Identifying Factors of Success in CIC Institutional Repository Development

Final Report

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Executive Summary

With support from the Andrew W. Mellon Foundation, the GSLIS Center for Informatics Research in Science and Scholarship at the University of Illinois at Urbana-Champaign undertook a one-year pilot study to investigate advances in institutional repository (IR) development. The aim was to learn about successes and challenges experienced by IR initiatives at university libraries that had made a substantial commitment to developing and sustaining an IR. Three sites were studied using the comparative case study method. They were purposefully selected to represent varying approaches to IR development undertaken at research libraries with similar missions and users.

Three primary strategic approaches to IR development were identified across the cases: problem-solving, collaboration, and intellectual property (IP) management. The **problem-solving strategies** were aimed at serving constituencies by continually assessing their needs, evaluating repository applications, and exploring ways to support faculty research by working "upstream" rather than focusing only on the final products of scholarship. Developers used **collaboration strategies** to assemble groups with the necessary expertise to advance IR work and take advantage of resources in the larger library and IR community. Internal collaborations within the library and university were used primarily to strengthen the composition of policymaking groups, and external collaborations addressed complex, often technical, tasks that have broader application for the professional community. **IP management strategies** included the hiring of specialized IP personnel, development of processes for systematic rights clearance, and direct engagement with publishers to facilitate rights negotiations.

The IR **development teams** were anchored with professional personnel serving in core coordinator and lead technical positions. Additionally, liaison librarians are serving as more loosely coordinated members of development teams, extending the **essential human infrastructure** of IR development through participation in planning and policy decisions and by working directly with faculty and academic units to identify potential early adopters and promote the IR mission. Unlike other aspects of repository building, liaison networks with faculty are already an integral part of library operations.

Core competencies fueling IR development were a mix of traditional and evolving professional expertise. All team members understood the intricacies and scope of **scholarly communication and IP issues**, including copyright requirements and open access principles, and they also were knowledgeable about **disciplinary differences** in research practices of faculty and the dissemination of scholarship. This base of understanding of the scholarly research environment was matched with extensive **technical skills** and experience. Additional competencies related to the **intermediary expertise** required for outreach, coordination, and collaboration with researchers and academic units.

The normal course of **content acquisition** was far from routine and unevenly paced. **Faculty recruits** have been important for sustaining deposit activity. Some faculty have contributed to their IR as **open access advocates** who believed in the importance of freely accessible scholarship for their research community or their university. Perhaps most important to the

viability of IRs, however, were the faculty who found that the IR could solve a particular **information problem** they faced in the everyday practice of scholarship.

Faculty freely discussed **barriers to IR adoption**, which included **copyright complications** and **reservations about trends in open access**. Some academic units were helping to increase faculty awareness and participation through influential administrators and high-profile scholars who are active advocates. There seemed to be little outright rejection of **deposit mandates**, with evidence of a patchwork of quasi-mandates emerging among academic units in response to IR initiatives.

The cases demonstrated a common resolve to extend the traditional position of the library as the focal point for scholarly collections and related services in the university. The results highlight how the tension between meeting the **demands of building content and providing services** in academic libraries extend to IR activities, where both collection and service functions are still highly experimental. Collection activities are offering alternatives to publisher-controlled access to scholarship and enhancing dissemination of grey literature and management of data sets. Service activities are resulting in the solution of information problems for faculty, collaborative technical advances that can be shared with the broader IR community, and professionalization of scholarly communication and IP expertise, applied in intermediary roles between the library and faculty but also between the library and publishers.

Within the cases, there were strong indications that IRs can make important **contributions to scholarship**, particularly in solving specific information visibility, management, or access problems experienced by faculty. At the same time, some of the assumed benefits of IRs are perceived as redundant by scholars who practice other forms of open access dissemination, or are considered risky by the standards of some disciplinary cultures. In general, the basic aims of universities in investing in IRs—to collect, preserve, and provide access to their research output—seem misleadingly simplistic compared to what IRs are actually attempting to accomplish, and what they will need to do to identify and successfully implement functions that are not redundant or risky and of high value to faculty. While the cases show lower levels of participation by humanities faculty and academic units, the traditional role of the research library as the laboratory for humanities scholarship is recognized, but exploration of the potential for IRs to better support humanities research processes has not yet been prioritized.

The cases are highly illustrative of the kinds of progress, but also the tradeoffs, involved in active development before realistic, long-term targets and goals can be identified, both locally and more widely within the profession. The many achievements and ongoing activities documented here can serve as proven approaches for making strong inroads for long-term IR programs. In addition, systematic research on several fronts could provide stronger footing for planning and coordination of IR efforts. Research questions needing **further investigation** include:

- What specific problems can IRs solve for faculty? How do these align or compete with the basic needs of the university to preserve and promote their scholarly assets? In particular, what functions can benefit disciplines that have been traditionally dependent on the library for research materials, or those not well-served by disciplinary repository efforts?

- Which IR aims should be addressed locally, and which are better organized cooperatively with other university-based IRs? How can these efforts best intersect with and leverage current library operations and consortial efforts? How can established best practices in collection development and liaison-based public services be better exploited?

- How can IRs interface with disciplinary and cross-disciplinary literature and data repositories and become an integral part of the growing network of digital repositories?

Project Context

The general mission of institutional repositories (IRs) is to collect, preserve, and provide access to the research output of a university. University IRs have yet to achieve the same level of acceptance or success as other types of repositories, for a variety of reasons. Direct comparisons between types of repositories should be made with caution, however. Unlike discipline or subject-based repositories, such as arXiv in physics and PubMed Central in biomedicine, IR systems and services need to support the broad range of disciplines within the university setting. They play a unique role in meeting local institutional needs and priorities, and therefore need to be assessed by their own standards. As a new, emerging area of librarianship, however, requirements and evaluation criteria for successful IRs have not yet been established. This case study documents the investments and progress being made at three operational IRs at doctoral research institutions to provide a provisional baseline for determining realistic goals and promising approaches for IR development at similar institutions.

The objective of this pilot project was to identify strategies and conditions that advance and influence institutional repository (IR) development. The aim was to learn about successes and challenges of IR initiatives at university libraries that had made substantial commitments to developing and sustaining an IR. One of the overarching research questions framing the study was: "How do librarian intermediaries contribute to the IR development process?" The study sites provided fruitful territory for exploring this question, with data collected directly from experienced repository developers and other librarians associated with IR efforts, balanced with the views of faculty who had some understanding of local repository efforts. The results identify strategic approaches used by development teams in advancing IR systems and services and the roles and competencies required in this new kind of professional library work. The analysis also includes important faculty perspectives on the value of IRs within the changing scholarly communication landscape, drawn from interviews with faculty depositors and liaison librarians affiliated with a range of academic departments.

As a pilot project, the study was designed to be illustrative and to capture a range of development approaches and experiences to suggest areas for further research. As a case study of three IR initiatives, the results presented here are not intended to be representative of the full range of IR development activities; however, the analysis does provide a useful base of findings that can inform and guide academic libraries as they make decisions about priorities and approaches to development for their own IR initiatives.

Methods

Study Sites

Three progressing IR initiatives were studied using the comparative case study method, a technique well-suited to capturing deep data on IR activities within a local context. The sites were purposefully selected to represent varying approaches to IR development undertaken at research libraries with similar missions and users. Thus the analysis emphasized the different

priorities, strategies, and activities carried out by those involved in the IR initiatives rather than specific institutional factors. The three institutions were at different stages of development, but all had made substantive commitments to their IR initiative as evidenced by dedicated IR staff and a relatively high level of ongoing IR-related activities. The body of this report emphasizes cross-case analysis. Supplemental profiles of the individual initiatives are provided in Appendix A. These profiles represent a composite view drawn from the full set of data for the given case, highlighting key development strategies and accounting for local conditions that influenced each approach.

Process

To capture evolving IR strategies and develop well-rounded cases during the course of the one-year pilot project, the research team visited each site multiple times over a nine-month data collection period. The cases were developed primarily through semi-structured interviews, with other contextual data derived from examination of repository collections and online documentation, as well as supporting materials provided by interview respondents. Interviews were conducted between March and December of 2007, with most respondents representing one of three primary roles: IR developer, liaison librarian, or faculty. Lead developers and other key respondents were interviewed twice to monitor progress and to build depth in the cases. Due to scheduling constraints, a single session was sometimes used to interview two participants. IR developers and liaison librarians made up the largest number of respondents, with a smaller number of faculty, administrators, and other campus representatives included at each of the three institutions. Because this research required interaction with human subjects, the University of Illinois Institutional Review Board approved the research procedures and protocols applied. A copy of the approval letter is provided in Appendix B.

Characteristics of the Respondents

Table 1 outlines the respondents and number of interviews conducted at each of the three sites. Although the research team attempted to interview administrators at each study site, participants could only be identified at two institutions. Administrators included deans, a research center director, a research program coordinator, and a university press director.

Within the sample of respondents, the difference between a developer and a liaison librarian was not always distinct. Developers could also serve as liaisons to departments, faculty, and other repository contributors. For this study, IR developers were defined as librarians with a substantial percent of their time committed to IR development and related matters as indicated in an official, institutional position description.

The liaison librarian group included selectors and subject reference librarians whose main responsibility was to coordinate with university departments and support faculty research pursuits, and who may also have some lesser, yet formalized, role in repository development. The research team relied on the lead developer at each institution to help identify the pool of potential liaison librarians and other IR related positions, which resulted in full participation from all key IR personnel. As shown in Table 2, liaisons were affiliated with a variety of disciplines in the sciences, social sciences, and humanities.

For faculty respondents, the research team began with a group referred by the IR developers at each site and then supplemented the pool with additional faculty who had contributed IR content. Although all respondents were aware of or participated in their local IR, it is important to note that there was considerable variation in the level of general understanding of IR activities and concepts. As Table 3 shows, a number of different disciplines were represented by the faculty respondents across the three study sites.

As the project progressed, a few respondents were added to the pool to build specific cases and expand the context for analysis. Specifically, lead repository developers at two peer institutions were included to provide additional institutional points of comparison. In addition, a graduate student depositor from Institution A and a data archivist from Institution B were brought into their respective cases to represent important dimensions of IR development that emerged during the course of the study.

