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Evolution of an Institutional Repository: A Case History from Nebraska

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Abstract

The 13-year history of the institutional repository (IR) at the University of Nebraska–Lincoln <<https://digitalcommons.unl.edu>> is recounted with emphasis on local conditions, administrative support, recruitment practices, and management philosophy. Practices included offering new services, hosting materials outside the conventional tenure stream, using student employees, and providing user analytics on global dissemination. Acquiring trust of faculty depositors enhanced recruitment and extra-library support. Evolution of policies on open access, copyright, metadata, and third-party vendors are discussed, with statistics illustrating the growth, contents, and outreach of the repository over time. A final section discusses future directions for scholarly communications and IRs in particular.

1. Current status

Every repository has a unique story; its environment—historical, technological, institutional, and even personal—is distinctive and cannot be reproduced. The repository described here was a relatively early implementation of the genre, and it has been successful, at least in the

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view of its managers and users, according to various criteria. This case history, therefore, is descriptive, not prescriptive; every installation must adapt to its own time and campus community. It may, however, be helpful to other programs to describe what seemed to work and what seemed unnecessary. At present (2018) the DigitalCommons of the University of Nebraska–Lincoln (UNL) is among the oldest, largest, and most heavily trafficked institutional repositories (IRs) in the United States, and on those grounds its history is worth reviewing.

When UNL’s DigitalCommons was established in 2005, there were fewer repositories (institutional or otherwise) than now and probably more fluidity in their definition and operation. As part of the first large wave of IRs, we were confronted with developing a new and relatively undefined program, but we were also at liberty to do whatever worked for us, without concern for precedents in an emergent environment. Subsequently, being an early practitioners put us in position to influence installations that came after, and we evolved from a client and user into an active proponent and proselytizer for IRs and for various methods of populating them with content.

The case history of the IR is further significant because it is one of the largest in the United States, with (currently) 99,500 items. Its number of contents trails only the IRs of Michigan and California and is roughly equivalent to those of Illinois and MIT. It is the largest repository on the DigitalCommons platform. Its annual usage of 6 to 7 million downloads, with more than 50 million to date, exceeds the published results from any other IR. More locally (and academic politics is all local), it is the most visited subdomain with a *unl.edu* address, accounting for around 15% of all university web traffic.¹ It was ranked last year by the Webometrics research group as number 3 among world university repositories.² What in its history has engendered these levels of content and distribution?

2. Challenges and opportunities

There were challenges to inaugurating an IR at this particular institution. The University of Nebraska–Lincoln is an R1 institution but not an especially large one (22,000 students at that time). It serves the thirty-seventh most populous state (1.8 million) in a “flyover” location

with an agricultural economy and a conservative culture. The state population is 89% white, 5% black, 2.5% Asian, and 1.5% Native American, with 10% identifying as Hispanic.³ In the 2016 presidential election, Donald Trump carried the state by 496,000 to 284,000 votes (59% to 34%).⁴ All five members of Congress and all major state officials are Republicans. Nebraska is not an environment where appeals to liberate scholarship from commercial interests finds much traction. The university itself has been and continues to be under financial constraints. The library operates with a limited and unexpanding budget and a primarily local focus; it is dedicated to serving campus and especially student needs.

On the other hand, the situation also presented some opportunities. This institution is the sole state-wide university; there is no “State” or “Tech” or “A&M” to compete for prestige or popular loyalty.⁶ UNL does not share its stage. It has close connections to the state’s population through its Extension, university press, athletics, and other programs. Game days find almost every farm machine shed, storage bin, front door, and flagpole within the state borders adorned with a big red N. This emotional valorization of the university usually outweighs the anti-intellectual sentiments sometimes directed against centers of learning; attacks on the university by right-wing legislators have come only recently and with limited but unfortunate effect. Significantly, the university conducts extensive USDA research that is directly related to the state’s economy *and* self-image. Cattle, corn, soybeans, irrigation, and farm equipment are matters of importance, and the university has been among the leaders in those research fields. There are also remnants of a populist agrarian collectivism, with agricultural cooperatives remaining important economic agents, and the university Extension providing educational and practical outreach to many small communities. Helping the state patriotism attach itself to the IR program has provided it with both traction and cover.

As a non-native Nebraskan, I have observed and experienced the state for more than thirty years, by marriage and by residence. There is a great deal of state pride and boosterism (“Nebraska ... the good life” signs adorn all highways into the state), but there is also an uneasiness about being outside the mainstream, a sensitivity to hints of condescension by flashier coastal cultures or “major” midwestern centers. When the Association of American Universities revoked UNL’s

membership several years ago, that further injured the institution's and the state's self-esteem.⁵ This leaves the communal psyche hungry for evidence of prestige, especially as expressed in rankings. The IR's first step toward wider local acceptance came when we discovered in the DOAR (Directory of Open Access Repositories) that ours was among the five largest—a much easier accomplishment in 2007 than now. Suddenly, by being ranked #5, we became more identifiable, respectable, and legitimate.

