessary so that the university can gauge her publication performance at both individual and institutional levels, and measure the research output. It can provide a better knowledge of the university’s output from research activities funded by national and international various organizations and improved information utilization for end-users.
b) **Department of Systems & Network, Faculty of Computer Science & Information Technology**: There are many routes to engagement and many strategies for service deployment to support repository services, among others in-house development and deployment, collaborative or partnering approaches, and contracting for services (Association of Research Libraries 2009). This research project employs in-house development and deployment of the IR since open source applications are available (e.g. DSpace, E-print or Fedora) making it possible to get a repository up and running with quite modest resource investments. In the early stage of the project, the DLRG partnered with their systems and network colleagues to evaluate two digital library softwares, Eprints and DSpace. The two systems were evaluated by comparing and contrasting them based on a number of criteria: database structure, interface, search capabilities, special features, software requirements, speed and reliability, and export options. Advanced search and sort options were only available in Eprints, but DSpace supported browsing by more search fields. Eventually, DSpace was DSpace, mainly because it represents knowledge through communities and collections; i.e. DSpace is organized into communities, a high-level organizational structure whose only purpose is to divide collections into related groups, and each community contains one or more collections, which are containers for related items (deposited object of any type: a published article, an image, audio, or video file, notes, a presentation, etc.). Both groups found that this structure for organizing information is very suitable for a research institution. Moreover, it was reported that nearly 80% of those with institutional repositories were using a local deployment strategy and more than half of them were using DSpace (Lynch and Lippincott, 2005).

c) **The University Management**: Institutional support is vital for the sustainability of any IR. The university management has agreed to mandate open access self-archiving. A letter from the Vice-Chancellor to all Deans and Directors dated 2 March 2009, required the Faculties, Academies and Institutes to submit softcopies of theses and dissertations to the Head of Information Systems Department at the library to be deposited in the IR developed by the DLRG.

d) **The University Library**: The librarians have been engaged in various stages of the IR development: the definition of goals and scope, evaluation of system and content, forming strategies and procedures, interpreting publishers’ policies, contacting and servicing faculty members, acquisition of content, and promotional efforts. Content recruitment for the IR has been set up in liaison with the university library. The Chief Librarian and her Deputy stepped up and volunteered to be part of the IR initiative, motivated by their belief in open access principles. They participated in advisory boards that crafted guiding policies on preservation, submission procedures, and collection scope, and they developed and implemented plans for generating repository awareness. A few librarians were also involved in evaluation and testing of repository functionality and interface design through a special workshop organized by the library.
The Institute of Postgraduate Studies: The Institute of Postgraduate Studies (IPS): Engaging in digital repository to surface the university’s postgraduate students’ research output is also high priority for the IPS, one that will be essential for maintaining the institute’s value in a research university. IPS has facilitated submission of the digital copies of theses and dissertations on CDs from faculties to be passed to the library for archival purpose in the IR.

ISSUES AND STRATEGIES FOR CONTENT RECRUITMENT

After setting up the infrastructure, the main focus is on getting content into the IR. After continuous content recruitment of the IR’s testbed of theses and dissertations by the Faculty of Computer Science & Information Technology community, the DLRG works on a wider content recruitment approach and user-support structure. The web-based survey concerning faculty’s self-archiving experience and IR adoption (Abrizah 2009) revealed that 73 (55.7%, n=131) academics of the university had deposited their research/teaching materials on publicly accessible web sites as well as other open access digital repositories. All these self-archiving respondents know what open access meant, 47 (64.4%) were aware of the university’s IR and the majority (65, 89.0%) planned to contribute to it. Therefore, most respondents had some IR awareness, and a majority of those who planned to contribute, already had experience with self-archiving. Out of the 73 respondents who had self-archiving experience, 3 (4.1%) had self-archived their work for more than 5 years, 9 (12.3%) had done so for 3-5 years and an additional 14 (18.2%) had 1-3 years experience. The majority (47, 64.4) had deposited their work in publicly accessible web sites for the past one year. When asked about the frequency of contribution to IRs in an open-ended question, one respondent reported the frequency of contribution to the web site of his faculty saying, "I have been contributing through my faculty's web site for years." Nine respondents who were aware of the university’s IR, planned to contribute in the future, and already had self-archiving experience in other open access venues such as arxiv.org, E-LIS and MyAIS (myais.fsktm.um.edu.my), the open access system for Malaysian scholarly publications. One professor indicated depositing various versions of his scholarly articles to a particular open access repository “whenever the papers have been submitted for review and have been revised”.

