



Subject Librarians' Perceptions of the Institutional Repository as an Information Source

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Abstract:

This paper focuses on the key results of an exploratory study of nine New Zealand academic subject librarians' perceptions of the institutional repository (IR) as an information source for their clients. IRs are a relatively recent and rapidly growing innovation in open access among academic and research libraries. The growth of IRs in numbers and size, however, is only a part of the equation for measuring the rate of institutional adoption of IRs.

The role of IRs is both to store and to make accessible the digital research materials created within an institution.¹ While the majority of IR studies have been investigating factors affecting why researchers decide whether to store or not store the content of their output in an IR, little research has been done about the access side of the equation. The success of the access component involves not only the information seekers' ability to locate relevant items in an IR – it also includes a prior element – knowledge of the existence of the IR and its potential value as a source of information for resolving information needs. Subject librarians have an important role to play in promoting an institution's IR if it is to be identified by information seekers as a potential source of information.

This study has used Rogers' Diffusion of Innovation (DOI) Theory for its conceptual framework. The DOI theory identifies five key attributes of an innovation that affect its rate of adoption: relative advantage, compatibility, trialability, observability and complexity. The theory also contends that the rate of adoption is affected by the

¹ wiki.tertiary.govt.nz/~InstitutionalRepositories/Main/Definition

degree of promotion by change agents within the institution. Subject librarians are in a strong position to act as change agents by promoting IRs as an innovative resource while assisting or training students and academics in identifying potential sources to meet their information needs.

The study's results indicate competing factors are affecting the subject librarians' perceptions of IRs, and thus their promotion of the IR. On the one hand, all but one subject librarian thought IRs will provide their clients with a means of access to difficult-to-find resources such as theses and obscure publications by their institution's researchers. On the other hand, subject librarians were reluctant to promote IRs because they perceive them currently to be less useful than other information sources. Differences between librarians in different subject areas as well as from different institutions were also found. For example, while the majority of participants believed their clients will find IRs to be conceptually similar to other online sources, the subject librarians at one institution felt their institution's IR was less user friendly than other sources. And, a science librarian believed that science librarians overall perceive IRs to be of less value to their clients than to clients supported by arts and humanities librarians. And finally, while subject librarians seem to be in a prime position to act as change agents, some believe their institution considers its IR to be insufficiently developed to warrant allocating resources for a promotional campaign.

Introduction

This paper reports on research about institutional repositories, henceforth called "IRs". IRs are a relatively recent innovation among universities, providing free access to the outputs of university staff and research students. These outputs include research reports, articles, conference presentations, theses, teaching resources and so on. From 2002 until 2006, the number of IRs harvested by OIAster, an IR aggregator increased by 700% (OIAster, 2008).

In New Zealand, the first IR became publicly available in November 2005 and at the time of this research there were 15 IRs located in New Zealand, eight at universities and seven institutes of technology and polytechnics. The Kiwi Research Information Network (KAREN) acts as an aggregator for these IRs (Kiwi Research Information Network, n.d.).

Problem Statement

While there has been much research in recent years about IRs, the focus has predominantly been on issues related to motivating individuals to input content into IRs. Yet to become a successful innovation, IRs must also be identified as a potentially valuable information source by information seekers – and then used by those information seekers. A simple equation to demonstrate how an IR will become successful is: Input of documents + Access/Use of documents = Successful Institutional Repository.

According to Rogers' Diffusion of Innovation Theory (henceforth DOI), the rate of adoption of a new innovation by its target population is closely related to five attributes of that innovation, as well as to the intensity of promotion by individuals, known as change agents.

One responsibility of academic library reference team is to show the academic staff and students in their university how to find and use information. Subject librarians tend to specialise and gain expertise in a few subject areas, providing assistance to clients with specific and often difficult information needs in those subject areas. Hence, subject librarians are ideally placed to act as change agents promoting the IR as an information source. Bauer (2005) points out that marketing the IR is critical and that marketing it to the librarians should be the first step in promoting the IR on campus because without their support, it will be difficult to achieve broader acceptance on campus. Librarians, especially subject librarians, are in an ideal position to act as change agents in the promotion of their own university's IR as well as other IRs as potentially valuable sources of information for their clients. However, very little is known about subject librarians' perceptions of IRs as information sources and the promotion of IRs as information sources.