While the primary target of IR content recruitment has been the university faculty, many affiliates outside the tenure-track author pool have accumulated scholarly content appropriate for inclusion. Achieving the trust of all potential depositors is essential, and our institutional identity and standing have usually given us a good start. "I'm with the University, and we want to put your stuff on the Internet for free" has been my opening, which has been met with positive reception by most audiences on and off campus throughout the state.

3. History of the IR

3.1 Dean of Libraries' Support and IR Policy.

The UNL IR's history begins with its establishment in 2005, or rather, with the decision, vendor search, and licensing carried out the previous year. The repository owes its existence to the then Dean of Libraries, the late Joan Giesecke. Joan was an active Association of Research Libraries (ARL) and American Library Association (ALA) member and board member, and she was aware of the emerging opportunities for libraries to play a more instrumental role in scholarly communications and distribution. Motivated in part by the work of Clifford Lynch,⁷ Joan saw the local repository as part of a coordinated approach to providing publishing options and user access to the scholarly work of our faculty and students. Her overall library strategy was described as "digital everything."

In 2004 ProQuest had begun to distribute the DigitalCommons software package, developed by the Berkeley Electronic Press (now known as bepress), an online journals publisher founded by members of the Economics Department at the University of California,

Berkeley. A Nebraska faculty member, Dr. Azzaddine Azzam, of the Agricultural Economics Department, was then operating a journal (*JAFIO—Journal of Agricultural & Food Industrial Organization*) using the platform,⁸ and he endorsed the functionality and user experience of the package. ProQuest was a known and trusted vendor for the library, and the deal was made to (1) create a repository for the university library, and (2) to load it with historical dissertations digitized from microfilm held at ProQuest (the former UMI). The IR went live in April 2005 with more than nine thousand dissertations, which were free full-text access for campus and free preview with purchase option for outsiders.

The retirement of the long-serving Coordinator for Scholarly Communications, Agnes Adams, made possible the opening of a national search and the revision of the job description to include management and promotion of the IR. The redefined position was filled by the present author, a refugee from scholarly publishing without a library-specific background. Investing responsibility in a single person, rather than a committee, made it easier to adapt, innovate, make decisions, and respond to new conditions more quickly. Some IRs begin by writing policies concerning collections, eligibility, allowable items and participants, defining and anticipating a range of issues and situations—we did little of that. We adopted basic boilerplate language for permissions and policies and focused instead on recruiting as many depositors and as much content as possible.

That first summer of 2005 was spent learning the platform and surveying the university website. The author had been two and a half years at this institution (at the university press and in the English department), but the contours of the university's resources and its reach into the state became much clearer as program websites were crawled and materials inventoried that might benefit from exposure through the IR. Dean Giesecke's advice guided efforts to represent and enlist the most productive and influential members of the faculty. Her strategies directed limited resources toward the most effective ends. She introduced the project to key administration figures, smoothed its path, and guided the repository manager along the road to acceptance.⁹ Without her encouragement, support, and wisdom, there would be no history worth telling.

3.2 *Promoting the IR*

The first fall semester's results were revealing; visits and presentations to academic departments produced little self-archiving activity. Faculty members were busy and disinclined to invest time and effort in a program with no track record and nontrivial investment of labor. (To this day, self-deposits represent a tiny—and frequently problematic—fraction of the repository contents.) But the content that we ourselves had deposited for a handful of faculty authors and the original publication we had developed were being widely and frequently downloaded—which we could tell from the metrics included in the Digital-Commons package. So the critical problem was not distribution and was not technological; the key issue was recruitment, and that was a matter of personal contacts and relationships. These encounters did not need to be face to face, and many of our most active participants are just a name and a vita, though it is always a looked-for pleasure to meet them “in real life.”

Our first step was to improve the offer of service from “We’ll allocate you some space on the internet once you figure out what to do” to “Send us your publication list and let us do the rest.” This created new needs for services, new demands, and new expectations, but without the change, we would have been managing a much smaller assemblage. Waiting for author self-archiving might have been easier, but it did not exploit the opportunities we saw to promote the library and the university by expanding the distribution of faculty scholarship and research. So from our build-and-hope beginnings, we rapidly moved on to mediated deposit and beyond.¹⁰

3.3 *IR Services*

Cliff Lynch's early piece⁷ defined an IR as “a set of services that the university offers to the members of its community for the management and dissemination of digital materials.” Our set of services now includes permission and copyright clearance, hunting and gathering, scanning, typesetting, writing metadata, uploading, posting, usage reporting, promoting, and print-on-demand publishing. Some of these fall outside the traditional set of library services, but they establish the IR as an active player in the scholarly communication system. As

the future of traditional paper publishers grows cloudier, the IR provides a home on campus for publishing skills and services—not to replace the presses but to offer different means of dissemination powered by digital technologies.

