

Institutional Repositories in New Zealand: Comparing Institutional Strategies for Digital Preservation and Discovery

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Abstract:

This paper outlines an ongoing project to create of a knowledge base to support the development of institutional repositories in New Zealand. The knowledge base wiki includes a summary of key literature to date, highlighting best practice, and standards relevant to the New Zealand sector, and a set of case studies of how New Zealand institutions have developed their repositories to date. These case studies are analysed, and different strategic approaches taken by institutions across the sector identified. These will then be discussed in relation to the issues identified in the literature. The paper also outlines new research areas being developed by the research team, a national approach that will link individual institutional approaches with the goals of the New Zealand Digital Strategy, and incorporate a survey of the perceptions and responses of NZ academics, and other key stakeholders, that are critical to the success of both the national strategy and individual institutional initiatives.

Institutional repositories; New Zealand; Open access; Academic libraries

Introduction

New Zealand's Digital Strategy [New Zealand, 2005] includes the goal of capturing the publicly funded research output of New Zealand's tertiary institutions in freely accessible digital format. Within the tertiary sector itself, this goal also includes the long-term preservation and enhanced discoverability of this research output. Several institutional repository initiatives have been funded by the Tertiary Education Commission (TEC) to identify the most appropriate formats and technologies for these purposes. These have been developed alongside a shared national infrastructure for discovery provided by the National Library's metadata harvesting initiative, KRIS. KRIS, an acronym for Kiwi Research Information Service, is an OAI-PMH harvester that provides a single search interface to all New Zealand institutional repositories.

As part of one of the TEC-funded repository projects, the OARiNZ (Open Access Repositories in New Zealand) project managed by Christchurch Polytechnic Institute of Technology, a research team at Victoria University of Wellington created a knowledge clearing house to provide an ongoing resource for participants in all the NZ IR projects, and to capture the history of the development of the open access movement in New Zealand. The Knowledge Base, which is a wiki web site, consists of an environmental scan and review of research on existing digital repositories overseas, an outline of initiatives within New Zealand, and will eventually include recommendations and a model of best practice to fit the New Zealand context. The Knowledge Base includes a series of eight case studies that outline how various key institutions have developed their repositories, what strategic choices they have made, what they have achieved to date, critical success factors, and the barriers that have limited their success.

The development of institutional repositories

The development of institutional repositories (IRs) resulted in part from a need to address problems inherent in the present system of scholarly publishing. As Harnad [2006] and Odlyzko [2006] have observed, academics have been drawing attention to such problems, and the need for a solution, for over twenty years. Chief among these problems are the affordability of key journals, with subscription costs rising faster than the rate of inflation and far outstripping library budgets, and the 'loss' of key resources if e-journal and database subscriptions are cancelled by libraries [Chan, 2004]. The resulting loss of access to research resources as well as output, may consequently reduce the 'research impact' of the work of scholars, and researchers. Institutional repositories are seen as having a role to play in overcoming these problems, a cost-effective method of providing access to research findings and improving the 'research impact' of an institution.

The history of institutional repositories is relatively short, with the first discipline-based repositories being implemented in the early 1990s. In their seminal text *The Institutional Repository*, Jones, Andrew and MacColl [2006] identify several successful repositories during this early period, in particular attention the ArXiv repository, launched in August 1991. Initially developed for physics researchers to ensure access to findings at a speed comparable to which new discoveries were being made, the repository was later expanded to serve the needs of other closely-related disciplines. ArXiv, however, has not served as a model for other repositories, possibly, as the authors suggest, because the other early repositories were created to cater for the needs of specific disciplines. EconPapers, for example, focused on economics working papers, CogPrints was concerned with cognitive psychology, and PubMed Central with the biomedical and life sciences [Jones, Andrew and MacColl, 2006].