Table 1. Interviews Conducted at Each Site

Role of Respondents	No. of Respondents	No. of Interviews
Institution A		
Developer	3	6
Liaison	2	2
Faculty	3	3
Administrator	3	3
Recent Graduate	1	1
Total	12	15
Institution B		
Developer	2	3
Liaison	5	5
Faculty	3	3
Administrator	2	2
Data Archivist	1	1
Total	13	14
Institution C		
Developer	4	6
Liaison	5	5
Faculty	5	5
Total	14	16
Supplemental Interviews		
Developer	2	2
Total	41	47

Table 2. Liaison Disciplinary Affiliations

Domain	Discipline
Sciences	Biomedical Sciences
	Biotechnology
	Physics
	Geology
Social Sciences	Labor and Industrial Relations
	Transportation
	Global Studies
	Social Work
	Anthropology
Humanities	Women Studies
	Art and Architecture
	Religion
	History

Table 3. Faculty Disciplines

Domain	Discipline
Sciences and Engineering	Entomology
	Epidemiology
	Plant Biology
	Physics
	Mechanical Engineering
	Civil Engineering
	Computer Science
Social Sciences	Natural Resources and Environment
	Social Work
	Communication
Humanities	English

Data Collection

When possible, the research team conducted in-person interviews; however, to accommodate respondents' schedules and preferences, five sessions were held over the telephone. Separate interview guides were created for the developer/liaison, faculty, and administrator groups of respondents, and are provided in Appendix C. The 45 to 60 minute interviews were fully transcribed before analysis. In total, the data analyzed for this project included:

- 2,180 minutes of audio recordings
- 44 transcripts (737 pages; 264,460 words)

In this report, every effort has been made to keep the participants' identities anonymous. All verbatim excerpts from the interview transcripts are referenced with a participant code and the date of the interview. In addition, expressions used by respondents and presented as examples or as "in vivo" concepts are provided in quotes or as block quotations.

Analysis

Iterative coding was conducted using ATLAS.ti qualitative analysis software. Analysis began with an initial conceptual framework developed from the literature on IR development and trends in scholarly communication. This framework was useful in preliminary interpretation of the interview data, yet flexible enough to allow inclusion of new, emergent themes to augment understanding and to help shape the course of investigation. To ensure intercoder reliability, the authors met regularly to interpret the transcripts in a constant comparative approach and to merge, weed, and build consensus on the definition of codes to be applied by the two research team members performing the coding. To maintain consistency in application of codes throughout the project, the team used free-text memos to document coding decisions and rationale. The general code list is presented in Appendix D.

Results

Key Repository Strategies

Each institution approached IR development with a set of strategies, comprised of complementary and often contingent activities. In executing their development plans, they concentrated on different priorities, yet key strategic approaches were evident across cases. The following subsections cover three strategic approaches identified in the body of data—problem-solving, collaboration, and intellectual property (IP) management. While emphasizing different aspects of IR development, all three development teams made substantial progress on both content and service development aims using those strategies. Institution A is distinguished by a strong service emphasis that takes a proactive approach in working with researchers to solve their information management problems, with a special focus on supporting the curation and management of data sets. Institution B represents a balance of policy-driven content development with selective technical and service initiatives that have implications for the broader IR professional community. At Institution C, developers made early advances in acquiring content with innovative approaches to confronting IP challenges and assessment of user needs.

The problem-solving, collaboration, and IP management emphases are best thought of as priority options for guiding IR initiatives. Each is presented below with examples of associated activities and experiences in implementation drawn from the full body of data across the three cases. Specific outcomes of the strategy are noted, followed by further observations about tradeoffs, tensions, and potentials (indicated with 🚫), many of which call for further investigation.

Problem-Solving Strategies

IRs have been conceived as a means to address problems in scholarly communication, and developers across the institutions were testing out new ways to serve their constituents by assessing depositor needs, evaluating repository applications, and exploring ways to support scholars at each stage of the research process, working "upstream" instead of only focusing on the final products of scholarship.

Assessing and reassessing depositor needs

- IR developers actively sought out research projects that could benefit from IR functions, and when feasible, they sought to customize services around researcher practices and needs.

- IR developers and liaison librarians served as consultants to faculty on information management problems that arose during the course of research and dissemination of scholarship. In some cases, librarians served as co-PIs on research projects in information management roles.

- Faculty were recruited for advisory roles to provide input on repository policies and development.

- Specific IR functions and uses found to be of value to faculty were used in repository marketing and outreach efforts.

Evaluating repository applications

- Customizations to repository systems and software components allowed IRs to support a wide variety of scholarly formats and improved accessibility to and preservation of those items.

- Interface testing was conducted with librarians, faculty, and students to improve accessibility and design.

Working "upstream" in the research process

- Developers sought out ways to support scholars at each stage of the research process. Data sets, protocols, interview data, and other materials generated prior to dissemination stages of the research process were increasingly collected.

- The information needs and uses of researchers drove repository design. Development activities remained fluid and responsive to research needs across disciplines and as they evolved over time.

Problem-solving strategy outcomes:
At Institution A, an emphasis on problem-solving led developers to conceive of separate repositories to address specific types of storage, management, and access problems. This resulted in a distributed architecture with separate components designed for different scholarly materials, such as academic publications and scientific data sets. Developers cultivated a strong working relationship with their university's multidisciplinary research center, which produces cross-departmental scholarly products. Developers expect this and similar relationships on campus to open up IR engagement in ways that otherwise would not have been possible.

At Institutions B and C, developers continually poll their constituencies to ensure the IR represents significant value to them. Typically, problems have been addressed on a case-by-case basis, resulting in individualized solutions. This approach has worked well for acquiring specific document collections from a unit or faculty member and for establishing goodwill about the IR with a small group or individual scholars.

🚫 A strong problem-solving orientation commits developers to a path of exploration and may make it difficult to extend the IR as a core library service equitably to all constituencies. The relationships that result from following problem-solving opportunities, however, can have unintended benefits, such as identification and acquisition of a corpus (e.g., departmental publication series, legacy data sets) that make the unique scholarly assets more visible. Problem-solving is well suited to IRs with identified content targets, strong engagement with faculty, and fairly autonomous professional personnel.

Collaboration Strategies

Developers assembled groups with the necessary expertise to advance IR work and take advantage of resources in the larger library and IR community. Internal collaborations within the library and university were used primarily to strengthen the composition of policymaking groups, and external collaborations with those outside of the university were tackling complex tasks that have broader application.

Internal collaborations

- Collaborative policymaking and prioritizing with stakeholders — including archivists and subject liaison librarians as well as administrators, information technology specialists, library science researchers, and university press representatives — allowed IR initiatives to proceed with administrative buy-in and interdepartmental support.

- Collaboration between the IR and library or campus level scholarly communication units created economies of scale for outreach and education efforts.

- IR developers engaged liaison librarians in discussions of repository use tailored to the needs of individual disciplines and faculties to identify potential IR content within departments and to cultivate active participation across library units. This was particularly useful for decentralized departmental library systems.

External collaborations

- Cross-institutional collaboration efforts addressed larger issues common across repositories and allowed developers to engage in more complex, time-intensive projects such as repository software and tool development.

- Best practices were communicated to an emergent community of IR development teams, fostering crucial ties with IR innovators and funding agencies.

Collaborative strategy outcomes:
Collaborative efforts proved essential across cases due to the variety of stakeholders involved in development. Reliance on subject specialists and departmental liaison librarians was key to repository building success. They drew attention to the needs of constituencies during the IR-establishment phase and were in the best position to identify potential depositors and collections.

Early development work at Institution A involved the formation of cross-unit groups from within the library charged with early implementation decisions. At Institution C, the lead IR developer conducted personal interviews with each subject librarian to discuss the potential within each department for IR growth. Strong cross-institutional collaboration between Institution B and a peer institution is advancing software development to create a feature-rich repository application that can facilitate rights clearance and perform citation analysis of IR contents.

🚫 Progress achieved through these collaborative relationships can be slow, and it is difficult to gauge how best to assemble and coordinate efforts. While benchmarks like collection growth are easy to assess, it is difficult to measure the value and impact of collaboration. Important, and sometimes unintended, outcomes include communication and cross-training among development teams, and the direct spread of best practices across institutions and experience in cooperative planning and implementation.

Intellectual Property Management Strategies

Much of the content that has been collected, such as postprints of journal articles or book chapters, requires copyright clearance before it can be deposited. The intellectual property (IP) obstacles involved in populating IRs consumed significant amounts of time and resources and can be a drain on other core development activities. Techniques employed to address IP issues included the hiring of specialized IP personnel, development of processes for systematic rights clearance, and direct engagement with publishers on IP issues.

Specialized personnel

- New IP specialist librarian positions have provided dedicated attention to a high demand and high profile function.

- Organizationally, libraries are finding ways to include copyright legal experts to provide support for IRs and other campus scholarly communication efforts.

<u>Systematic rights clearance</u>

- IR software and tool development was focused on known IP problems in the submission process and in tracking IP rights.

- Developers collected and analyzed curricula vitæ of interested scholars to identify materials that could be readily deposited into the repository.

- Informal copyright consultation was offered, and more formal IP responsibility was managed through online legal agreements drafted by library copyright officers and reviewed by university legal counsel.

<u>Engagement with publishers</u>

- Developers negotiated directly with publishers for the right to deposit previously published papers produced by their faculty.

- Developers were exploring ways to obtain IR-deposit rights of their authors through use of author's addenda and other IP arrangements.

IP management strategy outcomes:
A strong emphasis on IP management strategies has been a natural outgrowth of Institution C's long-standing history of innovative digital publishing programs and involvement with publishers. The IR development team there included two IP specialist librarians who covered copyright clearance and educational outreach for faculty and graduate students. While individualized approaches to tracking faculty copyright agreements have proven unsustainable, direct negotiation with publishers resulted in unprecedented bulk acquisition of the published versions of articles written by the university's faculty. Future plans included additional negotiation for IR-deposit rights for their authors as part of subscription arrangements with publishers.

Similar attempts to negotiate with publishers were not productive. In response, efforts turned to rationalizing and streamlining the deposit process. For example, copyright policy and deposit agreements were moved from the last to the first step in the online submission cycle. In addition, development has focused on designing value-added components that tie into the SHERPA/RoMEO copyright clearinghouse to facilitate rights clearance. The study sites have endorsed author's addenda as well. Institutions A and B recommend scholars use the author's addendum drafted by the university consortium, while Institution C has developed their own addendum for their scholars.

🚫 Some institutions are less assertive in their involvement in author/publisher agreements, and tend to emphasize author autonomy in publishing negotiation. Despite these different orientations, IP management strategies need to be more professionalized both locally and broadly across the academic library community. Investment in blanket approaches and more automated techniques would have a long-term payoff.

For additional context and details on the key development strategies at each institution, see Appendix A. In the sections on Librarian Roles and Faculty Perspectives that follow, we continue to present cross-case findings, with examples from particular cases, as well as excerpts from interviews that express ideas that resonated across the pool of respondents.

