INSTITUTIONAL REPOSITORIES AND THE ROLE OF ACADEMIC LIBRARIES IN SCHOLARLY COMMUNICATION

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Introduction: This paper explores the development of institutional repositories as a global phenomenon, comparing their objectives with the core principles of scholarly communication that have preserved and disseminated western knowledge for the past two centuries.

Method: The paper discusses some general issues related to uptake and acceptance of institutional repositories, including a range of perspectives on their purpose, what they should contain, and how to increase their use. The paper then relates these ideas to findings from some preliminary research in New Zealand based on interviews with university library staff responsible for developing repositories, and a pilot study of academics' attitudes towards institutional repositories.

Findings: As shown in reports from the literature, institutional repositories in New Zealand vary greatly in purpose, scope and content and they way they are managed and promoted. New Zealand academics making their research available in institutional repositories are motivated more by public good rather than enhanced reputation, but remain concerned with issues of intellectual property, and the quality and prestige of repositories as channels for disseminating research.

Conclusion: Libraries and the academic community have conflicting views concerning the value of institutional repositories, and their relationship with the traditional scholarly communication system. It may be necessary to reconsider the purpose of repositories, and how they are developed and marketed to maximise their benefits.

Introduction

The development of institutional repositories, electronic archives of the research output of the staff of any individual institution, are often managed by academic libraries. Their development raises key issues about the role of academic libraries in the scholarly communication cycle, and the impact that institutional repositories may have on traditional forms of scholarly communication in the 21st century. Academic libraries have played a key role in the scholarly communication process for the past 150 years. During this period, they have experienced major changes in the creation, dissemination, and preservation of knowledge, through changing social, philosophical and educational paradigms, and the emergence of new technologies. Academic librarians have shown themselves to be adept at adjusting to these changes, and been proactive in advancing research, scholarship and knowledge. With the advent of institutional repositories, they are being asked to adopt another new technology, one that brings with it the potential for a further paradigm shift in scholarly communication. This paper therefore explores the development of institutional repositories within this context, and the role of academic libraries in promoting and sustaining them, comparing their objectives with the core principles of scholarly communication that have preserved and disseminated western knowledge for the past two centuries. In doing so it provides a summary of recent thinking on the subject,

and makes use of some developmental research carried out in New Zealand, to exemplify emergent trends, rather than to report on the state of institutional repositories in New Zealand, and to examine the extent to which repositories are fulfilling the key functions of scholarly communications systems.

Academic libraries are a key part of the scholarly communication cycle that focuses on the creation of new knowledge through research and scholarship, the submission of findings to a journal in the discipline, rigorous peer review to ensure the contribution meets minimum standards, publication and dissemination (usually through library subscriptions), making the new knowledge available to the next community of researchers, who will further build on it. Although the pattern of creation, organisation and dissemination varies from discipline to discipline and may involve monograph as well as journal publication, it has been endorsed by the academic community, and is closely integrated into the promotion and tenure system that rewards academics. Roosendaal and Geurts (1997) identified four key functions of this process of scientific/scholarly communication:

- registration: identifying the 'owner' of the intellectual property;
- certification: establishing the quality of the research;
- awareness: making the research available to others; and
- archiving: long-term preservation to make the results available to future researchers.

However, in developing institutional repositories, academic libraries, and proponents of the Open Access movement who have led the movement have focused on somewhat different objectives. In response to rising journal costs, particularly in science and medicine, libraries responded by cancelling subscriptions, and, as a result, researchers lost access to key material. In 2001, the Budapest Open Access Initiative published a manifesto calling for open access to peer-reviewed journal literature (Open Society Institute, 2002). This recommended two strategies: (i) self-archiving of refereed journal articles in open electronic archives, and (ii) publishing in open access journals, which publish their content freely on the Web (but may impose author charges).

Institutional repositories have since become a global phenomenon—they are now established on all continents, with the largest repositories being found in Europe, North and South America, Japan, India and Australasia. Interest in establishing and promoting repositories is likely to show continued growth, particularly as academic staff increase their online presence and adapt their work patterns to the new Web 2.0 tools such as blogs, RSS, wikis, and virtual communities. As Lynch (2003, p328) noted "the intellectual life and scholarship of our universities will increasingly be represented, documented, and shared in digital form." Institutional repositories are one of the tools that make this possible.

