

The Development of Open Access Repositories in the Asia-Oceania Region: a Case Study of Three Institutions

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Abstract

In recent years open access (OA) models have transcended traditional modes of publishing, thus enabling freer access to research. This paper takes a trans-regional approach to open access publishing in the Asia and Oceania region focussing on individual institutions in three countries – Charles Darwin University (Australia), University of Hong Kong, and the University of Malaya, reflecting on how each one is rising, in its own individual way, to meet the range of challenges that its research communities are facing. Specifically, it focuses on open access and institutional repository development, and traces their development at each of the aforementioned institutions. This paper is based on interviews conducted with staff involved with the development of the repository, and the open access collection in particular, at each of the three institutions. It synthesises OA developments and reviews the role the library has played in each institution in the development of OA across the academic and research community; and the success that has been achieved to date. It highlights any common factors between the approaches taken by each institution, as well as any significant differences of note. The findings reveal that each of the three institutions are at a different stage of development with the University of Hong Kong repository ranked at the top within Asia. Each has used a slightly different approach toward open access, and used different software to develop their repository. The authors have collated the overall experiences of each institution in OA publishing and repository development. They have highlighted the successes and failures that each has experienced and formulated a set of guidelines that may help those embarking on establishing an open access repository.

Keywords: Open Access, Institutional Repository, Asia, Oceania, Australia, Hong Kong, Malaysia

Introduction

Open access has grown rapidly over the past few years. As at 30 June 2014, the total number of articles in the Directory of Open Access Journals (DOAJ) exceeded 1.6 million, PubMed Central had over 3 million articles, and the Electronic Library had a total of over 45,000 free journals. The growth has been in many counts – number of articles, number of journals, number of repositories, and number of countries represented (Morrison, 2014). Today it has become an important part of the publishing scene, serving the traditional need for scholars to disseminate their works while making these works freely available for public good.

The Budapest Initiative (2002) recommended two ways of achieving open access status: by publishing a journal article in an open access journal; or by self-archiving the article in an open access archive or repository. The ultimate aim is to make access to peer-reviewed journal literature more freely and easily available. The development of international metadata tagging standards has meant that these archives or repositories, can be easily searched and the content harvested (Harnad, 2001). This in turn will increase its discoverability through search engines and hence content visibility and impact worldwide, open and interoperable.

Institutional repositories are online archives for collecting, organising and making available electronic versions of scholarly materials (Harnad, 2005). Many universities and research institutions are developing institutional repositories with scholarly materials. At the same time, research funding bodies and universities worldwide are keen to maximise the impact of any research that they fund. In order to achieve this, they are increasingly requiring that the results of the research be made available open access. Institutions with established institutional repositories play a key role in implementing this requirement.

Open access repositories have also grown massively over the past few years, with some regions of the world growing faster than others (Pinfield et al., 2014). Many of the lists which record the open access repositories – such as the Directory of Open Access Repositories (DOAR), Registry of Open Access Repositories (ROAR), Confederation of Open Access Repositories (COAR) – all show growth over the years.

The open access movement and institutional repositories have also grown rapidly in the Asia–Oceania region. The economies of many Asia-Oceania countries are strong, which leads to growth in research and its outputs. Even among developing and less affluent countries, there is greater emphasis on research and publishing. According to the National Science Foundation's *Science and Engineering Indicators 2014 Digest*, the number of articles published by researchers in Asian countries increased from 89,000 in 1997 to 212,000 in 2011 (quoted from Marwaha, 2014). While the Asia-Oceania region contributed approximately 17% of the open access repositories in DOAR in 2009, the percentage is increasing (Wani, Gul and Rah, 2009). Similarly, while the repositories may not have been very visible in the past, that too is changing (Abrizah, Noorhidawati & Kiran, 2010).

This series of developments have, in recent years, transformed the role the library and the librarian, plays in the scholarly communication process. At most universities in developed countries, it is the library that manages the institutional repository.

This paper examines the recent developments of open access institutional repositories in the Asia-Oceania region through an examination of open access development in three regional research universities in Australia, Hong Kong, and Malaysia. Through this case study, the paper recommends best practices from each of the universities.

Australia, Hong Kong and Malaysia present excellent cases within this region because developments of the higher education and research infrastructure have been explored by previous researchers, establishing both the new emphasis placed on research and development in these societies but also the

context for developments of open-access repositories (McBurnie and Ziguras 2001; Mok 2008; and Chen and Su 2014) .

Open Access and Scholarship in Australia, Hong Kong and Malaysia

Despite the different pathways and incentives in the establishment of the three repositories, the outcomes of each project were similar. At the onset of research, the repositories and the open access collections at each of the three selected institutions were at different stages of development, and each had used different approaches, allowing an investigation and comparison of each repository to reveal differences and commonalities and practices that may prove of value to others at an earlier stage of development.

Australia: An Overview

In Australia, the Federal Government has played a major role in supporting the establishment of institutional repositories in academic institutions. More than 10 years ago, the Government began the first of a series of initiatives, which led to the establishment of open access institutional repositories. This included funding for a number of projects, but three of note that focussed on the establishment of open access repositories between 2003–2008 were the: Australian Partnership for Sustainable Repositories (APSR); Australian Research Repositories Online to the World (ARROW) and the Regional Universities Building Research Infrastructure Collaboratively (RUBRIC) (Shipp, 2006; Kennan and Kingsley, 2009) .