The more recent institutional repositories (focused on the output of staff across all disciplines working at one, or a group of institutions) were developed, Jones Andrew and McColl [2006] suggest, in response to the concerns of academics, some being reluctant to deposit their work in discipline-based repositories, while others were concerned about the longevity of such repositories. An institutional repository, by contrast, could be deemed more credible and trustworthy. In addition, Jones, Andrew and MacColl cite the creation of the Open Archives Initiative in 1999 as a major factor in the rise of institution-based repositories [2006, p.7] giving rise inadvertently to the dilemma of whether an author should deposit their research in their institutional repository or in a discipline-specific repository. Green and Gutmann [2007] exploring further differences between both types of repositories, identify ways in which partnerships can be built between the two. Peters [2002] also proposes an alternative model, a repository maintained by consortia, and argues that a variety of digital repositories—individual, discipline-based, institutional, consortial and national—will be used in the immediate future.

Recent literature on institutional repositories indicates that repositories are being implemented at a growing rate. A 2005 survey of United States institutions, for example, observed that 40% had already established institutional repositories [Lynch and Lipponcott, 2005]. A further 88% of colleges and universities that did not currently house institutional repositories intended to do so in the near future. Other reports indicate a surge in usage of the two main repository platforms, Eprints and DSpace, in recent years. According to Lomangino [2006], the use of Eprints rose from 125 to over 200 repositories in 2004–2005. The Registry of Open Access Repositories indicates that as of mid-2007, there are 227 known repositories using Eprints, with DSpace being the preferred software platform for 234 repositories. Lomangino also found that the number of repositories complying with the Open Archives Initiative's interoperability standards has risen from 243 to 617 repositories since late 2003 [2006, p.7].

Implementing an IR

To support the development of IRs several open access repositories of knowledge have been built up in recent years. The Directory of Open Access Repositories maintains a set of web pages identifying current views on best practice in addition to its listing of open access repositories [OpenDOAR, 2007], and the US-based Research Libraries Group have developed standards (based upon ISO 9000 and ISO 17799) and evaluation criteria widely promoted in their web document "Trustworthy Repositories Audit & Certification: Criteria and Checklist" [2005]. In response to an identified dearth of policies on key matters such as the permitted re-use of deposited items, submission of items, long term preservation, etc [Millington, 2006] the Open DOAR website offers a solution in the form of a tool to generate policies in a number of important areas, from metadata and content to submission.

One of the major tasks in establishing a repository is defining the scope of the project. Allen's 2005 study of *Interdisciplinary Differences in Attitudes Towards Deposit in Institutional Repositories*, found a great variety in scope and content in the 25 institutional repositories he examined. Allen notes that several are small and poorly utilised, (the contents dominated by science and technology deposits), and argues that this could lead to loss of trust in the project and its reputation. Content related issues remain crucial to the success of IRs, and problems persist with regard to the nature of material to be included. In his case study of the University of Oregon's institutional repository, Lomangino [2006] noted that only 18% of the 1,900 documents were authored by academic staff—the scholarly integrity of the remaining 82% was, therefore, in doubt. Key issues such as whether articles and conference papers should be deposited and retained only after peer review and acceptance, or at the time of submission, along with whether they should be updated if changes are required (or implemented) before publication, remain

hotly debated. Proberts and Jenkins [2006] list a range of attributes of items for deposit that must be clarified in an effective policy, including the type of document, status (peer-reviewed, accepted, published, etc.), format, who may contribute (only employees, or co-researchers and affiliates), related output (presentations, workshops, and work in the same series.) SPARC's 2002 Institutional Repository Checklist and Resource Guide argues for a repository that includes post-print, what used to be known as 'grey literature' and, in particular, pre-prints (as well as theses), on condition that this material is carefully handled and properly managed. A later SPARC position paper also encourages a broader view of scope, and the inclusion of items such as work-in-progress, grant applications and reports, student reports which are not confined to research degrees, classroom and teaching materials, computer programs, audio-visual material, creative works, institutional documents and reports. In such a case, careful attention to the assignment of categories, content management systems and version control will be required [Crow, 2002] This view is also supported by Lynch, who argues that repositories should "reflect campus life, symposia, performances, lectures" [2003]. Genoni [2004] also argues that these difficult decisions should be made by individual institutions and not mandated by international standards. In doing so, he raises important questions regarding quality control and how libraries will assert this, if not through the peer review process.