Librarian Roles

IR development has resulted in new responsibilities for academic librarians in planning, management, and technical development. To meet these demands, some established positions have been modified; additional technical lines, such as research programmers, have been added; and new types of positions have been created, such as:

- repository coordinator
- intellectual property specialist
- data research librarian

Liaison librarians, on the other hand, have long been part of public service operations in academic libraries. With IRs, they are taking on new, add-on roles as intermediaries between faculty and the development team and their goals. This section presents an overview of librarian roles, with an emphasis on the contributions of liaison librarians and competencies for repository development.

Development Team Roles

Development teams at each institution were anchored with two professionals serving as core coordinator and technical lead. The positions were not always explicitly designated in early planning stages but were established as needs arose during the repository building process, along with other IR team roles needed to sustain design, development, and operation.

Repository coordinator

- In general, a fulltime professional had responsibility for all day-to-day repository operations. Across study sites, the three repository coordinator positions reported to upper library administrators, and IRs were viewed as an integral service component of the library.

  I'm running [the repository]. ... I talk to lots of departments, lots of faculty. I'm trying to recruit content. I'm trying to understand how to build the system so that it meets the needs of what I learn people need. And I come back and talk to our system developer, and we figure out "Can it do this?" "Can it not do that?" "What should I say to the group?" "Who's our next target?"—that kind of thing. (Developer 00, March 1)

  I have overall responsibility for the IR, including recruiting content, developing policies and procedures for the IR; I supervise the programmer for the IR, so I supervise the technical staff; I do marketing; I go out and talk to faculty; I do upkeep

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on metadata. So I do everything, except for the actual programming. That's the only thing I don't do. (Developer 02, April 5)

Technical lead

- The technical lead planned for and managed the specific software package(s) necessary to implement the repository according to the needs of the constituent departments and depositors.

- Staffing levels were associated with implementation approaches. Commercial software options, such as Digital Commons, were considered to require less on-staff development expertise than open source options like DSpace.

Other IR roles

- Repository development efforts were part of a broader evolution and restructuring within the libraries, denoted by new administrative positions for associate deans, scholarly communication personnel, digital collections coordinators, and research liaisons.

- Intellectual property specialists were hired at Institution C to help provide counsel and to coordinate outreach and training for faculty and graduate students.

  We're responsible for rights clearance. ... And the first thing you can do before you can clear them is figure out who has them. And it's all very tedious kind of work, but that's part of what I'm doing. The other part is … thinking about what we can do in the future. (Developer 09, March 19)

- Other positions were being assigned responsibilities on a part-time basis.

  At Institution B, dual part-time appointments supplemented the core staff. A 25% time faculty liaison was appointed to identify and work with groups that could contribute to the repository collection. A 30% time backup systems developer was necessary to boost the IR to a "production-level" service.

Essential Contributions of Liaisons

The cases demonstrated an interesting shift in the nature of liaison roles. Librarians in these intermediary positions were a ready workforce, accustomed to working to represent the interests of faculty and departments to inform library decisions about content and services. At this point in the evolution of IRs, however, they are also involved in communicating IR development interests to faculty to influence their scholarly communication practices. Librarians worked in existing liaison roles to inform planning and policy decisions, to identify potential early adopters, and to communicate the mission of the repository to faculty. Unlike other aspects of repository building, liaison networks with faculty were already a functioning part of library operations and are now serving as essential human infrastructure in IR development.

The level of engagement of liaisons varied within institutions, based in part on the coordination methods used by the IR team but also due to liaisons' own views on how much involvement is appropriate as part of their duties. Some liaisons stepped up and volunteered to be part of their library's IR initiative, motivated by their belief in open access principles. Most liaisons expressed enthusiasm about their IR role, even when it required a significant shift in professional orientation.

Inform planning and policy decisions

- Liaisons participated in advisory boards and taskforces that crafted guiding policies on preservation, submission procedures, and collection scope, and they developed and implemented plans for generating repository awareness. They were also involved in evaluation and testing of repository functionality and interface design.

- Liaisons were an important source of information for needs assessment.

  At Institution C, the repository coordinator conducted interviews with 90 library liaisons to identify faculty needs and the range of materials and formats to be supported. This process captured librarian interest in the IR early on, nurturing crucial relationships between the development team and the liaisons that became increasingly important as development progressed.

Identify early depositors

- Liaisons were intimately aware of the needs of their faculty and leveraged their knowledge of departmental and disciplinary practices to recruit early adopters.

  Developers acknowledged that liaisons "know better what the departments are interested in, what they need" (Developer 13, March 30).

  We try and keep the departmental librarians involved at all times, especially when we're meeting with the department. … And there have been some that have been very influential where they have actually brought connections to us, where they've heard from their department that the department is interested in something like this and then they've mentioned [the repository] to them and brought them to us. (Developer 04, November 7)

- The strong departmental ties of liaisons were effective for consistent, incremental progress in selected areas where strong relationships with faculty already exist.

  Institution A and B's IR teams have focused on a small subset of liaisons to help recruit participants in the sciences and some limited social science disciplines, while they evaluate other ways to gain traction in the humanities and the rest of campus more comprehensively.

<u>Communicate the mission</u>

- Representing repository initiatives was consistent with liaisons' long-standing faculty service roles.

  > I think the librarian as marketer has always been a part of the duties .... [F]inding a way to reach out to [users] and make them aware of the services you provide is sort of fundamentally a job requirement. ... This is just one more service—and it has different specific qualities—but I think in general it's part of the same continuum, making people aware of what's there and how useful it can be. (Liaison 08, March 12)

- Translation of IR jargon was needed for faculty to understand and appreciate the IR functions in terms of their own disciplinary culture.

  > We shared our best practices of what we thought worked well with our user groups, and talking points of institutional repository will mean nothing to them. So don't go into librarian-speak about IR and other things. Try to bring it down to a level that they will understand. And I think that that's something that, too, was a big education point and still is for librarian liaisons of how to present this without getting into too much jargon. (Liaison 30, June 8)

  > There's an awful lot of librarian language that's used in talking about an institutional repository, ... and being able to translate the librarian words, the librarian language, to people who are not in the library, is important. (Developer 06, March 12)

🚫 Although involving liaisons can "slow the process down" because developers must work through a third party, including liaisons in development makes them more likely to become "advocates" for the repository (Developer 02, April 5). One developer, however, lamented, "We're adding stuff to the margins, but we're not taking any of the core stuff away. So what can I expect from [liaisons] who already had a full-time job before [the repository] existed?" (Developer 12, October 26). While the subject orientation of liaisons is being exploited in IR development, there seems to be much less application of their experience in collection development, management, and evaluation—areas of expertise that are highly relevant but need to be revised for the IR collection model.

Core Competencies

Professional IR knowledge and expertise is growing locally as projects mature. Although the competencies discussed here sat primarily within the members of the IR development team, they were strong among liaison librarians, as well. In particular, librarians involved in IR development understand the intricacies and scope of <u>scholarly communication and IP issues</u>, including copyright requirements and open access principles, and they also have <u>knowledge of disciplinary differences</u> in research practice and the dissemination of scholarship. This base of understanding of the scholarly research environment was matched with strong <u>technical skills</u>

and experience. Additional competencies were related to the <u>intermediary expertise</u> required to reach out and work with researchers and academic units.

<u>Scholarly communication and IP knowledge</u>

- Developers understood IRs to be one part of a complex scholarly communication system and an extension of library services to facilitate the production, use, and dissemination of scholarship.

    I think the other piece is the understanding of the scholarly communication issues involved, so everything from just basic copyright issues, and also open access issues, knowledge of things like gray literature, having an awareness of the range of issues within scholarly communication and being able to relate those to the IR and being able to talk about those in the context of the IR has been important. (Developer 02, April 5)

    [The IR is] not a piece of software and a system, but a set of services. (Developer 05, March 12)

    I think that more and more repositories are coming to the same conclusion that I am about [the repository]. It has to be part of a wider set of scholarly communication services, and it doesn't really work on its own. (Developer 02, December 5)

- Intellectual property expertise was essential, but it was also more difficult to integrate with existing positions and ongoing technical development responsibilities.

- Developers were cautious in using the open access concept as the exclusive impetus for recruiting depositor participation.

    I tend not to align with the open access movement with [the repository] because I think that carries along with it some freight and some baggage that scares people off. … [The repository is] about enabling our researchers to achieve the results they want to achieve with their publications. … that's the movement I want—the movement for enlightened self interest. (Developer 12, October 26)

<u>Knowledge of disciplinary differences</u>

- Developers understood that faculty from different disciplines perceive and value IR services differently, but the variance in needs and potential uses complicated promotion and outreach efforts.

    [S]o one of the biggest difficulties I have is explaining to myself or to anybody else what this service does. What it's for? What it's good for? What problems does it solve? And part of the reason for that difficulty is that it solves different problems in different disciplines, so there is no one answer. (Developer 00, March 1)

- Current scholarly communication trends in some fields were exploited to show the value of the IR. Developers pointed to directives from federal funding agencies, such as the NIH's push to make research findings openly accessible, to show how the IR was positioned to respond to changing expectations for disseminating scholarship.

- How IRs contribute differed across the science, humanities, and social sciences, but there were also important variations among research communities within a broader field.

  From my perspective, one of the useful things for someone in the social sciences and the humanities to have is a lot of the raw information that they have gathered as research that may never be used completely in their publications. (Liaison 28, June 6)

  In some sciences, people are really happy to share; there's lots of preprint posting going on online. And then in other ones, people don't want to get scooped. (Developer 10, March 19)

- Humanities scholarship posed a unique set of labor-intensive IP challenges.

  They have fewer journal publications and a lot more book chapters and books. ... For journal publishers I can get a copy of their standard copyright transfer agreement. I can figure out what's possible, and we also have things like the SHERPA/RoMEO database and publisher policies, but for books, I need to look at a book contract or the book chapter contract to figure out what the agreement is. And that's harder. (Developer 02, December 5)

Technical skills and experience

- IR development teams typically included one technical lead and other technical support staff to cover computer programming, database management, Web development, and digital preservation activities, with the primary IR coordinator managing technical work and aligning it with service priorities.

  I'm not a technical [staff person], so I'm not a programmer, but I have a pretty good understanding of the technical issues ... I work a lot with programmers, so I spend a lot of time communicating user needs. I've done a lot of work communicating user needs to programmers, sort of being that in-between person on the technical side. (Developer 02, April 5)

- Digital preservation and metadata expertise were required in early planning phases, as well as throughout development.

- Professional experience in systems development, project management, and computer networking provided important grounding.

- Library education had provided limited formal preparation for the technical challenges associated with IR responsibilities. Technical competencies had generally been acquired on the job; some respondents worked in IT specialist positions in the library before becoming involved in repository building.

  > I'm working on redesigning the repository … that's CSS, HTML, and XSLT. All of that I learned on my own, and not in library school. (Developer 36, October 16)

  > I feel like the traditional things that they teach you in library school really doesn't cover this. … [W]e weren't talking about these kinds of things. (Liaison 30, June 8)

- Technological challenges were seen as an opportunity for professional growth.

