THE ESTABLISHMENT OF INSTITUTIONAL REPOSITORY : A BRIEF COMPARATIVE STUDY BETWEEN THE NATIONAL UNIVERSITY OF MALAYSIA AND THE UNIVERSITY OF LIVERPOOL

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ABSTRACT
The implementation of an institutional repository has never been an easy task since there are challenges that need to be addressed in the pre-implementation process. There are various factors that can interfere with the smooth development of the IR. Awareness, budgeting, technology and human factors such as staffing and depositors' behaviour all become part of the challenges. Even with thorough planning, there is no guarantee that the IR will work smoothly as there are various post-implementation issues awaiting. As a result, institutions must provide solution plans to overcome all these challenges. This article is a brief comparative study on the challenges and issues experienced by the National University of Malaysia and the University of Liverpool on the establishment of an IR. The discussions are centered on issues such as depositors' behavior, management, access and sustainability.

Keywords: Institutional repository; e-ReP; University of Liverpool; Universiti Kebangsaan Malaysia

INTRODUCTION

Archives, libraries and museums are manifestations of cultural institutions. Dempsey (2000) upholds these collections as ''memory institutions'' due to its nature of storing the memory of communities, institutions and individuals, scientific and cultural heritage. According to Rothery and Bell (2006, p.123), institutional repositories or IRs have become one of the major instrument in research intensive institutions. They added that universities and research

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institutions all over the world are working on research and development of digital resources and learning materials in the form of e-repositories.

From a Malaysian's perspective, Zuraidah (2010, p.110) noted that all institutions are looking for new and creative ways to stay competent in the fast changing information, communication and technology (ICT) industry. She added that "with ICT, information that was traditionally kept in paper format can be digitised and stored in the system and made publicly available. The idea of providing and presenting information via electronic means and formats truly fascinates managers of information agencies worldwide. Presently, cultural institutions are actively connecting their collections to these emerging knowledge networks. They are creating innovative network services based on digital surrogates of their current collections in a rich, interactive digital environment".

IRs' main goals are to be a reliable platform for collecting, preserving and disseminating in digital form, academic and intellectual works. The objectives for having an IR in a university environment are:
1. to establish global access to university publications,
2. to create a "one-stop centre" for information on academic publications, and
3. to preserve the academic heritage through digital content.

THE IMPLEMENTATION
The idea for the IR implementation at the National University of Malaysia (UKM) came about in 2006 whilst preparing the research reports for the Research University Audit. A special committee was formed and given the responsibility of preparing the reports.The Library was included in the committee and was given the task of preparing the report on academic publications. Whilst doing this, the Library struggled to complete the task due to multiple challenges. In the worst case scenario, the Library itself did not hold complete collections of their academicians' publications. At that point in time, information on academic publications was scattered in various resources. The Library had to hold numerous meetings with various parties just to find out about the information they possess.

While preparing the report on academic publications, the committee suggested that it was the right time for the university to have a "one-stop centre" for all information on academic publications. Again, a special committee on IR was formed with the PPA as the secretariat. The core member of the committee is the Centre for Information Technology (CIT), Centre for Research and Instrumentation Development (CRIM) and the Library, and representatives from faculties joined the meeting on a temporary basis. As expected, there were

clashes of opinions among the committee members. For instance, the academicians wanted a system that is similar to well-established e-journal databases. At the same time, copyright and other principles of information management become the main concern for the librarians. Meanwhile, the IT personnel were in two minds whether to hire private system specialists or to opt for in-house development.

The University of Liverpool (UoL) experienced a similar situation when they began their IR project. The establishment committee obtained full backing which includes funding from the University Research Committee and the Information Services Committee. The University has set the objectives for the establishment as follows:

1. Build an IR which would provide increased access and visibility to the research outputs of UoL worldwide,
2. Provide a means of showcasing the research outputs of UoL in order to enhance its prestige and increase the citation rate of UoL staff, and
3. Provide a one-stop shop for all to access the research output of UoL.