Management and maintenance

There are many basic considerations that institutions need to take into account in setting up a repository, and to ensure it is sustainable, and an effective information management system. A key aspect of managing an open access repository is the need for staff with the necessary skills. Jones, Andrew, and MacColl [2006] argue that the development and maintenance of an institutional repository requires some organisational restructuring. Staff with high level cataloguing and metadata skills are required just at a time when many institutions have either been outsourcing cataloguing or purchasing their cataloguing records, with metadata already in place. Staffing is, therefore, a major element in costing estimates, according to Jones, Andrew, and MacColl [2006, 37–38]. Markey, Rieh, St. Jean, Kim and Yakei [2007] suggest that staffing costs account for nearly 40% of a repository's total budget.

Preservation is another critical issue, The OAIS reference model Consultative Committee for Space Data Systems, 2002, 650.0–B-1, cited by Jones, Andrew and McColl [2006] provides detailed recommendations about best practice, and appropriate work flows for each stage of the preservation process. For a more thorough account, Bradley's 2005 discussion paper on sustainability by Australian Partnership for Sustainable Resources (APSR) provides thoroughly referenced discussion on issues relating to sustainability and long-term preservation, and outlines the various steps needed to achieve this.

Advocacy

Allen's 2005 study, which was undertaken for the UK Arts and Humanities Research Council found that humanities scholars generally perceived repositories to be the greatest value to the reader (rather than the scholar who is depositing) and that they have ongoing concerns such as peer-reviewing, plagiarism, and intellectual property ownership. *Advocacy*—that is, marketing a repository to its academic community—forms a critical element in gaining acceptance of the concept, buy-in from potential depositors, and a successful rate of deposit. Advocates of open access claim that items freely available on the Internet have a significantly greater 'research impact'. In summarising research to date, Harnad [2006] suggests that open access items have twice the impact of those in more conventional repositories. Other well-designed research studies demonstrate the 'research impact' of open access to be perceptible, but more modest, in some disciplines. Antelman's 2004 study, for example, shows an increase in citation rates for philosophy (45%), political science (86%) and mathematics (91%), but argues that this was most likely due to the low rates on self-archiving and less use of online resources in humanities subjects. Wren [2005] and Tschider [2006] both report investigations into the higher visibility of science reported in open access repositories, as well as a greater likelihood that research in the highest ranked journals will also be found freely available on the Internet.

There are a number of strategies that existing institutional repositories have used to encourage acceptance and uptake of their 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. 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]

A common approach to a communications strategy includes the use of institutional and library newsletters, attendance at key meetings, and the use of leading researchers as champions. Mark and Shearer suggest that this must be supplemented by targeted content recruitment strategies, such as independent harvesting of content and mediated deposit – that is, systematic approaches to a academics, and assistance with the deposit process.[Mark and Shearer, 2006] Academics may need to be informed about the establishment of the repository service seven times before they become fully aware of the project and its benefits Barton [2004]. Incentives such as awarding prizes to top depositors, and publicly celebrating landmarks successes (such as 1000 deposits) have also been found to be effective [Kwan, Chok & Yip, 2005]. Pointing to the use of the repository as a reference resource by people outside the institution can be considerably persuasive when presented to academics.

Evaluation Criteria

There is broad consensus regarding the high-level criteria that should be met by institutional repositories, focused on the need for repositories to be scholarly, cumulative and perpetual in nature [Genoni, 2004, Johnson, 2002, Lynch, 2003, Jones, Andrew & MacColl, 2006], Genoni [2004, 304] additionally proposes that repositories should be evaluated in a similar way to print collections, based on, for example, size, levels of use, and satisfaction. A long-term study conducted by the [Shearer, 2003] Association of Research Libraries identifies key success factors as 'use,' input activity, disciplines covered, advocacy activities, and archiving policies. The RLG/NARA Audit Checklist for Certifying Trusted Digital Repositories is the most comprehensive system currently being advocated for the evaluation of a repository, and covers both technical and management issues in considerable detail. Kaczmarek et. al.[2006] report on the implementation of this checklist at the NDIIPP-sponsored ECHO DEPository project, but work on the checklist itself is ongoing [Moore and Smith, 2006]