Goals and Objectives

This research has used Rogers DOI theory as its foundation and was conducted with two primary goals in mind: (1) to generate new knowledge about the diffusion of IRs as an information source in order to assist institutions in increasing the usage of their IRs; and (2) to contribute to the literature on subject librarianship by exploring subject librarians' role as change agents for IRs.

The following two objectives were set to achieve the above goals: (1) to gain an understanding of subject librarians' perceptions of IRs as an information resource for their clients; and (2) to explore subject librarians' promotion of IRs as an information resource.

Research Questions

This research has focussed on answering the following two research questions:

RQ1: What are the perceptions of subject librarians of institutional repositories as an information source for their clients?

RQ 2: In what ways are subject librarians promoting (or planning to promote) institutional repositories to their clients as an information resource?

Literature Review

The literature about IRs has focussed predominantly on the promotion of IRs to, and adoption by academic staff as, a repository for their research outputs. There appears to be little by way of literature relating to the study of IRs as an information resource.

In the search for relevant literature about the attributes of IRs as an information resource and their promotion as such by subject librarians, three main topic areas emerged: (1) user education, (2) promotion of IRs, and (3) the value of IRs.

User education appears to be a critical requirement for the success of IRs. Allard, Mack and Feltner-Reichert (2005) believe that even though librarians are not necessary for an IR to function, they will be needed to educate users about how to access the material in IRs. Similarly, Bell, Foster and Gibbons (2005) comment that

on its own the Open Archives Initiative – Protocol for Metadata Harvesting would not create sufficient usage of IRs – and that librarians will be required to teach staff and students how to access the content of IRs. Bailey (2005) points out that the amount of support required for IRs is often underestimated and the need for librarians to provide user education, IR promotion, metadata creation and preservation is often overlooked. Lynch (2003) fears that without commitment from tertiary institutions to teach staff and students to use IRs, the IRs will not achieve sufficient usage to warrant their existence. Yet there appears to be no research undertaken about the role of subject librarians in the critical role of user education for IRs.

Promoting IRs has been a favourite topic in the IR literature. Many articles (e.g., Lynch, 2003; Mercer, Rosenblum & Emmett, 2007; Phillips, Carr & Teal, 2005) focus on the need to convince academic staff to submit their research to ensure the success of the IR and on the methods for convincing them to do so. For example, in New Zealand, Cullen and Chawner (2009) have been examining factors that influence academics decisions to contribute to and use IRs. The other side of the equation, i.e., promoting IRs as an information resource, has received much less attention. Indeed some believe that when IRs have plenty of good quality content, the content will be discovered by potential users through search engines (Jones, Andrew & MacColl, 2006), thus not even requiring promotion. This view, nevertheless, is not shared by Lynch (2003), who says that once the developers of an IR are satisfied with the content, they can then promote the IR to library clients – a two stage process for the IR's success. Yet promotion is no guarantee of success. For example, Genoni, Merrick and Wilson (2006) found that even though there had been an extensive promotion of the IR in the previous year at Curtin University, only 36% of the academic staff and students were aware of its existence. Given the importance of promoting IRs, it is surprising that no literature was found about the role of subject librarians in promoting IRs to the academic staff and students in their disciplinary areas.

The literature on the value or potential value of IRs is broad-ranging. The use of the Open Access model as a way to reduce costs and increase access is a point made by Crow (2002). Jones et al. (2006) argue that IRs have a greater potential than other types of information resources for disseminating research. Bauer (2005) points out that IRs can gather and provide access to a wide range of grey resources, i.e., material not in a journal article format, such as theses, datasets, presentations, archive documents and images. Others, such as Mercer, Rosenblum and Emmett (2007) contend that the number of items being added to IRs is far less important than their role as “disseminating engines,” while others point out that IRs allow information to be shared with external as well as internal users of the organisation (Primary Research Group, 2007; Whitehead, 2005), gaining recognition for the institution's research outputs. Nonetheless, Jones et al. (2006) point out that "institutional digital library services face a tough battle in being accepted on campuses because alternative systems usually exist" (p. 17). Overall this area of the literature identifies attributes that librarians, including subject librarians, might use as the basis for their perceptions of IRs as information resources – and indeed whether they would promote IRs given those perceptions.

In conclusion, the literature suggests that librarians have critical roles to play in the future success of IRs: (1) informing their clients about the value of IRs as

repositories for the resources they create, especially in relation to disseminating their research to others; and, (2) educating their clients in how to retrieve information effectively from IRs. However, no research was found that specifically investigated the promotion of IRs by librarians as a new information source for their clients.