In the spring of 2006 a meeting with several physics professors produced an unexpected flood of vitae, each with hundreds of articles, most of which were postable in their publishers' versions. With such a trove on hand, Dean Giesecke stepped up with money for student helpers, beginning a long tradition of applying student labor to the uploading and digitization of faculty materials. Student workers readily grasped the IR input procedures, and they made possible cost-effective applications of other existing technologies, such as scanners available in the media center and already-installed Adobe software for image and document manipulation. We found that students could produce good-quality OCR'ed pdf files from hard-copy originals for as little as two cents per page, and that those same files could be put online by students for considerably less than one dollar each, or less than twenty cents if the student was on work-study.¹¹

In 2008 IR staff was augmented by the addition of Sue Gardner, formerly a map and metadata librarian but also a keen editor and an avid recruiter with excellent contacts in the biological sciences. Sue became an invaluable asset and ally, especially in that she spoke “librarian,” a dialect to whose inflections, accents, and references the writer was frequently not attuned.¹²

3.4 Features of the DigitalCommons Platform

In the fall of 2007 ProQuest ceased distribution of DigitalCommons, and the IR began to work directly with bepress. This produced a much closer relationship, more support, and better service. The IR became more of a partner in the development of new features and upgrades, and it pushed the company for ways to make the system easier and more friendly. It takes credit for the presence of a prominent “Download” button on the article page, which effectively doubled the ratio of downloads to mere “hits.”

The DigitalCommons platform includes usage-reporting features that have been improved and upgraded several times. It now encompasses state-of-the-art article-level metrics, pushed out in real time

to registered depositors and administrators. DigitalCommons continues to lead the industry with the metrics it makes available to depositors and to the public. We did not need to develop those features; they came with the system. The results or usage numbers have been important on several levels. First, the reports encouraged the IR staff to continue uploading, showing us that contents were being found and accessed by local, regional, national, and global audiences. Downloads happening from Tuvalu, Nunavut, or the South Sandwich Islands were registered with surprise and vicarious satisfaction, engendering an almost inexplicable enthusiasm for the task. Second, providing download numbers to individual depositors became the most effective means of reselling faculty on their participation. Depositors were excited by the feedback from online dissemination. Their downloads and geolocation analyses incite authors to bring more; and when depositors casually mention their results in professional contexts, it sends the IR new recruits wanting to participate in the action.

3.5 Effective Outreach Efforts

A manager of a new and unproven program may be reluctant to say “no” to anyone, and there were a few dead-ends, as some parties attempted to use the online repository for incidental purposes, like privately sharing resources or materials among a group for admissions or departmental or administrative purposes. Fortunately the emergence and adoption of online systems specifically engineered for such uses has eliminated these issues. To this day, however, the IR almost never says no (unless there are outright legal barriers). The answer might be “It will take a while” or “We can’t make it a priority at this time,” but would-be depositors are almost never told to take their content elsewhere. If there is a way to make it work, the IR wants to go ahead.

Contributors to the IR’s hoard included many outside the writing-for-tenure faculty. Publication backlists or organizational histories from university-associated organizations were welcomed. Some programs provided digitized content; others were digitized by student workers on shared library equipment.

Visits to departmental faculty meetings produced scant self-archived content, and even demonstrations of the ease of use and facility of uploading had little impact. Faculty were interested not in how

easy it was but in what results it produced, so outreach efforts were focused on the system-generated distribution reports. There has never been a flyer or mass email solicitation. There was no budget for marketing pieces, and spamming faculty with email could erode the goodwill and rapport already established. The IR is its own best marketing tool. Adding content breeds new connections which breeds more content. Publicity, on the other hand, can be a two-edged sword, escalating the demand for services beyond what can be delivered.

The most effective promotion of the IR has been the unsolicited recommendations tendered by participants to other faculty. The next most effective has been finding postable items and then seeking author permission, along with lists of other possible content. The third most effective means has been the enrollment of coauthors through items deposited for already participating fellow researchers. The automated download reports they also receive serve to pique their interest and frequently elicit requests for further inclusions. Everyone swept up into participation wants more representation and more content.

A pragmatic benefit of the DigitalCommons platform has been its “third-party” status. The cloud-based system places no hardware or labor requirements on the local library IT staff, already stretched to capacity in our case by demands of modernizing catalogs and other online projects, including a local and very active digital humanities institute. A hidden advantage, largely unspoken but not unrecognized, has been that utilizing third-party software avoided many of the restrictions or requirements associated with the committee governance of the main university website and the library’s own web pages.