Based on the findings, it has been decided that the DLRG replicate Foster and Gibbon’s (2005) strategy for content by working with a small IR early-adopter group from other Faculties and networking from them to their colleagues. Ten academics from science-based faculties and invited them to participate in submission and evaluate the DSpace IR. However, only one responded and agreed to participate. This science researcher set up his research sub-community, and populates it with twelve items under a collection in two weeks time. However, for unknown reasons, the collection was deleted a few months later. It was found that the researcher did not want to “make his collection publicly available any longer” (anonymous, personal communication, November 26 2008) and decided to remove the items. This demonstrates a misunderstanding of the way an IR operates and the unawareness that the
system has the feature to allow access to the items and collections to members of the institution or community only.

In the web-based survey (Abrizah 2009) the researcher elicits 131 faculty response to a requirement from the university or research funder to make their work open access by self-archiving in the university’s IR. A total of 52.7% (69) respondents would comply willingly, 47.3% (62) would comply reluctantly. None would not comply. The finding clearly indicated that a mandate from an institutional employer or a research funder to self-archive would meet with very little resentment and even less resistance from the respondents. This study supports those by Kim (2007) and Swan and Brown (2005) who opined that if employers and grant funders encourage self-archiving, authors or researchers would consider depositing their work into IRs. If not, they would have lack of motivation to contribute to the IR. The researcher views that it would also make a tremendous difference if the university management could strongly encourage faculty members to self-archive, instead of the submission done by a librarian intermediary.

What make faculty reluctant to contribute to IRs? In order to investigate this question, the 65 respondents motivated to contribute to the IR in the web-based survey had to respond to the 28 statements regarding their concerns about self-archiving. Overall, many faculty members disagreed with the statements presented as “deterrents of self-archiving” (Pickton 2005). The top three deterrents for more than 70% respondents include: “I am concerned about other publishers owning the copyright of previously published material” (75.4%), “I am concerned about plagiarism” and “I am concerned that others might copy my work without my permission” (73.8% respectively). As such, concerns about copyrights and plagiarism might impede self-archiving. This issue has also been expressed by faculty and students who contacted the researcher through e-mails indicating that “the theses should be accessed only in campus networking using username and password to eliminate copy and paste and for security reasons” (Chin, H.L. personal communication October 5 2009) and “it is not a good idea to have the whole dissertation available full-text as students can easily plagiarize the contents (Yu, M.L. personal communication May 5 2009).

In addition, more than half of the respondents in the survey disagreed with the following statements reflecting pre-print culture, publishers’ policy, trust of readers and preservation as the reasons for not contributing to IR:

a) I do not want to put my work with work that has not been peer-reviewed (55.4%; 36)
b) I might want to change or delete my work (66.2%; 43)
c) I am concerned that if I deposit my work in the University’s Repository I may not be able to publish it elsewhere later (55.4%; 36)
d) I am concerned about the effect of open access repositories on journal publishers (67.7%; 44)
e) I am concerned that others might alter my work without my permission (67.7%; 44)
f) I am concerned about the long term feasibility of the repository (66.2%; 43)
g) I am concerned that my work might not be preserved in the long term (63.1%; 41)
This result suggests that the respondents might be more concerned or skeptical about the quality and secure maintenance of open access materials. As such, IRs might have to emphasize their function of facilitating the pre-print culture and of long-term preservation and explain how these would be accomplished. Although the quantity of deposited content is one indicator of successful recruitment, quality is also necessary for repositories to further the cause of open access. Students, as well as their research supervisors, were concerned of the quality of their work that is available on open access. A faculty member, during an academic meeting, expressed her concerns that the “quality of some students work [dissertations] might not be appropriate for it to be available on open access”.