The OAIS [2007] reference model can also be used as a basis for evaluating an open access archive system, although it may not be fully appropriate as an evaluation tool [Ball , 2006] 'Depositorship' and 'availability of full-text' have also been suggested as criteria [Xia and Sun, 2007] criteria, as well as the quality of documentation: "the purpose and aims of the IR (should be) clearly defined and that the IR documentation itself should be concise and easy to understand, with the rights and responsibilities of stakeholders clearly presented" [Probets & Jenkins, 2006, 57]. Download and usage statistics were used to assess the effectiveness, of the University of Wollongong Repository, focusing on access via Internet search engines, and the relationship between cover page hits only and full-text download. [Organ 2006]

Copyright, Intellectual Property and Third-Party Copyright

Intellectual property and copyright legislation are major and controversial issues which need careful consideration. [Jones, Andrew and MacColl, 2006] IP applies as well to pre-prints and post-prints the Open Access to Knowledge Law Project's repository guide makes clear [Pappalardo and Fitzgerald, 2007], Once a repository is established , with either pre-or post-prints, the question arise of what is the responsibility of the institution as publisher Jones, Andrew & MacColl suggest that the institution may take one of three legal positions: common carrier, distributor, or publisher [2006, 147]. Taking a firmer stand, Bide [2002] maintains that institutions running e-print archives or repositories must be regarded as publishers, and should attempt to follow a good publishing practice. Not all institutions developing IRs have an IP policy however, Kelley, Bonner, McMichael, and Pomea found that only 52 % of surveyed institutions had developed an intellectual property policy, while 29% had no such policy [2002, 259]. Third-party copyright issues are equally overlooked by many institutions. However, Jones, Andrew and McColl argue that material embedded within a thesis (such as text or images) created by a third-party who holds copyright cannot be covered by the defence of 'fair use' since this only extends to examination and research, and that publishing the thesis (in an IR) will breach copyright [Jones and Andrew 2005, 200]. As Gadd, Probets and Oppenheim [2003] found only 25% of self-archiving authors sought clearance from the original copyright holder They observe that authors wishing to self-archive previously-published research must notify, and receive

permission from any third parties cited in the research paper [Gadd, Probets and Oppenheim 2003, 259].

Methodology

Following the creation of that part of the Knowledge Base drawing on the literature, key elements of which are highlighted here, the project shifted attention to repositories in New Zealand. An inventory of New Zealand repositories was created, linked to a series of case studies describing the initial creation of some of these repositories. The case studies were based on interviews undertaken with staff from a range of these institutions. These accounts provide a unique perspective of the processes involved in establishing a repository, and focus on aspects such as the institutional context, the nature of the IR project, staffing, promotional activities, achievements, challenges and plans for the future.

In mid-2007, key staff in each of the initial group of institutional repository projects were interviewed to provide case studies of their project's early development (A further group will be included in 2008). These institutions included The University of Auckland (AU), University of Otago (OU), University of Canterbury (CU), Auckland University of Technology (AUT), Manukau Institute of Technology (MIT), Unitec, and Christchurch Polytechnic Institute of Technology (CPIT). (The University of Otago (OU) 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 covering all other disciplines.)

The results, available at <http://www.oarinz.ac.nz/oarinzwiki/>, show that a wide variety of institutional repository projects have begun operating in New Zealand. Most of these involve formal or informal consortia, with AU, CU and VUW part of *Institutional Repositories Aotearoa (IRA)*, and MIT, NorthTec, Universal College of Learning, Unitec and Wairarapa Community Polytechnic involved with *coda: an Institutional Repository for the New Zealand ITP Sector*. The *Library Consortium of New Zealand (LCoNZ)* project involves AUT, UW, VUW and OU, while *Open Access Repositories in New Zealand (OARiNZ)*, includes CPIT, OU, National Library, Nelson Marlborough Institute of Technology, Terawhiti Polytechnic, LU, Bay of Plenty Polytechnic, Northland Polytechnic, Waikato Institute of Technology, WelTec, and Wairarapa Institute of Technology. Other repository projects in use in New Zealand include the *Australasian Digital Theses Program (ADT)*, which is operational at AUT, LU, MU, UA, UW, CU, and OU, as well as the *Kiwi Research Information Service (KRIS)*, known during its development phase as the NRDS content harvester.