During this same period, the Australian Government introduced the Research Quality Framework (RQF), an exercise to measure the quality and impact of Australian research. Soon after the Government provided funding to enable universities to implement the RQF. One such specific initiative was the Australian Scheme for Higher Education Repositories (ASHER) through which A\$25.5 million was provided to universities between 2005 and 2007 in order “to assist institutions to establish and maintain digital repositories”, and to “allow institutions to place their research outputs, including journal articles and less traditional outputs ...in an accessible digital store...” (Department of Industry, Innovation, Science, Research, and Tertiary Education, 2010). A further A\$16.4 million was also provided from 2007 to 2010 as part of the Implementation Assistance Program (IAP) “to assist institutions to develop and implement data gathering and reporting systems for bibliometric and other data” (DIISRTE, 2010). These initiatives demonstrate the Australian Government’s “commitment to making publicly funded research more readily available” (DIISRTE, 2010).

A change in Government at the end of 2007, saw the RQF evolve into the ERA (Excellence for Research in Australia) exercise, a method of assessing quality and impact using metrics and expert review (Carr, 2008). The new Government continued to honour the funding previously committed to universities.

Australian university repositories

A study carried out in 2003 by the Council of Australian University Librarians (CAUL) revealed that just six Australian universities had developed eprint repositories with a further 10 institutions planning to do so. By 2008, this figure jumped to 37, or 95% of academic institutions that had, or would have established, a repository by the end of 2009, as revealed by a survey carried out by Kennan and Kingsley (2009).

Libraries and librarians run the majority of Australian repositories, so it follows that CAUL plays a major role in their development. CAUL’s mission is “to influence information policies and practices in Australian higher education, and to support and enhance the value of university libraries”, and one of its key objectives is “maximising the information resources available to researchers, and the facilitation of their access” (CAUL 2014). In 2009, CAUL established the CAUL Australian Institutional Repository Support (CAIRSS) “to provide support for all institutional repositories in Australian universities” (CAUL 2013), and followed this, in 2010, by setting up the CAUL Open

Access Scholarship Initiative Advisory Committee to “promote the benefits of open scholarship”. Both programs played a key role in the extending development of open scholarship and open access institutional repositories in Australia and, when the time was right, ceased in 2012, with many of the functions of the two programs taken on by CAUL itself as part of its regular activities.

At about the same time, the Australian Open Access Support Group (AOASG) (AOASG, 2013) was created with a view to providing advice and support for open access to the wider community. It was launched during Open Access Week 2012 by six Australian universities with open access policies: the Australian National University, Charles Sturt University, Macquarie University, University of Newcastle, Queensland University of Technology and Victoria University. The policies ensure that each institution’s research outputs are made freely available. Three new members have joined since: Curtin University, Griffith University and the University of Western Australia. AOASG develops resources, maintains a blog and has an active discussion list (AOASG, 2013) and is proving to be a valuable resource for academic institutions.

Mandates and policies

By the end of 2013, 75% of the 39 Australian universities had either introduced an open access mandate, or had a statement supporting open access.

Australia’s two major funding bodies have also introduced mandates in the last two years. In July 2012, the National Health and Medical Research Council (NHMRC) became the first funding body to introduce an open access policy. This meant that the findings of any research it has funded would need to be made available to the wider public as soon as possible but at least within 12 months from the date of publication. NHMRC’s policy applies to peer reviewed journal articles only; whereas the Australian Research Council’s Policy introduced in January 2013, applies to books and book chapters as well as journal articles.

Both mandates are based on the premise that the Australian Government makes a major investment in research to support its essential role in improving the wellbeing of society. Publications resulting from research activities must be disseminated as broadly as possible to allow access by other researchers and the wider community. Both bodies require that a post-print or final publisher’s version of a publication be made available; metadata must be deposited into an institutional repository as soon as possible after the date of acceptance.

The Australian Government has clearly made a significant contribution to the development of open access institutional repositories. In addition, organisations such as ALIA (the Australian Library and Information Association) (2014), CAUL, and AOASG (2013) are all supporting open access initiatives in a number of different ways. As of 2014, one hundred per cent of all Australian universities have established an institutional repository, and are committed to open access. Both major Australian funding bodies have mandated open access for any research that they fund. So while the infrastructure is in place, policies written, and the repositories are being filled up with content, there is still much work remaining to be done within institutions, and with researchers themselves, in order to ensure full compliance. This is being undertaken with a mixture of promotional activities, training and consultation, led primarily by library staff working within their own institutions. A good example (see below) of this is Charles Darwin University (CDU).

Hong Kong: An Overview

Hong Kong is a Special Administrative Region (SAR) of China. The region has eight universities funded by the University Grants Committee (UGC) of the Hong Kong SAR Government, the research funding body for tertiary education in Hong Kong.

The University Grants Committee (UGC) is the non-statutory body which advises the Government of the SAR on the funding and strategic development of higher education in Hong Kong. The Research Grants Council (RGC) is a non-statutory advisory council operating under the aegis of the UGC

responsible for the distribution of funding for academic research projects undertaken by academic staff of those UGC-funded institutions. The majority of academic research projects are funded by its General Research Fund (GRE).

During 2012–13, there were 25,064 items of research output produced by the UGC-funded universities. The total expenditure on UGC-funded institutions was HK\$27,044m, of which 28% (HK\$7,576m) was spent on research (The University Grants Committee, Statistics).