The thirteen-year history has not been without its bumps and its internal detractors. Early meetings with librarians perhaps engendered expectations that subsequently went unfulfilled and sparked dissatisfaction. A new library program, managed by an outsider not only to libraries but to the local culture as well, protected and encouraged by a dean who actively promoted change and sought concrete results—these factors may have unsettled the house a bit. A few library faculty came forward with content and projects and enthusiasm, but librarians as a group were less willing to participate than the campus-wide faculty. There were murmurs about going too fast, about treading on other people’s areas, about the use of clip-art icons, about “the metadata is corrupt” because self-archiving authors did not observe

catalogers' practices regarding name authority, about exceeding our charter because we allowed faculty to collect and curate public domain documents, and finally (and literally) "you are uploading too much." Fortunately, the IR has persisted, and its popularity with the campus has generally shielded it from foreclosure. There have been suggestions that other systems (Rosetta or something yet to be developed by Unizin) could or should replace the DigitalCommons platform, but these have so far come to nothing.

For its first seven years, the IR reported directly to the Dean. This was an organizational structure that allowed it to innovate rapidly, exploit opportunities, and react to changes in the scholarly communication system. Dean Giesecke's resignation in 2012 began a departmental odyssey for the unit: first to technical services, then to archives and special collections, and most recently to computer services, which has subsequently morphed into media services. During the critical early years, the support and protection of an activist, well-placed, empowered, and digitally oriented dean made possible the rapid adoption and expansion of the program, enough for it to become entrenched to a point where it would be difficult eliminate; too many faculty authors would mourn its loss.

3.6 IR Statistics

Statistics relative to the IR's growth and distribution are presented in Tables 1–3. Table 1 shows the open content count and downloads by fiscal year from 2006 to 2017; note that the per-item average peaked at around 115 in 2013, then seemed to stabilize around 90—an effect I attribute to changes in Google search algorithms to accommodate mobile devices. Google searches account for 93% of referrals, with Bing 2.6%, Yahoo 0.8%, Facebook 0.6%, DuckDuckGo 0.3%, and Yandex and Baidu 0.1% each. Table 2 shows content representation and downloads by series type for FY 2016; note that theses and dissertations and especially educational resources are downloaded at rates much higher than their representation in the Content column. Table 3 shows calendar year 2017 downloads by continent; note that usage outside Europe/North America represents almost 40%.

Table 1. Contents and distribution, UNL IR 2006–2017 FY

<i>FY</i>	<i>Open Contents</i>	<i>Downloads</i>	<i>Avg/item</i>
2006	2,397	56,234	23
2007	8,374	243,980	29
2008	15,492	829,225	54
2009	23,885	1,379,604	58
2010	31,378	2,024,734	65
2011	37,893	3,323,784	88
2012	44,265	4,381,762	99
2013	51,480	5,902,200	115
2014	59,238	6,028,419	102
2015	66,956	6,124,840	91
2016	72,087	6,518,200	90
2017	78,658	6,684,995	85

Table 2. Contents and distribution by series type, 2016 FY

<i>Series type</i>	<i>Content</i>	<i>Downloads</i>	<i>Avg/item</i>
Research articles	44%	40%	95
Journals & proceedings	30%	23%	80
Theses & dissertations (open)	6%	15%	255
Reports/Documents/Circulars	17%	12%	73
Educational resources	0.4%	3%	978
Monographs	1%	1%	123
Presentations	1%	1%	68

Note: The 2016 numbers represent all series with $\geq 2,000$ downloads (N=310), accounting for 96% of traffic. There were an additional 430 series with $0 < \text{downloads} < 2000$, and 138 series with $\text{downloads} = 0$.

Table 3. Downloads by continent, calendar year 2017

<i>Location</i>	<i>Downloads</i>	<i>Percentage</i>
North America*	2,706,352	44%
Asia	1,536,934	25%
Europe	1,064,515	17%
Africa	573,329	9%
Oceania	164,717	3%
South America	139,227	2%
Total	6,185,074	100%

* USA – 39%, Canada – 4%, Mexico – 1%

4. Policy decisions and impact on growth

4.1 *Open Access and Copyright Issues*

Most strategies for growing and managing the IR have been based on its particular environmental situation rather than on advice from outside sources or organizations. Some of those strategies are reviewed here.

The pursuit or administration of “open access” (OA) funds to pay authors’ article processing charges (APCs) has been eschewed. The library’s financial situation dictated this anyway, but even had money been available, it was not seen as a wise use of funds or a way to loosen the grip of entrepreneurial publishers on the academy’s output. (Moreover, the manager is always opposed to paying for something that can be had for free with a modicum of effort.) Researchers who already have lab or grant funds for APCs are encouraged to use OA journals (and avoid hybrid publication); authors who lack those funds are assisted in developing green OA versions for (mediated) free self-deposit.