The researcher also has expected that 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. However, the Vice-chancellor has made it a requirement that each faculty submits the softcopies of theses and dissertations to the library and the library will deposit the resources in the IR developed by the DLRG. As such, it has been decided that the IR will only include theses and dissertations. Through a discussion with the librarians, it has been agreed upon that populating the IR is not yet incorporated in the standing workflow and processes of the library, as “the system is not yet owned by the library” (Deputy Chief Librarian, personal communication, Feb 27 2009). The Library maintains an electronic catalogue of theses which provides the metadata and abstracts, of all the Masters and PhD theses produced at the university. To simplify workflow, the IR librarian suggested that “the DOI be linked to our Pendeta WebPAC when our catalogers do the inputting of each thesis in the library catalogue” (Head of Information Systems Department, personal communication, Aug 8 2009). A mechanism has been established to capture new theses on a regular basis. Depositing is currently done by the DLRG, and would be likely to be taken care of by the librarians later. Table 1 presents the results of piloting the university’s IR which has provided the strategies for content recruitment.

Table 1: Results of Piloting the IR after 1 Year

<table>
<thead>
<tr>
<th>Type of Content</th>
<th>The main focus of the IR holdings is on textual material. Contains Theses, Dissertations, Conference proceedings (organized by the university), and articles deposited by research groups.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality control policies</td>
<td>Submission buffer monitored by the digital library research group.</td>
</tr>
<tr>
<td>Copyright policies</td>
<td>Submitters must “sign” (i.e., click through) a distribution rights agreement that affirms that the submitted item does not infringe on copyright or that copyright clearance has been obtained</td>
</tr>
</tbody>
</table>
| Archiving policies | a) Self-archiving by faculty who are members of a recognized “community” within the University.  
b) Opt-in vs. opt out policy – to secure their consent, students are given a form to include theses and dissertations in the IR, and the choice of making them either public or private access  
c) Governance licences |
**Advocacy**

Demonstrations performed at the internal level to faculty members and workshops to librarians.

Also planning to put more information on the library website regarding IR and open access.

Presentations about IR to Library and University committees and to departments identified as potential early adopters.

IR staff from the library will begin solicitation of other faculties.

**Involvement of Academics**

None so far.

**Delivery process**

Populating the IR is not yet incorporated in the standing workflow and processes of the university. Depositing is currently done by the DLRG, and would be likely to be taken care of by the librarians later.

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**IMPLICATION ON LIBRARIANS’ ROLES**

Although IRs are gaining in momentum throughout academia, the faculty in this study seems to be cautious regarding IR contribution. The concerns relating to IR among the faculties reflect to some degree the way in which repositories have developed in Malaysia, where for the most part IRs have been introduced for the worthy purpose of giving researchers a vehicle to enhance the availability of their publications by making them available via open access. The study has identified the following roles of librarians to make the IR service and content recruitment a success:

**a) Understanding the software used:** Although IR technology was not a strong focus in the IR literature (Allard, Mack and Feltner-Reichert 2005), it is very important that librarians have a full working knowledge of the software features. Tasks such as a database evaluation, by comparing and contrasting the IR systems available based on criteria such as database structure, interface, search capabilities, special features, software requirements, speed and reliability, and export options need to be done before the final selection of the software.

