

## Institutional Repositories: Faculty Deposits, Marketing and the Reform of Scholarly Communication

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## Institutional Repositories - Title

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### **Institutional Repositories: Faculty Deposits, Marketing and the Reform of Scholarly Communication**

#### **Abstract:**

Institutional repositories (IR) have captured our attention as having significant potential among the many elements of the digital library genre. Because of the possibility to enhance the current system of scholarly communication and advance open access scholarship, academic libraries have invested resources to build a technical infrastructure that will facilitate access to the intellectual output of their institutions. However, there is little indication that faculty are active partners in building the content of IR. Using the web content analysis method this study explores faculty deposits in IR in selected disciplines and identifies the diverse navigational paths to IR sites from library homepages. The statistical relationship between the development of an IR and the presence of a website dedicated to the reform of traditional scholarly communication is also explored. The implications of these findings for the future development of institutional repositories are highlighted.

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## **Introduction**

Libraries today are at the intersection of three momentous changes in the world of scholarly communication. On the one hand, giant commercial publishing houses have progressively cornered the publication rights of influential journals. Increasingly they bundle these journals and make them available to libraries at progressively more prohibitive prices, not permitting the libraries to selectively acquire specific journals. The subscription price of a “bundle” can at times exceed one million dollars (USD) per year. The consequence is that overall acquisition costs have risen dramatically in ways that have seriously affected the ability of all but the richest libraries to build well-rounded collections.

The second major change is the development of Internet technology, which increasingly permits, indeed, encourages, the democratization of knowledge. In fulfilling their traditional role as collectors, organizers, preservers and disseminators of information, libraries now have at their disposal the means to make knowledge widely and cheaply available. In a sense, a library can now transform itself into a publishing and archival institution by creating mechanisms whereby information can be collected, organized, preserved and broadly disseminated outside the confines of the traditional publication format. While the culture of academic institutions is still deeply wedded to a traditional promotion process that emphasizes publication in prestigious journals, the trend is clearly toward digital publishing. Nowhere is this tendency more marked than in the development of the open access movement, which is the third prong in the new information

environment. Based on the intersection of rising publication costs with a technology that permits low-cost self-archiving, the open access movement encourages scholars both within and outside institutions to make their work available in the easiest and most economical way to the widest possible audience at the earliest time after the completion of their work. An outgrowth of this movement is the institutional repository (IR), a type of digital library, whose contents are typically intended to be publicly available and preserved. Clifford Lynch of the Coalition for Networked Information (CNI) states that institutional repositories are among the essential infrastructures for scholarship in the digital world.<sup>1</sup> Institutional repositories have become one of the fastest growing elements of the digital library genre. Because of their potential to reform the current system of scholarly communication and their role in advancing the open access movement, many academic libraries, especially those at research universities, have invested human and technical resources to build a robust technical infrastructure that will foster access to the intellectual, cultural and administrative output of their institutions. The hope is to gain enhanced access to faculty research and increased visibility of research generated within the university that is relevant to society.<sup>2</sup>

Despite the fact that the scholarly content of an IR will largely consist of faculty work and contributions from individual faculty, studies have shown that actual faculty participation in, and awareness of, the development of IR is extremely low. A few studies, therefore, have emerged in recent years warning librarians not to be trapped in the pursuit of IR dreams.<sup>3</sup> The purpose of this paper, therefore, is to examine the actual content of selected institutional repositories and to assess the volume of faculty work represented in them. Specifically, this paper has three objectives. The first is to create a snapshot of the scope of actual faculty input into institutional repositories and the differences in the degree of input from the sciences, humanities and social sciences. Excluding the organized gray literature such as technical and

working papers and seminar series, the volume of work represented in IRs under individual faculty names serves, we believe, as a sufficient indicator of the scope of faculty participation.

Second, much of current IR literature addresses the issue of marketing and outreach in order to recruit new content to the IR. In order to determine the ways that IRs are presented and marketed on library homepages, we examine how and from where IR sites are linked in order to assess marketing support and visibility within the library website.

Third, because institutional repositories are inherently tied to the open access movement, we have explored the library's role as a change agent for encouraging reform of the current practice of scholarly communication. One indicator is the presence of a website as part of a library's homepage that specifically addresses the issue of scholarly communication. In this case we attempt to determine the relationship, if any, between the presence of a website for scholarly communication and the development of institutional repositories.

### **Definition of IR**

An institutional repository is “. . . a set of *services that a university offers to the members of its community* for the management and dissemination of digital materials created by the institution and its community members.” – Clifford Lynch<sup>4</sup> (authors' italics).

Users and developers of institutional repositories and digital libraries do not typically take the time to define their terms. In the above definition, Lynch focuses on the university and services, which is a good starting point. In this discussion, we will present a “layered” approach in order to clarify terms for our audience.

The digital library (DL), as shown in Figure 1, serves as a platform or framework for developing and offering new services to the university. In this context, the digital library, at a minimum, provides a mechanism to capture material in digital form, to deposit or ingest this material into the digital library, and to provide access to these digital materials. A general DL platform should also support multiple formats and disciplines.

**(Insert Figure 1 – General Digital Library Architecture)**

We can compare and contrast IRs and DLs by answering some basic questions. For example, the DL is generally targeted at many different users, both within the institution and in the public at large whereas the IR defines its community more narrowly and is typically composed of the members of an institution – faculty, staff, administrators, and students. Given the heterogeneous nature of the DL community, it is difficult to plan and develop specific services. However, specific services become possible and realistic within the IR context.