The purpose and scope of repositories

Reasons for setting up repositories vary, and a range of projected benefits has been suggested in the literature. These include benefits to the researcher, to the institution, and to individual disciplines. Academic libraries also benefit from being involved in institutional repository initiatives, and there are implications for scholarly communication overall. The primary reasons used to persuade academics of the benefits of placing their output in an institutional repository is exposure—that by having their research and publications openly available on the Web, not just in fee-based databases, scholarly journals, or books, their work is likely to be used and cited more. As a result, their reputation will be enhanced over the long term, due to the recognition they gain from this (Pinfield, Gardner and MacColl, 2002). Other benefits to researchers include stewardship and preservation of their publications in digital form, which frees them from the need to maintain this content on a personal computer or website (Lynch, 2003, p330).

Many of the benefits identified, though, are at the institutional level, or even at the national level. In Japan, for example, the Ministry of Education, Culture, Sports, Science and Technology has encouraged Japanese university libraries to develop institutional repositories to promote sharing of knowledge throughout Japan and internationally (Cullen and Nagata, 2008). The development of institutional repositories in Africa is seen as a way of making institutional research outputs available to a community with less than optimal access to resources (Musoke, 2008). In a survey of academic library directors and senior administrators carried out in 2006, Rieh et al. identified "capturing the intellectual capital of [the] institution" as the most important benefit of an institutional repository (Rieh

et al., 2007). Improved long term preservation of the institution's digital assets is another benefit to be realised through centralising content in known, standardised formats (Crow, 2002,).Other proposed benefits focus on increased institutional prestige from exposing research carried out by staff and students. Crow suggests that this will be a much more effective way of highlighting an institution's total academic outputs, which are otherwise spread among many publications (Crow, 2002). He sees a further benefit in increased differentiation between institutions, because of the unique content in individual repositories, and suggests that potential students with an interest in a discipline may be attracted to an institution that makes its research in the field widely available through a repository.

These motivations relate to only two of the principles of scholarly communication outlined above, namely, awareness and archiving. The principles of registration, and certification, which were the initial driving principles behind the system of scholarly communication which has grown up over the past 200 years, have largely been ignored in discussions of repositories This raises important questions about whether the institutional repository movement, at least in its current form, is sustainable in the long term, and whether it will need to modify its objectives, and its vision, as it finds a place among the many competing forms of digital knowledge in the 21st century. It also raises the question of whether the concepts of registration and certification will remain key dimensions of the traditional model of scholarly communication, long term, in this age of 'socially created knowledge'.

A key to the answers to these questions lies in the attitudes of academics in our tertiary institutions, the scholars and researchers whose work is needed to populate repositories, and who are considered to be the prime beneficiaries. Further considerations include issues such as:

- the way in which the repository is marketed to the academic community within an institution;
- what rewards are seen to flow from contributing to the venture;
- institutional decisions on scope;
- the degree of coercion applied by the institution, in the form of mandatory deposit.

Defining scope can therefore be seen as a major task for institutions involved in establishing a repository. Whether the repository will contain theses, peer-reviewed post-prints, pre-prints, working papers, presentations, learning objects, as well as institutional records and reports and historical items being digitised for preservation or access can impact on the attitudes of academics. In his study of 25 United Kingdom repositories, Allen (2005) found a great variety in scope and content, identified several small and under-utilised repositories, and noted that the contents were dominated by science and technology. This unevenness in content, he suggested, can lead to loss of trust or reputation, and make it more difficult to persuade contributors of the value of the repository. The same pattern was observed in the Repositories by the Numbers Project (Thomas and McDonald, 2007; McDowell, 2007), which also found a wide range of items deposited, the largest proportion comprising PhD and other theses, followed by faculty research output, of which only 13% was peer reviewed. The typical pattern of deposit was one item per depositing author. Well-reasoned decisions and rules on scope must be therefore made and communicated early if trust in the repository is to be maintained, and its value is not compromised by a lack of support from academic staff.