Open access movement

Open access (OA) in Hong Kong started with the first institutional repository (IR) in 2003. By 2007, IR or digital initiatives were initiated at the eight universities (Chan, 2007). In 2007, Hong Kong institutional repository and open access action principles were proposed setting out the goals and policy changes with the purpose of promoting open access and the use of institutional repositories in Hong Kong (Ferguson, 2007) and the Hong Kong Open Access Committee (HKOAC) was formed with an aim to promote the concept, the reasons for, and the practice of OA in all Hong Kong academic, governmental and philanthropic institutions.

At the same time, UGC set up a knowledge transfer working group, and in 2009, it charged and funded all of its eight tertiary education institutions to begin programmes for knowledge transfer (KT). The UGC has committed to provide an annual special allocation for KT to UGC-funded institutions for the 2009–12 and 2012–15 trienniums to enable them to build up their capacity and broaden their endeavour in KT. The new directive and fund resources stimulated the development of many new initiatives, including IR and other OA projects.

Institutional Repositories

The first institutional repository was brought to life in 2003 by the Hong Kong University of Science and Technology (HKUST) Library. Since then, each UGC-funded university library has developed its own institutional repository or digital archive to collect, showcase, preserve and disseminate the research output of each institution. The eight institutional repositories and digital archives are harvested and can be cross-searched at Hong Kong Institutional Repositories (The Hong Kong University of Science and Technology Library, HKIR). There were 338,930 items in HKIR as of 30 May 2014. Journal articles, conference papers and theses form the major content. Six IRs use DSpace and its related software and the other two use Digital Commons (BePress) (Palmer, 2014).

Mandates and policies

In Hong Kong, multiple funding agencies require researchers to deposit a version of their papers in their institutional repository when the publisher's version is not available open access: These include the *GC Early Career Scheme*, *General Research Fund*, and the *Specialized Research Fund for the Doctoral Program of Higher Education* (SRFDP) and *Research Grants Council Earmarked Research Grants* (RGC ERG) *Joint Research Scheme* (The University Grants Committee, RGC Forms)

There is no institutional OA mandate at the local universities except for The Hong Kong Polytechnic University (PolyU). In September 2010, PolyU started to require its academic and researchers to deposit electronic copies of their peer-reviewed journal articles and conference proceedings in PolyU IR for open access (The Hong Kong Polytechnic University, 2010). As discussed in more detail in subsequent sections of this paper, the University Libraries at HKU adopted a mandatory OA policy for its staff. Masters and doctoral level students are also required to deposit theses in the institutional repository for open access.

Malaysia: An Overview

As at the end of 2013, Malaysia had 20 public universities, 7 foreign university branch campuses, 37 private universities, 20 private university-colleges, and 414 private colleges (Ministry of Education, 2013). Many of these are involved in research and development (R&D) activities.

Among these universities, there is an awareness to make valued research outputs openly available to enhance their visibility and provide access to the global academic community. Abrizah (2009) reported that 55.7% of researchers had deposited articles into OA repositories. The open access movement in Malaysia had a direct impact on the development of institutional repository services and collaboration between scholars. By June of 2014, there were 21 Malaysian IRs listed in Open DOAR, all of which were functional.

However, challenges remain. A recent study by Singeh, Abrizah and Noor Harun (2013) indicated that while most academics endorse the principle of open access and are willing to contribute content to an IR, they do so only if an opportunity arises or if mandated by their funding institutions. However, they had little knowledge or experience of institutional repositories and were unfamiliar with self-archiving opportunities. Those who agreed to self-archiving saw it as being beneficial to by enhancing visibility and recognition of their work. The main problem encountered, however, is the fact that researchers feel it was time consuming. The major barrier to self-archiving is fear of plagiarism.

Methodology

Interviews were used to collect data for this study from a small population of library staff directly involved in the institutional repository and/or open access initiatives. This methodology allowed the interviewers to follow up on open-ended questions and discuss issues in more depth as they arose within the interviews.

A series of common interview protocols and questions were devised by the authors and used at each of the three institutions. Once an appointment was made, the questions were sent to the relevant staff before face-to-face, semi-structured interviews took place during the month of May, 2014. A face-to-face interview of one hour duration, with one or more staff was carried out with three staff at CDU and one at the University of Hong Kong. The interviews were not recorded but notes were taken and additional data was obtained by phone, email or text message. At the University of Malaya, two senior librarians who were directly involved with the repository development were interviewed via email because of their unavailability for a face-to-face interview. The questions were predominantly related to policy and procedural matters, technical aspects of the repository, along with any issues and challenges faced by the individual institution. Their responses were recorded and analysed manually looking for keywords, which were then organised into categories. These categories were then used to attempt to identify patterns and connections.

Open Access and scholarship at CDU

The University

CDU is a young regional university based in northern Australia that services more than 23,000 students on and off campus. In 2014, the University featured in the Times Higher Education's (THE) annual listing of the world's top 100 universities under the age of 50, for the third year running (THE 2013-2014). This listing uses 13 performance indicators to determine rankings for this list, including: research volume, income and reputation; citations; the learning environment; and international outlook (CDU, 2014).

Its geographical location ensures that CDU has close links with its near neighbours in Asia, and forms the heart of the wider Australasian region with East and South East Asia to its north, and Australia, to its south. Darwin, the capital city where the main campus of the University is situated, is equidistant from Singapore and Melbourne, both of which are four hours' flying time away.