According to Jackman (2007, p.36), although the project has won the confidence from a select group of senior academics, the majority still need to be made aware of the benefits of an IR. Within the early establishment period, UoL successfully maintained a series of dialogues in order to develop a system that will serve the needs of the academics.

INTRODUCTION OF eREP

The committee then decided that UKM need to develop a new system for IR with all the functionality needed by the university namely a multi-tasking system that has a role as a "one-stop centre" for all information on academic publications of UKM academicians. The library and PPA were given the responsibility of designing the system specification before handing it to CIT for the technical development. CIT took approximately three months to come up with a prototype and a series of meetings were held for system improvement before it is ready for the pilot phase.

In September 2007, the system was named e-Penerbitan and was in the pilot phase until December 2007. During the pilot phase, the academicians were given an option of whether to register their publication under SMK (UKM Staff Information System) or they can venture into a new experience by registering their publication in e-Penerbitan. The library was given the mandate to become the administrator for the system, while CIT will continuously work on the technical aspects. In 2009, e-Penerbitan was renamed eRep.

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In contrast, UoL started their "Research Archive" pilot project with small scale audiences. They pre-identified nine academic departments with different academic disciplines, and these faculties represented all faculties in the pilot project in order to learn and study the issues and challenges. The pilot faculties can freely decide on their content submission which was later retained as content contribution practice after the pilot project ended. In 2008, eRep was given the mandate by the university, and it becomes mandatory for every academic staff to deposit their academic works into the system. In garnering the support from academics, the library staff approached them via effective advocacy strategies.

TECHNOLOGICAL ASPECTS

Nowadays, most IRs are developed using open source software such as Eprints, DSpace, and Digital Commons (Chapman, Reynolds and Reeves, 2009, p.311). The majority of the open source software has the capability to support various formats of information such as audio, image, video, and most commonly, text documents. UoL decided to "follow the crowd" by opting for open source initiatives software. UoL chose Eprint as the software for their "Research Archive". In contrast, open source software was rarely mentioned in the discussions during the eRep pre-establishment process. Furthermore, UKM had never had any experience in developing an information management system based on an open source software. Based on eRep's multi-tasking functionality, it is easier to start from scratch and CIT confidently suggested that they are capable of developing a system.

eRep was developed using the programming software ColdFusion MX7 and its database management was supported by Informix and MySQL which enables the database to manage its saving and uploading process. CIT decided that the suitable server for eRep is the Dell PowerEdge 2850 which is operated by Intel Xeon 2.8GHz as its central processing unit (CPU). The server supplies 2GB memory and has a capacity of 68.24 GB on its hard disc. The server for storage and database is also using the server from the same series but its CPU is on 2X Intel Xeon 38.GHZ with 4GB memory and a bigger hard disc capacity at 270GB. The system took almost six months to be fully operational and undergo its pilot phase. However, the ongoing upgrading process is still continuing as it needs to satisfy its user needs and to ensure its sustainability.

As the key player in the establishment committee and the administrator for eRep, the Library plays a major role to ensure that eRep can be accepted by the academic community of the university. The Library has put a lot of effort in organizing a number of programmes distinctively to ensure that eRep is a successful project. The road shows on eRep were launched in parallel with the Library's outreach programme. As a result, a series of trainings, workshops, meetings, talks and advocacy on eRep was successfully conducted and in

addition, the Library was in demand for advance advocacy and training sessions for the faculties.

UoL's librarians also maintained similar roles in the implementation of the university's IR. Looking back at their establishment history, the "Research Archive" was initiated by the Library, and the University Librarian, Phil Sykes, has been successful in clarifying the benefits of an IR to university management, and as a result, they agreed to fund its establishment (Jackman, 2007, p.35). The University also agreed on the appointment of a librarian dedicated to the administration of the IR.

