

The Process of Discovery: The CLIR Postdoctoral Fellowship Program and the Future of the Academy

John C. Maclachlan, Elizabeth A. Waraksa, and Christa Williford, editors

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Foreword

Then felt I like some watcher of the skies
 When a new planet swims into his ken;
 Or like stout Cortez when with eagle eyes
 He star'd at the Pacific—and all his men
 Look'd at each other with a wild surmise—
 Silent, upon a peak in Darien.

John Keats, "On First Looking into Chapman's Homer"

Discovery is a complex venture. Think about the sweep of time, internal and external space, and the role of technology in Keats's transformative discovery of the poet Homer. The formulation of the power and insight derived from reading Homer—a conceptual revelation within the mind of Keats—is expressed analogously as a real world observer who first sees a new planet or as explorers standing on a mountain top beholding for the first time the vast stretch of the Pacific Ocean, previously unknown to Europeans. Augmenting this astonishing array of observational distance (in a few deftly rhyming lines encompassing the cosmos and the vanishing far horizon of the earth) is the temporal distance between Keats as a nineteenth-century reader and the nearly 3,000 years separating him from Homer's Greece. The role of technology is determinative as well; in this instance, the book of Chapman's translation serves as a bridge that unifies these worlds and perspectives, and instigates the discovery. We can appreciate, via the trenchant proposition of this sonnet, that discovery is a multilayered conversation often mediated and partly determined by the technology of the era.

This superb volume of collaborative essays is threaded with technology—the digital equipment, tools, and resources upon which we have become dependent—and the means, mechanisms, programs, and projects developed by CLIR's postdoctoral fellows, who work within this flourishing digital environment to help manage, sustain, and extrapolate valuable information in support of higher education. The process of discovery—obtaining new knowledge, developing insight, uncovering what was previously unknown or invisible: the wild surmise of seeing clearly what had been incoherent, fragmented, or disjunctive—is a salient theme of each essay.

The fellows describe how knowledge is gathered, analyzed, and shared, always within the context of the new methodologies and intellectual strategies that have arisen in the academy as the digital revolution has taken hold. Each essay is a look into the working conditions associated with creating a new profession of expertise and responsibilities in response to emerging forms of

scholarly communication and pedagogy. From the eighteenth-century Age of Enlightenment onward, the chief objective of most colleges and universities has been to promote “discovery and advancement of new knowledge”; this collection of essays sits comfortably, formatively within that tradition.

As importantly, the essays also represent the most articulate, detailed evidence of a major shift in CLIR’s vision and mission over the last decade. Previously, the Council conducted research, convened review panels, and awarded fellowships framed by a pervasive theme—the preservation of and access to our cultural heritage. We still pursue this fundamental responsibility. However, we have augmented our agenda by taking a more active role; we are forging partnerships with libraries, cultural institutions, and communities of higher learning and collaborating with them to create programs to enhance research, teaching, and learning environments. CLIR means to influence and help direct the evolution of higher education in the twenty-first century thoughtfully, deliberately, and over the longer term: to transform the information landscape in support of the advancement of knowledge. This approach can be described as a sustained innovation.

Like *discovery*, the term *innovation* adheres to higher education in varying degrees. The concept generally applies to business and corporate phenomena, but more recently has nested in discussions of higher education as both a warning and a way out of some of the problems that vex universities and colleges, such as the cost of tuition, the perception that research is too narrowly focused or abstract and does not serve the public good, and questions about the practical value of an institution’s curriculum. Almost invariably, a disruptive innovation is some form of digital technology. Most recently, MOOCs have taken center stage. These massive online courses, which can enroll more than 100,000 students, have been hailed within higher education as the future of pedagogy, with predictable exhortations to adopt these instruments of instruction or face obsolescence. Also predictably, the chorus of proponents has become more muted over the last few years as the costs, production complexity, market, and faculty investment of time have become better understood and more challenging.

The eager initial embracing of MOOCs and the attendant agitation are reminiscent of similar prognostications and heated prose two decades ago, when online course instruction was touted as the end of higher education as we know it.¹ Extrapolating, there appears to be a tendency both inside and outside higher education to grab onto the newest, brightest technological phenomenon; invest it with disruptive, transformational potential; and then walk back when the proof of concept falters. This is not to argue against experimentation and risk taking; it is to caution about the ad hoc nature of these technologies and the surprising lack of the skepticism and rigor of testing that attends other aspects of higher education.