Similarly, the repository and its imprint have not participated in membership organizations (COAR, OASPA, DLF, LPC, COAPI) because it usually does not fit their criteria or see concrete returns for the investment. The library has continued membership in SPARC despite some philosophical differences with its treatment of and approach to IRs.*

The library has abstained from campaigning for a campus OA mandate or similar policy that would require faculty authors to deposit in the IR or formally opt out. I have argued this point elsewhere¹³ and will only summarize here that we discovered requiring something of faculty made them less willing to participate and put the library in an enforcement role it was not prepared to enact. The faculty senate has endorsed the use of the IR; the library has not seen the need for further regulations. The clause in many campus OA policies that empowers the institution “to exercise all rights under copyright” is a further troubling issue.

*COAR – Coalition of Open Access Repositories, OASPA – Open Access Scholarly Publishers Association, DLF – Digital Library Federation, LPC – Library Publishing Coalition, COAPI – Coalition of Open Access Policy Institutions, and SPARC – Scholarly Publishing and Academic Resources Coalition.

The promulgation of the SPARC Author Addendum was greeted with great anticipation, but it was soon found to entangle faculty authors in negotiations with giant publishers unwilling to cede to their claims, usually leaving the author with few choices but to surrender, to misrepresent their work's copyright status, or to accede to terms that were understood differently by the contracting parties. We did not want to send faculty out thus equipped, and see them expend time and energy to little or no avail. The IR does not recommend the addendum to authors or depositors. Instead, it helps them publish post-prints or other versions that are permitted in almost all cases.

More recently has come a broad push for open source systems, where the software is “free” and can be modified and adapted at will, the user remaining responsible for installation, customization, upgrading, hardware, protection, servicing, and debugging. Open source may make sense where resources and technical expertise are available to the managers, but we have found so far that the (proprietary and externally hosted) DigitalCommons platform does better and delivers more at lower cost than could be achieved locally.

How much of the IR and scholarly communication efforts should be devoted to “open access” causes? Some OA proponents insist on a definition that excludes much of what the IR holds. It hosts many author's versions (with permission of the publisher) and university-published documents to which redistribution or derivative licenses (such as CC-BY or equivalent) cannot be applied. Such works can still be found, accessed, downloaded, stored, shared one-to-one, text- and data-mined, and exploited for “fair use” without cost or registration, but they are not considered “open” in some quarters. This situation relegates the IRs to an inferior sort of second-class participation in open access. To some advocates, so-called “green OA” does not actually qualify as “open,” nor does content licensed with non-commercial or no-derivative restrictions.¹⁴ Our library's primary goal was to grow the repository; enacting dreams of a broad open access movement has remained beyond our means. We had practically abandoned the descriptor “open” until Michael Organ of University of Wollongong lately convinced us that IRs must stand boldly by the self-descriptive “open access”—as we are supplying free and unrestricted access to content.

The IR has hosted original content since its very beginning. For some objects, peer review serves an appropriate role—but not for

everything.¹⁵ The IR hosts and “publishes” an extremely wide range of content types and does not require peer review and approval for everything. Online publication creates a signed permanent record of academic activity and places responsibility for the content on the participating authors and their endorsers; unsigned works are not acceptable. Peer review is valuable in some contexts, but it can become a means of policing for orthodoxy and a barrier to innovation or intellectual dissent.

4.2 IR Content and Metadata

The proper relation of the IR to traditional library metadata and authority controls has been an elusive question. The managers have liked the simple (Dublin core-based) metadata schema of the DigitalCommons; it is fast to upload (generally), and the document itself sits only one click away, so its particular characteristics are easily referenced. This simplicity has left more traditional catalogers unsatisfied, however, and some have desired more structured schema requiring authorities, added fields, and more advanced knowledge of cataloging standards and techniques than has been expected of student uploaders. Metadata normalization remains an area in flux or under negotiation.

4.3 Policy Impacts

The impact of various policies on the growth of the IR can only be inferred. Not doing some recommended things does not seem to have limited its growth or acceptance. In practice, we consciously adapted policies to the specific goal of enhancing and accelerating the growth of the IR, and it appears that at least some of them had that desired effect. The aim has been to have a large repository with many items and many depositors.

A sobering lesson has been how little direct impact the IR or the scholarly communications program or even the library generally can have on university policy. Many things that the IR does boost the institution—spread its news, attract students, enhance its profile, encourage its faculty, promulgate its research—but none of that brings the administration to us for advice. The IR’s impact comes through

pursuing its mission to change the scholarly communications environment. To guide ourselves through the daily rounds of tasks and decisions, we have evolved some philosophies or rules of thumb, which are presented next.