ADAPTATION AT THE FACULTY LEVEL

In its early introduction, the task to inculcate the awareness and encourage faculties to use the repository was very challenging. The introduction of an "IT based" system did not sit easily with some quarter of the "veteran" academicians due to the time constraints between their teaching commitment and learning a completely new repository, and as beginners, things are always too complicated. The promotion and advocacy campaign was an ongoing process before and after eRep's pilot phase as it is important to inculcate the awareness and encourage the faculties to use the repository. According to Jackman (2007, p.36), the advocacy campaign is adopted by many universities as an effective method to raise the awareness of the IR and to ally fears on depositing in an IR. As for UoL, in their early stage of implementation, the Library had to go through a series of advocacy sessions in order to convince the academics that the IR offers tangible benefits to them. UoL was wise enough to assign a senior academician to act as their "Ambassador" and who played a major role in gaining the support among the peers.

DUPLICATION AND TIME CONSUMING

The issue of time consuming in depositing works in IR was one of the concerns in UKM. Besides the Research Archive, authors were already submitting their works into other databases. They believe that depositing the same works in eRep is duplication of effort and time consuming. As the system also required all the full-text or proof of publication to be uploaded in portable document format (PDF), the academicians and their supporting staff need to be trained on how to convert their files to PDF. However, CIT provided the converter software which can be downloaded from the system. The user friendly software is called doPDF. Similarly, UoL also had to deal with the same issue with regards to the reluctance of prospective depositors due to duplication and time consuming. In practice, UoL's academics were already bound to a university regulation to update information on their academic contributions into another system at the university level.

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SELF-ARCHIVING

As described by Chan, Kwok and Yip (2005), it was never an easy task to drive the universities towards self-archiving. UKM was having the same experience as the system did not sit easy with the academicians. In the early stage, most of them showed some reluctance and the Library faced various challenges in handlingit. As the system requires all depositors to upload full-text, there are issues on unavailability of scanners and conversion software for digital born publications. The Library had to join forces with CIT to solve the problem. Whilst the library focuses on gaining the confidence and promote the system to the academicians and facilitates the faculty members on the registration process, CIT was providing sufficient technical equipments for every faculty. While experiencing the same situation, UoL approached self-archiving in another manner. As depositing was voluntary, the librarians were the one who deposited the works on behalf of their academic colleagues.

CONTENT

Many academic institutions around the world share the view on the importance of academic heritage digitization for future research and effectively managing it (Hayes, 2005). Academic content is the basis of an IR. Most repositories set their content selection as published materials or post-prints such as journal articles, seminar papers, books, chapters in books or proceedings. However, some still insist that their grey literature or pre-prints such as manuscripts, working papers, thesis, dissertations or technical reports should be part of the IR's content.

Jackman (2007, p.36) said that some IR administrators agree that the repository should accept every type of academic work that the academicians wanted to submit, while others emphasized that there should be limitations. However, in any situation, with or without content limitations, the faculties as the content contributors must be aware of it, as according to Kim (2006), the amount of content contribution is the measure of an IR's usability and it will indicate whether the IR is a success or otherwise.

The content in eRep is limited to 15 categories which include pre-prints and post-prints materials, and is based on system-generated data. Until 1 July 2011, the number of academic works that has been deposited into eRep was 23,954. The publications are dated from 1991 until 2011. The contents in eRep are based on the following item type:

1. Books
2. Chapters in books
3. Monographs
4. Journal articles
5. Proceedings
6. Technical reports

7. Seminar papers
8. Book reviews
9. Translated articles
10. Occasional publications
11. Popular writings
12. Translated books
13. Teaching packages
14. Films / Videos/ Slides/ Multimedia
15. Others

Although the numbers are encouraging, it took a lot of effort on the part of the Library and the University to encourage contributions from the academic staff. The same issue also appeared in several studies related to the response by academic staff, notably Chan (2004), Bjork (2004), Foster and Gibbons (2005) and Pelizarri (2005).