The adoption of CLIR’s sustained innovation approach acknowledges that digital technology is indeed transformative and often disruptive, but it is also expensive, duplicative, and inefficient. Lessons are learned; projects fade into virtual fossils. We also believe that technology will eventually transform higher education and want to ensure that this transformation is well

1 See Lewis J. Perelman, *School’s Out* (1993); and Wikipedia article on rise and fall of Fathom.com <https://en.wikipedia.org/wiki/Fathom.com>.

managed. Effective management takes years of sustained, coordinated, and coherent investment of funds and talent; continual planning for and adjustments of programs; and a vision that insists that the flourishing of digital technology, tools, and resources needs to be conceived as a systemic, inter-related ecology.

In this respect, this collection of essays by CLIR postdoctoral fellows is to date the most comprehensive and insightful guide to this philosophy in action. How are the people intent on transforming higher education accomplishing such a sweeping goal?

- By acknowledging that many of the most complex, trenchant challenges to the academy in our era cannot possibly be resolved by a single profession, organization, or institution (Waraksa)
- By articulating a new multifaceted program that can attract gifted, empathetic scholars supported by an evolving, rigorous curriculum (Coats and Shore)
- By recognizing the impeding bias that the obsolescent trope of lone genius and solitary author entails, and by collaborating interpersonally and interinstitutionally, working with colleagues, information technology programmers, librarians, and scholars to create new partnerships and new knowledge (Rose-Steel, Kouper, Parrott, and Rawson)
- By rethinking, enriching, and expanding the concept of a library from an institution of neatly organized analog materials to a vibrant portal to the future (Chen, Pickle, and Waldroup)
- By repositioning the library as an active partner in the effective incubation, development, maintenance, dissemination, and reuse of the raw materials of research (Flores, Brodeur, Daniels, Nicholls, and Turnator)
- By embodying a workplace approach that eschews tracks, hierarchies, and traditional or even trendy labels and instead aims for more fluid and programmatic matching of skills, methodological acumen, and intellectual interests to support research and teaching: a flexible matrix of talent as opposed to a siloed arrangement of narrow specialization (Sayre, Brunner, Croxall, and McGinn)

All of the projects and activities of the postdoctoral fellows are designed not to establish zones of exclusion, but to erect markers of intersection that are encompassing, formative, and extensible.

Because of this exemplary work, a new digital environment—a system of correlated parts and functions, with its attending cohort of expert professionals—will come to pass. Higher education should benefit greatly, as this virtual campus will facilitate new discovery; promote innovative thinking; respond to new, more intricate kinds of questions; support new forms of academic expression; have the ability to map and embed our questions as aspects of future inquiry—a collaborative ideation; preserve and make accessible data, tools, and applications; and evolve to meet the most demanding formulations of our curiosity, whether that curiosity, at first glancing, fixes on the far blue seam at the confluence of earth and sky, or further still on the light of a distant star.

—Charles Henry

About This Publication

John C. Maclachlan, Elizabeth A. Waraksa, and Christa Williford

In the summer of 2012, a handful of former CLIR postdoctoral fellows gathered at the home of Distinguished Presidential Fellow Elliott Shore to help him prepare the ninth annual fellowship seminar cookout. We had each come to the seminar to help lead the newest cohort of fellows—at that time, the largest group to date—in workshops and discussions designed to prepare them to inhabit their new positions in academic libraries, data centers, and other research support units on college and university campuses. While arranging bottles in coolers and shucking ears of corn, the group discussed the approaching ten-year anniversary of the fellowship, reflecting upon the similarities and differences between the roles of the fellowship’s newest members and those of the participants in the earliest days of the program. The one or two years we had spent as fellows had become deciding moments in our working lives, exposing us to career paths in academic service that we had never before considered and to a broader variety of ways to contribute to the creation of new knowledge than had our previous training.

While retracing the contours of our shared memories—Bryn Mawr College “bootcamps” of summers past, interactions with leading thinkers in higher education, valued opportunities to catch up at conferences and meetings—we wondered what might be the most appropriate way to mark the program’s entry into its second decade. If true to our experiences and to the changing nature of the many libraries that have hosted us, any celebration of the occasion must look to the future at least as much as it reflects upon the past. It should represent the array of perspectives and disciplines represented in the fellowship over the years; it should highlight key issues of common interest to many participants without oversimplifying those issues.