Diffusion of Innovations Theory

IRs are a relatively new innovation as an information resource. The adoption of innovations is the focus of the Diffusion of Innovations (DOI) theory developed by Everett Rogers. Rogers' *Diffusion of Innovations* was first published in 1962 and the 5th edition was published in 2003. DOI Theory has been used by early adopters of institutional repositories to support the advocacy for and population of institutional repositories (Jones et al., 2006, p. 112).

Several key concepts from DOI theory are employed in this research and require explanation. According to Rogers (2003) "an *innovation* is an idea, practice, or object perceived as new by an individual or other unit of adoption" (p. 12). The concept of *diffusion* is defined as "the process in which an innovation is communicated through certain channels over time among the members of a social system. It is a special type of communication, in that the messages are concerned with new ideas" (p. 5).

Several parts of the DOI theory have been used to provide a theoretical framework for the research design. DOI theory identifies five key attributes of an innovation that affect its rate of adoption - and it also concludes that certain persons labelled as *change agents* can positively affect an innovation's rate of adoption through their promotional efforts. People cannot realise they have a use for an innovation until they become aware of the new development and the benefit it provides (Rogers, 2003, p. 246). This research is based on the assumption that subject librarians are in a prime position to act as change agents in support of the adoption of IRs as a new information source by their clients. A change agent is "an individual who influences clients' innovation-decisions in a direction deemed desirable by a change agency" (p. 27). The change agencies in this research are the university libraries that are establishing IRs as a new way of preserving and disseminating information about their institutional research. The people within the academic community, including the librarians, academic staff, postgraduate and undergraduate students make up the social system in which the IRs are innovation in the process of being diffused.

The first key attribute of an innovation is *relative advantage*, defined as "the degree to which an innovation is perceived as better than the idea it supersedes" (Rogers, 2003, p. 15). Thus, the greater the perceived relative advantage of an innovation, the more quickly it will be adopted. *Compatibility* is "the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters" (p. 15). In other words, when an innovation is perceived as being compatible with the existing ways of, and reasons for, doing things, it will be adopted more quickly than one that is perceived as being incompatible. *Complexity* is defined as "the degree to which an innovation is perceived to be difficult to understand and use" (p. 16). Thus when an innovation is perceived as being difficult to understand and hard to use, it will be adopted more slowly than any that are easy to understand and simple to use. *Trialability* is "the degree to which an innovation may be experimented with on a limited basis" (p. 16).

When potential adopters can try an innovation bit by bit, they will be able to see how it works and will adopt it more quickly than those innovations that cannot similarly be tested in small bits (p. 16). The final attribute, *observability*, is “the degree to which the results of an innovation are visible to others” (p. 16). If a potential adopter can see the positive outcomes when an innovation is adopted by someone else, he or she will be more likely to adopt it himself or herself. These five attributes from Rogers' DOI theory are used in this research along with the change agent concept to operationalise the research questions as interview questions posed to the participants.

Research Methodology

Two main reasons guided the selection of a qualitative methodology for this research. First, the IRs as information sources are a relatively new phenomenon - and qualitative research is best suited for exploring a topic of which little is known (Westbrook, 1997, p. 144). And second, qualitative research is well suited to investigating the causes of events and the reasons for actions undertaken related to events (Maxwell, 1998, p. 75). This research considers the adoption (or non-adoption) by library clients of IRs as information sources as an event and it makes use of DOI theory to examine an element of the causes related to this event, i.e., subject librarians' reasons for promoting or not promoting IRs.

Semi-structured interviews were conducted with nine subject librarians, three at each of three New Zealand university libraries. At each of the libraries, one subject librarian was from the Humanities, one from the Social Sciences and one from the Sciences. This purposive sample would allow for comparisons across universities as well as across disciplinary areas. The questions posed to the interviewees were developed from Rogers' DOI theory, i.e. based on the subject librarians' perceptions of (1) the attributes of IRs as an innovative information resource and (2) their effort to promote IRs to their clients as an information resource. The interview questions were fine-tuned through a pilot interview to ensure the validity of the resulting data. In keeping with the human ethics requirements of Victoria University, each participant was provided with an information sheet and after reading it he or she then chose to sign a voluntary consent form. To ensure confidentiality, none of the participants nor their institutions have been identified in this report. The nine interviews were conducted over a one-month period in July 2008.