Lynch's definition of an institutional repository stresses the concept of services to the community. For an IR to be successful, it must go beyond the basic DL model and provide services to specific communities within the institution. For example, in Lynch's survey of institutional repositories, it is clear that one of the more popular services provides support for electronic theses and dissertations (ETDs).<sup>5</sup> The community within the institution is the graduate school administrators, the students who are graduating with advanced degrees, and, ultimately, the larger community of users who will want access to these materials. Although an ETD service has appeal to graduate school administrators and students, the value of the service to the general body of researchers or faculty is less obvious. The successful IR will then require a clear understanding of user communities and will need to support the unique processes and workflow of these communities. For example, an academic library could offer its faculty an IR service for archiving and preserving science data. This service would support the unique aspects of science scholarship including collaboration among multiple researchers and the ability to archive and preserve versions of large science datasets. As an example from an administrative perspective, the IR might provide a capability for the university archivist to archive and preserve university websites and university records. Each of these examples requires the support of a specific workflow process within the IR digital framework. All of these capabilities can be built on top of the DL platform with custom portals as shown in Figure 2.

**(Insert Figure 2 – Institutional Repository Framework)**

**Literature Review**

As briefly touched upon in previous sections, the development of institutional repositories is intimately tied and interconnected to two other developments—those of digital libraries and the open access movement. The literature that addresses these two areas is vast and expanding rapidly. A comprehensive review of the literature of these fields, therefore, is beyond the scope of this paper. Following is a highly selected review that centers on the discussion of the development and implementation of IR and its content.

*Research Impact of Open Access Scholarship*

The research impact of open access scholarship will have a significant influence on the success or failure of future institutional repositories. John Willinsky's book, *The Open Access Principle*, is an elegant argument that stresses the responsibility of researchers to share their scholarship as widely as possible, particularly in the growing digital environment. Public access to research literature, Willinsky argues, will enable people to have a greater role in research that directly affects their own lives, leading ultimately to better science.<sup>6</sup> K. Antelman's widely circulated study of open access journal articles in four selected disciplines concludes that these articles have had a greater research impact than articles that are not freely available. As a consequence, libraries must now plan to build institutional repositories, among other initiatives.<sup>7</sup> Similarly, Harnad and Brody show that comparative citation counts of individual Open Access (OA) and non-OA articles appearing in the same (non-OA) journals are revealing a dramatic increase in citations for the OA articles.<sup>8</sup> Among 119,924 conference articles in computer science and related disciplines, Lawrence reports that online articles are cited 4.5 times more often than offline articles; articles with fewer citations were more likely to be in journals with restricted access.<sup>9</sup> Swan and Brown's study of author self archiving behavior found that one of the main reasons why authors publish in open access journals is their perception that their work will reach a larger audience.<sup>10</sup> More broadly, Harnad stated that the real reason for open access is not

because of a serials crisis or because developing countries are in financial difficulty but because of greater research impact.<sup>11</sup> Despite these studies, Mark Ware argues that to date universities' IRs have had very little influence on academic publishing with the result that the impact on the open access movement is limited.<sup>12</sup>

*Studies of IR Development and Implementation*

There are two seminal works related to the nature and development of institutional repositories. The first is the Association of Research Libraries' (ARL) position paper authored by Raym Crow. In this article Crow sets forth a comprehensive review of the *raison d'être* for institutional repositories as a critical component in reforming the scholarly communication process in what is now a newly disaggregated publishing structure. IRs can also serve as a tangible indicator to demonstrate the scientific, societal and economic relevance of academic research activities to the general public.<sup>13</sup> The other widely circulated work on this topic is written by Clifford Lynch at the Coalition for Networked Information (CNI). Lynch sums up a number of his presentations and writings on the subject of IRs in an article published in *Portal: Libraries and the Academy* entitled "Institutional Repositories: Essential Infrastructure for Scholarship in the Digital Age."<sup>14</sup>

Four major surveys on the state of institutional repositories in North America were conducted in recent years. First, in the spring of 2005, Lynch and Lippincott conducted a survey of members of the CNI regarding the status of IR development.<sup>15</sup> Second, the University of Houston Libraries Institutional Repository Task Force (chaired by Charles W. Bailey Jr.) conducted a survey of IRs on behalf of the Association of Research Libraries that was released in July 2006. This is a comprehensive survey of IRs in member libraries covering the status of IRs and associated issues such as budget, staffing, policies, assessments, content recruitment, and so forth.<sup>16</sup> Third, Shearer reported on the survey results of the Canadian Association of Research Libraries (CARL) institutional repositories projects in the summer of 2004.<sup>17</sup> The fourth is the latest and most comprehensive survey of US colleges and universities regarding the status of IRs.



Funded by a federal grant, a team of University of Michigan School of Information researchers conducted a census of institutional repositories by querying 2,147 US academic libraries. Their chief objective was to identify the specific factors contributing to the success of IRs and effective ways of accessing IRs.<sup>18</sup> This survey found that of those surveyed 52% have no plans to introduce IRs while 10.8% have already done so. Not surprisingly, among those implementing IRs, research universities vastly outnumber smaller colleges.<sup>19</sup>

*Case Studies, Content Recruitment and Marketing*

Several early organizers of IRs have shared their experiences in planning, developing and implementing institutional repositories. However, what struck us in reviewing the IR literature is that many of these case studies were deeply concerned not with the technology required for implementation but with content recruitment and mapping strategies on how to populate the IR. Therefore, we decided to combine reviews of case studies, works on content recruitment and marketing.