After considering several possibilities, the group settled upon the idea of a publication that would give both current and former

participants in the program an opportunity to work together to craft essays about the lessons they had learned and about their ideas on the future of academic libraries and higher education. To capture those insights and generate a list of topics of broad interest, three former fellows conducted a survey of past and current fellows. Over the course of the ensuing months, Jason Brodeur, John Maclachlan, and Jennifer Parrott developed the survey and launched it in late 2013; an analysis of its results appears on pp. 27–34.

When CLIR agreed to provide financial and logistical support for the publication project, the editorial team issued a call for participation in the fall of 2014, highlighting some of the common themes that had arisen in the survey responses and from a “Liquid Café” session (Healey, Marquis, and Vajoczki 2013) led by Lauren Coats during the 2013 winter meeting of current CLIR postdoctoral fellows. This session allowed for further exploration of those questions and themes, and complemented the survey in identifying and articulating areas of interest for the CLIR postdoctoral fellowship community.

More than a dozen prospective authors responded to the call for participation in the collaborative writing project. After indicating their preferred topic(s) of exploration, the eventual 16 authors were divided into four teams that made up the larger collaborative writing group. (For more information on collaborative writing groups, see Maclachlan and Lee 2015; Marquis, Healey, and Vine 2014.) Each team spent the ensuing months producing an outline, draft, and essay exploring some aspect of a broad topic of significance to the CLIR Postdoctoral Fellowship Program: the nature of collaboration, the changing and expanding library, the future of research data management, and PhDs on the “alt-ac” track.

In January 2015, the editors and team leaders met to discuss common themes in the publication and to gauge overall progress. Prior to the meeting, at least two people working on other topics reviewed each group's submission. This important step allowed everyone involved in the project to have an idea of the directions taken and the types of conclusions reached by their colleagues so that they could consider how the others' work might relate to their own and understand how their work might fit into the larger organization of this final report. Upon completion, chapters were submitted to external peer reviewers for comments, and these comments informed final revisions.

It is the authors' and editors' hope that the following collection will be meaningful both to the community of stakeholders connected to CLIR's Postdoctoral Fellowship Program and to anyone working toward the development of future leaders for tomorrow's libraries, research organizations, and institutions of higher learning.

The editors would like to extend their heartfelt gratitude to CLIR for supporting this publication project from start to finish, especially Charles Henry for his leadership and vision, Lizzi Albert for logistical assistance, Alice Bishop for facts and figures and insights into the program's history, Kathlin Smith for editorial assistance, and Rita Van Duinen for crucial data gathering. We also thank Elliott Shore

for providing both the venue for the project's initial brainstorming session and encouragement throughout the process. The speed and ease with which this volume came together are a testament to the collaborative spirit of the CLIR postdoctoral fellowship collegium, and the editors would like to thank each and every one of the authors for making this experience a true pleasure. We sincerely hope that readers will gain as much from reading this volume as we did in stewarding it.

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A Brief History of the CLIR Postdoctoral Fellowship Program (2004–the present)

Elizabeth A. Waraksa

The Council on Library and Information Resources (CLIR) Postdoctoral Fellowship Program, launched in 2004, is marking its decade-plus of existence with a collection of essays dedicated to reflections, recommendations, and prognostications on some of the issues central to its mission. To provide some background and context, this brief contribution will trace the history of the fellowship from its origins to the present, including remarks on some reactions to the program over the years and a brief characterization of the program as it welcomes its twelfth cohort in the 2015-16 academic year.

The CLIR Postdoctoral Fellowship: Origins, Expansion, and Select Data

From the fall of 2004 to the fall of 2014, the CLIR Postdoctoral Fellowship Program has supported 116 fellows at 53 host institutions across the United States and Canada (CLIR 2015).¹ Throughout its first decade, the program expanded not only in terms of the number of fellowships awarded and the number of institutions hosting fellows, but also in the types of fellowships offered, the array of fields from which fellows were drawn, and the variety of institutions hosting fellows. The number of funding agencies that support the program has also increased, with The Andrew W. Mellon Foundation joining the Alfred P. Sloan Foundation in 2012 as the second major provider of grant funds for the CLIR/DLF Postdoctoral Fellowships in Data Curation (CLIR 2012).