The coding and analysis were done using the open-source WEFT QDA software (available at: www.pressure.to/qda/). The concepts within the interview subquestions, all of which were grounded in DOI theory, formed the basis of the initial coding of the data. As the analysis progressed, new categories emerged.

Data Analysis and Discussion

This discussion proceeds by analysing key elements in the data relevant to each of the two research questions.

Research Question 1

RQ 1: What are the perceptions of subject librarians of institutional repositories as an information source for their clients?

Five sets of questions were posed to the interviewees to obtain the data necessary to answer RQ 1. These questions were focused on the attributes of innovations identified in DOI theory.

Relative advantage

To determine their views on the relative advantage of IRs, the interviewees were asked how useful IRs are compared with other information resources. The range of answers extended from "I find them extremely useful for a variety of reasons" to:

[the institutional repository] is not high on my priority as an information resource. If it became something I thought was a really useful resource, I might promote it more, but it just doesn't match the teaching needs or research needs that I am aware of.

The interviewees tended to compare IRs to information resources that had a similar purpose. Six participants compared IRs negatively to databases, stating for example, that IRs lacked journal articles, or noting their content was less important to the Sciences than the Arts and Humanities. Another person commented the areas of research are too narrow and too advanced and therefore of use only to someone in the same area of research. One interviewee contended the information in IRs was not current and therefore not useful. Thus, some subject librarians, the subject and currency of content in IRs is a relative disadvantage with respect to the kinds of resources required by their clients.

The information resources most frequently compared to IRs by the participants were the *ProQuest Theses and Dissertations Database*, and hardbound copies of theses and dissertations. Indeed, the main positive advantage mentioned by the subject librarians was when they compared the IRs to print copies of theses and dissertations. Other positive advantages were that IRs are open access and easily accessible and the content of IRs was discoverable through Google Scholar.

Surprisingly, only three librarians discussed the advantage or potential advantage of IRs providing access to grey material, other than dissertations and theses. The shortage of discussion about grey material may have been due to a lack of knowledge about IRs in general. Interestingly, three of the nine participants volunteered that they were familiar only with their own institution's IR or those within New Zealand.

Compatibility

Three questions focussed on the compatibility attribute of innovations. The first question asked the interviewees if they saw a need for their clients to have access to IRs, and if so, why. Eight interviewees identified at least one client need that would be met by IRs. These included the need of postgraduate students' "to know whether their field has been covered locally or further afield" and the need for clients

to have full-text access to resources such as dissertations and theses and journal articles, especially when held elsewhere and available only in hardcopy.

The subject librarians were then asked if there are resources similar to an IR that their clients will have already used. Many examples were provided, including ProQuest Digital Theses, Google and Google Scholar, databases, catalogues, other academic institutional repositories, the Australasian Digital Theses Program, and archival and text repositories. Interestingly all three subject librarians identified resources that provided access to theses.

The third compatibility-related question asked the subject librarians if they thought IRs fit in which contemporary methods of academic research. Seven librarians answered "yes", with the most common reason reflected in the following remark: "[Institutional repositories] are accessible through the Internet, and so many people go into everything through the Internet and through Google Scholar." Five of the participants commented that IRs fit in with the contemporary academic environment because they are an effective way of disseminating research.

The two other interviewees were ambivalent. One believed IRs should not be cited in research, stating "I think a serious researcher will still go and find the original document, even though they might get the full text in an institutional repository." The other ambivalent librarian felt that IRs were not the place to go "to form research" but were an appropriate place for completed research.

Complexity

For this attribute, each interviewee was asked "how complex are institutional repositories to use?" The three librarians from one institution were the only interviewees who expressed doubts about the user friendliness of IRs. One said IRs were easy to use through Google but believed clients would have difficulty accessing them using the direct method. The concerns of the interviewees from this library included: poor search interfaces; clients' lack of awareness of institutional repositories and their inability to recognise one when it turns up in a results list; and poor quality author-generated subject terms in the metadata, coupled with a lack of subject specific groups or topics making it difficult to find information.

The other six librarians thought IRs were easy for their clients to use. Their reasons included: IRs are easy to search using keywords; they "are far easier to use than most of our databases"; their small size makes them easy to browse by subject or author; and their search interface is similar to other information resources.