This lack of consensus about what a repository should contain does appear to have had a considerable impact on the acceptance of repositories and their growth. Statistics from international registries of repositories, such as ROAR and OpenDOAR,[1] show that growth in the number of items in repositories has not reached early expectations. The willingness of academics to contribute to a repository appears to depend on a number of factors. Historically, particularly in the sciences, groups of researchers keen to share their research findings, and with an element of competitiveness, have led the way (Jones, Andrew and MacColl, 2006). Other early adopters are those from more recently developed academic disciplines, or who are seeking to build an academic community across a dispersed workforce, such as Nursing Studies (Cullen and Chawner, 2008). In contrast, academics accustomed to the well established routines of publication in academic journals of known prestige, with effective systems of peer review and dissemination, see little benefit in alternative methods of access to the same material. As Hendler (2007) notes, prestige of publication venue plays the single

[1] Found at http://roar.eprints.org/index.php , and http://www.opendoar.org/ respectively

largest role in faculty decisions about the destination of their research.

This issue was also highlighted in a report issued by the University of California Office of Scholarly Communication (2007), which surveyed staff involved in managing repositories. The findings indicated that academics have little awareness of opportunities for open access publishing, continue to publish in traditional venues, and identify a major obstacle to change as "the existing reward systems of tenure/promotion (and even grant making) which favour traditional publishing forms and venues." (University of California, 2007, 3). This well established reward system is currently being reinforced by an international focus on the use of research outputs to evaluate tertiary institutions, a focus which emphasises publication in the most prestigious journals and conference proceedings in a discipline. In addition, the lack of alignment of the deposit process with the routine daily activities of academics may also contribute to the lack of interest shown by academics in depositing their output.

Arts and humanities researchers differ in a number of ways in their use of library services from their colleagues in the sciences and social sciences, and these differences continue to be evident in the way academics view institutional repositories. A survey of British academics (Allen, 2005) found peer review to be as important to British as to US academics. The study showed that humanities scholars had low awareness of repositories and their value to the research community; they perceived the value of repositories to be to the reader, rather than the scholar depositing, and had on-going concerns about repositories, such as peer review, plagiarism, and intellectual property ownership. More recent research in the UK about the impact of e-publishing and open access for researchers in the arts and humanities suggests that they continue to be less aware and make significantly less use of e-publications and open access services than their counterparts in the sciences (Heath, Jubb and Robey, 2008). This may be partly because the advance of knowledge in the arts and humanities is typically slower than in other disciplines, and researchers are more likely to be interested in the final versions of articles, or post-prints, rather than pre-prints. Because of the very long half-life of journals in the humanities, publishers may be less willing to allow open-access posting of e-prints even after an embargo period (Heath, Jubb and Robey, 2008). However, the authors also note that although many humanities journals let authors make their material available through repositories, their willingness in some cases outruns the inclination of their authors to self-archive.

Persuading the academic community to contribute

Content recruitment, that is persuading academics to deposit their research output in an institutional repository continues to be a major issue. All respondents in the Census of Institutional Repositories in the US reported having difficulty recruiting content from faculty and graduate students, and the study found that the more mature the repository is, the more sceptical respondents (that is staff responsible for administering the repository) have become about the success of any given recruitment strategy (McDowell, 2007). These findings, echoed in many other reports of individual repositories, challenge the fundamental open access philosophy that posits institutional repositories as an alternative tool for the current scholarly publishing model (McDowell, 2007). It appears that members of the academic and research community do not see repositories as part of the publication process. Given the reluctance of academics to deposit their research output, whether through lack of interest, lack of knowledge, or through concern over the purpose and function of repositories, it is clear that tertiary institutions wanting to increase their rate of deposit (and use) need to actively market the concept of the institutional repository within their institution. Advocacy is an ongoing task to ensure that new depositors are being recruited, and that previous depositors continue to contribute updates of their research output, and remain committed to the overall success of the repository.