1 Fourteen additional fellows were named in June 2015.

The brainchild of past CLIR President Deanna Marcum,² the CLIR postdoctoral fellowship was originally conceived as a fellowship that would bring those who had recently earned a PhD in the humanities and who had an interest in library work—regardless of whether they held a master of library and information science (MLIS) degree—into academic libraries as a means of enhancing dialog between scholars and the academic libraries they use, exposing the new PhDs to career opportunities within the library, and engendering a new kind of specialist and potential leader (Brunner 2010; Marcum 2012). An additional aim of the program was to expose host institutions to the research skills and technological abilities that those with PhDs in the humanities might bring to the library with an eye toward reinvigorating collection development and use, exploring new means of teaching with library collections, and advancing new and different modes of scholarly communication (Henry and Smith 2013; Shore 2012). Although the fellowship was not, at its origins, specifically branded a “digital humanities” (Marcum 2012) or “alternative academic” (“alt-ac”)³ opportunity—these terms were not yet pervasive in 2004—it was in part conceived as a response to the ever worsening job market for those with a PhD in the humanities who were seeking tenure-track positions (Brunner 2010; Shore 2012).

Given the program’s early recognition of some of the most significant issues facing higher education in the twenty-first century, including “the exponential advance of linked information technologies and the concomitant need to manage them, the need for deep and diverse subject expertise in libraries, and the increasing scarcity of full-time teaching positions in the academy” (Shore 2012, 194), one may indeed characterize the program as one of the earliest alt-ac fellowships, created specifically to address the needs of both the emerging scholars and the institutions facing radical changes in the information landscape. In short, the CLIR postdoctoral fellowship has been, from its beginning, an attempt to address the pressing issues facing academic libraries by placing recent PhDs in full-time positions for a period of one to two years so that they might apply their training to the urgent needs of their host institution.

The CLIR postdoctoral fellowship has expanded to include an array of opportunities for PhDs from a wide range of disciplines, from the humanities and the arts to the natural and social sciences. And although the terminology used to describe the types of emerging professionals who tend to seek out CLIR postdoctoral fellowships has evolved through the years—from “feral professionals” (Neal 2006) to “hybrarians” (Watson et al. 2011) to digital humanists, among others—the core aims of the fellowship remain intact. Further, libraries’ ongoing need for the expertise that can be provided

2 For a recent reflection on the origins and aims of, and the initial resistance to, the program, see Marcum 2015.

3 For more on this term and its use, see Bethman and Longstreet 2013; the website “#alt-ac in Context”; and Sayre et al., “Toward a Trackless Future: Moving Beyond ‘Alt-Ac’ and ‘Post-Ac,’” in this volume.

by recent PhDs is clearly demonstrated by the ever-expanding number and variety of fellowships offered throughout the past decade.

As noted earlier, over the last decade, the fields from which fellows have been drawn, as well as the types of institutions offering CLIR postdoctoral fellowships, have expanded significantly. Past and present hosts include not only college and university libraries, digital humanities centers, and other information-centered campus institutions across the United States and Canada, but also state libraries such as the Arizona State Library, Archives and Public Records; specialized libraries such as the College of Physicians of Philadelphia and the Folger Shakespeare Library; and academic and library associations such as the Appalachian College Association. Adding to the diversity, the 2015 cohort will include a fellow based at the nonprofit digital library, the Internet Archive (CLIR 2015).

With these disciplinary and institutional expansions have come several name changes for CLIR's postdoctoral fellowships. The fellowships currently known as the CLIR Postdoctoral Fellowships in Academic Libraries are the latest iteration of the original postdoctoral fellowship offered through CLIR, the Postdoctoral Fellowship in Scholarly (and) Information Resources (2004–2007). Other name changes have occurred as well. Following the merger of CLIR and the Digital Library Federation (DLF) in 2009 and an environmental scan and research data management needs assessment funded by the Alfred P. Sloan Foundation in 2012,⁴ a series of joint CLIR/DLF Postdoctoral Fellowships in Data Curation for the Sciences and Social Sciences were launched in the fall of 2012; these were offered in addition to the continuing Postdoctoral Fellowship in Academic Libraries. Additional funding from the Mellon Foundation allowed for the establishment, in 2013, of five fully funded, two-year CLIR/DLF Postdoctoral Fellowships in Data Curation for Medieval Studies, which were offered in addition to the already established Fellowships in Academic Libraries and Data Curation for the Sciences and Social Sciences. In the following year, 2014, the Mellon Foundation enabled the creation of five additional, fully funded CLIR/DLF Fellowships in Data Curation for Early Modern Studies. Beginning in the fall of 2015, five fully funded fellows, supported by a grant from the Mellon Foundation, will take up CLIR/DLF Fellowships in Data Curation for Visual Studies, while numerous Postdoctoral Fellowships in Academic Libraries and Data Curation for the Sciences and Social Sciences will again be offered.