UoL's Research Archive divided the publications into two categories, Research Outputs and E-Theses. In UoL's view, flexibility is important for the IR to serve the multi-disciplinary academic departments. The approach is also based on the believe that flexibility will encourage close relationship with the faculties as it is important for the sustainability of content contribution in the long term. As of 1 July 2011, UoL's Research Archive had 699 publications, which encompass the following publications:

1. Articles
2. Book sections
3. Monographs
4. Conference or workshop items
5. Books
6. Thesis
7. Patents
8. Reviews
9. Softwares
10. Maps
11. Reports
12. Discussions
13. Pre-submitted thesis
14. Others

In terms of submitted digital format, for now, eRep only accepts digital content in PDF format. However, recently the administrators agreed to revise the procedure and accept a variety of digital formats. Uol however has already set up their IR to accept more digital formats:

1. HTML

2. PDF
3. Postscript
4. Plain text
5. Rich text (RTF)
6. Microsoft PowerPoint
7. Microsoft Excel
8. Microsoft Word
9. Image (JPEG)
10. Image (PNG)
11. Image (GIF)
12. Image (BMP)
13. Image (TIFF)
14. Video (MPEG)
15. Video (QuickTime)
16. Video (AVI)
17. Video (WMV)
18. Video (MP4)
19. Video (MP4)
20. Video (Flash)
21. Video (AVCHD)
22. XML
23. N3
24. RDF/XML
25. Archive (BZ2)
26. Archive (TGZ)
27. Archive (ZIP)
28. Audio (WAV)
29. Audio (MP3)
30. Audio (OGG)
31. Audio (FLAC)
32. Audio (WMA)
33. Others

PUBLIC ACCESS

Global access to its academic heritage might contribute towards the improvement of a university's prestige among its peers (Kiran and Chia, 2009). Realizing the need for global access, UKM decided to open its IR for wider access but with limited bibliographical information. Full text can only be access by UKM staff with a valid username and password. Another low key in eRep access capability is its content is not indexed by Google or GoogleScholar. However, UoL's IR is available for worldwide access with some boundaries due to their copyright policies. Uol's Research Archive works as an open access

initiative platform and it enjoys freedom of access as its content are searchable and accessible globally.

IR MANAGEMENT
1. Human Resource / Staffing
Human resource management is important since there is a need for additional posts in the administrator team, which consists of a librarian and a library assistant. The system is currently managed under the Archives, Gallery and Special Collection Unit (AGSC), which is headed by a senior librarian, who recently took up the portfolio and was not part of the establishment team. It took her a lot of effort and time to study the technical aspects of the system. Fortunately, she is assisted by a librarian who was involved midway during the establishment stage and is involved in the educator team. There is one senior library assistant, three library assistants and a junior general clerk supporting the service. However, they are experiencing a difficult time in having to manage the eRep administration as well as attend to their routine library work such as acquisition, indexing, cataloguing and others. In other words, the staff have to multi-task. Currently the organizational chart for the unit is shown in Figure 1.
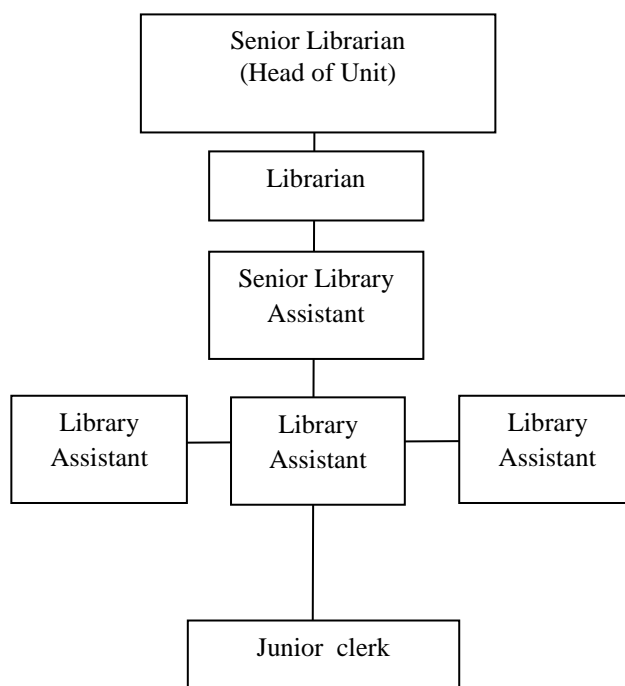
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        ┌─────────────────────┐
        │   Senior Librarian  │
        │   (Head of Unit)    │
        └──────────┬──────────┘
                   │
            ┌──────┴──────┐
            │  Librarian  │
            └──────┬──────┘
                   │
        ┌──────────┴──────────┐
        │   Senior Library    │
        │     Assistant       │
        └──────────┬──────────┘
                   │
   ┌───────────┬───┴───────┬───────────┐
┌──┴────┐  ┌───┴────┐  ┌───┴────┐
│Library│  │Library │  │Library │
│Assist.│  │Assist. │  │Assist. │
└───────┘  └───┬────┘  └────────┘
               │
          ┌────┴──────┐
          │Junior clerk│
          └───────────┘
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Figure 1 : Current AGSC Organization Chart