Baudoin and Branschofsky 's article *Implementing an Institutional Repository: The DSpace Experience at MIT* is representative of this category of literature. In it, the authors suggest that the technical implementation of DSpace requires only local adjustments, if any; but, as MIT did, they emphasize the need for librarians to take time to plant the idea of DSpace, to allow it to take root, and then to nourish it.<sup>20</sup> In their 2006 book entitled *The Institutional Repository*, Jones and his colleagues point out how innovations spread in other industries and the need for librarians to adopt similar strategies.<sup>21</sup> They also recount their experience in implementing an IR at the University of Edinburgh Research Archive. This is one of the first monographs that is totally devoted to the topic of institutional repositories with a large portion of the book devoted to the importance of filling the IR with content.

There are several other works (we suspect many more in this category will appear in the near future) that report on a single institution's experience with implementing an IR --all with slightly different emphases and strategies for recruiting content.<sup>22</sup>

Most of the findings about marketing and outreach strategies were imbedded as part of case studies and in studies of content recruitment. Several articles emphasized the role that reference librarians, liaison librarians and subject specialists have in communicating to faculty the features of an IR and its advantages.<sup>23</sup> Feijen and van der Kuil, however, recruited prominent scholars to initially populate the Dutch consortium of institutional repositories, the DARENet; they report that the project, “Cream of Science,” was launched (following a two day leadership conference) to unlock top quality content and to make that content more easily and digitally accessible via institutional repositories.<sup>24</sup> Gierveld, on the other hand, attempts to translate IR language and concepts into professional marketing terms. She particularly emphasizes the notion of social marketing, which requires behavioral change on the part of researchers – a reminder for librarians that an IR is a technology driven product not a researcher driven one.<sup>25</sup>

#### *IR Deposit Content*

The Internet has proven to be fertile ground for data collection for a number of studies, including those that analyze the content of IR deposits. Two of the most recent studies, similar to what we report here, reviewed IR web sites in order to explore a number of issues including that of IR deposit content. Westell’s study examined nine Canadian Association of Research Libraries (CARL) Institutional Repository Project web sites and found that for Canadian repositories direct input by individual researchers has been negligible.<sup>26</sup> Another study on web-based repositories was commissioned by a UK consulting firm, Publisher and Library/Learning Solutions. Its author, Mark Ware, in the 2004 issue of *Nature* magazine, reported the highlights of this study. Ware selected 45 IR sites from around the world and found that the average number of documents per archive is just 1256, most of which were theses, dissertations or gray literature, such as technical reports, and working papers.<sup>27</sup> Shearer’s survey of the CARL libraries found that of the seven repositories, five have less than 200 deposits. Content recruitment thus remains the biggest barrier to the implementation of IRs at CARL libraries.<sup>28</sup> In their study of deposit patterns in digital repositories; Thomas and Macdonald found that almost 30,000 authors

contributed only one (1) item on average making up 73% of disciplinary repositories and 74% of voluntary institutional repositories. The same author group contributed one (1) item on average for 61% of mandatory institutional repositories, with others contributing more than one item.<sup>29</sup>

The low numbers of deposits by faculty has resulted in a trend for some institutions to establish a mandatory deposit policy. Sale's study of Australian university IRs suggests that a requirement to deposit research output into a repository delivers high levels of content deposits.<sup>30</sup> Pinfield also argues that making deposits mandatory helps to accelerate change and make the benefits more apparent across all subjects disciplines—a mandate would quickly overcome the cultural and management barriers that currently exist in academia.<sup>31</sup> While Stevan Harnad, considered by many as one of the founders of the open access movement, stated in a recent interview that all sorts of technical innovations have made constructing an IR easier but that until mandates are in place, IRs won't be successful.<sup>32</sup> From the experience of implementing *the DAEDALUS Project* at Glasgow University, Mackie reports that recruiting faculty work, especially published peer reviewed journal articles, is too time consuming for librarians to sustain over a long period of time.<sup>33</sup> Lynch, however, warned that one of the potential dangers of an IR is that it can be viewed as a tool of institutional (administrative) strategies that can strongly discourage any approach that requires deposit of faculty work.<sup>34</sup> Lynch's concern was partially corroborated by Foster and Gibbons who noted that the very way that an IR is named and organized is counterproductive to faculty reception of IRs. The term institutional repository conveys a different meaning to faculty---suggesting something about institutions but not about faculty scholarship.<sup>35</sup>

The significant and serious challenge of populating IR content with faculty work has also been noted by the latest survey on IR by the members of the Association of Research Libraries.<sup>36</sup> Indeed, all four surveys mentioned earlier indicated that content recruitment is one of the biggest challenges in successfully implementing an IR. Ware's study of university IR content specifically noted that a key obstacle is securing the engagement and participation of faculty.<sup>37</sup>

Since IRs to date have largely failed to attract faculty contributions of their work, studies have begun to emerge that seek to understand faculty work culture. The objective is to determine how, when and in what way support can be offered to facilitate the deposit of faculty work in an IR. Richard Johnson, then the Director of SPARC, articulated the need to partner with faculty using institutional repositories as a way to redefine scholarly communication.<sup>38</sup> Foster and Gibbons did fieldwork by going to faculty offices in order to learn how and where libraries can facilitate the deposit of faculty research.<sup>39</sup> Similar to later studies, they found that faculty expressed little interest in IR