Jones, Andrew, and MacColl (2006, p.111) identify a number of strategies as being helpful in securing a critical mass of content early on, from securing sought-after research reports, to using well-regarded individuals who have some informal leadership status within the institution to 'champion' the project. It is possible that more active recruitment of content, with library or repository staff managing the process, often referred to as mediated deposit, rather than leaving it to academics themselves will be more successful. One of the more controversial policies is to make deposit mandatory for all staff and students. A strong recommendation for this was made in 2004 by the House of Commons Science

and Technology Committee Report (Pinfield, 2005). Harnad (2006) also argues strongly for mandatory deposit, citing research which showed that 95% of researchers sampled would self-archive if their employers required it. (Swan and Brown, 2005). Tertiary institutions which have adopted this policy, while allowing some exceptions, and rarely being aggressive in pursuit of those who do not deposit, have indeed had high rates of deposit. Henty (2007) cites the Queensland University of Technology as one such example. But, there are also downsides to this approach —not the least of which is the high workload involved in managing the process (ie modifying metadata, employing version control, checking that intellectual property rights have been observed and overseeing quality control), whether self-deposit or mediated deposit is employed. A more widely adopted solution is to mandate deposit of theses from any research degree awarded by the institution, and encourage the deposit of other staff publications. However, some academics are taking the initiative for themselves. Members of the Faculty of Arts and Sciences at Harvard University voted recently to require all staff to allow the university to deposit their peer-reviewed publications in the Harvard repository. In proposing this policy, Stuart Shieber, Professor of Computer Science at Harvard, said commented that the decision "should be a very powerful message to the academic community that we want and should have more control over how our work is used and disseminated" (Guterman, 2008).

In summary, research to date suggests that while tertiary institutions and their libraries, sometimes encouraged by national institutions, are pushing ahead to establish repositories in order to maximise exposure to their academic output, and make it as widely available as possible, there is still considerable reluctance in at least some parts of the academic community to participate in the venture. Concerns, whether real or not, about intellectual property rights, the value of additional exposure, and adherence to the existing model of scholarly communication work against widespread acceptance of the concept.

Report on New Zealand investigations

It is useful to compare these findings in the literature with some preliminary scoping studies conducted as part of a longitudinal study of the implementation and use of institutional repositories in New Zealand. These early studies highlight both the institutional response, and academic responses to some of the issues noted above. The full project will address a number of research questions, including:

- what is the purpose and scope of the repositories being established by New Zealand tertiary institutions, and their libraries;
- how have libraries gone about implementing and marketing their repositories;
- what have they achieved to date;
- what are the attitudes of academics in New Zealand tertiary institutions to institutional repositories;
- how will these perceptions impact on their use of repositories for the dissemination of their own research, and as a knowledge resource

The first study conducted in New Zealand, beginning in mid-2007, carried out a preliminary investigation of the situation from the perspective of libraries building institutional repositories, as the first phase of the larger long term study. In subsequent phases, the investigation is extended to the academic community and its perceptions of institutional repositories, and use made of the contents. The study will conclude with a further investigation of the role of repositories from the library perspective, and changing perspectives on the venture.

Phase I

In the initial phase key library staff involved in a number of institutional repository projects were interviewed about their project's early development (Cullen and Chawner, 2008); the interviews were continued through 2008. The initial institutions included six of the eight New Zealand universities (University of Auckland, University of Otago, University of Canterbury, Auckland University of Technology, Victoria University of Wellington), and three Polytechnics (Manukau Institute of Technology, Unitec, and the Christchurch Polytechnic Institute of Technology). (The University of Otago project, the earliest in New Zealand, which 'went live' in November 2005, has to date been

based in the Business School. The university will now initiate its own repository, managed by the Library, covering all other disciplines.)

These preliminary interviews show that New Zealand tertiary institutions (and their libraries) are involved in a wide variety of institutional repository projects, most of which involve formal or informal consortia. For example, the University of Auckland, University of Canterbury, as well as Victoria University of Wellington are part of *Institutional Repositories Aotearoa (IRA);* MIT and Unitec are involved in *coda: an Institutional Repository for the New Zealand ITP Sector* along with three other technical colleges. AUT and Otago are involved in *The Library Consortium of New Zealand (LCoNZ*) along with the University of Waikato, Victoria and the University of Otago, while *Open Access Repositories in New Zealand (OARiNZ),* includes CPIT, Otago, the National Library, and half a dozen polytechnics, some of which are active in it and others not. Other repository projects in use in New Zealand include the *Australasian Digital Theses Program (ADT),* which is operational at all the universities except Victoria, and the umbrella metadata resource discovery system, *Kiwi Research Information Service (KRIS*).