Trialability

Two questions were posed to examine the trialability of IRs. The first question enquired whether the subject librarians give clients the chance to trial IRs in teaching sessions. Six interviewees responded negatively for reasons that included: students not asking to try the IR; lack of time; lack of content in the IR; targeting teaching to the resources required by students in specific papers; IRs are only useful for postgraduate students. These six participants provided several reasons why undergraduate students need not trial IRs, such as: undergraduates are required by their lecturers to find peer-reviewed journal articles; IRs are not an index;

undergraduates need other resources and need to be shown search skills related to those resources.

Three of the subject librarians said they did demonstrate IRs during teaching sessions, for reasons such as: simply to point people to where they can go and look for information; to teach postgraduates, academics and researchers through Google Scholar; for students looking for theses and dissertations; and to teach postgraduate students that the IR may be a place to find things that cannot be found elsewhere.

The second trialability question asked the subject librarians for some examples when they are on the reference desk of situations and they get clients to use IRs. Only three of the librarians, all from the same institution, provided examples of giving clients the chance to trial IRs. Their examples included: when clients are looking for previous research in their own disciplinary area; when clients are searching for research from within their own university or from within New Zealand; and when clients require a local thesis. The six librarians from the other two universities could not provide actual examples, though they did provide some hypothetical ones.

Observability

Two questions were posed to the interviewees to determine how well IRs can be observed by, or communicated to, other people. The first question asked them for factors that make it easy or difficult to demonstrate IRs to their clients. Factors that made it easy to demonstrate included the clients' high level of computer literacy and familiarity with online resources, and the ease of finding IRs using a search engine like Google Scholar.

Though eight interviewees said IRs are easy to demonstrate to their clients, they also gave reasons of why they are hard to demonstrate. For example, one interviewee said some IRs have search interfaces that are difficult or a nuisance to use, while another explained:

In a tutorial you've got a lot of people in the class, normally of different levels. They're all doing different questions, so you can't usually get a resource that matches everybody's topic unless it is a database that indexes journals in the particular broader field of their paper.

Though the perceptions of the librarians varied between two views, there appeared to be greater strength of support for IRs being relatively easy to demonstrate.

The interviewees were then asked how easy it is for clients to find or notice IRs. The four subject librarians who felt IRs were easy to find or notice reasoned that when IRs were added to database lists, clients would have no difficulty locating or identifying them. One interviewee said that having a clear name for the IR, such as "University Research Database" and to include the IR among the databases on the library's website would make it easy for those clients familiar with databases to notice the institutional IR.

Five interviewees provided a variety of reasons for IRs being difficult to find or notice. One librarian, for example, commented that when a link to an IR is on the library's home page, there would only be a low chance of a client who is unfamiliar with IRs to notice it among all of the other resources. Another interviewee commented that the name of the IR might prevent it from being noticed, especially if that name did not suggest that the IR was a database of university research content. The term 'repository' also has negative connotations to some people; for example one meaning of *repository* is "a place in which a dead body is deposited" (Repository, 2008). And to others, the term has little or no meaning.

Research Question 2

RQ2: In what ways are subject librarians promoting (or planning to promote) institutional repositories to their clients as an information resource?

Nine questions were posed to the subject librarians to obtain data for answering Research Question 2.

Centralisation of Diffusion Process

Two questions sought to find out whether there was an centralisation of efforts within the libraries to promote IRs as information sources. The first asked if there was a mandate to promote IRs as information sources. All nine interviewees said that there was not. Four of them, however, identified mandates at their libraries to promote the depositing of research into their institutions' IRs and one person noted it had become a requirement for doctoral students to deposit their theses.

The subject librarians were then asked if any of their colleagues have informally been promoting IRs as information sources. Eight participants said they did not know of any instances of their colleagues doing so. Responses included remarks such as: my colleagues "use them [i.e., IRs] so infrequently themselves, there's no real need for them." Only one librarian noted the occurrence of some informal discussion in staff meetings about promoting IRs as information sources.

Information Resource Overload

The next three questions focused on whether there are excessive communication inputs which might be hampering the promotion of IRS.

When asked whether they are promoting other information resources instead of IRs, six interviewees said they were. One person listed eight other information resources including books, databases and electronic journals that would be promoted instead of IRs. Of the three participants who did not identify any information sources being promoted ahead of IRs, one provided the following perspective: "we are trying to promote what we hold, and we are trying to give fair chances to all our resources."