#### *Evaluation of IR*

Given the nascent stage of IR development, we were not surprised to find few studies on the evaluation of IRs. However there is a clear indication that efforts are being made to measure the success of future IRs. Current evaluation studies of IRs are focused on developing indicators for procedural accomplishment from a management perspective rather than developing indicators for performance that determine whether the IR meets the goals and objectives of the IR mission. One early evaluative framework, developed by Kim, sets forth a management model of the dCollection (a Korean consortium of institutional repositories) that can help IR organizers to self-diagnose their local IRs.<sup>40</sup> Westell developed similar indicators in order to measure the success of an IR based on the level of integration of the IR with other existing research initiatives.<sup>41</sup> In evaluating the reasons for the non-use of an IR by faculty, Davis and Connolly report that Dspace at Cornell (and six other institutions) is largely under populated and underused by its faculty and that most faculty have little knowledge of and motivation to use an IR.<sup>42</sup> Organ, however, analyzed the download statistics of the Wollongong University Online Research Digital Commons. His findings indicate that works deposited in an IR are accessed usually within 24-48 hours after being uploaded and that 95% of Wollongong IR items were accessed by the Google search engine. Certain user behaviors were also identified in this study. Among the top ten most downloaded papers during the study period were works written in the field of history.<sup>43</sup>

## **Methodology**

The members of the Association of Research Libraries (ARL), as represented on the official ARL website, were used as sample institutions for this study.<sup>44</sup> Ten non-university library members of the ARL, such as the New York Public Library, were deselected from the study sample, resulting in 113 institutions (N=113). A previous ARL survey has indicated that the growth of academic IRs is at a nascent stage.<sup>45</sup> IR development is progressing haphazardly as institutions and libraries debate their merit. As a result, content studies in this area are time-sensitive and track a moving target.

We decided to use both qualitative and quantitative approaches to examine the ARL library websites. In the qualitative phase of our research, we explored library websites to understand how IRs are referenced on these websites and to explore and assess the scope of faculty work that is represented in current university institutional repositories.

In the Web exploratory phase of our study, the ARL university library home pages of these institutions were visited during the summer of 2006 to determine the status of their institutional repositories. If an institutional repository was not easily identified from the university or library homepage, the terms “institutional repository” or “digital repository” were then searched using either the local site index, the search box for the local website or Google. Our initial search showed that about 56% of the ARL academic library members (63 of 113) had implemented some sort of IR. This exploration also led to the emergence of nine navigational paths as means of linking to IR websites. For example, navigational paths to IRs might originate on a library homepage or in other less obvious areas such as under the library “About” page. We found IR links from the “main homepage,” “scholarly communication” “news/events,” “digital projects,” “services,” “about libraries,” “collections and electronic resources,” “for faculty,” and “finding information” among others. Much of the current literature regarding IRs at universities addresses the issue of marketing or outreach or the lack thereof. We believe that the location and ease of use of a navigational path to an IR site from a library website is one good indicator of

effective marketing. The marketing approach of institutions can obviously impact the degree of faculty awareness and therefore the number of faculty deposits. During our investigation of the faculty work that is represented in IRs, we noted that libraries are linking IR sites from many different headings on their homepages. Several libraries linked their IR sites from a web page that is solely dedicated to issues of reform in scholarly communication either directly from the homepage or from another page such as “about the libraries”. Using the term “scholarly communication”, websites dedicated to issues of reform in scholarly communication were also searched for all 113 ARL university library homepages using either the site index, the local search box, or Google. If the term “scholarly communication” was used as part of either a mission or goals statement, a strategic plan or a symposium proceeding but lacked statements informing faculty on the issue of scholarly communication reform, these sites were excluded. In other words, only those Websites dedicated to the reform of scholarly communication on a sustained basis were considered for the study.

As a second part of our qualitative study, we then determined the extent of faculty deposits in the subset of the sample whose institutions had an IR. Of the 63 institutions that had an IR, we deselected 14 IRs which were not likely to have a faculty deposit service such as sites dedicated to ETDs (electronic theses and dissertations) and early pilot or prototype sites, resulting in 49 institutions for the faculty deposit analysis. These IR sites were revisited in August/September 2006 to assess the extent of faculty work represented in IRs in selected disciplines in order to determine the disciplinary differences in individual faculty participation. The IR contents of the following disciplines were sampled: English, History, Linguistics and Philosophy in the humanities; Anthropology, Economics, Sociology and Political Science in the social sciences; Biological Sciences, Computer Science, Engineering (all areas of engineering) and Mathematics in the sciences. These disciplines were selected as being representative in their respective areas. Items deposited were predominantly pre-prints, post-prints and scholarly related reports. Only those items listed under individual faculty names under their academic units were

considered in all counts. Beyond this, this study did not attempt to determine whether the items deposited provided full text or only descriptive metadata. We will use basic descriptive statistics to describe the scope and extent of faculty input into institutional repositories and how libraries are using their websites for marketing and outreach as evidenced by the use of one or more of the navigational paths.

In the quantitative part of our study (N=113), we wanted to understand if there is any significant relationship between the development of an institutional repository and the focus on scholarly communication as represented by the presence of a library website dedicated to scholarly communication. However, we do not suggest that there are causal relationships between these two aspects of IRs. For this analysis, we examined two variables as follows: HaveIR indicating whether an institution has an IR and HaveSC, indicating the presence of a scholarly communication website. Our null hypothesis is stated as follows: there is no significant relationship between the appearance of a scholarly communication website and the existence of an IR. To understand whether we have a relationship between these two variables, we will use Pearson's chi-square test and a pre-set significance level of  $p = .05$ .

## **Results – Qualitative Analysis**

### *Descriptive Statistics*

To assist readers in better understanding the total population of ARL institutions, we present some basic demographics. The ARL institutions have used a variety of digital library platforms. In Figure 3, it should be noted that NDLTD represents the platform used by the Networked Digital Library of Theses and Dissertations consortium. The term “Local” represents those custom platforms designed by an institution and not used widely by others. Dspace, Fedora, and Greenstone are open-source digital library platforms and Bepress is a commercial organization that publishes peer-reviewed journals as well as institutional repository materials.