The Repository

At CDU, CDU eSpace, its institutional repository, was set up by the Library in 2009, with support from ASHER funding, the Australian Government initiative mentioned above.

The software used is Fez-Fedora, with Fez being a PHP / MySQL front end to the Fedora repository software. Fez was developed by the University of Queensland Library (UQL) as an open source web-based digital repository that allows the integration of metadata for all research outputs including theses and images. UQL continues to support CDU.

The APSR Government-funded project, had investigated and supported the adoption of two repository software applications, DSpace and Fedora, for the management of digital resources in universities in the mid-2000s. Its aim was to directly assist universities to establish institutional repositories primarily for the purpose of reporting their research publications; this ensured that universities had the technical means for making their scholarly outputs open access to the world. The Government's RUBRIC initiative, as part of their focus on working with regional universities, tested a range of repository solutions and confirmed that Fez-Fedora, with sound technical management, met the requirements. This led to CDU opting to use Fedora with the open source Fez interface, supported and developed by UQ. The Fez interface allows Fedora content to be harvested by Trove, the National Library of Australia's database, by Research Data Australia, as well as by the worldwide OAister (Open Archives Initiative) open access catalogue. Furthermore, Fez allows users to be given differing levels of permissions, which means that academics can self-submit records into a repository, and Library staff can go in and review and publish them. CDU is part of a small Australian community of Fez-Fedora users – partners that share scripts and experiences.

Self-submission prototypes for uploading research materials into the IR are being developed and will be made available with a new repository interface in coming months.

Collections

The Open Access Collection of research materials at CDU was established much more recently, in 2011, with the groundwork laid prior to that in consultation with the CDU Office of Research and Innovation (ORI). ORI provided support by initially sharing HERDC (Higher Education Research Data Collection), and ERA records, which were used as a basis for planned OA development.

In 2012, a special short-term position within the Digital Collections team was created to establish a critical mass of OA materials in CDU eSpace. At the same time, the software management tool for managing the eReserve collection was changed from Greenstone to the eSpace repository. By 2013, the team's responsibilities and workflows were restructured so that focus was on open access rather than eReserve management as had previously been the case. More recently, a permanent part-time member of staff has been able to take on the responsibility for the OA Collection and focus on its development.

The responsibility for spreading the OA message to the wider research community at the University is shared between a number of Library staff: the Library Director, who is a member of the University's Research and Research Training Committee (RRTC); the Digital Collections Coordinator, who is overall responsible for the repository and who works with his staff on developing digital collections including the OA collection; the Library's Research Services Coordinator, who works in a consultation and support role primarily with the research staff and research students of the University; and the team of Liaison Librarians who work with the wider academic community.

The promotion of open access scholarship, its benefits, and the process of making research available freely at CDU, is done in a number of different ways. Firstly, CDU Library marks Open Access Week in October by organising an annual seminar, which consists of a series of presentations targeting the research and academic community. An OA award was launched two years ago and is presented at this annual event to the researcher with the most OA publications in the repository in any given year. In addition, Library staff carry out presentations to various research committees and at research school

meetings to promote the project. For example, when the NHMRC (National Health and Medical Research Council) and the ARC (Australian Research Council) funding bodies introduced new OA requirements in 2012 and 2013 respectively, the Library created awareness of this significant development to the University research community. In addition, the library created a new OA subject guide.

Whilst the Library has taken overall responsibility for the management and coordination of the OA Collections and the repository, it receives strong support from ORI as well as the internationally renowned Menzies School of Health Research (MSHR), an independent institution until 2004, but now merged with CDU. Both ORI and MSHR contribute data to the repository, both NHMRC and ARC-funded data, as well as HERDC data. All Australian universities are required annually to collect data about research output and income for the Commonwealth Department of Innovation, Industry, Science and Research, and this is then fed into the Library. Where full-text data is available, the Library follows up with data checks for open access.

The CDU repository, with a total of 21,317 records, is made up of a series of collections: Research Publications including the Open Access Collection; Theses; the Arafura Digital Archive Collection; eReadings, Photograph Collections; CDU Press Publications and the Living Archive of Aboriginal Languages (LAAL). The LAAL collection deserves special note: it is a unique project arising out of an ARC grant awarded to researchers at CDU. The Library has worked with Project staff in developing a space for books in Aboriginal languages, scanned and made available open access. The collections reflect the University's research strengths and interests. Each repository record includes download and access statistics, grant numbers, project information for special collections; bibliometric and altmetric data are soon to be made available.

At the end of 2013, a Researcher Identifiers Project was set up with a project officer employed by the Library to work with the RSC in rolling out ResearcherIDs and ORCID IDs to all researchers at CDU. Within three months, 50 per cent of the community had set up a ResearcherID account, with a lesser number following on with an ORCID account. The plan is to link them to records in the IR. This project has now been taken over by the Research Office.

The Digital Collections team is made up of 1.5 staff, who spend most of their time on OA development. Their greatest achievement has been the restructuring of Digital Collections from being primarily tasked with managing eReadings to being primarily engaged with research collections. Support is provided by the Library's Technical Support Officers when required.

Policies and strategic support

The implementation of the Institutional Repository demonstrates the commitment of the University to the open access movement; and that it regards this development as a strategic priority.