Findings

Goals and scope

The interviews involved universities and polytechnics associated with all of the New Zealand repository consortia. Two repositories were part of *IRA*, two were in *coda*, two in *OARiNZ* (although OU is not particularly active yet) and one in *LCoNZ*. The size of the institutions visited in this phase of the research varied considerably, and this also affected the size and content of each repository. In terms of staff, CU, for example, employs 600 academic staff compared with approximately 400 staff at CPIT. Student numbers also differed greatly, from AU's 40,000 equivalent full-time students to Unitec's 9,000. Correspondingly, the repository at the UA contains 1300 theses, and 200 other items ranging from working papers to images, whereas Unitec's repository only contains 14 items including papers from the initial staff researcher, and some theses. There were similar differences in annual library budgets between the institutions, with the polytechnics at the lower end of the scale. The University of Auckland Library had a budget roughly 15 times that of the smallest, Manukau Institute of Technology's library.

The research orientation and disciplinary focus of academic staff varied between the institutions as well. Unitec's focus is nursing, business, and architecture and design, while UA, which claims to be New Zealand's leading research university, encompasses a variety of faculties including the specialist areas of medicine, engineering, law and architecture. This also influences the scope of the IRs and their size; institutions which focus on applied areas tend to have fewer research outputs per staff member; in addition, the results of applied research, which may be physical objects rather than formal papers, can present challenges for repositories.

Each institution approached their repository with different goals in mind. AUT, for example, was initially concerned with preservation of digital theses rather than discovery. At OU, 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, the scope and content varied between repositories. UC, for example, focuses on high-quality research output (rather than theses), while AUT is primarily concerned with theses. Even within a consortium, individual institutions make their own choices about content and scope. In the *IRA* project, AU and CU have taken very different approaches, AU's primary focus being on PhD theses, while CU is emphasising staff research outputs. The OU, Business School repository contains working and discussion papers (avoiding duplication of published material) as well as 73 theses from Commerce Honours and research degrees, while MIT intends to hold staff theses (whether or not they have been undertaken at other institutions), along with other staff research outputs, which may be multimedia. Not all repositories are confined to the full-text of published and peer-reviewed items: some repositories include metadata-only entries for conference presentations in addition to full-text items.

Staffing, budgeting and managing workflow

Overall, the institutions do not share a common approach to budgeting or staffing. For OU, the initial financial outlay for the Business School was minimal but the University Library has since contributed to the costs, and will build its own repository along parallel lines. The current set up at MIT has meant that there have not been any major costs (except for staff time) and the MIT librarian has had time to work on the project. AU, by contrast, has employed two full-time staff to work on their repository, with these positions being initially funded when the institution was setting up the *IRA* project with VUW and UC. With their larger budgets, the larger institutions were more likely to have dedicated staff for their repository, funded within the overall budget for the library, while smaller institutions tended to have added repository-related duties to the existing staff responsibilities. At CU, the repository project benefited from Information Services staff involvement with the national research evaluation process, the Performance Based Research Fund (PBRF), and some of the new duties associated with the repository were able to be fitted into existing workflows related to collecting and recording staff research outputs.

Further differences between institutions were particularly evident when we examined key decisions about issues such as whether or not to establish a legal (or statutory) framework within the institution to support the repository (particularly in relation to mandatory deposit of theses). Other core issues to which varying approaches were taken included managing workflow, requiring author self-submission, and managing intellectual property rights (especially third-party copyright). Organisations focusing on theses tended to start by ensuring that their statutes were amended to require mandatory deposit of completed theses, and in some cases this started more than 18 months before the repository began collecting them. The OU workflow initially allowed anyone on the project team to create data records, but this role was later assigned to a single research assistant (on the dedicated repository staff) who would enter key words and Dublin Core metadata elements. Following this process, library staff with cataloguing expertise would check, confirm and enrich the metadata, if necessary. CU, in contrast, has developed a single workflow for all types of digital objects in its collection, whether they are in the institutional repository or not. AUT envisions future authors of theses will be required to self-submit, with staff taking on the role as moderators to ensure the thesis metadata meets the ADT standards, based on the Dublin Core metadata elements.