**(Insert Figure 3 – Digital Library Platform Usage Across ARL Institutions)**

Given our search methodology, we were not able to locate an IR for 50 of the ARL institutions and these are coded as “None” in Figure 3. The remaining 63 institutions are distributed as shown across the other 6 categories. It should be explicitly noted that the above chart is not a count or census of IRs in North America since IRs may appear in non-ARL institutions or possibly were not detected by our methodology.

*Faculty Deposits.*

In Figure 4, organized by subject area, we have indicated the number of objects or items either deposited by faculty or deposited by an agent of a faculty member such as a librarian. Among the forty-nine (49) institutional repositories at ARL university libraries, about one third of the IRs currently in place in the disciplines noted in the methodology section are empty of individual faculty work. That is to say, there are no works listed under individual faculty names in these specific disciplines. However, works listed under the names of individual faculty or researchers that are attached to working papers, technical papers and seminar series were excluded as noted earlier. Figure 4 shows the distribution of the number of objects or items in an institutional repository by specific subject discipline.

**(Insert Figure 4 – Number of Items in IRs by Selected Subjects)**

In Figure 4, the left four bars represent the sciences, the middle four bars represent the humanities, and the right four bars represent the social sciences. Among the over 5000 items that are listed under individual faculty/researcher names in the disciplines that were analyzed, 67% are by science faculty, 27% by social science faculty and 5% by humanities faculty. About 27 institutions out of 49 have populated their IRs with individual faculty work in the disciplines selected for this study (excluding working papers, technical reports and colloquia series). Of these, one institution alone accounts for almost 60% of all the work that is represented. Many of the items listed under individual faculty names appear to be from files imported from a commercial vendor.

*Navigational Paths.*



Our study finds that IRs are linked through a number of different navigational paths. As reported earlier, there are 63 institutions that have IRs. Table 1 shows a total of 40 institutions that have links to their IR sites from nine different navigational paths that are identified in this study. Thus, there are a number of institutions that have not linked to their IR from the library website.

**(Insert Table 1 – Navigational Paths to Institutional Repositories)**

Given the rather scattered distribution across navigational paths, it appears that libraries are using a variety of approaches to market IRs. This distribution may also suggest that there are diverse opinions about the role an IR will play in the library.

**Results – Quantitative Analysis**

In our quantitative analysis, we wanted to determine if there are any statistically significant trends that can be uncovered in the data that were produced from our exploratory analysis. In particular, is there any relationship between the variables HaveIR and HaveSC.

The contingency table for HaveIR crossed with HaveSC is shown in Table 2.

**(Insert Table 2 – Contingency Table for variables: HaveIR and HaveSC)**

The p value for this table is considerably larger than our pre-set value of .05, therefore we fail to reject the null hypothesis. Intuitively, by examining Table 2, one would expect the cell (Has An IR – Has SC Web) to be much larger in order for there to be any significant relationship. However, in this analysis, this cell and the adjacent cell (No SC Web – Has An IR) are almost the same (33 versus 30). Although we will comment further on this result in the conclusion, one observation here is that libraries either do not see a connection between IRs and scholarly communication<sup>46</sup> or, if they do, they are not using the library website to explain and market the benefits of IRs.

**Conclusion and Emerging Trends**

Open access repositories are rapidly gaining a reputation as a trusted and novel intervention in scholarly discourse. Institutional repositories can also support the unique processes and workflow of faculty research at their own institutions. However, the findings of this and earlier studies clearly indicate that individual faculty participation is either low or non-existent in one third of current university IRs at ARL libraries. We also found that IR deposits differ greatly by disciplinary area with humanities faculty depositing the least number of their works. As noted earlier, however, Organ discovered that when humanities scholarship is deposited in institutional repositories, it is heavily used.<sup>47</sup> The lack of uniform navigational paths to IR sites among academic libraries implies the lack of a common understanding of what an IR represents. While Lynch defines IR as a set of services, this study finds that many academic librarians consider IR to be part of their expanding digital collections. This confusion is at the root of Daniel Greenstein's belief that the exact definition of IR is important in order to establish integrity and to facilitate inter- and intra-institutional operability.<sup>48</sup> The precise understanding and perception of the nature of IR by librarians will determine how IR will be introduced and marketed to faculty. Contrary to the ARL's case for an IR as a way to intervene in the traditional ways of disseminating research information,<sup>49</sup> our study has demonstrated that there is no statistical relationship between the development of an IR and the discussion of scholarly communication on the library website

There are several emerging trends for populating IR content with faculty work. Clearly a better understanding of faculty research culture is required in order to engage in marketing that is more effective than current practice. Understanding the culture of scholarship in different disciplines is also required since the distribution of deposits by disciplines is highly skewed. Librarians need to apply a market segmentation concept to deliver targeted services. The deployment of change agents (such as retired faculty or early adopters of IR) as cultural intermediaries is thus strongly advocated. Mandatory self-archiving is increasingly gaining support although caution is urged since the concept of "mandate" is contrary to the fundamental

independence of faculty research. Informal conversations with our own faculty members, however, strongly suggest that a university mandate without proper “incentive structures” will not be successful in attracting faculty to deposit their work. Nevertheless, this approach, if accepted, will increase the intermediary role of academic librarians between the university administration and the faculty.