**b) Publicity and advocacy of IR:** The success of open access archiving in expanding access to scholarly works depends significantly on the author’s knowledge of open access, and the ready availability and accessibility of archives to authors. As Papin-Ramcharan and Dawe (2006) plainly put it “If authors are unaware of the existence and benefits of archives then they cannot self-archive.” The faculties in this study are poorly-informed on institutional repositories. Almost two-third does not know if their institution has one. This low level of awareness may results from one current strategy used by the university library to populate its repository in which librarians collect and deposit materials on behalf of faculty members. The deposited items are generally post-prints, such as conference papers and journal articles. Therefore, faculty members may not realize that their materials are already in the library’s repository. The other reason is that the IR of the university has just been deployed and has not been widely publicized. As such, the librarians need to approach the faculty in a number of ways: on a one-to-one basis through informal conversations, small group discussions, departmental or faculty visits through the liaison librarians, and campus-wide promotion.
c) **Establishing an institutional mandate:** All faculty respondents in this survey would comply with the university or research funder that required them to deposit copies of their scholarly work in the university's repository. As institutional repositories exist to serve the institution and funding bodies, rather than the individual, several institutions around the world have implemented such a mandate as recorded in the Registry of Open Access Repository Material Archiving Policies (ROARMAP). An institutional mandate might be successful in producing Open Access for the research intensive university in this study. There have been evidences demonstrating that institutions that have a mandatory policy have high proportion of published articles self-archived (Sale 2006), compared to those that have only voluntary policies (Suber 2006). The library need to discuss with the university’s top management regarding mandating submissions in the IR and establish the self-archiving policies. Genoni (2004) suggests that librarians should play the role of a content manager and establish relevant policies which cover what to include and exclude; and how to determine copyright ownership for different types of documents.

d) **Educating faculty regarding self-archiving issues:** The commonly expressed concerns regarding self-archiving are copyright and plagiarism. Considerable work has been done on copyright in association with the use of repositories to enhance the open access for research outputs, especially published articles. Librarians need to seize every opportunity to inform the faculty members of the open access movement, the trends of open access publishing, and increasing governmental and organizational support for IRs. Faculties need to be informed that over 90% of journals explicitly permit authors to self-archive their articles (Swan and Brown 2005), in most cases as postprints (after peer review, in the form of the author’s final submitted manuscript). Educating the faculty regarding self-archiving issues need to be undertaken to highlight the motivations for using the IR and reassure faculty who may be worried about the deterrents. As such, to facilitate faculty to make an informed decision to deposit their work, the university’s IR would provide FAQs covering the following areas: ownership of copyright, protection of rights using Creative Commons license, plagiarism and file security. The IR would also need provide a link to the SHERPA/RoMEO list of journals’ publishers’ self-archiving policies (http://romeo.eprints.org).

e) **Submission review for content and metadata:** When faculty self-archive, they will also be submitting metadata. In an IR environment, librarians have to be responsible to determine the acceptable resources, metadata standards, review the content as well as the quality of metadata described by the authors. 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. As such librarians have to be incorporated in the standing workflow and processes of populating the IR.

f) **Training of authors:** authors are a very important aspect of the IR. Librarians must actively pursue their role as educators to work with authors of intellectual works who will be contributing to the IR. This is a natural extension of the user training that librarians have provided for decades. Education would include helping the university community learn to use IR software for self-archiving. In addition, the training should include topics related to creating documents that can be more easily maintained in a
digital environment, to issues surrounding digital preservation and to providing guidance concerning metadata.

Populating the university’s IR through self-archiving has been a painfully slow and uphill process, similar to the process described in Chan, Kwok and Yip (2005). The IR started in January 2008 with a small collection of computer science theses and dissertations. They are mainly PDF files. Faculty members through official letters signed by the Vice-Chancellor are invited to submit to the IR. The response was not encouraging; only twelve submissions were received in the first three months after the IR was implemented at the faculty level in June 2008. The total number of direct submissions reached 64 by the end of 2008, by no means an encouraging figure. The author has reasons to believe that the academics have busy schedules, and will consider self-archiving extra administrative work, however many understand and support the idea of open access and IRs. Therefore more aggressive strategies were adopted to populate the IR when faculty made it mandatory for students to submit an electronic copy of their theses and dissertations, and the Digital Library Research Group initiated the submission of these resources in the IR. At the time of this study, the university’s DSpace held 476 items, which were organized into 17 collections within 18 communities and sub-communities. The IR has been piloted as a university-wide structure and publicised with an established skeleton of communities and collections already in place. However, only 7 faculty communities have been populated and 61% of these communities remain empty. Known as DSpace@UM, it is now available at http://dspace.fsktm.um.edu.my.