The size of the institutions included in this preliminary phase of the research, numbers of staff and students, budgets, and library size, varied considerably, which affected the size and content of each repository. So did the decisions that had been made concerning purpose and scope. A primary motivation for most participating institutions appeared to be the fact that top institutions internationally were setting up repositories, and New Zealand institutions must be seen to be a part of this international trend. Secondary motivations included a range of reasons from exposing staff research and student theses to a wider international audience, managing and archiving research outputs of both kinds, and showing leadership in electronic information management. All participants accepted the key role of the library in the development and maintenance of institutional repositories, although some of the smaller institutions participated largely because they were invited to join a consortium, and would not otherwise have had the expertise or the motivation to undertake such an exercise of their own volition.

While obviously the stronger research focus of the universities meant that they had potentially a far larger body of staff research outputs, as well as student theses, that could be included in their repository, this was only one of the factors impacting on the size of the repository. The research orientation and disciplinary focus of academic staff varied between the institutions as well, and this also influenced the scope of the repositories and their size; institutions which focus on applied areas tending to have considerably fewer research outputs per staff member. But the most important factors appeared to be the goals developed for each institutional repository, and the way in which the institution had gone about its creation. AUT, for example, was initially concerned with preservation of digital theses rather than discovery. At Otago, however, the School of Business intended its repository to contribute to a higher research profile for the School, in addition to connecting with the wider global research community. Linked to their individual repository goals, scope and content varied significantly between repositories-even within the consortium they belonged to, individual institutions made their own choices about content and scope. In the *IRA* project, for example, Auckland and Canterbury have taken very different approaches, Auckland's primary focus being on PhD theses, which can be mandatorily acquired, while Canterbury is emphasising staff research outputs, with no compulsion to deposit. Victoria initially accepted staff research outputs from some leading researchers, and only subsequently made the deposit of theses mandatory. In addition, not all repositories are confined to the full-text of published and peer-reviewed items: some repositories include metadata-only entries for conference presentations, or staff theses completed elsewhere, in addition to full-text items.

Given the importance of advocacy to the growth of content in institutional repositories the initial case studies explored this in some depth. While those institutions focusing on mandatory deposit of theses started their campaigns by getting the necessary policy and statute changes in place, other institutions, with their focus on staff research outputs, had developed various strategies for marketing their respective repositories, and soliciting input, a standard approach being to draw attention to the repository during academic board meetings and then approach faculties, and departments individually, making use of institutional newsletters. Some attempted to get leverage off pre-existing mandatory procedures (e.g. annual reporting mechanisms of research outputs). Institutions that focused on

research content tended to find 'champions' (high profile researchers or groups) for the project to assist with promotion, highlighting the increased exposure of their research. This would sometimes include the provision of personal pages for researchers wiling to put content in the repository. However, this did not necessarily result in a flow of papers into the repository.

In general, the New Zealand tertiary institutions interviewed in the first round of the research appeared to have embraced the concept of institutional repositories with some enthusiasm, and felt that they could show some beneficial impacts from the venture. Every repository held content of some description, although content varied greatly between institutions (and in some, the majority of content was well below the standards set by international institutions). Figures drawn from the KRIS web site[2] show the highest number of records (approx 2,500) in the Auckland university repository, largely theses; this figure is not matched by the other universities, which have less than 500 deposits each, or the polytechnics which have relatively few deposits, often around 50 items.) Marketing strategies seem to be less proactive than advocates in literature recommend, with the result that the repositories, especially those focused on staff research outputs, are not growing fast. The academic community has not been persuaded to overcome its reluctance to deposit, and repository staff indicated that their academics remain concerned about plagiarism and intellectual property rights (especially their right to deposit, post publication). No institution appeared to be actively 'harvesting content' as is recommended in the literature, (Mark and Shearer, 2006), although most were still at the stage of mediated content recruitment, and metadata management.