The second question asked the interviewees if they felt the issue of overwhelming their clients with too much information might be influencing the promotion of IRs by subject librarians. Two types of responses arose from this question. Eight respondents remarked there was a very large selection of information sources to promote, and as one person commented "this [the IR] is just another thing." Some librarians commented they were restricting their promotion of IRs to postgraduate

students and teaching staff, and not to undergraduates. This type of response suggests that subject librarians limit their promotion because of potential information source overload issues.

The second type of responses, from three of the nine interviewees, demonstrated that some subject librarians promoted IRs without regard to fear of overloading their clients. For example, one person remarked:

I think everybody is overwhelmed with too much information, but it is about getting the right information. So if the right information is on an institutional repository then that's the type of information they want. So don't show them anything different.

This type of response focussed on promoting IRs when they were the most appropriate information source and therefore these interviewees were not overly concerned about information overload.

The third question focussed on how the subject librarians decided which information resources to promote. Two Arts and two Social Science subject librarians responded that what they promote to undergraduates is determined by course requirements and course lecturers. A Science librarian, however, remarked that she focused on her favourite databases because lecturers were not familiar with all the databases. Three interviewees, each at a different library and from a different subject area said that the client's level of study determined what they promote. And though there was high affinity among the interviewees with one participant's comment that "any information resource is appropriate, depending on what the user wants" there nonetheless was a view expressed by some that they should keep looking until they found a more appropriate resource than an IR.

Client Feedback

The success of change agents' diffusion efforts are likely to be more successful if they find out about their clients' needs and their promotion of the innovation has a client orientation rather than a change agency orientation (Rogers, 2003, p. 375). Two questions therefore focussed on finding out about the feedback the participants received from their clients about IRs and the responses related to that feedback.

Only three respondents reported receiving client feedback about IRs, feedback that included both positive and negative comments. Two of the positive comments focussed on postgraduate students being pleased about having access to theses on the IR. The other one discussed clients who were pleased to be able to find research in the IR in their subject area from within their own university. Thus content appeared to be an important feature of feedback related to IRs meeting clients' needs.

One of the two negative comments was from a librarian who reported client dissatisfaction with the IR's interface. The other one was received by a subject librarian in an email from an academic staff member who said that he wouldn't look at the IR because he did not believe it was a good idea.

The second feedback question asked the participants about their responsiveness to client feedback. Only one of the three librarians who had received feedback appeared to be influenced by it, stating "It has probably meant that I've become more aware of them." Two of those who had not received feedback did indicate, however, that if they had received feedback in the form of questions about IRs, they would promote IRs more.

Promotional Campaigns

DOI theory suggests that if change agents' communication campaigns are not carried out in an effective manner, the adoption of an innovation will be slow or unsuccessful (Rogers 2003, p. 377-381). Two questions were posed to the interviewees about campaigns to promote IRS as information sources.

The first question was aimed at investigating whether any of their institutions had used promotional campaigns. None of the participants knew of any campaigns, though one commented that it was "probably time to start" and another librarian said that the promotion of IRs "will probably come up as something we should do for database week." One interviewee commented the library's IR was not ready to be promoted because it only held dissertations and theses but not many articles written by academics. Another noted that their promotion of the IR was still very low key because of uncertainty related to technical difficulties with the IR: "You don't want to encourage use of a thing that's going to crash every five minutes."

Those who informally provide opinions and advice about innovations to others in the system are known as "opinion leaders" (Rogers 2003, p. 26). To determine whether librarians were working with opinion leaders, interviewees were asked if they have been promoting IRs to clients who are in a position to influence others to use new technologies. Only one interviewee identified an attempt to work with potential opinion leaders, in this instance with researchers. Another interviewee identified a very strong potential opinion leader in this comment: "The Library can do promotional campaigns, handout pamphlets and web sites, but there is nothing like a lecturer saying look at this, because they'll look at it. They're the opinion leaders for the students". Surprisingly no interviewees identified any attempts to work with lecturers or teaching assistants in promoting IRs.

Critical Mass

"Critical mass [is] the point after which further diffusion becomes self-sustaining" (Rogers 2003, p. 343). In other words, when there are sufficient clients using IRs, no further promotional campaigns will be needed because IRs will be seen as a useful information resource by the client community.