From the first (2004) postdoctoral fellowship cohort of 11 fellows placed at 10 institutions, the number of CLIR postdoctoral fellows and host institutions has varied from year to year; steady growth has been most evident since 2011, largely because of the creation of the suite of data curation fellowships described earlier. To date, the greatest number of fellows hosted at a single institution from within the same cohort is four (at McMaster University in 2011). The largest number of host institutions in a given year stands at 23; these are the

4 Published as *The Problem of Data* (Jahnke, Asher, and Keralis 2012).

institutions currently hosting the 27 fellows of the 2014 cohort. Although not all host institutions continue to host fellows every year, some early adopters of the program have hosted several fellows throughout the program's first decade (e.g., Bryn Mawr College: 5 fellows; Lehigh University: 7 fellows; Johns Hopkins University: 8 fellows; University of California, Los Angeles [UCLA]: 13 fellows). Others have either sporadically hosted fellows throughout the years, hosted just one fellow at a time when there was a particular need or interest, or are current hosts that may yet welcome additional fellows in the future.⁵

The institutions offering CLIR postdoctoral fellowships include those approached by CLIR at the outset of the program (Brunner 2010), as well as others that have approached CLIR over the years. Once an institution becomes a CLIR postdoctoral fellowship host, there is an ongoing dialog between CLIR and the host, particularly as CLIR provides educational support for both new and continuing fellows. (The salaries of those awarded the Postdoctoral Fellowship in Academic Libraries—as well as some parts of the Data Curation fellowships—are funded by the host institutions themselves, rather than by CLIR or its funding agencies.) This educational support takes the form of a one- to two-week orientation “bootcamp” held at Bryn Mawr College at the start of the fellowship,⁶ monthly online synchronous sessions featuring guest speakers and updates from fellows, and a winter seminar that has been held at various venues over the years, including the 2013 Coalition for Networked Information (CNI) winter membership meeting and the 2014 DLF Forum (Brunner 2010; CLIR 2015; Henry and Smith 2013).

The parameters within which host institutions offer their fellowship positions are outlined on the CLIR website (CLIR 2015), and the application process for prospective fellows in the first years of the CLIR Postdoctoral Fellowship Program has been summarized by Brunner (2010). Beginning in 2009, to better align with the academic hiring calendar and to adjust to the ever increasing number of fellowships and applicants, CLIR adopted an application process reminiscent of the Fulbright Fellowship model, in which CLIR staff and past or current fellows first evaluate candidates' qualifications and then make candidates' applications, including preliminary reports generated by CLIR, available to host institutions for review. Hosts then typically conduct their own interviews before selecting their preferred fellow(s) and making an offer.

5 Additional statistics on the CLIR Postdoctoral Fellowship Program are presented in an infographic available at <http://www.clir.org/fellowships/postdoc>.

6 For more on the pedagogy of the CLIR Postdoctoral Fellowship Program, see Coats and Shore, “Postdoctoral Pedagogy” in this volume; for an overview of the content and nature of the bootcamp in its present form, see CLIR postdoctoral fellow Jessica Otis' Storify chronicle of the 2014 orientation at Bryn Mawr College.

Critiques and Resistance

The CLIR Postdoctoral Fellowship Program has not been without its detractors over the years. However, critiques of the program tend to revolve around one particular misconception about the program: the erroneous belief that the CLIR postdoctoral fellowship is a “fast-track entrance to coveted positions in academic libraries without the need for the traditional LIS [library and information science] education and resulting degree from an accredited program” (Bell 2006). Unfounded though it is,⁷ this critique appeared at the very outset of the program, even before the first cohort of fellows had been selected (Berry 2003). Questions surrounding the necessity and ultimate goals of the CLIR Postdoctoral Fellowship Program, as well as larger questions (e.g., whether candidates with subject doctorates but without library degrees could, or should, find a place within the twenty-first century academic library) persisted for several years after the first CLIR cohort took up their fellowships in 2004, with librarians, library administrators, and numerous CLIR fellows engaging in vigorous discussion.⁸ The debate largely disappeared from the literature around 2006, most likely because, as Rentfrow (2007) noted, more and more CLIR postdoctoral fellows were by then completing their fellowships and going out into the professional world, effectively forming the program’s proof of concept and thereby quelling many of its detractors.