  > I tend to be a little bit more of the traditional librarian, because I don't know TEI, and I don't know SHTML. I don't know XML. But, it's pushed me to try to understand that a little bit better. … But what I see happening is ... and actually over at the library itself, is this beautiful combination of understanding the structure of information, and understanding the code that goes behind it, and how to make it usable to the people who want to access it. I think that we used to talk about blended, or the hybrid librarian — now that's the librarian. Usually the librarian can't be disassociated from technology because we realize more and more how important that is to us, to get our message out, to get the information out there to the people who use it. (Liaison 15, April 12)

Intermediary expertise

As we have already seen, liaisons were positioned to serve as intermediaries between faculty and library services. Their traditional roles in reference, collection development, and information systems provision were extended in IR development to include mediating "between the needs and wants of the people who are depositing and the possibilities of what the software and what the technical support can do behind the scenes" (Liaison 07, March 30). Additionally, IR librarians were increasingly serving as collaborators and interpreters to help further IR awareness and to harness the extensive faculty networks that liaisons rely on to monitor faculty needs and develop collections and services of value.

- Liaisons traditionally worked to interpret faculty needs and direct them to appropriate library services and resources. This skill was particularly useful for IR development efforts and was essential for setting priorities for developing IR services and communicating their value to faculty.

- Developers who had been embedded in the research culture were more effective interpreters.

  > I have spent half my life as a patron and half my life as a librarian, so I always come at everything from two directions—from the users' standpoint and from the

librarian's standpoint. And I find that you sometimes have to be an interpreter for both groups. (Liaison 14, April 5)

- In cases where librarians were collaborating on research projects with faculty, they could directly demonstrate the value of repository functions at different stages of the research process, while also providing more direct support for workflow issues involved in the deposit of data or documents.

  At Institution A, there are "unprecedented numbers of librarians as co-PIs on research proposals, where scientists recognize the value of these skills of classification, description, preservation, access, and use of the research outputs and the support of the research process" (Developer 05, March 12).

Faculty Perspectives

The small pool of faculty respondents allows for only preliminary impressions of the characteristics of depositors in relation to factors such as faculty status or discipline. A few observations are worthy of note, however. The more senior faculty members were inclined to discuss the value of IRs and their deposit practices in relation to open access principles, while mid-career faculty were interested in specific features, such as content management and accessibility of the collections. Science faculty have generally made use of their IRs for depositing research papers, but scholars in the social sciences and humanities are submitting a more diverse range of materials. Where developers have been successful in recruiting departmental grey literature, it has come primarily from social science departments.

In this section, we focus on specific faculty motivations for IR participation, their perceptions of barriers in advancing use of IRs, and how academic units are encouraging participation. These views were conveyed directly through interviews with scientists and scholars but also from the interviews with librarians who offered faculty views by proxy. It is important to note that while there are some institutions that are moving toward deposit requirements for their faculty, this was not the case at the sites involved in this study. These cases provided data on how faculty voluntarily became interested in depositing their scholarship, the aspects of service that they valued, and their views on barriers and complications in expanding IR use.

Contributing content

Researchers deposit content in IRs for a variety of reasons. Among faculty respondents, there was a general sense of trust in the library and university commitment to collecting and providing access to scholarship. Nonetheless, acquisition continues to be slow and uneven, and faculty recruits were still needed to keep content levels increasing. Some faculty were involved as open access advocates who believed in the importance of freely accessible scholarship for their research community or their university. Perhaps most important to the viability of IRs, however, were those who found that the IR solved a particular information problem they faced in the everyday practice of scholarship.

<u>Recruits</u>

- Developers identified and worked with particular campus units, departments, or individual scholars to acquire their scholarship for the IR. In some cases, coordinators were invited to make presentations to departments to encourage faculty to use the IR.

  At Institution A, IR developers worked closely with the campus research park to host research materials, including data sets, generated by their projects, which are outside the usual academic research operations.

- Curricula vitæ were solicited from faculty to review them for eligible content for deposit, which often facilitated interest and voluntary deposit by faculty.

- Targeting of specific departments for recruitment of unique or high profile content was productive, but labor intensive.

  One humanities liaison initiated interactions with a history scholar to obtain an important collection of interview recordings with Holocaust survivors.

- Digitization was seen as a productive correlate service.

  A science liaison planned to work with an esteemed faculty member in microbiology to digitize material and make them ready for IR deposit and access.

<u>Open Access Advocates</u>

- Some faculty held a fundamental belief in the concept of open access.

  [I]t's an academic aspiration that knowledge be as freely available as possible. And so, [depositing] fulfills that. (Plant Biology Faculty 01, April 4)

- Respondents from other countries were particularly cognizant of the value of open access materials for academic institutions with fewer resources for library materials, such as those in developing countries.

- In some fields, it was common practice for junior faculty to post their papers electronically—regardless of whether or not it was considered "legal"—to increase their visibility leading up to and during the tenure process. Using the repository was one way of making those papers accessible (Mechanical Engineering Faculty 39, October 25).

🚫 One open access advocate pointed out that it was redundant to deposit materials into an IR if they already published in open access journals. Still other authors questioned the value of enhanced access to IR materials, when "journal publications are so easy for [them] to get directly" from the library's online journal subscriptions (Natural Resources and the Environment Faculty 31, June 11). Depositors and liaisons alike commented on how many

faculty members could not differentiate between open access scholarship and scholarship that was available through the library.

Information problems

- Faculty recognized the value of depositing non-standard scholarly products, such as measures and protocols, data sets, technical reports, as well as components of publications.

  > I do interaction analysis and I develop coding systems. And people want those coding systems, and so rather than sending them a paper copy or a file, I thought I'd put them in the repository, give them the address, and they can get it loaded. (Communication Faculty 25, June 12)

  > The IR has been useful as a place to access material that was cut out of a journal article during the editorial process (Social Work Faculty 40, October 26; Communication Faculty 25, June 12), and to make a heavily illustrated non-formal report widely available to a research community. (Natural Resources and the Environment Faculty 31, June 11)

- In fields where e-journals were not pervasive, the IR was an important alternative.

  > That's been frustrating for people who want copies. Especially overseas, I find there's quite a few scholars who haven't had access to the journal. And so they'll e-mail me and then I usually will send off a hard copy because, until recently, I didn't even scan in a copy. So it meant mailing hard copies of these articles to people around the world. (Social Work Faculty 32, June 11)

- The IR was recognized as a better option for materials that would otherwise be posted on faculty Web sites, because of the permanence, accessibility, and the technical infrastructure offered by the library.

- There was a clear need for easy access to materials while traveling, especially slides for conference presentations or materials for working with collaborators, but the IR as a tool for this purpose was not yet widely understood by faculty.

- Faculty were making important recommendations for services that needed to be considered for development:

  > Two faculty members from different universities expressed interest in a kind of alerting service that would identify researchers depositing on particular topics of interest (Mechanical Engineering Faculty 39, October 25; Communication Faculty 25, June 12). At this point in time, neither repository has sufficient deposits or rich enough metadata to offer such a service.

Another faculty member suggested harnessing IR functionality for the annual review process (Epidemiology Faculty 34, June 28).

Challenges to progress

Faculty freely discussed barriers in scholarly communication related to IRs, stressing <u>copyright complications</u> and voicing <u>open access concerns</u>.

<u>Copyright complications</u>

- The time and effort involved in determining or securing copyright often outweighed IR benefits.

    Copyright just affects every single thing. It has affected every job I've been on, and it has not been getting simpler or easier or cheaper. (Developer 06, March 12)

- Many scholars did not pay attention to copyright agreement stipulations or retain their transmittal forms. For some scholars, the utility of access overrode copyright restrictions.

    If I break a law just posting a paper that I wrote … I don't feel I am doing anything wrong, so I feel very comfortable with that. (Social Work Faculty 40, October 26)

    Who is going to come after individual researchers? (Epidemiology Faculty 34, June 28)

- Faculty members with strong publishing records and editorial experience tended to be better informed on intellectually property issues, but this knowledge did not appear to increase their deposit activity or belief in the value of open access.

<u>Open access concerns</u>

- The optimal timing of making something openly accessible was dependent on a number of variables, including the need to maintain a competitive edge or local control.

    I'm more careful now because I've had ideas … I've had stuff taken. (English Faculty 35, September 18)

    I want to make sure that our research team is able to use the material first; you know, use the data and publish what we want. (Social Work Faculty 32, June 11)

- Questions about the authoritativeness of repository materials were not isolated.

    I kind of had the wind taken out of my sails a little bit when I was talking to one of our most distinguished biology professors and was trying to encourage him, actually, to put things in [the repository] and basically what he said was, "Why put

things there? They're not the version of record?" … And to me that almost tolled the death knell for it. (Liaison 23, May 29)

[S]ome of the most ardent, active digital library scholars we have have said to me, "I would never, ever advise a student in my discipline to put their dissertation in an open access repository. It would kill their career." And so, you know, that's an informed response—a very informed response about both the service and the scholarly communication environment in that discipline. (Developer 00, March 01)

The only thing I would worry about is getting unpublished reports up there that haven't been peer reviewed. And we'll get the same problem we have now with people publishing on the Web anything that they feel like publishing. (Social Work Faculty 32, June 11)

So you can write a completely valueless article in a high-end journal, and it counts more than if you wrote something meaningful and put it in open access. In fact, open access would not count at all. It would be like doing volunteer work. … I do enough that doesn't count [toward tenure]. I can't afford to do much more. (English Faculty 35, September 18).

Impact of Academic Units

Some academic units were becoming active in IR promotion and are having an impact on faculty views and practices. Factors that appear to be increasing faculty awareness and participation in the cases examined in this study included influential administrators and scholars in a field. There seemed to be little outright rejection of mandates, with a patchwork of quasi-mandates slowly emerging. In general, faculty have very mixed views on mandates for IR deposit. Here we use specific comments but also examples of activities to illustrate the dynamics around these issues.

Influential administrators and scholars

- At Institution B, the director of a new school wanted to use the IR to consolidate the research output of the merged departments to strengthen the school's identity and visibility. Initial conversations between the director, liaisons, and the IR coordinator had begun to explore this opportunity.

- A dean of an academic unit at Institution B assigned a staff member in the internal publications unit to coordinate a department-wide effort to submit faculty materials and contributed decades of papers published in a well-known journal produced by the department.

- The provost at Institution C encouraged faculty to send their curricula vitæ to repository staff for assessment of eligible content. The method proved to be unsustainable for populating the IR, but it helped to raise the repository's profile on campus.

- As partnerships with administrators succeeded, developers strove to maintain their prominence as service innovators and providers.