When asked if it was possible for IRs to achieve a critical mass as an information resource, six interviewees replied "yes." One suggested a critical mass would occur when the IR's content includes 'vital things' to which clients must have access. Another interviewee said that critical mass for IRs would occur through being part of a "technology cluster" which would include Google Scholar, OALster, Arrow Discovery Service, KRIS and other databases. DOI theory identifies a technology cluster as "one or more distinguishable elements of technology that are perceived as being closely interrelated (Rogers, 2003, p. 14). When an innovation can be perceived as part of a package it will be adopted more rapidly (p. 14).

Of the remaining three librarians, one believed that databases had not yet achieved a critical mass which would be necessary before IRs could achieve it. This person went on to say somewhat cynically that before IRs would achieve a critical mass, someone in the information industry "will have invented some other technology to replace it." Another person said that entries in library catalogues are a prerequisite for IRs to achieve a critical mass. The third interviewee felt that IRs are being created "in an amateurish way" and will not be able to compete for content against the commercially operated databases. Coupled with this latter point is, as Crow (2002) points out, academic staff need to publish in prestigious commercial journals and choose those over IRs because of their desire for academic advancement.

Reasons for Non-Promotion

In their responses to previous questions, five respondents indicated they did not promote their institutions' IRs. When asked why, lack of appropriate content, especially for the largest client group, i.e. undergraduates, was the main reason. One interviewee's reason for non-promotion of IRs was because of a lack of research content in the specific subject areas of graduate students. Interestingly one librarian reported not promoting IRs because they were not an index, though this person eventually admitted doing some promotion of IRs through Google Scholar as an indexing site. This type of response raises the issue of whether some subject librarians are unfamiliar with IR specific aggregators such as OIAster.

Future Promotion

At the planning stage of this research the possibility was considered that because IRs are new, subject librarians either may not have considered promoting them or it was too early to promote IRs.

Because two of the participants had indicated through their responses to earlier questions that they were already promoting IRs, only seven subject librarians were asked if they would consider promoting IRs in the future. Six interviewees said they would begin to promote IRs, with size being the most frequently expressed reason for beginning to do so. As one person noted, "the bigger it [the IR] gets the more important it becomes to promote." The extent of content in IRs was the other key issue for four librarians - including all three Science librarians. Additionally one interviewee was only interested in promoting IRs from outside of New Zealand because they were more likely to hold information from databases to which this interviewee's library did not subscribe.

When the subject areas of the participants is considered in relation to the responses about promoting IRs, a spectrum of results emerges. At one end are the Arts subject librarians all of whom were already promoting institutional repositories in some way. Social Science subject librarians are centrally placed in the spectrum with two of them saying that they would start promoting IRs straight away and the other likely to promote IRs in the future. At the other end of the spectrum are the Science librarians none of whom are currently promoting IRs, but all of stating they would promote IRs in the future.

Conclusion

The study's results indicate competing factors are affecting subject librarians' perceptions of IRs, and thus affecting their promotion of IRs as an information resource for their clients. While subject librarians' generally perceive IRs to be a positive innovation, they nonetheless have reservations stating that IRs are not yet well enough developed to be promoted to their clients as an information resource.

According to DOI theory, when an innovation is perceived as being better than the idea that preceded it, it will have a higher rate of adoption (Rogers 2003, p. 16). In this study, the participants identified both advantages and disadvantages of IRs in comparison to other information resources. This tension between the relative advantages and disadvantages of IRs suggests that subject librarians are ambivalent about promoting IRs to their clients at this time.

When innovations are compatible with clients' needs, previously introduced innovations, and existing values and beliefs, they have a high rate of adoption (Rogers 2003, pp. 241-248). The recognition of a client need for IRs by eight interviewees, their long list of reasons why clients need IRs, the identified similarities to other information resources and the general belief that IRs fit in with contemporary methods of academic research suggest that IRs will likely be adopted quickly as an information source by members of the academic community. However, all three Science subject librarians in this study could only compare IRs to information resources that provide access to dissertations and theses, and two participants were highly ambivalent with respect to whether IRs fit in with contemporary methods of academic research. These latter points suggest there is group of subject librarians with a very limited view of IRs and who might not become enthusiastic proponents for IRs as an information source.

DOI theory contends that low complexity increases the rate of an innovation's adoption (Rogers, 2003, p. 257). In this study the majority of interviewees (six) believed IRs were relatively easy to use. Nevertheless three participants, all from the same institution, expressed negative views about the user friendliness of IRs. This finding might mean that when an institutions' IR is hard to use, its staff will perceive all IRs to be relatively complicated for their clients whereas the opposite will be true when an institutions' IR is easy to use. Thus IRs with well designed interfaces will lead to a higher client uptake and a higher level of promotion of IRs.