A second round of critiques directed at the CLIR Postdoctoral Fellowship Program began in April 2011, immediately following a lecture delivered at The Pennsylvania State University by Jeffrey Trzeciak, then university librarian at McMaster University. In his lecture, entitled “Transforming Traditional Organizations,”⁹ Trzeciak made a case for hiring PhDs to fill positions previously held by librarians with the traditional MLIS (Ciszek 2011). Dubbed “Trzeciak-gate” (Bell 2011) or “McMastergate” (Dupuis 2011), the lecture set off a firestorm on social media and brought past anxiety about the CLIR Postdoctoral Fellowship Program back to the surface. By that time, the program was well established at the McMaster University Library (Trzeciak, Maclachlan, and Shenker 2011), but it had not,

7 The fellowship was explicitly announced as a one- to two-year fellowship open to all recent PhDs in the humanities—including, but not limited to, those already holding an information studies degree (as at least one fellow from the first cohort did)—with the aim of fostering “a new kind of scholarly information professional” (CLIR 2003). From the beginning, CLIR staff took no position as to where fellows might find employment at the conclusion of their fellowships, suspecting that some might take up hybrid positions based in both academic departments and university libraries (Marcum 2012); as the years went on, it became clear that fellows would go on work in all manner of academic and alt-ac positions, both within and outside the library (Brunner 2010; Marcum 2012). A complete list of all current and previous fellows and their host institutions is available at <http://www.clir.org/fellowships/postdoc/fellowsupdate>.

8 See, for example, Bell 2006; French et al. 2005; Neal 2006.

9 Although video of the presentation is no longer available on the Penn State Libraries website, an abstract of the lecture may be found at the Libraries Colloquia Committee web page at <https://www.libraries.psu.edu/psul/groups/colloquia.html>, and much discussion of and reaction to the lecture remains readily available online (see, e.g., Bell 2011).

it should be noted, proven to be a fast track to academic librarianship nor a solution to libraries' long-term staffing needs. Particularly when bloggers or other commenters misstated or decontextualized Trzeciak's prediction that future McMaster Library staff were more likely to have PhDs, come from an information technology (IT) background, or have skills we haven't even thought of than to be traditionally trained librarians and paraprofessionals¹⁰—that is, when Trzeciak's prediction was presented as if he were advocating for a staff full of CLIR fellows, rather than outlining the likely skill set of future long-term hires—the CLIR fellowship once again became a lightning rod for a host of anxieties relating to the future of academic librarianship.¹¹

Although the misconception continues to crop up in the occasional publication (e.g., Webb 2012, 116–120, 122–124), the resistance—or at the least, isolation—reported by early fellows in the program appears to exist no longer; the more recent fellows tend to be quickly integrated into new or existing collaborative endeavors at the start of their fellowships (Williford 2013). This rapid integration is again likely the result of host institutions' recognition, some 11 years on, of the value of a CLIR postdoctoral fellow. The 130 past and current fellows, and their varied successful projects, are too numerous to delineate here,¹² but they stand as testament to what can be accomplished by a well supported recent PhD during a limited-term fellowship in an academic library. Alumni of the CLIR Postdoctoral Fellowship Program, as befitting their diverse academic training and skill sets, have moved on to a wide array of positions in libraries and IT organizations, academic departments, government, law, and independent consulting all around the world. Of the 71 former CLIR postdoctoral fellows, only 18 are currently employed by the institution that sponsored their fellowship; of those 18, many are based in new or different departments than the one in which they originally held their fellowship. And while some former fellows who did not previously hold library science degrees have chosen to pursue one, all fellowship alumni no doubt continue to use the broad range of skills that they acquired during their fellowships in their post-fellowship endeavors.

10 The relevant slide from Trzeciak's lecture is available at Rogers' 2011 blog post, "This Is Not the Future of Librarianship."

11 For a balanced response to both the Trzeciak lecture and the ensuing firestorm, see, e.g., "Laika," *A Library without Librarians? The Opinion of a PhD-Librarian on the Jeffrey Trzeciak Controversy* (Laika 2011).