  I have to work with some kind of decision maker … so I don't think I can just [recruit faculty] alone, but I don't want to leave everything to [the administrator] because that pretty much gives the impression that the library has nothing to do with it. (Liaison 26, June 13)

- Librarians also leveraged the support of credible, working scholars.

  Librarians talking [about open access] doesn't cut it; it's other faculty that have to. So we need to get some folks who are really excited about this … because I really can't imagine that there would have been that many in the audience if it had been a librarian talking. (Liaison 23, May 29)

  At Institution B, the entomology department sponsored a talk by an eminent scholar in the field, focusing on open access issues and the newly created open access journal he started. This was a prime opportunity for the IR coordinator and the department liaison to make contact with interested scholars and resulted in new content being contributed to the IR.

Mixed views on mandates

- IR coordinators were concerned that imposing campus-wide mandates could cause faculty backlash.

  We are trying to make some connections outside of just the deposit of faculty publications; so it's a larger set of services. And I think that's going to be key, because I think that the mandate piece—unless faculty really see the value of that and want to do that—it's not going to make the IR popular. (Developer 02, April 5)

- A "patchwork" mandate (Sale, 2007), where departments or units individually require various forms of IR deposit, appeared to be emerging.

  I think my relationship with [the dean] is very important because he will actually mandate that to faculty members and faculty members will have to do it, and then when they see the rankings of papers being downloaded, then they will see the value … he wants to make the program here stronger. So this is kind of becoming a kind of showcase of what the department does. (Liaison 26, June 13)

  The fine arts department at Institution C requires students to deposit masters and honors projects into the IR, as arranged by the department liaison and the graduate college.

- Faculty had varying and nuanced views of the value of mandates.

  I don't think there'd be a great resistance. (Social Work Faculty 32, June 11)

  If they make it mandatory, then I guess I will have to do it. It's one of those things that's an extra piece of effort, and if you are not required to do it, then typically you are not going to do it. (Entomology Faculty 24, May 22)

  It could be mandated and it wouldn't happen. There are lots of things that are mandated and don't happen on campus. If the only way in which a publication would be counted for promotion and tenure were publications that were deposited in [the repository], then yes, that would work, and they would get deposited. But the only way that I would support that is if there are coherent, demonstrable reasons that it adds value to the publications by putting them in there. (Plant Biology Faculty 01, April 4)

  My own opinion is the surest way to kill these repositories is the mandate. (Communication Faculty 25, June 12)

Conclusions and Future Research

The objective of this study was to identify strategies and conditions influencing the advancement of IRs. At the three sites studied, programs of development differed in emphasis, due largely to varying institutional strengths and organizational structures, but three prominent strategic approaches were applied across IR initiatives. These approaches were productive in each case and demonstrated a common resolve to extend the traditional position of the library as the focal point for scholarly collections and related services in the university. IR activities have pushed the range of activities conducted within the libraries with notable outcomes—information problems are being solved for faculty, collaborative technical solutions are being developed that can be shared with the broader IR community, and scholarly communication and IP expertise is becoming professionalized. These kinds of advances will continue to be critical for stabilizing IRs resources and assuring that they function as more than basic storage bins for ad hoc digital materials.

In expanding the purview of both collection and service activities, IRs are intensifying the long-standing tension inherent in balancing these two necessary library operations in an institutional environment where resources are already overextended and funds for new programs tend to be minimal and temporary. Still, across the cases, IR initiatives were ambitiously striving to make advancements in both areas, by offering alternatives to publisher-controlled access to scholarship, enhancing dissemination of grey literature and management of data sets, and building tools and services to promote growth and exploitation of content. At the time of this study, each site had a distinct orientation to content and service development activities, with one initiative strongly focused on information service initiatives, one with particularly strong content acquisition efforts, and the third with more uniform investment in both. Had the study been extended over a longer period of time, however, it is likely that cycles of content and service

emphasis would have been observed in each IR program over the long term. IRs will need to be strong in both areas to succeed, and there is much to learn about how to optimally prioritize, sequence, and coordinate development across the areas.

Within the cases, there were strong indications that IRs can make important contributions to scholarship, particularly in solving specific information visibility, management, or access problems experienced by faculty. At the same time, some of the assumed benefits of IRs are perceived as redundant by scholars who practice other forms of open access dissemination, or are considered risky by the standards of some disciplinary cultures. The basic aims of universities in investing in IRs—to collect, preserve, and provide access to their research output—seem misleadingly simplistic compared to what IRs are actually attempting to accomplish. As a group, the initiatives studied are recognizing the need for IRs to serve many more specific functions that are aligned with the nuances of varying disciplinary practices. In light of this, IR developers need to begin to move their focus beyond their own institutional priorities to better anticipate and coordinate with existing and emerging disciplinary repositories, while identifying and expanding their support for the humanities, and more generally for fields not well served by existing or emerging disciplinary efforts.

At one institution, IR developers made impressive advances in acquisition of high-value scholarly publications by negotiating directly with publishers, a particularly important accomplishment on a seemingly intractable problem facing all universities. However, success with publisher agreements has been isolated and such negotiations are not proving to be a viable model for the IR community at large, at this point in time. The approach is representative, however, of the non-standard collection development practices that are being applied more generally in the IR initiatives. Policy and criteria-based selection and evaluation are not typical. Instead, developers have been quick to capture collections not encumbered by copyright constraints, offering access to a growing base of local technical reports, grey literature, and theses and dissertations. The ingest of these informally published materials produced by departments and other research units are stimulating innovation in service models and technical development, especially for preservation and management of data sets and other raw products generated during the course of research. Moreover, the strong social networks among liaisons and academic departments are being exploited for promotion and recruitment of content. As of yet, librarians' professional expertise in principled appraisal and selection of materials for research communities is not being widely applied in the development of collections. Cooperative collection development approaches, which are a proven strategy for confronting scholarly collecting challenges, are surprisingly receiving little attention.

The cases are highly illustrative of the kinds of progress, but also the tradeoffs, involved in active development before realistic, long-term targets and goals can be identified, both locally and more widely within the profession. The many achievements and ongoing activities documented here can serve as proven approaches for making strong inroads for long-term IR programs. In addition, systematic research on several fronts could provide stronger footing for planning and coordination of IR efforts. Of the many possible research questions raised by this pilot study, several seem particularly important for rationalizing how development options are coordinated and prioritized:

- What specific problems can IRs solve for faculty? How do these align or compete with the basic needs of the university to preserve and promote their scholarly assets? In particular, what functions can benefit disciplines that have been traditionally dependent on the library for research materials, or those not well-served by disciplinary repository efforts?

- Which IR aims should be addressed locally, and which are better organized cooperatively with other university-based IRs? How can these efforts best intersect with and leverage current library operations and consortial efforts? How can established best practices in collection development and liaison-based public services be better exploited?

- How can IRs interface with disciplinary and cross-disciplinary literature and data repositories and become an integral part of the growing network of digital repositories?

Answers to these questions could greatly improve the value of IRs to their local constituencies and the integration of IRs into the evolving scholarly communication landscape.

Appendix A— Repository Profiles

The brief profiles provided here have been excerpted from the authors' article: Palmer, C. L.; Teffeau, L. C.; & Newton, M. P. (in press). Strategies for Institutional Repository Development: A Case Study of Three Evolving Initiatives. *Library Trends, 57* (2).

Abstract provided in Appendix G.

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Aligned with the comparative case study method used, the profiles presented here emphasize distinct aspects of IR development at each institution. Each profile represents a composite view drawn from the full set of data for the given case. The table below introduces basic descriptive characteristics of each IR, followed by a fuller narrative that distinguishes key development strategies. As indicated in the methods section, the aim throughout is not to elaborate on specific institutional factors but to present accounts of IR development from the perspectives of IR developers, while providing context for interpretation and understanding of the rationales for given priorities and choices. Our intent is not to provide full case studies laden with local history and nuance but to document a range of development options that can be weighed by readers for applicability to other situations.

Basic Repository Characteristics

	Institution A	Institution B	Institution C
Primary goal	build collaborative relationships between librarians and researchers	provide persistent access to digital scholarship and develop related services	provide access to the university's research output
Repository software type	commercial	open source	open source
Length of pilot development phase	none	15 months	18 months
Funding sources	library / grants	library / provost / campus IT /	library / provost
Current number of repository documents*	7,847	3,207	41,897
Primary personnel	document repository coordinator; data research librarians	primary developer; research programmer	primary developer; research programmer
Auxiliary personnel	faculty liaisons	a faculty liaison	intellectual property specialists
Initial content scope	data & information related to faculty and research center projects	research output from selected early adopter departments	peer-reviewed literature from all university units
Initial service activities	collaborations with faculty to solve information management problems	open source software development and value added applications	enhanced intellectual property support

*As of February 22, 2008, from the Registry of Open Access Repositories

Institution A

Guided by a strong service orientation, the repository activities at Institution A are part of a larger, recent campaign to involve librarians in faculty research projects and increase the profile of library services on campus. To this end, research librarians interact directly with departments and faculty, offering skills, resources, and repository services to assist in solving researchers' information management and data curation problems. The developers' approach acknowledges the heterogeneous and distributed nature of contemporary research and aims to respond to researchers' needs with innovative collaborations and customized solutions. One developer summed up their perspective as such: "Let's talk with people to find out how this will help them solve problems.' … [R]ather than taking what probably would have been more of a top-down approach, we're sort of bottom-up" (Developer 05, March 12). Another explained:

> I think right now we're slowly building off of smaller projects that are getting us in that direction, as opposed to being able to pinpoint and say: "There it is. There's that spot. Here's how we're moving towards it. I think it's starting to, through this formative process, show itself." … It's because we've never really worked with the researchers on campus other than in that more service-oriented way. (Developer 04, November 7)

With service provision as a priority, formal policy has assumed secondary importance after user needs: "I guess one of the artifacts of this kind of development-in-production is that we're kind of backtracking now to formalize processes and policies" (Developer 05, March 12). Content acquisition has been uneven but diverse in material types, which include data sets, grey literature, and archival collections, which is managed in a "distributed" repository structure with separate software packages (and access points) for digital data, literature, and special collections. The retroactive approach to policymaking also resulted, in part, from a push to launch the repository quickly once an early technical advisory group identified suitable software. Following implementation, technical queries have been directed to the library's in-house applications administrator and the software vendor, allowing the technology lead to redirect attention to specific data-related repository projects.

In working on data activities, the IR developers have been involved with information further "upstream" in the real-time research process and therefore have been less burdened by the IP constraints associated with scholarly papers. With their research initiatives and collaborations falling into place, developers have turned attention to bolstering the document repository in response to a growing service need in that area. Responsibility for document acquisition now rests with a faculty librarian under a newly appointed associate dean in an effort to streamline repository workflow and keep research librarians focused on data curation activities.