The opportunity to try out an innovation "is positively related to its rate of adoption" because "a personal trial can dispel uncertainty about a new idea" (Rogers, 2003, p. 25). In this study, only the three Arts librarians demonstrated IRs to their clients which implies that at this stage of their development IRs are predominantly of use to those in the Arts and Humanities area, a view articulated by one of the Science librarians. And while three interviewees (all of whom were at the same institution) provided actual examples of getting their clients to try IRs, the other six librarians provided hypothetical examples. This latter point suggests that the strength of promotion of IRs varies between institutions, and though the promotion and trialling by clients at an institutions may be weak at present, the subject librarians see potential for demonstrating the IRs in the future. One possible explanation of the reluctance to provide trials for IRs is provided by Marianne & Adwoa (2005) who point out "for reference librarians already inundated with other new and existing

technologies, the IR becomes one more technology to learn about and to add to a busy schedule of technology instruction.”

When the positive results of an innovation can be seen by others, the innovation's rate of adoption will increase (Rogers 2003, p. 16). Eight of the nine interviewees provided reasons explaining why IRs were easy on the one hand and difficult on the other to demonstrate to their clients. And there was a relatively even split between participants who thought IRs were easy for their clients to find or notice and those who believed they were difficult. One subject librarian astutely pointed out that clients might not use IRs if they do not recognise what the term institutional repository actually means. With respect to the observability of IRs, the results from this study are again somewhat ambivalent.

The findings related to RQ 1 suggest several things. First, subject librarians perceive IRs to have many positive attributes while also perceiving many negative attributes. This finding suggests that subject librarians are generally positive about IRs as an information resource but at this point in time they have reasons for not promoting them. Second, subject librarians perceive IRs to be developed to the greatest degree in the Arts and Humanities and to the lowest degree in the Sciences, signifying that promotion will likely be greatest by Arts and Humanities subject librarians, followed by those in the Social Sciences and least by Science librarians. Third, subject librarians perceive IRs to have little value for undergraduates, thus the promotion by librarians will most likely be targeted to academic staff and postgraduate students. And fourth, the fact that only the three librarians from one university perceived IRs to be hard to use may be explained by the quality of the IR interface at that institution. This possibility suggests that the design of the interface of the IR in terms of its user friendliness will not only affect how easy or difficult it will be for clients at an institution to use the IR, it will also affect how easy or difficult it is for the librarians to demonstrate the IR - two aspects that will affect the rate of adoption of IRs at a specific institution.

These findings from the first research question provide some help in understanding results from the second research question which focussed on subject librarians as change agents.

Most of the subject librarians in this study stated they were not currently promoting IRs as an information resource and they were not aware of any colleagues doing so, nor had their institutions established mandates to promote their IRs. Thus, central diffusion systems were definitely not occurring. One subject librarian perceptively commented IRs might not be developed enough to warrant resource allocation for mounting communication campaigns and this point appears to be supported by findings related to RQ1. And while subject librarians provided a variety of reasons for their current lack of promotion of IRs (e.g., lack of quantity and quality of content), they also suggested reasons for promoting them in the future. Supporting this finding were the participants' many positive perceptions of IRs identified earlier. The positive perceptions of IRs, however, can explain the reason that two thirds of the interviewees believed that IRs as an innovation will achieve a critical mass and therefore eventually will not require intentional promotion. However, the fact that some interviewees considered IRs to be less useful than other information sources, of most value to the Arts and Humanities clients, and of little value to

undergraduates, also implies that only librarians in some subject areas will promote IRs, and they will be selective in terms of to whom they target their promotion.

Future research might investigate the role played by tools such as Google Scholar, OAlster, Arrow Discovery Service, KRIS and other databases in the diffusion of IRs as an information resource. An investigation into how to increase the utility of IRs for undergraduate students could also be the focus of future research. Similarly a study of how to identify and employ potential opinion leaders in the diffusion of IRs as an information resource would also be of value. And given that this research was limited to a small group of subject librarians in New Zealand, and at a relatively early stage in the diffusion process for IRs as an information resource, aspects of this research could be undertaken with a larger population and at a future time in order to understand the factors that are supporting or hindering the diffusion of IRs as an information source.

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