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Under the Malaysian Standards, MS ISO 9001:2000, each library staff must attend at least two training programmes conducted by the university or the library, which means they have to leave the office. Normally each staff attends four training programmes, either selected by the library management or at their own request. As the library is short of staff, this somehow affected the services, especially in delivering immediate action on enquiries from the eRep users.

On the other hand, the organizational chart for UoL is more simplistic which is reflective to its nature of work and they really optimize the available human resource. Figure 2 shows four tiers of administration structure for their IR management.
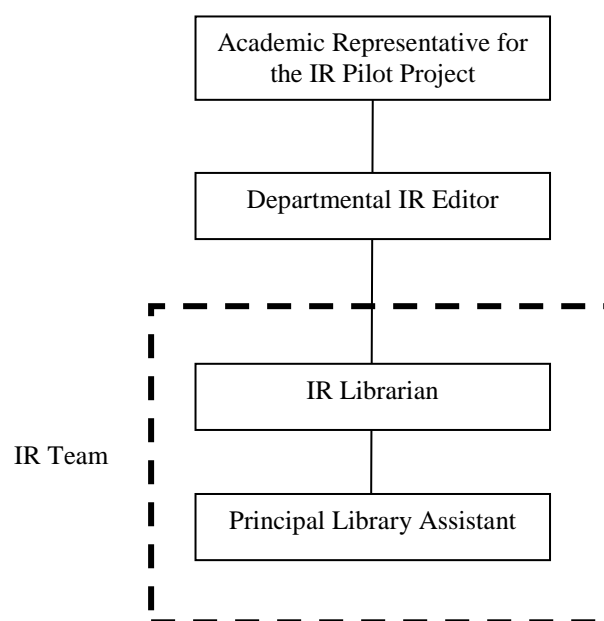
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┌─────────────────────────────┐
│   Academic Representative for │
│     the IR Pilot Project      │
└─────────────────────────────┘
              │
┌─────────────────────────────┐
│      Departmental IR Editor   │
└─────────────────────────────┘
              │
  ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
  │  ┌───────────────────┐   │
     │    IR Librarian    │
  │  └───────────────────┘   │
IR Team      │
  │  ┌───────────────────┐   │
     │ Principal Library Assistant │
  │  └───────────────────┘   │
  └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
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Figure 2: Current Research Archive Organization Chart.