5. Philosophies of the Nebraska IR

The IR is a publisher, not an archive. Most publishers don't understand this. They regard IRs, in the words of PLOS cofounder Michael Eisen, as "parasites." I am willing to believe he meant that in an ecological and not judgmental sense; i.e., IRs inhabit the "host" journals system but do not produce new content for it. But this misapprehension conceals some willful blindness. IRs do not just keep the publisher's content in a drawer or a jar on a shelf as backup in case the original is lost or damaged; rather, they actively distribute the content to new and wider audiences, in many cases more widely and more actively than the first publisher.

A corollary to the previous statement is: ***The IR is a publishing project, not an IT project.*** Information Technology people are wonderful; they do things that seem magic and are capable and helpful in every way. But with an IR, they can be more concerned about how it works and how to improve it technically than about its content and its audience reach. The crux is not in satisfying the developers but in engaging a wide external set of depositors and readers.

The IR belongs to the faculty, not to the library or the university. This philosophy can be hard for librarians to swallow, but in fact there is almost nothing in the IR that belongs to the library. We don't own or rent any of it. The faculty, however, by copyright or by moral right of authorship do own or did create some part of it all. The IR content is held by permission of someone or else is in the public domain and beyond ownership. A server with files on it, but with no permission to post them to an online public, does not make an IR. Consequently, the managers seek to operate the IR as a sort of faculty cooperative.

This ownership understanding clarifies many decisions: What should we do? Do what the faculty member wants. Without the faculty the IR has no content; without their permission or tolerance,

there is no repository. A major issue looming in years ahead is the potential for conflict between what the faculty wants—(1) freedom to participate or not, and (2) massive distribution of their publications—and what the university administration may seek—a means to track and judge faculty productivity based on publication metrics. Incorporating the IR into a system of surveillance and control would be deadly to its acceptance and support among faculty. It is a sensitive position to be working in the library, for the university, and espousing the interests of the faculty above both those other limbs of academe. Yet the trust of the faculty depositors is the essential requirement of the IR; their voluntary participation requires us to be good stewards of their work and to be sensitive and responsive to their professional interests.

The mission of the IR is to maximize access to content online. We remain optimistic that the expanding availability of authoritative free open content will ultimately shift the balance of power in scholarly communications away from the sellers and toward the producers. Our repository cannot affect the big deals between publishers and countries or consortia; but we make those deals less relevant each time we put content outside the paywall. Every publication we liberate from access restrictions is another step toward universal free content. Obviously, the publications of the academy are as the grains of sand on a beach, but persistent and sustained effort will eventually have effect.

The personal reward is seeing the global dissemination. What keeps the writer engaged and enthusiastic over thirteen years is the reception of the IR's works. The feedback from usage reports, including institution types and geolocation, has prevented boredom or burn-out. It is somehow emotionally satisfying to see and analyze the distribution information from Uummannaq, Greenland, or Ogbomosho, Nigeria. It connects us to a person who found something helpful on seal parasites or sorghum malting in our online treasure trove. And to see that the educational systems of Omaha, Brooklyn, North Carolina, Georgia, or KwaZulu-Natal were regular high-volume downloaders feeds a sense of contributing to the world's instructional resources.

6. The future of scholarly communications

IRs are of necessity denizens of the Internet, which resembles a modern-day Wild West frontier—most of it lies beyond our knowledge and control. It does, however, offer space for experimentation and innovation. Enforcement is spotty; there are gaps between jurisdictions, and there is more freedom than supervision. The digital production and distribution of written or illustrative materials is inexpensive compared to traditional forms. It is cheap and fast to try things and easy to abandon what doesn't work out. Digital publishers are not stuck with unsold inventory representing dead investments of capital funds.

In the rapidly evolving and expanding online universe IRs are an effort that trends to positive ends—to increased access to information and to easier and more efficient means of dissemination. IRs are international actors, and their democratizing influence is undeniable and encouraging. Downloads sent to Iran or China may somehow lead to better understanding and enhance prospects for world peace and prosperity.

Bibliographic robots will soon accelerate the harvest of materials. This process is already underway, although human intervention or vetting seems requisite for the near-time horizon. The day will come, perhaps, when IRs can update themselves and collect institutional materials without prolonged efforts from the managers.

When conflicts arise between the interests of the depositors (the faculty) and the providers (the institutions), reclaiming and preserving author rights will be a critical role for the IRs. How extensively IRs become incorporated into full-scale research and surveillance systems will have an impact on their acceptance. It is possible that the more useful they become to administrators, the less attractive they will be to faculty voluntarism.