At this early stage of the development of open access collections at CDU, a dedicated working group has not yet been established; however a Library eSpace Working Group meets periodically to discuss any issues or areas of development relating to the IR and includes any issues relating to OA. Also the Library meets with its relevant partners to coordinate particular contributions to the IR. Specifically, the introduction of the NHMRC and ARC mandates has propelled additional interest in the IR at the University and, in particular, the research community has enthusiastically welcomed the Library's facilitating role in compliance with the mandates. The challenge now is to extend compliance to all the other research being carried out at CDU but not funded by the two major funding bodies.

The Library formulated a new Institutional Repository policy together with a set of procedures. More broadly known as the IR Policy, it has been approved by University authorities and was released in September 2014. The policy will play a big part in helping consolidate the CDU OA collection. To quote the policy, CDU eSpace will provide a platform to:

- Archive, preserve and showcase the University’s intellectual outputs and special collections entrusted to the University;
- Assist with the University’s research data management and to adhere to requirements from ARC and NHMRC for research outputs to be available on open access wherever possible;
- Enhance awareness, use and impact of the University’s research outputs; and
- Contribute to the growing international body of refereed and other research outputs that are available on open access.

Challenges and issues

There are two challenges ahead: in the short term the team is working on enabling Google to pick up CDU publications through the web; and more long term, the aim is to change the culture of academics at CDU to encourage greater participation. This will be a gradual process and continual promotion of the benefits will be required.

Generally, feedback from academics and researchers to open access at CDU is very positive with the majority supporting the concept; there are comparatively few scholars who appear to be opposed to the concept. What is becoming increasingly apparent though, is that researchers do not always retain correct versions of published papers to submit to the IR. Follow-up emails are sent to individuals; however post-print versions are not always available. Continual and regular promotion to academics and researchers will be required to ensure that correct versions of publications are retained in order to be compliant with Government policies.

Open Access and scholarship at HKU

The University

Established in 1912, the University of Hong Kong (HKU) is the oldest university in Hong Kong and one of Asia’s finest, attracting the highly qualified students and the distinguished academics from all over the world. It was ranked as 1st in Hong Kong, 3rd in Asia and 43rd in the world according to Times Higher Education (THE) World University Rankings 2013 (THE 2013-2014). There were 27,440 students and 7,000 academic and non-academic staff in 2013.

The Repository

The institutional repository known as Scholars Hub was set up by HKU Libraries in 2005. The Hub is managed by a team consisting of the Digital Strategies and Technical Services Librarian and two library staff. The team also gets assistance from other library teams. It started as the traditional institutional repository but gradually evolved into the Current Research Information System (CRIS) which includes not only HKU authors’ publications but also diversified research information. The following table (Fig. 1) shows the comparison between IR and CRIS.

	IR	CRIS
Content	Publications	Research information (e.g., publications, people, projects, organisations, results, facilities, equipment, etc.
Software	DSpace	DSpace-CRIS (Palmer, et al. 2014)
THE Purpose	<ul style="list-style-type: none"> • Provide Open Access • Create global visibility • Collect content in a single location • Preservation 	<ul style="list-style-type: none"> • Measurement & analysis of research activity • Optimisation of the funding process • For the media & public: easy access to research results → Open Access

Figure 1 IR and CRIS

Source: Palmer 2014

The IR held about 152,309 items by 2012–2013. Journal articles, conference papers and theses constitute 87% of the entire content.

ResearcherPages (RPs) includes a range of information on a researcher such as a profile, publications, network of collaborations, external relations, patents, university responsibilities, grants and bibliometrics. These pages allow one to find an expert for collaborative or contract research, a professor for thesis supervision, or a spokesperson for the media. After initial creation by Hub administrators, researchers can further sustain and enhance their own RPs. Recently, ORCID accounts were created for all HKU professorial staff and linked to their RPs.

Separate pages were created for theses, grants, patents and community services. In June 2014, HKU developed pages for faculties, departments and centres, cumulating research and statistics.

The Knowledge Exchange Office and HKU Libraries have made agreements with several publishers, that allow HKU authors in some cases to publish in Open Access journals for free, and in other cases at a discount. HKU authors are encouraged to make use of the benefits of Open Access publishing such as increased readership and citations and possible offers of collaboration. The publishers include: *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*, *BioMed Central (BMC)*, *Springer Open*, *Bentham Science Publishers* and the *Directory of Open Access Journal* (The University of Hong Kong, OA Publishing for HKU Authors).

The Hub, is undoubtedly by far is the greatest OA achievement at HKU. The Hub team won the HKU Knowledge Exchange Award (Non-Faculty Unit) in 2012. It was also ranked by Cybermetrics, in February 2014 as the number one IR in Asia and number 57 in the world (Cybermetrics Lab, 2014).

Policies and strategic support

OA is recognised as a part of Knowledge Exchange (KE), which is one of the university's strategic themes. There is a well-defined internal structure to support and enhance KE activities across campus. OA projects are funded by UGC's annual special KE allocations to eight local institutions. The institutional OA policy is in place and HKU Libraries has its mandatory OA policy for its staff. OA achievements at HKU are evidenced by the growth of its institutional repository and OA publishing. OA has provided an opportunity for HKU Libraries to reposition itself and plays a greater role in fulfilling the university's strategic goals. The success of IR and OA publishing is a collaborative effort from all stakeholders.