CONCLUSION

The paper reports on the strategies in establishing a facility to provide open access to digital resources, and allow faculties, organisations, and individuals to cooperatively develop and upload the resources to the IR. The results identify the approaches used by development teams in advancing IR system and services in the university and the roles and competencies required in this new kind of professional library work. The analysis also includes important faculty perspectives on the value of IRs within the changing scholarly communication landscape, drawn from web-based survey with faculty depositors and interviews with librarians affiliated with a range of academic departments. The bottom-up strategy initiated by the research group involved in the implementation was first to publicise the potential benefit of the IR, apart from surfacing UM’s 'hidden resources' (which have not been tapped on large scale so far) and low cost interoperability among various faculties’ web portals. Since the IR is indexed by Google and GoogleScholar, it helps to increase the accessibility of scholarly works, which exist in digital format and make UM’s contributions to world literature more visible. Materials can be accessed more widely and also exploited for purposes different from those that originally motivated the creation of the repositories. Moreover, the possibility of accessing this repository enables the construction of new kinds of services that can better serve the needs of the learning community. The academic librarians will face a new challenge with IR since acquisition, a key aspect of the collection management process, is placed in the hands of the university community through the act of self-archiving. In fact, to populate an IR with content,
faculty and students are actively encouraged to contribute their intellectual works. This characteristic of the IR suggests a fundamental shift in the collection management process, since authors of intellectual works are now responsible for selecting items that will be added to the collection, and for creating the initial surrogate record that facilitates access. The study, based on a small set of survey data, has presented findings on faculty awareness and their use of open access repositories, the advocacy undertaken, and issues that may influence faculty's motivation for IR contribution, which will lead to the actual deposit into the IR. Findings suggest that over one third of the faculty respondents are unaware of open access and IR, or are aware of its existence but remain detached from it. However, faculty’s’ attitudes to the open access movement and IRs are generally positive – the majority acknowledge the importance of an IR and like the idea of making their intellectual output available through the university’s IR. The concerns faculty has regarding IR contribution implicates that librarians have an important role to play with regard to the relationship with self-archiving authors. The paper has identified the following roles that are of the responsibilities of librarians in an IR environment: (a) Understanding the IR software used; (b) Publicity and advocacy; (c) Establishing an institutional mandate; (d) Educating faculty regarding self-archiving issues; (e) Submission review for content and metadata; and (f) Training of authors.

Based on methodical IR development informed by best practices in the Open Access community, as well as findings from this study, have been used for repository design customizations and functionality enhancements that complement the needs, interests and concerns of the faculty. The IR development has been aimed at achieving near-term goals for building content and services in close consultation with faculty. The testbed is a collection of theses and dissertations by the Faculty of Business and Accountancy, Faculty of Computer Science & Information Technology, Faculty of Education, Faculty of Languages and Linguistics, Faculty of Law, Faculty of Medicine and Faculty of Science community. Future work will involve promoting DSpace@UM to other faculties in the university to create communities and collaboratively develop collections of peer-reviewed post-prints of scholarly articles, image and video objects, learning objects, theses and dissertations. It is hoped that more communities, especially within the science-based faculties will be established in the IR. This is due to the fact that those publishing in the sciences such as molecular biology, physics, mathematics and computer science and were the most likely to have published their work via an open access repository, as reflected from the open-ended responses in the web-based survey, which listed Genbank, EMBL, MiRbase, arxiv.org, and E-LIS as the avenues for archiving (Abrizah 2009).

Preliminary findings has shown that an IR, is an extremely worthwhile endeavour, and is a viable proposition for the University’s support for a new pattern for scholarly communication, apart from surfacing its scholarly works and low cost interoperability among various faculties' web portals. It is hoped that this IR will increase the accessibility of scholarly works, which exist in digital format and make the university’s contributions to world literature more visible. However, as evidenced by other studies (Davis and Connolly 2007) and verified again by this initiative, faculty output is snailing through into the university’s IR and has not found its way there in large numbers (see http://dspace.fsktm.um.edu.my). The prevalence of peer-reviewed
work nationwide and the well-documented difficulty of recruiting works of any type are not currently facilitating significant inroads in the open access movement. However, at this stage, the success of the institution in implementing an IR, as gauged by the criteria in this study, should provide hope to later entrants into the community and should influence the way we evaluate the potential of these repositories in Malaysia.

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