One quick way to initially populate an IR with faculty research is to work with commercial vendors and import deep back files to an IR. This approach, if financially feasible, would allow academic libraries to reach an initial critical mass of IR content. The hope is that a positive “information cascade”<sup>50</sup> will follow. The latest study of the UK Research Information Network suggests that the use pattern of “discovery resource” tools is very clearly a “long tail,” meaning that with the exception of popular search engines such as Google, scholars use many diverse resource tools only a few times.<sup>51</sup> However, as Chris Anderson, the author of the *Long Tail*, cautions, the “long tail” starts with a million niches, but isn’t meaningful until those niches are populated with people who want them.<sup>52</sup> An IR can serve as a meaningful niche resource tool only when it is populated with the intellectual output of the institution. James Neal suggests that the scholarship of the future will routinely circulate on the global network and that the academic library will be a central player in redefining the information value chain.<sup>53</sup> Our institutional repositories can form a vital, new conduit for the flow of research products from the producer (scientists, scholars and researchers) to the information consumer.

Because the notion of open access and an IR means many different things, several future studies are clearly recommended. A study that will investigate the extent of full text objects versus metadata only objects deposited in IR can address the half open/half shut debate. Another area is the determination of the ratio of items “born digital” versus digitized items, which will help understand the future service needs of IR. Measurement of the research impact of items deposited in an IR is another significant area of investigation that will be increasingly necessary once IRs mature as a stable location for faculty to deposit their work. Finally, faculty need to be

made aware that IRs are among the best hope for increased visibility of their scholarship and for preserving their research that may become orphaned by technological advances.

Based on the results presented here and observations from earlier studies, some final comments are offered. Given the lack of faculty participation, the obvious question is “why the lack of interest?” The most likely answer is that faculty do not perceive any significant value of an IR to their scholarly endeavors. We believe this is due, in large part, to two factors: immaturity of the IR platform (both content and infrastructure) and the absence of any coherent articulation of how IRs can advance scholarship.

Immaturity of the IR platform is two-fold: insufficient useful content and not having the services required to support scholarly methods. As Lynch’s definition suggests, emphasis needs to be placed on developing the services to support scholarship in the 21<sup>st</sup> century. Scholarship is becoming increasingly digital, some would say exclusively digital, and libraries need a heightened awareness of the risk to scholarship that is created by this transformation from print to digital. Digital content is ephemeral and highly mutable, conditions which jeopardize the authenticity of digital resources. The unique methods and tools of the many scholarly disciplines are complex and are likely to be supported outside of or external to a repository. However, once the digital object is deposited in the IR, the library community can offer generic archival and preservation services. Although there is much research and development in this area, we still do not have the comprehensive policies and infrastructure required to preserve the digital object over its life cycle. Other generic services might include collaboration environments, grant support, and metadata creation. With these essential services in place, the digital content is likely to follow.

The second factor, lack of a coherent articulation of the value of IRs, is related to the roles of libraries in the advancement of scholarly communication. Budd<sup>54</sup> has written extensively on how information professionals need to re-conceptualize their profession, specifically within the context of rapidly advancing technologies. We need to think, not only about how technology

can be used, but how it can be transformative. Our research here suggests that libraries are ambivalent about their relationship to institutional repositories as evidenced in the variety of navigation paths and, in some cases, the total absence of any reference to IRs. There is an institutional vacuum here that libraries should consider filling, namely the articulation and marketing of IR services and how IRs can advance scholarship. All too often, faculty view IRs as only a place to deposit without seeing the full service potential of an IR. A first step in this marketing approach might be to change the name “institutional repository” to one that suggests a connection to scholarship.

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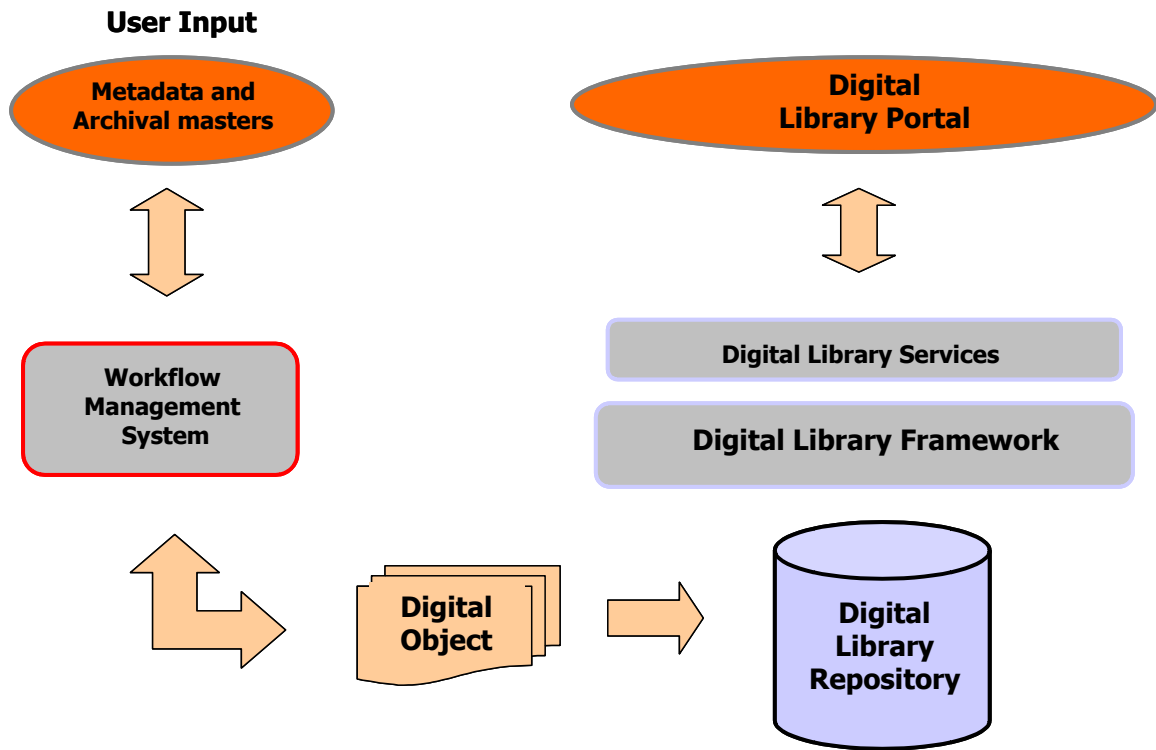