When the Hub was introduced in 2005, it was not attractive to the faculties (Palmer 2011). In 2009, HKU incorporated Knowledge Exchange (KE) into its mission statement. The new five-year strategic plan for the years 2009–2014 includes several strategic initiatives and operational priorities to accomplish KE (The University of Hong Kong, 2009-2014 Strategic Development).. The Hub was recognised as the university exchange hub and HKU Libraries was positioned as an organ of KE to be strengthened. Since the advent of KE, the organisational, monetary and administrative support has been established to facilitate OA development. KE has spurred fresh interest and changed the old landscape of OA development at HKU.

To support and enhance knowledge exchange (KE) activities, the University defined an administrative structure with the Knowledge Exchange Office (KEO) as a core unit. Directed by the Pro Vice-Chancellor for Research, the KEO supports the development of a long-term strategy for KE at the institutional level; liaises with Faculties, other academic units, and administrative offices in promoting KE; and coordinates the University's communication with the UGC on KE matters including KE funding.

Recognising the value of knowledge exchange and OA as one of the KE key indicators has increased the incentive for researchers to deposit more items in OA. The KE fund and new KE organisations have ensured the sustainability of OA development.

OA has helped reposition HKU Libraries in a role of high strategic importance at the University. While HKU Libraries plays the leading role, the OA development largely relies on the collective

efforts across campus. It is important to involve some high-profile academics and administrators in the OA advocacy. They are the OA activists and can exercise significant influence on their peers.

The UGC committed to provide an annual special allocation for KE to UGC-funded institutions for the 2009–12 and 2012–15 trienniums to build capacity and broaden the KE endeavour. At HKU, the UGC's annual special allocation was awarded to KE proposals through the KE Funding Exercise for Faculty Capacity Building, Impact Projects, and Student KE Projects. The OA projects including the Hub and OA publishing were funded under Impact Projects which aimed to create impact that can be recognised and acknowledged by both non-academic sectors and the general public (The University of Hong Kong, Knowledge Exchange (KE) Funding Exercise 2012/13).

HKU has a theses mandate which requires postgraduate students to deposit an e-copy of their thesis into the Hong Kong University Theses Online (HKUTO) created by HKU Libraries for open access which is now a part of the Hub collections The University of Hong Kong, HKU Policy on ETDs).. By 2014, there are more than 22,000 full-text theses online.

The University is a signatory to the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities, as of 22 October 2003. Signatories to this declaration are asked to implement an Open Access depository policy and to encourage Open Access publishing at their institutions. As a response, HKU Libraries issued a mandatory OA policy in February 2010 which requires each staff member to grant HKU non-exclusive permission to make available their scholarly articles publicly available as part of the Hub The University of Hong Kong Libraries, The HKU Libraries Open Access Policy).

Although the University does not have an OA mandate at the institutional level, the University Intellectual Property Rights (IPR) Policy approved in June 2011 requires staff to procure rights from the publisher for the University to re-use the scholarly work, including posting the work on the Hub and encouraging staff to submit prior versions of the published work ("Author's Manuscript") to the Hub to facilitate knowledge sharing (The University of Hong Kong, Intellectual Property Rights Policy).

Challenges and issues

Most of the faculties initially did not appreciate open access. They did not believe the general public could understand their research, and insisted they would prefer sending their publications personally to other researchers whose organisations could not afford access. This belief resulted in a relatively low deposit rate for the institutional repository. Motivating and educating researchers to participate in the repository has been a considerable challenge.

There are difficulties in obtaining the repository content from different sources including individuals, university and external publishers. When it's been obtained, the data may be erroneous and inaccurate and need constant verification and corrections.

After years of advocacy and development, while OA is widely accepted as an alternative scholarly publishing model, there are still doubts about the quality of OA journals due to the lack of a sophisticated peer-review process and scholarly impact compared with the traditional subscription-based academic journals. It is not uncommon that academics tend to search and read OA journals but feel reluctant to have their articles published in them.

Studies have shown that OA mandates can accelerate the OA compliance (Poynder, 2011). OA development may be impeded by the lack of OA mandates from research funders or individual institutions in Hong Kong.

Open Access and Scholarship at UM

The University

The University of Malaya (UM) is the oldest and leading university in Malaysia. It was established in Kuala Lumpur in 1962, although its roots go back to the establishment of King Edward VII College of Medicine in Singapore in 1905. It is a multidisciplinary research university today with more than 27,000 students (of which about 4,000 are international students) and 1,700 academic staff.

The Repository

At UM, the institutional repository came about as one of the new initiatives of the Library influenced by developments in other countries. It started when the UM Library had a workshop on Eprints attended by systems librarians from various local academic libraries, which led to the establishment of the institutional repository in 2007. The repository has developed over the years, and now has approximately 30,000 items. It is placed under the Information Systems Division in the University Library.

There are four staff members involved with the institutional repository, but they also have to handle other tasks, e.g. IT acquisitions, and other day-to-day tasks, and serve on various committees. They are responsible for the release of documents into the IR, after they have been deposited by staff or students.

The users of the institutional repository fall into two categories:

- Academic staff and researchers who are keen on self-archiving, especially those who are doing intensive research.
- Students who are doing research (especially postgraduates) and are keen on self-archiving, although many do not have the products of research to deposit as yet.

Unfortunately, there are some who are reluctant to use the facility and they have adopted a wait-and-see attitude.

Collections

The repository has a number of sub-repositories, with collections (as at mid-2014) being approximately as follows:

- The key section is the UM Research Repository, which has 7,097 research-based items. These items include full-text articles, posters and slide presentations. This is growing rapidly in view of UM's emphasis on research and publishing.
- The overall collection is also growing, despite there being no specific mandate by the University. This increase is due to promotion activities by the UM Library, including roadshows, encouragement during information skills sessions, and by researchers doing self-archiving.