To encourage broader support and generate awareness both inside and outside of the library, the repository was uniquely branded and then promoted internally and externally. Repository developers held meetings within the library and alerted the campus through press releases. Library administrators performed further outreach through presentations to department heads, while developers entered into extensive discussions with multidisciplinary research centers to investigate how to use the repository to solve information problems encountered in those units. More broadly on campus, developers have functioned as "embedded librarians" to identify how campus researchers can benefit from the library's initiatives.

> This is like going to call outs and seminars [to] really find out what the research thing is and listening with your ear for things that relate to data problems, curation problems, archiving problems, and then seeing if there are ways to follow up. (Developer 04, November 7)

Anticipating a broader rollout of repository services across campus, developers are installing tools to support use of the document repository. A Search/Retrieval via URL (SRU)[1] interface, which uses custom hyperlinks to query the repository, has been implemented to facilitate transparent limited searches of repository content. For example, some faculty can use the repository to add a link to their departmental Web page that returns a list of accessible "dissertations advised." Still, not all people and departments that have expressed interest in repository services are convinced of its value. Therefore, developers continue to focus on the "fruits of consultation" that result from their collaborative approach.

Institution B

IR Development at Institution B has been aimed at achieving near-term goals for building content and services in close consultation with academic departments and faculty. Developers, in collaboration with a small set of liaison librarians, interact with department administrators and individual faculty on a case-by-case basis to assess needs and recruit content. The organization of the university library is complex, with strong departmental branches that do not lend themselves to uniform library operations. These conditions have contributed to steady and methodical IR development informed by best practices in the repository community and at peer institutions. To enable technical flexibility, the development team includes a full-time repository software specialist who leads repository design customizations and functionality enhancements that complement the team's work monitoring the needs and interests of faculty.

Advisory groups, composed of members from the library, university administration, and the campus IT unit, have played an important role in the development goals and priorities, and policy refinement is ongoing. Based on several years of coordination work, policies in the areas of content acquisition and retention, preservation, and access have been developed, and the criteria and parameters for inclusion of content have been specified and made available to the public. The development team has taken steps to acquire the various kinds of content supported by policy guidelines and infrastructure.

> We've put a lot of effort into scrambling to get back files. We're analyzing people's CVs and trying to contact them…. And one of the things that we've also tried to do is to focus on the grey literature that's being published by departments: … occasional papers, technical reports, and working papers, and other sorts of reports. (Developer 02, April 5)

Commitment to the preservation role of IRs is represented in part by ongoing work on trustworthy repository audit certification (TRAC[2]), which demands considerable time and expertise to assure adherence to adequate technical architecture, processes, and capabilities, and takes account of an extensive list of necessary organizational factors. Once conferred, however, TRAC asserts the IR has the protections and procedures in place to preserve digital content and adhere to acceptable standards and best practices in the field.

Many of the librarians in departmental liaison roles have been informed about the IR activities, and the development team, in collaboration with other library units, is planning to broaden internal library communication about repository and scholarly communication issues. External promotion of the repository has been limited to small-scale announcements on librarian and faculty e-mail lists and more direct contact with departments and individuals identified by liaisons as potential early depositors. Developers have worked closely with these selected groups, nurturing new collections in preparation for an impending general marketing campaign. Further promotion hinges on forthcoming IR software upgrades that will include cosmetic changes to the interface. In the meantime, the developers continue to foster their relationships with liaison librarians and advance value-added development activities.

To encourage contribution of content by faculty, developers have concentrated on removing obstacles to deposit and adding value for users. For example, based on usability testing of the repository's Web interface, software modifications were implemented to move the copyright clearance stage from the end of the submission process to the beginning. Moreover, developers have observed that in some cases "the open access piece doesn't fly with faculty" (Developer 02, April 5). More proactive, value-added measures are needed to encourage them to deposit. One effort of note is a collaborative arrangement with an IR at another university to build a citation analysis tool that uses the SHERPA/RoMEO copyright clearinghouse[3] to streamline identification of eligible content and rights clearance. The intent is to eventually support publication analysis, visualization tools, and social networking, with the tool potentially serving as a high-functioning "front end" in the future.

Institution C

IR development at Institution C evolved within an academic library with a history of involvement in innovative digital publishing and scholarly communication projects. Following this line of activity, IR development has focused largely on content recruitment, with an emphasis on managing IP issues and interactions with publishers. Branding of the repository and furthering awareness of the IR across campus have also been priorities. Strong campus level commitment to the IR initiative resulted in funding for IP specialist positions designed to manage copyright problems and encourage deposit through outreach to faculty. The IP specialists, one with a law degree and IP interests, help field many of the copyright inquiries previously routed through the university general counsel office.

Content acquisition was a primary aim of the pilot development phase. The university brokered arrangements directly with publishers to acquire copyrighted, peer-reviewed journal papers written by their faculty. A flexible collection policy and interactions with individual faculty members and campus units afforded opportunities to collect a range of other materials, including preprints, postprints, grey literature, and non-textual materials. When possible, developers have coordinated with departments for bulk ingests. Additionally, the provost actively encouraged faculty to send their curricula vitæ to IR developers for them to determine which materials were eligible for deposit. This experimental strategy proved unsustainable, as one developer clearly stated: "Doing it person by person is just not cost effective. It's just hopeless" (Developer 09, March 19). But, the experience was informative and spurred plans to negotiate further with

publishers for agreements to allow authors to deposit their work freely into the repository, superseding copyright transfer agreements signed by authors. To assist publishers in assessing the potential impact of IR access on the use of their formally published products, repository usage statistics have been shared with some publishers for the IR content they provided. The next stage may be to take up negotiation of authors' deposit rights when renewing serial subscription packages, with the university acting as an agent on behalf of its authors' IP rights.

Developers also conducted focus groups with both faculty and doctoral students to examine awareness of copyright and IP issues on campus. The results prompted the IP specialists to conduct campus seminars and to create a Web site for copyright resources. It has become routine for the repository developer to speak on request to campus units about the IR initiative, and a major promotional campaign featuring brochures and postcards also helped build awareness among campus faculty. The postcard mailing introduced a distinct logo and repository brand name and advertised the copyright resources made available by the IP specialists. Multiple waves of promotion were successful in reaching faculty and staff beyond the direct contacts made by liaison outreach and other awareness efforts.

Recognizing the important role of subject librarians, developers conducted interviews with approximately 90 library liaisons, prior to developing the initial repository prototype, to identify possible repository content, the range of formats needing support, and preservation requirements. This process captured librarian interest early on and fostered crucial relationships between the development team and liaisons. Since then, liaisons have served on taskforces, helped with policy development, and have become especially influential in identifying potential early depositors among the faculty across the local and branch campuses.

Notes

[1] http://www.loc.gov/standards/sru/simple.html
[2] http://www.crl.edu/content.asp?l1=13&l2=58&l3=162&l4=91
[3] http://www.sherpa.ac.uk/romeo.php

Appendix B—IRB Approval Letter

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Office of the Vice Chancellor for Research

Institutional Review Board
528 East Green Street
Suite 203
Champaign, IL 61820

February 26, 2007

Carole Palmer
Department of Library Research Center
219 LIS
MC-493

RE: *Intermediary Models for Institutional Repository Development (IMIRD)*
         IRB Protocol Number: 07463

Dear Carole:

Thank you for submitting the completed IRB-1 form for your project entitled *Intermediary Models for Institutional Repository Development (IMIRD)*. Your project was assigned Institutional Review Board (IRB) Protocol Number 07463 and reviewed. The research activities involving human subjects are exempt from Title 34 – Public Welfare, Part 46 – Protection of Human Subjects, Subpart A – Federal Policy for the Protection of Human Subjects per the following category:

45 CFR 46.101(b)(2): This exemption applies since this study involves participants engaging in interviews related to the development of institutional repository's on their respective campuses. There is a data key that connects responses to identities, but responses aren't connected to identities in dissemination efforts. In any event, disclosure of responses would not reasonably place participants at risk of criminal/civil liability or be damaging to their financial status, employability, or reputation, therefore the category 2 exemption applies.

This determination of exemption only applies to the research study as submitted. Please note that additional modifications to your project need to be submitted to the IRB for review and exemption determination or approval before the modifications are initiated. To submit modifications to your protocol, please complete the IRB Research Amendment Form (see http://www.irb.uiuc.edu/forms/amendment.asp). Unless modifications are made to this project, no further submittals are required to the IRB.

We appreciate your conscientious adherence to the requirements of human subject research. If you have any questions about the IRB process, or if you need assistance at any time, please feel free to contact me or the IRB Office.

Sincerely,

Sue Keehn, Director, Institutional Review Board

telephone 217-333-2670 • *fax* 217-333-0405 • *email* IRB@uiuc.edu

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Appendix C—Protocols for Round 1 Interviews

IR Developers Protocol

What is your professional background? (library and information science, computer science, upper management, subject-specialist librarian?)

How did you get involved with your campus' IR? Current IR responsibilities?

(If non-librarian) How have the librarians on the IR development team contributed to the project? OR (if librarian) How do you think your LIS skills have contributed to your campus' IR development?

What have been some of the successes and difficulties you and your team have encountered over the course of this project?

What are the short-term objectives for this project? (Ask for specifics.) How will you determine when these objectives have been met? (Probe: number of deposits, number of disciplines represented in the repository, other goals?)

How have you decided to make faculty and administration aware of the repository? (Probe: How have you requested submissions? How have you advertised the utility of the repository?)

How has the campus responded to the IR? Administration, Faculty, Student reactions?

(If non-librarian) Have you noticed a difference in the ways in which librarians support the IR over the course of its development? OR (if librarian) How has your role as a librarian changed with regards to your campus's IR? (Probe: librarian as faculty intermediary, librarian as marketer, more metadata/service orientation?)

Is there anything else you can tell me about librarians' involvement in the IR?

Faculty Protocol

<u>Early Adopter</u>:

Demographic info: Discipline/research areas, time in academia, use of OA materials

What prompted your use of your campus' IR? How often do you use it?

What do you see as some of the advantages and disadvantages towards using IRs to self-archive your research output? How do you think this differs from your colleagues who do not self-archive?
What types of things do you deposit? What types of things are you uncomfortable depositing?

Do you self-archive in places besides your campus' IR? (subject/e-prints repository, personal/departmental Web site, etc.)

What do you think about the open access movement and how it pertains to your discipline?

How has copyright and intellectual property policies affected your decisions to self-archive? Has this influenced the types of journals you submit work to?

Have you attended any of the IR programming and training opportunities at your campus?

What have been some of the factors that have made depositing your work in the IR easier?

What is your perception of the IR librarians? How have they affected your usage of the IR?