2. Publicity and Advocacy

The Library might think that they have already done used all the methods available in promoting eRep within the campus.The methods used included road-shows, web-based announcements and demonstration sessions during faculty meetings. However, as the system is undergoing an ongoing upgrading process, the information that they delivered in the previous roadshows has to be updated. Unfortunately, this was never be done and the Library compensates by delivering the latest information via the Library's and the University's webpages. According to Papin-Ramcharan and Dawe (2006), the poor response

to self-archinving by academicians might be a result of low system understanding and awareness due to ineffective publicity and advocacy strategies. Uol has "planted" a representative among the academician to play a promotional and advocacy role. This role is effectively undertaken by Professor Ann Jacoby. On the Library's part, the IR Librarian, Shirley Yearwood-Jackman, consistently issues publications on IR which are made available online. With her IR team members, they conduct mobile talks for every division in UoL.

WHAT CAN WE LEARN FROM THE UNIVERSITY OF LIVERPOOL ?
1. Sustainability
The crucial component after the establishment of an IR is its sustainability. There are a number of recommendations in approaches for the library to undertake in order to maintain the usability of its IR. Content curation must be an ongoing process to guarantee the usability value of the current content in the future. As there are possibilities for the institution to refocus or increase their IR functionality, various experiments are needed and perhaps a willingness to learn from both the success and failure of the IR will contribute to its sustainability.

The engagement of all parties involved with the IR is very important especially the major players in the earlier establishment team. This ensure their continuity in contributing relevant inputs especially within their expertise. For example, the Library will continue the research on IR usability, user behaviour or digital preservation needs. From the technical aspect, CIT can play their role as a technological watch where they must be prepared with alternative solutions when there is technology obsolescence. UoL adopted a partnership approach, in which academics take partial ownership of making decisions on how the IR will function in their academic unit. Representatives from the academic cluster will work closely with the Uol IR team for approximately 6 month. During that period, the representatives will receive advocacy and give their contribution in developing the partnership policy between the IR administrator and their faculty.

2. Publicity and Advocacy Strategy
Advocacy is considered as one of the major tools to deliver the value of the IR to potential depositors. UoL set the executive management and head of departments as the target market. They believe that garnering the support of influential personnel is important for close partnership that will contribute towards the development of services based on the needs of the research community.

The Library can effectively deliver IR in many ways, For example, by using their internal communication through meetings, bulletins, newspapers or circulars. The wider communication such as through university gazettes, official websites, bulletins or campaigns will contribute more. Perhaps the University

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can utilize all channels which may include going on-air and disseminating the information throughout the campus via Radio Midas, UKM's own radio station.

In order to gain the confidence and to deliver the information effectively, the Library should carefully document the information by outlining the benefits of the IR to the University by emphasizing more on academic development and preservation. The follow up approach should be promotion strategy through workshops, trainings or any other hands-on programmes.

3. Managing Copyright

The Library must ensure that all the IR users are acknowledged and be knowledgeable about the University's intellectual property policies and ethics policies. This legal precaution must be taken at the start of the implementation and the University's policy on copyright should be in place. If necessary, depositors and users should be able to access the policy online. UoL provides legal information related to the University which includescopyright at http://www.liv.ac.uk/legal/copyright/index.htm. In practice and in accordance to their policy, all depositors are required to agree to a click through licence, or sign a written licence in order to give permission for their work to be held in the repository, to provide for the distribution of their work, and to allow ongoing preservation of both their work and the related metadata. Upon receiving any complaint or detecting any potential breach of copyright, the IR team will immediately remove the item from public access pending further investigation.

UKM should implement a similar policy by making legal information related to the University accessible, especially with regards to copyright. For eRep, the copyright requirements should also be made available. UoL's Research Archive is attempting to do this although the page is still under construction as of 8 September 2010.