Policies and strategic support

While UM does not have a policy in place, the repository is given support by the university top management, even though it is not listed as a strategic priority. Funds are made available, but they have to be budgeted for well in advance and competitively bid for.

In reflecting upon the development of the IR, one factor that can enhance the growth of the IR is the need for a top-down approach, where a specific mandate should be made to ensure all academic staff contribute to IR.

Challenges and issues

In the development of the IR, there have of course been many challenges. The main hurdle has been academics who feel that depositing their work in IR increases their workload, as they already have to submit to another university database, the UM Expert, which basically lists the expertise and publications of the staff for outsiders to view. Efforts are being made to link the two databases, but the issue of intellectual property rights remains to be overcome.

Future plans call for increasing the visibility of the repositories and improve the repository ranking among public universities in the country as well as internationally. Among the challenges are the technical aspects and increasing the copyright clearance of some items.

Discussion of findings

The survey findings reveal that OA collections have been established and developed at the three institutions with remarkable progress.

The institutional repository is the focus and represents the major achievement of OA development at each institution. Each IR is at its own developmental stage and differs in content, size, software and approach. While they share a basic purpose to collect, showcase the institutional research output and make it more visible to the general public, HKU's Hub has gradually evolved into a Current Research Information System, including Researcher Pages (RPs) and links to staff ORCID accounts, serving as a vehicle to increase research collaboration. CDU's eSpace is taking a similar course by rolling out Research IDs and ORCIDs to its researchers. While one IR archives all publications at HKU and CDU, UM has three IRs, each with a distinct collection. IR is encouraged at three institutions with different degrees of policy, funding, staffing and organisational support. OA at CDU is blessed with the ARC & NHMRC mandates, while at HKU, the knowledge exchange, the IPR policy and the well-defined OA organisation have provided a solid foundation for its OA growth.

In all cases, the library initiated the IR and is responsible for its development, management, promotion and coordination. An IR team (HKU) or library staff (CDU and UM) are dedicated to IR projects with additional support from other relevant library staff. Although the library plays a leading role, the success of the IR relies largely on the collaboration between all stakeholders such as internal and external data sources, administrators, individual researchers and software partners.

In addition to uploading to the IR, HKU staff are also encouraged and subsidised to publish their articles in OA journals from several publishers.

The challenges facing OA development are common to all three institutions. There is usually a process of change in perceptions about OA from indifference, even active disapproval or suspicion to acceptance and appreciation. The library's proactive promotion has contributed or will contribute greatly to this shift. But still, there are barriers that impede OA progress. Typically, they include researchers' concerns about the extra workload resulting from depositing their publications in IR (UM) and the quality of OA journals (HKU), and lack of OA mandates from research funders or institutions, etc. While the IR is supported by various data sources (HKU, CDU), the accuracy and consistency of the data received needs to be regularly verified and corrected (HKU).

Conclusion and guidelines

While the future of the IR at all three institutions has a slightly different focus in line with their own state of development and targets, each one aims to encourage greater participation, foster an open access culture, and eventually increase the institutional visibility.

This research has shown that best practices can be derived from the experiences of three institutions despite differences in the context and scope of each project. The following guidelines may be of value to institutions in the region at various levels of repository development are as follows:

1. Talk to your institutional administrators about the need, value and benefits of OA to get their support.

It is of utmost importance that institutional administrators understand the need for, value of and benefits to the institution of effective OA. Having their support is critical as they control the budget

and set priorities for its allocation. This has been evident at both HKU and UM where management have provided a lifeline to the IRs in the form of financial support.

At CDU, although financial support was provided by the Government to establish the repository, the University management have recently approved the IR policy, a development that will go a long way in growing the OA collection.

2. Develop a good IR team equipped with the required expertise and skills.

The first critical element is that the library – or rather, a team within the library – has the capacity and staffing levels to set up, develop and manage the IR. Therefore a good team of skilled staff is invaluable to the success of the repository. This includes having the technical capacity to manipulate the software application of choice, even if this is achieved initially through short-term positions. There may be circumstances where you need to start small either by utilising existing resources or taking advantage of any grants available to hire special staff as was the case at all three institutions.

Whilst at UM, there isn't a team dedicated to working with the open access collection, at HKU and CDU, the IR team has sole responsibility but is required to call on other teams for support.

3. Make your IR easy for academics to deposit publications and flexible for them to edit information and choose what to show or hide.

The easier it is for academics and researchers to be able to deposit material, the better the uptake is likely to be. It is important to give them the option of self-submitting or self-archiving their publications and in this way they have control over when to upload the item and the level of detail they wish to include.

There are several things to consider in this section: the software used and the processes and procedures for submission. Ideally IR software, such as the Fez-Fedora software used for CDU eSpace, needs to allow differing levels of permissions so that academics can self-submit their materials and library staff can edit records as required. The self-submission process and the submission form need to be clear and straightforward to use.

4. Position your library at the frontline of responsibility for the OA development, administration, coordination and publicity.

The development of institutional repositories and the promotion of open access have been led by the library at all three institutions, but it is notable that the more the library is involved, no matter the level, the more successful the venture. The library is naturally enough involved in the development stage, and in the subsequent administration of the working system; but to be more effective, the library also has to take the lead in promoting and advocating for open access.