Based on your experiences with your campus' IR, what are some things you would like to change or improve?

In terms of your experience with your campus' IR, what do you view as success factors for the IR?

Non-User:

Demographic info: Discipline/research areas, time in academia, use of OA materials

What do you think about the open access movement and how it pertains to your discipline?

How has copyright and intellectual property policies affected your decisions to self-archive? Has this influenced the types of journals you submit work to?

Why have you not deposited any of your work to your campus' IR?

What do you see as some of the advantages and disadvantages towards using IRs to self-archive your research output?

Do you self-archive in places besides your campus' IR? (subject/e-prints repository, personal/departmental Web site, etc.)

Have you attended any of the IR programming and training opportunities at your campus?

What is your perception of the IR librarians? Is there something more they could be doing to encourage your usage of the IR?

What would make you more willing to deposit your research output at your campus' IR?

Administrators Protocol

How and to what extent have you become acquainted with the goals of the IR at your institution?

What avenues of assistance have you pursued to encourage participation and deposit in your institution's IR?

As you see it, what are the major issues at play between your institution's IR and your faculty and student base's willingness to participate in its population? (Probe: Why do you believe this? What feedback have you received from the IR caretakers? From the faculty? From the students?

Please describe the significant successes and obstacles you've encountered in communicating the goals of the IR to the faculty and students at your institution?

What, if any, should be the role of librarians in encouraging and facilitating faculty deposit into your institution's IR? Into IRs in general?

Which other university staff may well assist in faculty encouragement to participate?

What methods do you intend to use to foster success of your institution's IR? (Probe: Ask about how this relates to openness and increased exposure of the items within the IR, and whether these facets are being used to encourage IR deposit.)

To your mind, what are the necessary factors for success of IR initiatives at your institution and throughout the CIC?

Appendix D—Selected Codes Applied in Preliminary Analysis

Administrative Views — The ways in which administration has influenced, encouraged, stifled, or otherwise engaged the other constituencies (e.g., faculty, developers, liaisons) in the repository development process.

Advocacy — Evidence of interest outside of the development group in expressing to others the benefits of repository development or contribution or of a concept fundamental to these, such as open access in scholarly communication.

Architecture, of repository — Expressions of administrative and developer views on the implementation decisions regarding the repository structure. Also included are instances of issues with repository design and usability on the Web as well as utility in interface or which content it supports, and so forth.

Authoritativeness of repository objects — Things like version of record, peer review process, legality of repository objects. Often evident in expressions of reluctance to deposit non-publisher provided document versions into repositories (i.e., preprints).

Automated population — The method of repository population whereby the scholars are either fully or partially obviated from the document submission process.

AV formats — Issues related to documents in audio, video, or other multimedia formats—including their appropriateness for or obstacles to inclusion in the repository.

Awareness of IR, creating — Descriptions of efforts made to make campus entities aware of the repositories on their campuses and to encourage their use.

Buy-in — Sentiments in the transcripts that address the case in which stakeholders believe the goals of the repository are beneficial, adopting that position as their own. This code is also used to identify discussions of the absence or lethargic emergence of this phenomenon. Initial analysis suggests this may be used in-vivo; that is, "buy-in" may be the common catchphrase used to signify this phenomenon.

Cataloging concerns — Used to identify expressions (primarily by librarians) of the ways in which repository development either impinges on or augments the traditional efforts of librarians in cataloging/metadata development.

Closed archives — Repositories that allow only limited access to their materials.

Collaboration through IR — Expectations of the ways the repository could function as a medium between researchers, facilitating collaboration.

Collaboration, institutional — Collaboration between institutions, both in and out of the CIC, on projects related to institutional repository development.

Collection development — Discussions of the role of collection development with respect to repository development. This includes discussions of the repository as an agent of collection development as well as the role of librarians in content acquisition.

Collection policy — Refers to discussion of administrative or development decisions to codify the types of items targeted for inclusion in the repository and of discussions related to the need for such codification.

Communication between parties — Used to cite discussions of general communication between the target populations in this study when more specific codes such as "duties, negotiations of" are inappropriate.

Conference and presentation materials — Discussions of the inclusion of conference and presentation materials in an IR.

Copyright and rights management — Instances and discussion of copyright issues, rights management, awareness, tools, and so forth.

Data sets — Discussions of data sets (as different repository objects than documents).

Deposit motivation — Discussion of the reasons and motivating factors for authors to submit their objects to the institutional repositories. This is more specific than buy-in, which does not necessarily imply IR usage, only agreement about IR value. This code should also be used to code barriers to deposit or factors that affect deposit motivation.

Deposit, difficulties during — Discussion of problems that arise when depositing materials in an institutional repository.

Development groups, relationships — Discussions between the primary stakeholders at the inception of the repositories and their relationships throughout the development process, detailing their interconnectedness and hierarchical relationship structures within the university.

Digital orientation — Discussion of digital orientation, either the preference of digital materials over print or the aptitude to manipulate digital materials as well as analog.

Discipline culture — Discipline-specific needs, which are disparate, among many of the target populations with whom repository developers work.

Duties, negotiation/description — Discussion of the repository development and population tasks explicitly or implicitly assigned among responsibly constituencies. This code includes reports of duty delegation and assumption.

Early adopters — Discussions of early adopters, the first individuals and departments that either use or deposit into their institutional repositories.

Embargo — The period of time before a publication may attain open access status. This may be facilitated by the repository software and mandated by the publisher.

Exemplars — Cases cited by interview subjects of departments, repositories, and institutions that have achieved success in some aspect of institutional repository development.

Expectations — Expectations refer to beliefs on the part of the subjects regarding future events concerning which the repository may be either the subject or object. For example, both "the repository will be online next year" and "the research centers may embrace the repository most quickly" are expectations according to this view.

Extension of library services — For discussions of the repository as tool with which librarians may extend the service mission of the library. This also refers to the extension of the service mission of the individual librarian with respect to the repository.

Extramural influence — The use of the repository to expand the reach of scholarship beyond local communities. In this view, the institution uses the repository to not only embrace open access and scholarly communication ideals, but to increase extramural relevancy and visibility as well.

Faculty opinions — Expressed faculty opinions regarding the benefit or lack thereof of institutional repositories. Faculty opinions reported by proxies are also captured by this code.

Faculty relationships — The ways in which the respondents typify their relationships (or those of others) with the faculty authors and depositors.

FRPAA — In specific, this refers to the Cornyn Lieberman bill that requests free public access to publicly funded research. References to NIH, NSF funding for open access research is evident here as well.

Funding — (1) Ways in which the IR becomes a means of driving funding, and (2) ways of funding the IR itself.

Google — (1) Assessments of the depth of object accessibility in Google. (2) Increase in research visibility through Google (Scholar) and other similar search engines as an incentive to attract early repository adopters.

Graduate student awareness, garnering — Targeting graduate students with outreach on issues regarding open access publishing, intellectual property, and institutional repositories.

Gray literature — Informally published materials under consideration for collection in an institutional repository that have not first been the objects of traditional or commercial publishing.

Ground-up development — The opposite of top-down development, ground-up development is the process of first identifying the repository objects that potential contributors are willing to

share and the needs that potential contributors would like the repository to solve and then building the repository to suit those objects and needs.

Integration — Integration of the repository with the university at-large or with other discrete units. For example, having the IR located with the library or partnered with tech services. Integration also occurs at the level of scholarship workflow and may refer to efforts to situate the repository deposit as an integral step in the production of scholarship.

Intellectual property — Discussion of intellectual property generally. More specific instances of copyright and rights management discussion should go under 'copyright and rights management.'

Interdisciplinary research — Discussion of research that ranges across traditional disciplines.

Librarian as collaborator — "Librarian as collaborator" looks at the process of IR development as opening opportunities for librarians to work with the faculty. This is an increased level of involvement than is provided through the intermediary role, but not as specific as the research partner role.

Librarian as intermediary — Evidence of the librarian both communicating the repository mission of the library to faculty in his or her department as well as representing the faculty interests to the repository development group within the library.

Librarian as interpreter — Examples where librarians demonstrate or describe themselves as repackaging librarian lingo and institutional repository concepts to better connect with faculty when promoting their institutional repository.

Librarian as liaisons — Librarians performing their traditional roles as liaisons: working closely with departmental faculty to ensure that library resources and services meet their research needs.

Librarian as research partner — Discussions of librarians as significant contributors to faculty research, such as being a co-PI on a research grant. This is a more specific case of 'librarian as collaborator.'

Librarian as salesperson/marketer — Discussions of librarians using their relationships with faculty and departments to advertise the new services of the library in ways that will appeal to individuals or niche groups. This can also be used to code instances of businesslike language in discussions of librarians and their duties.

Librarian development of IR — Instances where librarians in non-repository-specific roles either have or attempt to influence the development of the repository.

Limitations of repository — Things that cannot be done with the institutional repository—either because of technical limitations or self-imposed policy limitations on scope of material in the repository. In some cases, this code indicates a barrier to use instead of some fundamental IR feature that is a limitation.

LIS approaches — Responses of how librarians with professional training choose to apply the principles of their LIS education to the evolving profession, changes in technology, and prominence of scholarly communication issues, which includes institutional repository development.

Mandates — Scholarship deposit mandates, into any kind of repository, from any authority whatsoever.

Marketing, IR as a vehicle of — Considerations of the repository as a marketing tool on the part of the institution that hosts it, whether that be related in general terms of the assumed marketing benefits or expressed more specifically (e.g., using the repository to attract graduate students).

Measurements of success — The ways in which repository constituencies (developers, faculty, liaisons, and administrators) judge whether the repository has been successful.

Non-adopters — Scholars and academic departments that willfully refuse to use their institution's document repository and their reasons for doing so.

Open access — Open access publishing, as achieved through institutional repository deposit or in some other venue. This code is not limited to the open access principles that drive repository development. Rather the code is targeted toward opinions and anecdotal evidence of open access implementations that shape the interviewees perception of the issue.

Preprints/post prints — A version of a piece of scholarship that is not the publisher-provided PDF file yet may be eligible for deposit into an institutional repository. Typically the preprints or postprints are text files provided by the authors.

Preservation — Preservation of digital materials as part of the long-term commitment by the library and its institutional repository.

Print culture — Expressions of individual preference for print library materials over digital content.

Priorities — Expressions of development priorities from any of the constituencies consulted in the study. Examples of priorities include types of materials targeted for inclusion in the repository; services that may be extended through the repositories; departments and individuals that whose buy-in developers would like to acquire.

Publisher relations — Dealings with publishers on the part of interview subjects. This includes, but is not limited to, publisher relations in negotiating the utility of copyrighted materials in an institutional repository.

Rare literature — Discussions of the utility of an institutional repository to manage publications in niche venues or difficult to access locations.