The Library, as the IR manager, can create an online copyright form for authors to deposit content in the repository. In order to create a proper copyright form, the Library can seek advice from the University's lawyer or legal advisor to draft, review and work together to draft suitable terms for the copyright form. Many authors believe that their works should be well protected under the Copyright Act, the Library must initiate sufficient measures that can serve their needs. The Central Michigan University provides a copyright agreement whereby the author is acknowledged as the copyright holder on approval of their handing over of their publications to the repository (Helwig, 2009).

However, not every original author is the copyright holder. Some may have turned over the copyright to the publisher and appropriate steps must be taken to deal with this. The IR must have well defined policies and in this case, access to

the publication may restricted, at least until the copyright holder grants permission.

4. Content Submission

The most effective method to counter poor content submission from the faculties is by establishing a mandatory policy as an institutional mandate. Based on findings by Suber (2006), institutions with a mandatory policy have high volumes of content in their IRs which are also largely self-archived. In contrast, institution with a voluntary policy appear to have a lower level of content contributions. UKM and UoL can be taken as direct examples of the presence of a mandatory mandate. Within three years after its establishment, eRep (UKM) has 16,059 records, while Research Archive (UoL) only managed to accumulate 623 records after its establishment in 2008. Thus, there should be a written policy based on the university's mandate.

However, the decision to establish a mandatory or a voluntary policy should be taken according to the needs and capabilities of the institutions as the IR will serve their needs. Genoni (2004, p.302) noted that "these repositories are, after all, designed to serve the needs and interests of the institutions that support them, and their content should be developed with local requirements foremost. Just as academic libraries would not look to international standards to determine the content of print collections, nor should they look to such standards to dictate the content of an institution-based repository. It may be that some form of acknowledged "best practice" will emerge with regard to content selection, but each institution or library must be responsible for selecting material that suits its own needs.".

UoL practices the following content submission:
  i. Self-Archive Deposit - Depositors complete the submission procedure and upload the full-text document into the repository themselves without any assistance from the library.
 ii. Assisted Self-Archive Deposit - The assisted self-archive deposit process allows depositors with limited time to complete a reduced number of fields in order to submit their work to the repository. The Faculty's supporting staff or library staff will complete the submission process on behalf of the original author.
iii. Mediated Deposit - The mediated deposit service must be negotiated with the IR librarian. The Library or any third party will be responsible for completing the entire submission form. This service is aimed at helping depositors who have extremely limited time to deposit their research output in to the repository. Depositors opting to take advantage of this service will be required to sign a standard deposit agreement in order to give permission for the IR staff or their agents or an authorised individual

     in the depositors' department, Faculty, division or some other related unit to complete the deposit process on their behalf.

iv. Bulk Deposit - The bulk deposit service provides for the submission of large amounts of usually retrospective content. The Library IR team or any authorized third party will complete the submission process on behalf of the original author.

5. User Support

Information regarding policies, procedures or any related information regarding IR must be available for reference. It is advisable to provide all information online, and it is good to make it available not just on the IR website, but also on each university's webpages such as the library, faculties, centres of excellent, academic societies, institutions' official websites or research departments. While policies and procedures must be presented in its original format, any other related information can be presented as *Frequently Asked Questions (FAQ)* document and *Best Practice Guide*. Any effort by the IR system to assist its user to use the system may increase its usability and effectiveness. UoL's Research Archive for instance equipped its IR with email alert, Users may set up email alerts or RSS feeds so as to be alerted to new contents.

CONCLUSION

The development an implementation of an IR has never been an easy task. There are challenges that need to be addressed in during the pre-implementation process. There are various factors that can disrupt the smooth development of an IR. Awareness, budgeting, technology and human factors such as staffing and depositors' behaviour are potential challenges. However, even with thorough planning, there is no guarantee that the IR will work smoothly as there are various post-implementation issues. As a result from diversity of working culture, collections and background, institutions must be prepared to encounter unique challenges that had never been experienced by other institutions. Both UKM and UoL have similar and unique challenges in the development of their IRs.

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