It is a good start for the library to set up an IR, but it can do a lot more to progress it. Critically, the Library can take the next step of generating interest in and promoting the IR to the wider community. At CDU, the Library spreads the message about OA through various activities including presentations and workshops. The establishment of an OA Award and the Library's management of OA Week are also ways in which the Library creates publicity. At UM, Library staff carry out promotional activities in similar ways including as part of roadshows and of information skills sessions.

5. Reach out to academics via different communication channels such as seminars, emails and phones to cultivate a broad understanding of OA.

Once the IR is in place and procedures for establishing collections set up, you are only half way to having a complete and comprehensive OA collection set up within your repository. The work of spreading the OA message to your community will need to begin, and it won't be a one-off process,

rather it will be an ongoing task of educating and informing your clientele. This can be done in any number of ways, formally or informally. At all three institutions, Library staff play a key role in taking every opportunity to promote OA. At CDU and UM, formal presentations are held in the form of seminars and road shows to create awareness of OA. HKU has taken this a step further and involves high-profile academics, that is, academics with established careers and high visibility, in advocating OA throughout the University community. This brings us to the next guideline.

6. Develop a circle of OA advocates including administrators, librarians and academics to exercise the positive influence on their peers.

Successful advocacy is best done peer to peer; that is, by OA champions talking to peers in their respective communities – administrators to administrators, librarians to librarians and academics to academics. The latter community is best served by well-established and recognised academics extolling the benefits of OA, and by demonstrating their support to OA and uploading their publications into the repository. This has been successfully adopted at HKU, and is in the process of being implemented at CDU.

7. Recognise and award outstanding OA achievements and their contributors.

Another way of putting OA on the agenda is by recognising and awarding OA achievements at your institution as an incentive to other staff, academic and non-academic. At HKU, the Hub team won the HKU Knowledge Exchange Award (Non-Faculty Unit) in 2012 for their outstanding achievement. Similarly, at CDU the Digitisation Team won the internal 2014 Chief Operations Office's Award for doubling the number of OA records in the repository with twelve months.

The above awards recognise the teams responsible for IRs, and the publicity this generates can be useful promotion for OA. On the other hand, at CDU, the Open Access Award is presented annually to a researcher for the highest number of OA contributions to the repository. This also generates publicity and can serve as an incentive to other members of the research community to submit their publications.

8. Develop an institutional OA policy or mandate to encourage and enforce OA compliance.

As Poynder (2011) has demonstrated, institutional OA policies or mandates play a significant role in OA compliance. At CDU, a policy for open access became a reality in 2014 when the University authorities approved the Institutional Repository policy. This will provide greater leverage for the Library with the research community. In addition, Australian universities are fortunate to have its two primary funding bodies, the ARC and the NHMRC both introducing OA mandates for any research that they fund. At HKU, the Intellectual Property Rights (IPR) Policy approved in June 2011, requires staff procure a right from the publisher for the University to re-use the scholarly work including posting the work on the Hub to facilitate knowledge sharing. The University also has a theses mandate and as well, HKU Libraries have a mandatory OA policy for Library staff to make their publications available OA through the Hub.

9. Find a strategic position for OA at your institution that may help justify its funding, staffing and organisational support.

OA can play a big part in repositioning libraries strategically within universities. It's almost always the library that sets up the IR; it is equally common that the leading advocate for OA within an institution is also the library. Up until this point, IRs and OA can be considered 'traditional' library activities, in that it they are an extension of the library's teaching, learning and research role, making available the written evidence of research through books and journal articles.

For OA development to be truly effective, a library will have to rely on the collective efforts of a number of departments across the institution, and in particular those that are part of the research

community. Since one of the core functions of research is to discover new knowledge, and to share this in written as well and other innovative ways, this collaboration can be leveraged into something more, positioning the library beyond its traditional role.

A good example of this new position is the development of the HKU Scholar Hub from an IR into a CRIS (Current Research Information System); from a publications repository into one that includes additional vital information about researchers and the research community. This also enhances the image of the institution professionally and keeps the institution in the public eye. This is good strategically, and can enhance funding opportunities. The library thus becomes a key gatekeeper to the whole university.

10. Work with other regional, national or international institutions, libraries, research funders, and publishers to develop OA initiatives, policies and practice guidelines.

For institutions in the early stages of establishing a repository, reaching out to other institutions, libraries or other bodies such as national, regional or international consortia, is a way to learn and benefit from their experience.

It is not necessary for every individual institution to forge its own path; collaboration across institutions can provide support and better outcomes. In Australia, CAIRSS and AOASG are good examples of initiatives to support and provide advice to academic institutions. CDU has benefitted enormously from this support.

The University of Malaya is member of the ASEAN University Network (AUN) Inter-Library Online (AUNILO) and this arrangement benefits the dissemination of information among AUN members by encouraging the repositories to work more closely. Similarly, the UGC-funded universities in Hong Kong have collaborated to form the Hong Kong Institutional Repositories initiative that allows searching across all member IRs.

Another example is the collaboration of the HKU Knowledge Exchange Office and HKU Libraries with publishers to make it easier for their academics to publish in OA journals.

Final word

This research shows that OA collections have helped reposition the library into a role of high strategic importance at each of the three institutions regardless of the level of support provided by University management. While the primary effort has been towards developing IRs and OA, the libraries are also seizing the opportunity to consolidate this strategic role and take on new functions to better support the researchers and overarching institutional and regional research and development objectives.

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