Phase II

The next phase of the research focused on academics' attitudes to institutional repositories, both as an information source, and as somewhere to deposit their research. This phase consisted of two concurrent projects, an initial pilot study of academics at Victoria University, and a randomised national survey of academics at tertiary institutions. The survey results are not at this stage ready to report, but brief findings from the pilot study can be reported.(Reid, 2008) This study reports on interviews with eight academics, five of whom had deposited their research in the institutional repository, and would do so again, one who had deposited but would not do so again, and two who had not, and were unlikely to do so. Six of the eight academics interviewed were aware of the increased exposure that their work would gain, and saw this as desirable, in that it contributed to the public good, some expressing frustration with traditional channels of dissemination, which they felt did not reach a wide enough audience.

The benefits of an institutional repository, largely noted by those who had deposited and would continue to do so, thus related to the public good aspects of open access, making information more freely available, allowing the dissemination of knowledge that did not fit the dominant paradigm. This was a stronger motivating factor than personal benefits such as greater citation rates for their work, although the benefits of this were recognised. Most of the participants who deposited had a motive for wanting their research disseminated quickly, feeling this was an effective way to reach their target audience, although concerns were also expressed that open access of this kind was feeding the 'Google' phenomenon

Disadvantages of depositing, noted by both groups, depositors and non-depositors, related to concerns about the prestige of an institutional repository and the issue of quality assurance, (for some this was a key factor in their choice not to deposit). Concern was also expressed by most participants about the potential risk of copyright infringement, concerns over intellectual property rights, the potential for plagiarism, and the impact of the open access movement on the established scholarly communication process and peer review. In some disciplines the numbers of citations a work received was of less concern than the prestige of the scholar who used it. Greater exposure was thus of no interest. An equal concern shared by the majority of participants centred on the university's motivation for seeking to maintain a repository, They were satisfied with the existing systems, loyal to their discipline rather than the institution, and unconvinced that the reward system for academics would shift away from the existing international peer review model. Only the concept of public good was stronger than their loyalty to this system (Reid, 2008). Although these are only interim findings

[2] http://nzresearch.org.nz/index.php/institutions

from a small pilot study, there are indications that data from the national survey on which analysis has just begun will reiterate these core findings.

Conclusion

Given the investment that most institutions are making in this venture, and the very high expectations of its impact on the process of scholarly communication, several key points stand out from these two preliminary studies that echo earlier findings of studies in the US and the UK. Academic libraries, and their institutions, have adopted the philosophy of the open access movement, and committed themselves to a long term process without it seems, taking their academic communities with them. Even those institutions which have decided to go down the mandatory deposit route, seemingly with their academic communities behind them, appear to have given little thought to the radical nature of the changes they are proposing. Apart from the issue of arresting, or at the very least by-passing, the increasing costs of the scholarly publication system (something which has yet to be demonstrated) little thought has been given to the enormity of what is proposed- a shift of the entire infrastructure of the scholarly publications system to an open source, open access medium, and this, at the same time that institutions are calling for more accountability, more international systems for evaluating the research outputs of their academics.

In terms of the four key functions of scholarly communication outlined in the introduction, a paradigm that has been widely accepted and cited as representing reality, it seems that tertiary libraries and their institutions, are at cross purposes with academics and their institutions in an interesting and somewhat conflicting way. While academics, and the rewards systems within which they operate, focus on the principles of *registration* (identifying the 'owner' of the intellectual property) and *certification* (establishing the quality of the research) as the most important elements of the scholarly communication model, those creating institutional repositories are focused on *awareness* (making the research available to others), and *archiving* (long-term preservation to make the results available to future researchers). Until these two conflicting motivations can be brought into alignment, the future of institutional repositories looks less assured than some of the early rhetoric suggested. It is time for a serious reconsideration of the purpose and function of institutional repositories to ensure that they are better aligned with the aspirations of the academic communities they are intended to serve, and that the investment brings the benefits suggested.

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