12 A selection of fellows' projects is available at <http://www.clir.org/fellowships/postdoc/projsandpubs>.

Contributions, Collaboration, Collegium: The CLIR Postdoctoral Fellowship Program in Its Second Decade

Perhaps the best way to describe the CLIR Postdoctoral Fellowship Program in its current state is as a *collegium*, a group of diversely trained, deeply engaged, and dedicated scholars working together to solve the issues facing academic libraries today. CLIR fellows may be based at a variety of host institutions throughout the United States and Canada, but their orientation seminar, monthly synchronous sessions, and winter meeting create a cohesion that is seldom found among fellows or alumni of other, similar postdoctoral fellowships, particularly those in the humanities. Furthermore, CLIR fellows are dedicated to enhancing library collections and services by applying their specialized skills to the needs of their host institutions, and this like-mindedness of purpose has proven to be a bonding agent for many current and former fellows, even as the program has expanded beyond humanists to include those in all fields of study and many diverse types of fellowships. This cohesion, fostered so fervently by CLIR, drives the continued expansion of the program as it enters its twelfth year.

Participation in the collegium that is the CLIR Postdoctoral Fellowship Program need not end when the fellowship ends. Fellows who seek continued engagement with CLIR and the postdoctoral fellowship community at large find many outlets for their talents. From serving as pedagogical consultants at the annual orientation seminar to speaking to fellows at their monthly synchronous sessions, from contributing to CLIR's "Re:Thinking" blog to collaborating on CLIR publications such as this essay collection, and from engaging in informal mentorship via e-mail and social media to cooperating on formal panels, presentations, and research projects, the possibilities for meaningful engagement with CLIR and with one another are numerous and ongoing. As a result, the program is much more than a one- or two-year experience; rather, it is a college of scholars offering sustained engagement with critical issues well beyond the fellowship years.

The output of CLIR postdoctoral fellows is further testament to the program's longevity and success. In addition to their contributions to an enormous range of research library services, projects, and products, CLIR fellows past and present have authored or coauthored numerous publications about their fellowships (e.g., Kouper 2013; Kouper, Akers, and Lavin 2013), as well as on topics of interest to the greater academic library community and within their areas of specialty.¹³ Principal among the current topics of conversation at CLIR is collaboration, which is not only an integral facet of a successful postdoctoral fellowship, but also a pervasive component of contemporary academic engagement both within and outside of the library (Henry and Smith 2013; Marcum 2012; Waraksa 2014; see

13 See above, n. 11.

also the essay by Rose-Steel et al. in this volume). It is this essential feature of the twenty-first century information landscape that CLIR fellows embody, and the collegium that is the CLIR Postdoctoral Fellowship will doubtless continue to model—and improve upon—its by now well established tradition of scholarly collaboration as it moves into its second decade.

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Postdoctoral Pedagogy

Lauren Coats and Elliott Shore

Every summer since 2004, recently minted PhDs have gathered at Bryn Mawr College for a seminar that inaugurates their CLIR postdoctoral fellowship. Held in classrooms recently modernized—spaces that serve as linchpins of ivy-walled histories to techno-chrome futures—the seminar proposes that participants too might help forge connections between the past and future of higher education. This connection is not merely aesthetic. The CLIR Fellows Program was born of the conviction that by introducing some of the finest young minds of the current generation into our libraries, they could become a force for change. The seminar has been an instrumental piece of this vision, a shared and founding experience that has produced a collegium of fellows attuned to the same problems and uniquely positioned to address them.

The seminar's content responds directly to the issues that inspired the program's foundation. The creators of the program had agreed that academic libraries were facing a crisis: opportunities to develop leadership were inadequate for bringing library organizations and collections into the emerging digital environment for higher education. At the turn of the twenty-first century, the information revolution had engendered what would prove a perverse effect: many had expected that the advent of digital technology would reduce the need for traditional research and teaching knowledge. In this new world, they believed that a technically savvy leadership would be adequate to manage the transition that blended ivy-lined quads with the virtual campus. The opposite proved true: the digital transformation of higher education created a demand for deeper skills development and broadly informed leadership, leadership that

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required experience with traditional values and inherited methods of research and teaching in combination with a refined understanding of the implications and disruptive potential of the second machine age (Brynjolfsson and McAfee 2014).

As scholar and higher education innovator Cathy Davidson notes:

Almost all the institutional apparatus that now governs our forms and norms of higher education were developed in the period from 1870 to 1925, the height of the Fordist industrial age. . . . Quite precisely, the late nineteenth-century research university was structured around the affordances of the last information age, when steam-powered presses and machine-produced paper and ink made print abundantly available to the masses for the first time in history and the new technologies of electricity and telegraphy were extending the reach of mass, top-down broadcast media through film and radio (2014, 6–7).