Figure 1 – General Digital Library Architecture

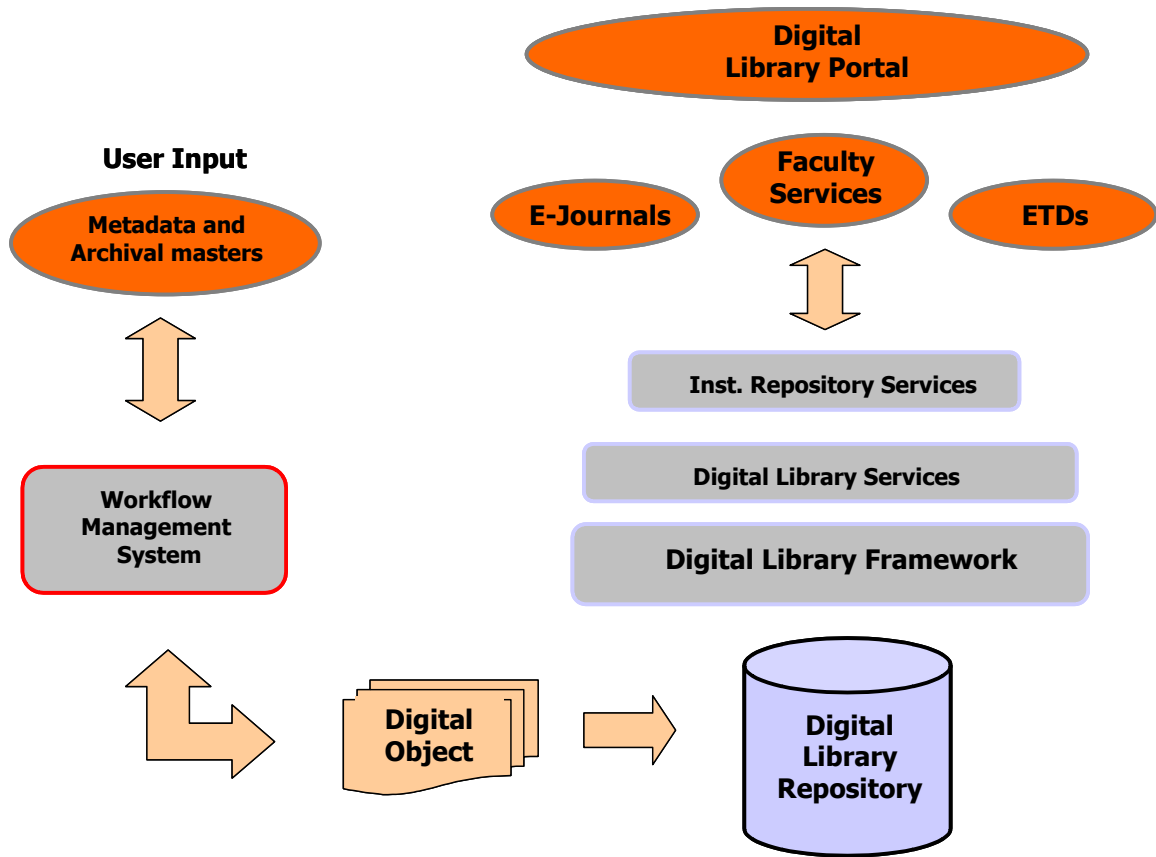
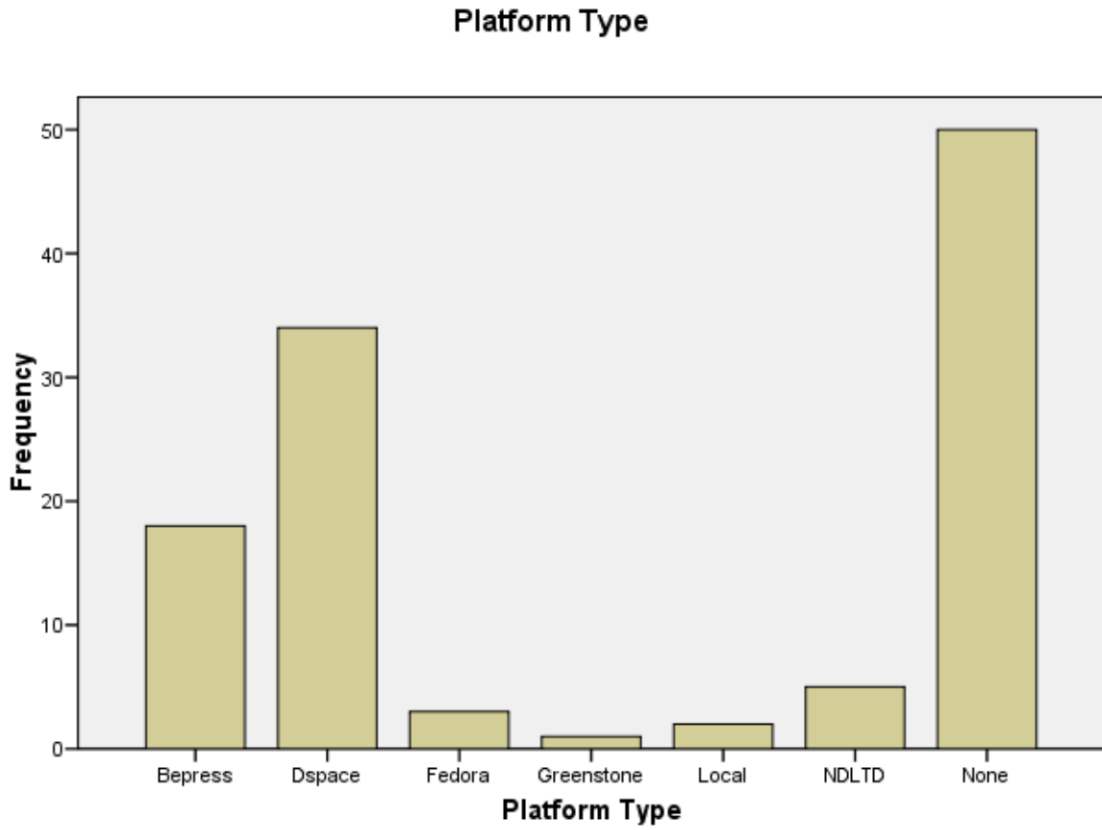
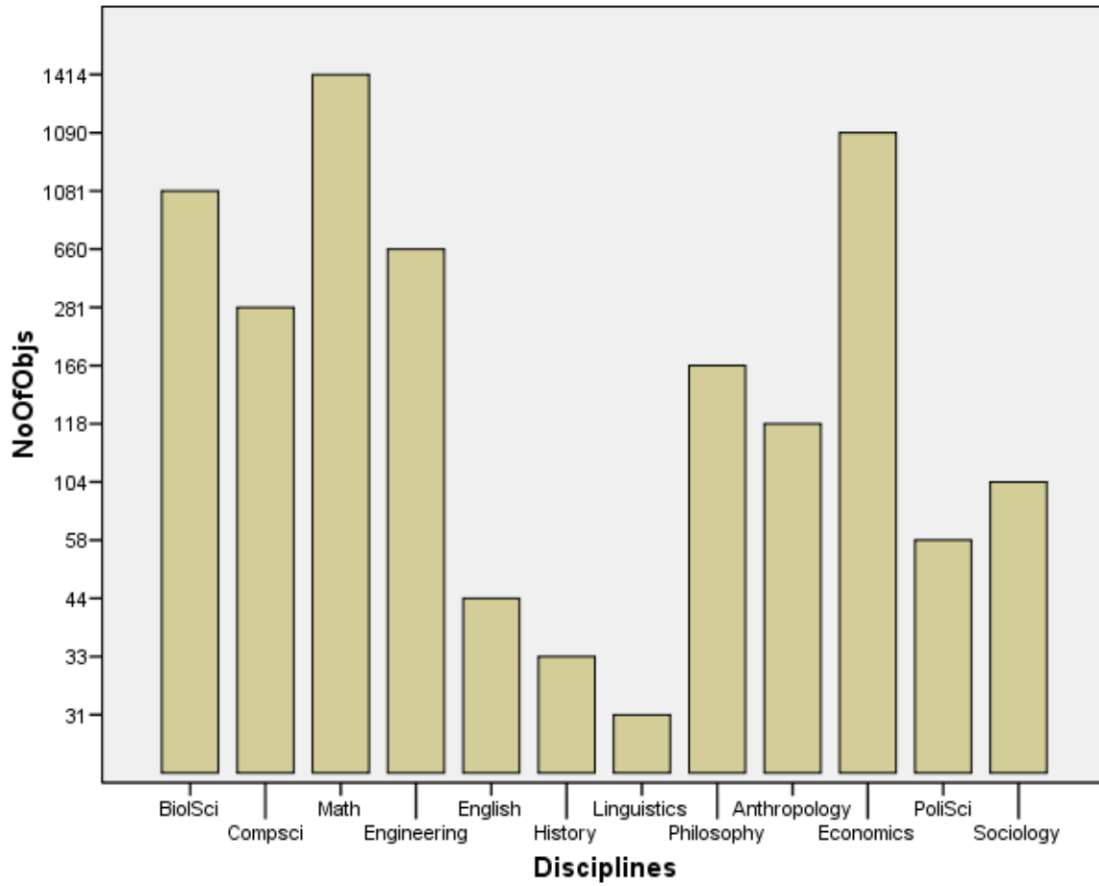


Figure 2 – Institutional Repository Framework



**Figure 3 – Digital Library Platform Usage Across ARL Institutions**



**Figure 4 – Number of Items in IRs by Selected Subjects**

<b>Linked From - Navigational Path</b>	<b>Count of Institutions</b>
<b>Scholar Communication Page</b>	<b>11</b>
<b>For Faculty</b>	<b>9</b>
<b>Collections and Resources</b>	<b>7</b>
<b>Library Home Page</b>	<b>4</b>
<b>Services</b>	<b>3</b>
<b>News and Events</b>	<b>3</b>
<b>About Libraries</b>	<b>1</b>
<b>Digital Projects</b>	<b>1</b>
<b>Finding Information</b>	<b>1</b>
<b>Total</b>	<b>40</b>

**Table 1 – Navigational Paths to Institutional Repositories**



	<b>No SC Web</b>	<b>Has SC Web</b>	<b>Total</b>
<b>Doesn't Have An IR</b>	<b>27</b>	<b>23</b>	<b>50</b>
<b>Has An IR</b>	<b>30</b>	<b>33</b>	<b>63</b>
<b>Total</b>	<b>57</b>	<b>56</b>	<b>113</b>

**Table 2 – Contingency Table for variables: HaveIR and HaveSC**