All institutions are concerned about copyright and intellectual property issues, but some have taken more formal approaches than others. AU has developed several copyright licenses, including one in which the author of the thesis grants the IR a non-exclusive license to publish their work in the IR, and one for people downloading the thesis. Some institutions are very willing to place restrictions on digital theses because of concerns over third-party copyright or commercial sensitivity, while others take the view that they will make as much as possible available, and remove content if there are complaints.

Software

There are a variety of software platforms used in New Zealand institutional repositories, ranging from DSpace and Eprints, to Digital Commons and ADT. Each institution made software choices for their repository based upon several factors. UA, for example, investigated both Digital Commons and DSpace and found that although the former was judged to be a good product, its support was poor (perhaps because it is hosted outside of New Zealand, in the USA), the turnaround time for resolving problems was slow, and the software did not deal well with formats other than text. MIT has experienced problems of this kind, and *coda* staff have

spent a lot of time working behind the scenes with “little to show for it”. AU found that DSpace, by contrast, could be hosted locally, offered more sophisticated authorisation levels and software option at the collection level, and was better suited to the library’s needs. Other institutions’ decisions about software choices were made with concerns about future needs, the possible need to migrate to other systems and future collaborations in mind. OU’s project developers considered both DSpace and Eprints software, for example, and decided to use the latter was because it was widely-used and well-supported, and did not lock the repository into any specific technology.

Despite the lack of standardisation across all participants in this first phase of the study, metadata is one area where there has been considerable standardisation, largely because of the NRDS metadata harvesting project. This was possible because all projects were (more or less) at the same stage, and were able to make compromises as necessary to support the national metadata harvesting project.

Marketing and Promotion & Champions

The institutions in question developed various strategies for marketing their respective repositories. The standard approach was to draw attention to the repository during academic board meetings and then approach faculties, schools and departments. Institutional newsletters also proved to be an effective way of marketing the repository, as were pre-existing mandatory procedures (e.g. annual reporting mechanisms). The most basic approach was to persuade individual academics to contribute. MIT, for instance, highlighted the advantages (in terms of exposure and downloads) to those who deposited, explaining that this was ultimately in their best interests. It is interesting to note that institutions that focused on research content tended to find ‘champions’ (high profile researchers or groups) for the project to assist with promotion. Unitec’s repository, for example, began by capturing outputs from a high profile member of staff from the School of Education, and her story is used for demonstration purposes. However, institutions that focused on theses, such as UA and AUT, began by seeking to change their legal framework instead of having specific champions. Indeed, the AU Library has focused on their repository as a means by which Ph.D. theses would be made more widely available, rather than as a place to deposit published research materials. Staff also emphasised how the repository would facilitate greater access to theses via various search engines, such as OpenDOAR and OAISTER. Adopting a different approach, the polytechnics—all of which were new to the Performance Based Research Fund (PBRF)—formed an alliance with their Research Office as a way of seeking out suitable institutional champions. These institutions also tended to provide personal pages for researchers who had content in their repositories.

Successes

All of the institutions considered their respective repositories to be successful. Importantly, every repository held content of some description, regardless of type or scholarly value. The content, however, varied greatly between institutions (and most was well below the standards set by international institutions). The CU repository staff, for example, said that success was measured by the ‘comprehensiveness’ of their repository. Other institutions, such as OU, considered the growth of the repository to be its greatest success. Content is, moreover, being downloaded and this indicates that the repository content has been found and is in use. The OU repository had a particularly high number of downloads which could be explained by the repository’s comparative longevity and the fact that key research papers *about institutional repositories* were available in the repository. Other successes noted by participants included: securing Tertiary Education Commission (TEC) funding for the initial phases of the projects and developing staff expertise in building repositories. Another benefit noted was the extent of collaboration among staff at the institutions involved in the various consortia, and lessons about collaboration learned from this. IR staff reported that workflows have also been successfully developed and implemented, and in some institutions, necessary policy frameworks have been set in place. In addition, KRIS has begun to harvest metadata from all of the projects, which in turn provides another access point to the repository content.