The best future role for the IRs will be as cornerstones for institutional publishing platforms. Repositories should evolve beyond their “hunter-gatherer” lifestyle (in which they find and incorporate content from elsewhere) into an active production economy, enabling the scholarly community to develop and distribute its own research products.

Blogs and columns have pronounced the “failure” of green OA and raised questions of whether IRs have already become obsolete. Significantly, such gloom has not come from institutions that adopted

proactive and inclusive programs. That faculty would not willingly self-archive in large numbers was pretty apparent all along, but energetic and determined work by library specialists has produced enough positive results to keep faculty interested, if not always motivated. At least, it has engendered expectations among our own faculty that suggest some degree of success in establishing a basic and useful service.

The purchase of bepress last year by Elsevier sparked concern among all practitioners in scholarly communication. To date, one year later, there has been little noticeable change, except to see more resources allocated to development of features previously requested (streaming, ORCID integration, etc.). IRs using the bepress platform still maintain control of their own contents and policies; bepress acts as a distributor, not a publisher. Efforts to organize open-source, non-commercial, community-controlled competitors remain in the discussion phase. These are interesting times, and emotionally charged disputes among advocates for greater public access to scholarly literature can be an unnecessary and unprofitable distraction from the larger goals we all share. I look forward to a time when disagreement over practice or issues does not involve impugning the values and ethics of others.

At present, the functions of IRs are replicated most competitively by the commercial services ResearchGate and Academia.edu, though neither is positioned to earn the trust of faculty depositors. Both spam users with multiple daily advertisements for their paid services. IRs, on the other hand, provide a trusted local alternative, attuned to the needs and interests of the campus faculty. Broad-based movements for open access need the IRs, as institutionally resourced infrastructure for open scholarly communications. The IRs are by no means perfect solutions yet, but continued effort and support does yield substantial benefits. Perhaps in the future repositories will:

- host documents, data sets, source code, audio, video, and web content;
- not be commercial and not carry advertising;
- recruit volunteers, not compulsory depositors;
- be “open” access—at least their contents are free and unrestricted to see, read, hear, view, download, save, and

manipulate—deferring for now the issue of redistribution and repostings;

- support all licenses—from traditional copyright to Creative Commons;
- promote “fair use” in an expansive sense;
- be abstractable and generously abstracted;
- have free and open metadata;
- provide public or private analytics, according to depositors’ options;
- be undivided, without differences in service or access for members or payers;
- be extractable;
- promote standards for “machine-readable”;
- not watermark, stamp, or disfigure the content (cover sheets are OK);
- provide direct access to the content, not derivatives generated “on the fly”;
- be undefended, to the greatest extent possible;
- require registration or log-in only to edit or deposit;
- have human or human-level quality control;
- include ancillary services (scanning, harvesting, file prep);
- interact seamlessly with other similar or equivalent repositories;
- host original publishing activities;
- defend the privacy of users’ information and oppose its commercialization;
- become the default mode of scholarly communication.

This case study has focused largely on the local environment because successful IR’s grow from local roots and reflect the culture of a specific campus or system. The sustainability of an IR derives from its interactions with campus and community cultures. Aligning the program with faculty interests and university traditions builds acceptance in key quarters. Our strategies must be guided by our reading of

the cultural and psychosocial environment, and our longevity in the effort will be directly related to the satisfactions we find in the work. We are fortunate that our institution provided us the resources, opportunity, and freedom to experiment in a new mode of scholarly communication. If our steps and missteps prove instructional to others, it will not have been in vain.

In closing, I wish to express our gratitude for the trust of authors and depositors who directed materials to us and appreciated our dissemination, for the cooperation and advice of a vendor-partner whose cloud-based platform closely matched our needs and resources, for the aid and encouragement of colleagues—students, faculty, staff, and affiliates—and mostly for the support, inspiration, guidance, and protective aegis of an innovative visionary dean and dear friend, Joan Giesecke.