Repositories, awareness of — Respondent's level of awareness of institutional repositories in the scholarly communication process or the survey subject's views on the need for increased awareness of institutional repositories.

Repositories, other — Repositories that aren't a part of the current study, whether their scope be institutionally defined or discipline specific.

Repositories, understanding and education — Evidence of the interview subject's understanding of the scope of institutional repository development as well as general concerns about the issues inherent to such development.

Repository, as home for homeless — Instance in which the repository functions as a Web presence for individual researchers, departments/centers, collaborative research groups, or other units that lack such representation elsewhere.

Repository, as publishing platform — Discussions of (in)appropriateness of an institutional repository as a publishing platform for new scholarly materials, such as a peer-reviewed open access journal.

Research, supporting with IR— Discussions of the ways in which researchers may use repository resources and services in their research activities.

Responsible for deposit — Evidence of the delegation of responsibility for deposit of repository content, whether this be to students, developers, librarians, administrative staff, or researchers. This is a specific instance of "duties, negotiation/description of."

Sciences, value of IR's to — Discussion of the value of institutional repositories to science scholars (as contrasted to the value extended by institutional repositories to other disciplines).

Student papers — Discussions of student work (e.g., dissertations, theses, etc.) that may be or has already been deposited into an institutional repository.

Target communities — The first specific campus communities (e.g., academic departments) that repository developers approach with the intention of acquiring scholarly materials for the repository.

Teaching materials — Discussions regarding the inclusion of classroom teaching materials into an institutional repository.

Technical expertise — Evidence that particular technical skill sets (e.g., computer programming, database maintenance) are explicitly or implicitly noted.

Technical support — Discussions of the need for technical support in the successful implementation of an institutional repository. This technical support may be provided through library staff; campus technology specialists; or repository software vendors among others.

Tenure — The ways in which the issues around institutional repository development (particularly in the area of open access publishing and copyright management) affect the promotion and tenure process among scholars. It also includes instances where a person's tenure status affects their publishing behavior or opinions about open access, scholarly communication, and IR issues.

Theoretical viewpoints from literature — Citations of authors or publications that have informed the opinions of the interviews subjects in the area of institutional repository development.

Top down — The institutional repository development model in which the repository and its governing policies are first prescribed and then potential depositors are invited to contribute their materials. (The opposite of bottom-up development.)

Training — Instances of the faculty or developers (or any two members of the repository development constituencies) entering into a training relationship with each other in which one explains and illustrates the proper use and mechanics of the institutional repository to the other.

Trustworthiness — Used to cite issues of the trustworthiness of the repositories themselves, particularly as embodied in discussion of the Trust for Digital Repositories and Checklist for Trustworthy Repositories initiatives.

Use statistics — Discussion of repository downloads and other related use statistics. Such evidence may be either concrete or anecdotal.

Value of IRs — General discussion of the value of institutional repositories to various constituencies. This value may be generated through access to specific scholarship afforded through the repository or through the layer of services built atop the repository stores.

Workflow — The ways in which the deposit of scholarly materials into the repository will enter the workflow. This happens at both the micro-level (as depositors follow a specific sequence of events to prepare each document to be ingested) and the macro (as the deposit of materials into the repository enters the workflow of academic production on university campuses).

Appendix E—Background

The following section has been excerpted from the authors' article that is currently in press. Please refer to Appendix G to view the article abstract.

Palmer, C. L.; Teffeau, L. C.; & Newton, M. P. (in press). Strategies for Institutional Repository Development: A Case Study of Three Evolving Initiatives. *Library Trends, 57* (2).

<p style="text-align:center">*　　*　　*</p>

The rising cost of serial subscriptions, rapid changes in technology and document delivery, and the open access movement have brought new challenges and opportunities to libraries as participants in the scholarly communication process.[1] One response has been to begin building IRs to collect and preserve digital scholarly output, help faculty reclaim their intellectual property (IP) rights long lost to publishers, and presumably curb collection development costs over time. In 2005, Lynch and Lippincott reported that 40% of doctoral institutions in the United States had an operational IR; and over 47% of respondents to a 2007 census of institutions at all levels reported either planning, piloting, or administering an active IR (Rieh, Markey, St. Jean, Yakel, & Kim, 2007). The emergence of repository management software, such as DSpace,[2] EPrints,[3] Digital Commons,[4] and Fedora[5] has facilitated the technical aspects of repository implementation, making it a reasonable prospect for many institutions.

According to a 2005 content analysis of the literature on institutional repositories, a third of the reviewed articles did not discuss libraries, leading the authors to conclude that "librarian involvement is not seen as a defining feature of IRs by everyone involved in the early stages of IR development" (Allard, Mack, & Feltner-Reichert, 2005, p. 332). At the same time, advocates have suggested that libraries are uniquely positioned to manage IR development and sustainability, because of their existing information infrastructure and professional expertise (Crow, 2002; Lynch, 2003; Chan, 2004; Gibbons, 2004; Walters, 2007).

> In the long-term, organizing and maintaining digital content—as well as supporting faculty as information contributors and end users—should remain the responsibility of the library. Libraries are best suited to provide much of the document preparation expertise … to help authors contribute their research to the institution's repository. Similarly, libraries can most effectively provide much of the expertise in terms of metadata tagging, authority controls, and the other content management requirements that increase access to, and the usability of, the data itself. (Crow, 2002, p. 20)

Academic librarians have always adapted to the evolving needs of faculty and students while navigating the changes in technology and the information landscape at large. This trend has continued as library professionals, who were originally "focused on reference services, liaison activities, and collection development," are taking on responsibilities for IR development (Phillips, Carr, & Teal, 2005, p. 308). They have become influential in software implementation, and their skills and knowledge are effective in IR project management and planning overall (Allard et al., 2005; Walters, 2007). Given their traditional competencies, librarians are particularly well positioned to direct collection development and preservation activities (Crow,

2002; Horwood, Sullivan, Young, & Garner, 2004; Allard et al., 2005; Bailey Jr., 2005; Jenkins, Breakstone, & Hixson, 2005; Phillips et al., 2005).

Advocacy and promotion are also essential IR development activities for librarians (Horwood et al., 2004; Bailey Jr., 2005; Bell, Foster, & Gibbons, 2005; Jenkins et al., 2005; Phillips et al., 2005). "It falls to librarians to develop IR collections, both by recruiting content and by making IRs as attractive as possible to faculty members" (Bell et al., 2005, p. 284). In the literature, librarians are portrayed as "change agents" (Bailey, Jr., 2005; Buehler & Boateng, 2005; Phillips et al., 2005), exploiting the preexisting relationships they have developed with faculty through their work as subject bibliographers, reference librarians, and "library liaisons" (Gibbons, 2004; Foster & Gibbons, 2005; Jenkins et al., 2005). In academic libraries, liaison librarians have traditionally served as intermediaries between faculty and the library, with responsibilities traditionally ranging across collection development, user instruction, reference, and current awareness (Reitz, 2007). Unfortunately, the base of literature is not yet "providing libraries with the resources to prepare to provide services that address the new dimension" of work with faculty and their intellectual property (Allard et al., 2005, pp. 332-333). As suggested by Gibbons (2004), more customized instruction and assistance for faculty on contributing to and using IRs may prove important for extending the legitimacy, credibility, and trust the library has traditionally enjoyed in their relationship with faculty.

While open access principles are frequently at the heart of the professional library discourse on IRs, faculty are not uniformly accepting of open access ideals (Park & Qin, 2007). They are also not always easily convinced of the personal benefits of contributing to an IR (Crow, 2002; Bell et al., 2005). To make progress on populating their repositories, some libraries have focused on cultivating library liaison programs with faculty (Bell et al., 2005; Jenkins et al., 2005; Phillips et al., 2005), while others have decided to take on the responsibility of submitting content on behalf of their faculty (Jenkins et al., 2005; Devakos, 2006). With limited incentives in place to encourage faculty to contribute their scholarly output, deposit mandates from funding agencies, universities, or departments are considered by some to be an attractive strategy for fostering growth of IRs (Harnad et al., 2004; Pinfield, 2004; Harnad, 2005; Sale, 2007). Given the recent faculty-approved deposit mandates at Harvard University, and the reaction among open access and IR advocates (Guterman, 2008), such requirements may be gaining some traction in the academy.

One recent report ties the success of repository building to meeting the needs of various stakeholder groups (Jones, 2007, pp. 13-23), which consist of the users, providers, and mediators of scholarly information. In the cases examined in this study, faculty stakeholders were the primary focus of attention for IR developers, but the interests of the university, academic publishers, and, of course, librarians were also influential in the overall process of IR development. The literature asserts that libraries are actively moving beyond a custodial role with scholarly publications to the management of various kinds of digital content and fuller participation in the evolution of the scholarly communication process (Horwood et al., 2004, p. 170). This is true of the libraries studied in this project, but there were important differences in how the three IRs were conceived and how they are making progress. All IRs host digital content and provide services that facilitate the deposit and use of that content, but a library's approach to goal-setting and policymaking impacts its perspective and potential (Lynch & Lippincott, 2005).

Although receiving little attention in the literature to date, this study clearly shows the inherent tension in fulfilling both content and service-oriented goals and how the identity and trajectory of an IR is intertwined with its investment in these two core library operations. The study also illustrates an interesting shift in the nature of librarian liaison roles. Librarians in these intermediary positions are accustomed to working to represent the interests of faculty and departments to inform library decisions about content and services. At this point in the evolution of IRs, however, they are also involved in communicating IR development interests to faculty to influence their scholarly communication practices.

Notes

[1] Refer to Correia & Teixeira (2005) for an overview of the recent issues in scholarly communication.

[2] http://www.dspace.org/

[3] http://www.eprints.org/

[4] http://www.bepress.com/ir/

[5] http://www.fedora-commons.org/

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Appendix G—Abstract for *Library Trends* Article

Strategies for Institutional Repository Development:
A Case Study of Three Evolving Initiatives
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Abstract
As an evolving part of the profession of librarianship, institutional repository development is still in the process of establishing guiding principles and best practices. There is no one path to follow and few established cases from which to learn about development options and risks. This case study presents a close examination of the approaches taken at three university libraries, comparing choices, strategies, and conditions driving development activities. The most pronounced differences stem from how the initiatives are balancing content acquisition and service provision. Across cases, intellectual property concerns are prevalent, and repository goals and policies are often implicit, with the value of the repository for faculty and the university emerging in multiple ways. The complex planning, management, and technical work of repository developers is increasingly dependent on coordination with liaison librarians and their existing relationships with faculty. The three cases suggest a range of productive responses to the many challenges facing institutional repositories, as they mature, expand, and integrate further with library operations, and continue their important contribution to the ever-changing enterprise of scholarly communication.