Challenges

There have been significant challenges encountered by staff when establishing and maintaining repositories. Most notably, there has been strong resistance from potential contributors to some of the repositories, and some debate about the benefits of mandatory depositing and concern about plagiarism. Other challenges include a lack of ongoing support

from senior management and problems involving quality control and staff training. With regard to the technical side of the operations, it was noted that commercial software companies tended to provide inadequate support, particularly during the initial stages of a project. In addition, some participants commented that the thesaurus chosen as the standard for subject access by KRIS, based on the subject codes used for categorising research grant applications for the national research fund, the Marsden Fund, provides limited subject access, and is too high level to be adequate for searchers' needs. A further comment made by several institutions was that New Zealand academic journal publishers lacked the appropriate copyright policy to support depositing of the author's copy of a document into the repository. The ongoing issue of copyright and multiple 'versions' of documents was problematic and it was widely stated that researchers needed to be educated as to how this could be resolved. So do library staff- there were varying opinions on where a thesis completed by someone who was a staff member of one institution, but a student at another, should be deposited. Other challenges involved conflicts between institutional and departmental repositories. On a broader scale, collaboration between institutions was at times difficult due to the focus on the individual consortia and not the New Zealand IR sector as a whole.

Conclusions

Several issues have emerged at this stage of the project. With the diverse range of approaches by the institutions, and the various collaborations between them, the question of a 'national approach' must inevitably be raised. An alignment of policy between the projects, or even a national umbrella project, as advocated by Peters [2002], would most certainly provide a sense of cohesiveness for the institutional repositories of New Zealand.

In general, New Zealand tertiary institutions have embraced the concept of institutional repositories with enthusiasm, and have made a good start towards making New Zealand's publicly funded research freely available, within the context of the New Zealand Digital Strategy. The various projects have had beneficial impacts, not least in increasing awareness of complex IP issues that are emerging in the digital age. In addition, some institutions are using the IR processes to foster new relationships between library staff and academics. Liaison librarians who learn more about individual staff research interests will be in a better position to recommend resources, and select relevant material to support their research. On the down side, there is some way to go to maximise the effort and resources being put into this endeavour nationally. The lack of clarity over scope, version and quality control continues to be a challenge, as is the confusion over the ownership of intellectual property between institutions.

Marketing strategies seem to be less proactive than some advocates in literature recommend. The repositories are not growing fast, academics have not been persuaded to overcome their reluctance to deposit, and remain concerned about plagiarism and IP rights. No institution appeared to be actively 'harvesting content' as Mark and Shearer [2006] recommend. This lack of focused marketing and support for academics is a cause for concern, as is the over-reliance on PBRF as a motivator for staff to deposit. Library staff need to recognise that PBRF is multi-faceted, and publications tend to be the easiest part for academic staff to complete. PBRF also involves providing evidence of peer esteem and contribution to the research environment, and IRs do not provide support for these aspects. If the repositories do not begin to demonstrate a Return on Investment, the support of parent institutions may drop even below its current levels. The sustainability of some projects may be at risk. However, if they do take off, and show signs of growth, some decisions made to date may turn out to be less than optimal. The lack of detail, and granularity in the thesaurus chosen to date will severely impede discoverability as the repositories grow—a key issue in the New Zealand Digital Strategy. In addition, some of the workflows adopted by various institutions suggest that scalability will be a key issue for New Zealand institutions as well.

Thus, sustainability, scalability, and the ability to demonstrate value are key issues yet to be addressed by these various projects. The level and methods of evaluation reported in this study was minimal—based primarily on numbers of inputs and, in a limited way, downloads. New Zealand IRs need to pay closer attention to models for evaluation in the literature, and the evaluation criteria developed by leading partnerships such as the Canadian Association of Research Libraries [Shearer, 2003]

Future Research

As the project continues, the research team intends to complete the portfolio of case studies, which would ultimately represent/comprise all of the institutional repositories of New

Zealand. A national survey of academics and their attitudes toward repositories is also planned as a new phase of this research, to determine what is their level of awareness of repositories, whether they use them as information resources, and their attitudes towards deposit. Barriers to depositing, once identified, may be more readily overcome. In the meantime, the online Knowledge Base wiki will continue to be maintained, with the intention of encouraging more contributions from the New Zealand institutional repository community.

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