Notes

1. <https://www.alexa.com/siteinfo/unl.edu> (See the section “Where do visitors go on unl.edu?”)
2. Webometrics, “Ranking Web of World Repositories,” <http://repositories.webometrics.info/en/world> (January 2017). Now removed, but available at <https://web.archive.org/web/20170302225028/http://repositories.webometrics.info/en/world>
3. US Census Bureau, <https://www.census.gov/quickfacts/NE>. However, the institution’s immediate environment, Lincoln, the state capital and a university town, has long been a resettlement location for international refugees, and thus has significant Vietnamese, Iraqi, Ethiopian, Afghani, Bosnian, Mexican, Russian, Ukrainian, Tajikistan, Kurdish, Sudanese, and Chinese populations.
4. John A. Gale, Nebraska Secretary of State, *Revised Official Report of the Board of State Canvassers, General Election, November 8, 2016*, <http://www.sos.ne.gov/elec/2016/pdf/2016-canvass-book.pdf>.
5. Tamar Lewin, “American Universities Group Votes to Expel Nebraska,” *New York Times*, May 2, 2011, <https://www.nytimes.com/2011/05/03/education/o3aau.html>.
6. The University of Nebraska system includes 3 other campuses—at Omaha, Kearney, and a Medical Center. There is also a Nebraska State College System including Chardon State, Peru State, and Wayne State Colleges. My point is that there is no similarly-sized in-state competitor for allegiance and identification such as seen in many states (e.g., Auburn, Iowa State, Texas A&M, UCLA, etc.)
7. Clifford Lynch, “Institutional Repositories: Essential Infrastructure for Scholarship in the Digital Age,” *ARL Bimonthly Report* 226 (2003): 1–7.

8. *JAFIO* has since been transferred to the De Gruyter umbrella (<https://www.degruyter.com/view/j/jafio>), as bepress subsequently divested its journals to focus on the repository platform.
9. Joan Giesecke, "Institutional Repositories: Keys to Success," *Journal of Library Administration* 51, no. 5-6 (2011): 529-42, <https://doi.org/10.1080/01930826.2011.589340>. I recall especially two pieces of encouragement that Joan told me, off the record: (1) "You understand what the faculty want" and (2) "The Chancellor understands what you do; most librarians don't understand what you do."
10. See Paul Royster, "The Institutional Repository at the University of Nebraska-Lincoln: Its First Year of Operations," *OCLC Systems & Services: International Digital Library Perspectives* 23, no. 2, 183-89, <https://doi.org/10.1108/10650750710748487> or <https://digitalcommons.unl.edu/libraryscience/58/>. I have characterized that early period as "expecting the fish to jump into the boat" and represented it visually in a PowerPoint slide showing a rowboat with seventeen animated fish successively flying in from offscreen to land amidships. It would begin to get laughs only at about the eighth or ninth fish ... but perhaps you needed to be there.
11. We are privileged to work on a college campus with access to a pool of bright and talented but necessarily transient labor. The first student workers were Jessi Chandler and Nathan Raabe; they were followed by (in alphabetical order) Abbey Strahm, Addy Roth, Ashleigh Auman, Ashlyn Hans, Bailea Kerr, Candy Hermosillo, David Clawson, Edgar Reynaga, Eva Gautam, Gabriel Ajang, Gaby Kline, Gina Lucero, Haley Hack, Jackie Spencer, Jade Zuehlke, James Chu, Kasey Ma, Kendra Gallup, Krystine Phelps, Marie Shaw, Mary Elizabeth Barmettler, Nhung Phan, Nicole Bogus, Phillip Sanks, Roz Thalken, Ryan Smith, Sam Lee, Sara Huwaldt, Teal Gardner, Telesa Madole, and Toan Nguyen. Their commitment and enthusiasm has made the work more successful and enjoyable along the way. I am indebted to Maggie Van Diest for finding them all and steering them to us. OCR refers to optical character recognition—a process that converts images of printed text into machine-readable language.
12. We were joined in 2014 by Linnea Fredrickson as a staff Production Specialist; Linnea is a former copy editor from commercial and scholarly publishing, with an MLS degree. During a unit reassignment in 2016, scholarly communications faculty was augmented by the addition of Margaret Mering as Metadata Librarian.
13. Andrew Wesolek and Paul Royster, "Open-Access Policies: Basics and Impact on Content Recruitment," in *Making Institutional Repositories Work*, ed. Burton B. Callicott, David Scherer, and Andrew Wesolek, Charleston Insights in Library, Archival, and Information Sciences Series (West Lafayette, IN: Purdue University Press, 2016), <http://www.thepress.purdue.edu/titles/making-institutional-repositories-work> or <https://digitalcommons.unl.edu/libraryscience/330/>.

14. See Paul Royster, "Up from Under the 'Open Access' Bus," *Journal of Librarianship and Scholarly Communication* 1, no. 2 (2012): eP1045, <http://dx.doi.org/10.7710/2162-3309.1045>. See also Richard Poynder, "The Open Access Interviews: Paul Royster, Coordinator of Scholarly Communications, University of Nebraska-Lincoln," August 31, 2014, <https://poynder.blogspot.co.uk/2014/08/the-open-access-interviews-paul-royster.html> or <https://digitalcommons.unl.edu/libraryscience/318/>.
15. Paul Royster, "Publishing Original Content in an Institutional Repository," *Serials Review* 34, no. 1: 27-30, <https://doi.org/10.1080/00987913.2008.10765148> or <https://digitalcommons.unl.edu/libraryscience/126/>.

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