The future, the program's founders agreed, would flourish only with a judicious melding of past practice and thoughtful, imaginative application of new tools and resources. The challenge went well beyond technology: the inherited cultural and behavioral customs of higher education needed to be re-examined in order to manage more efficiently our evolution into the twenty-first century. A variety of interested stakeholders convened in Sarasota, Florida, in 2003 to negotiate one response to this challenge: the CLIR Postdoctoral Fellowship Program. Leaders from the academy, from the funding community, and from libraries and their associations gathered at the invitation of Deanna Marcum, then president of CLIR.¹ To move institutions of higher learning out of the affordances of the last information age, it was agreed that the CLIR fellowships would focus on the structure and organization of, and access to, information in the twenty-first century. Yet the group collectively acknowledged that the most critical components of such an effort would be the people; it was imperative to gather together the most talented minds steeped in the traditions, the languages, the research methods, and the critical thinking skills of academic scholarship and inquiry. Who is more thoroughly steeped in these than recent graduates of PhD programs? By catalyzing change in the ways that academic librarians conceive of traditional workplace boundaries, recently minted PhDs could embrace new information technologies while holding close the ideals of the academy, the library, and most especially those of advancing scholarship and learning.

Implicit in this framing of the program's development is the centrality of education to the fellowship program, in terms of providing fellows (and the institutions they join) with a new perspective on the inherited values, methods, and customs of higher education, as well

1 Those present at the Sarasota meeting were Chuck Phelps, Francis Blouin, Jerry Campbell, Rick Detweiler, Paula Kaufman, Suzanne Lodato, Richard Lucier, Deanna Marcum, Susan Nutter, Elliott Shore, Winston Tabb, Karin Trainer, and Karin Wittenborg.

as a space to imagine alternatives. When CLIR and its partners began to develop the parameters of the fellowship in 2003, Elliott Shore, then chief information officer, director of libraries, and professor of history at Bryn Mawr College, posed the question of the program's pedagogical orientation: How would CLIR foster in the groups of fellows the kinds of understanding they would need to take on the challenges that were already so daunting to the library community? The discussion that ensued confirmed that education should become an explicit part of the program. With a directive to develop a pedagogical component to the fellowship, the work of defining the fellowship's educational program had begun.

The summer seminar emerged as the program's central education component. As co-leaders of the seminar since 2008 (the first year that Lauren taught the seminar; Elliott has been teaching it since its inception in 2004), we have worked to develop a pedagogical experience that lays a foundation for the learning that continues throughout the fellowship. As tokened by its name, the seminar is in many ways traditional: walk into the classroom on any given day of the seminar, and you will find activities that you might expect to find in any graduate course, whether a guest lecture or a reading discussion or a collaborative research project. But in significant ways, the seminar is unlike a traditional course, and its formation reflects our response to four guiding questions that challenged us to re-think how we teach, and how a classroom functions. What exactly is the subject matter of the seminar? How do we "teach" such a class, in which the "students" are already deep experts in their subject areas, veterans of their respective college and university programs, and, often, seasoned teachers in their own right? How could the work of the seminar be made integral to the duration of the fellowships? And, how could we help the fellows enter the specific culture of the academic library, to respect its traditions and strengths while also being a force for change within that institution?

The answer to the first question is deceptively clear. The CLIR postdoctoral fellowship focuses on the creation, organization, and distribution of new forms and scales of information: terabytes of born-digital data from lab equipment, or the large-scale digitization of manuscripts, printed pages, and other analog information that make them widely accessible and computationally query-able. In the broadest sense, this focus gives the seminar its subject. Yet as the discussion above suggests, the issues that the fellowship addresses involve fostering leadership and changing embedded cultural habits. In other words, we build our pedagogy on the proposition that working with information today is not simply a matter of acquiring more information. So, for example, while we invite guest speakers who are at the cutting edge of data curation, digital humanities, and new information technologies and strategies, these guests model ways of inhabiting and navigating institutions as much as they dispense specific knowledge about their areas of expertise. We identify the seminar's subject more properly as exploring the kinds of roles and relationships that the fellows must have to lead others in new

forms of knowledge construction and navigation. We maintain that the human infrastructure of institutions is as important to information management as the technologies in use. Moreover, the people at the heart of the program—the fellows themselves—are already highly qualified, well trained, and passionate about the work they do in the academy. This recognition identified, for us, two of our three pedagogical goals: first, creating a cohort of fellows who can work together, relying on each other's expertise and shared mission even when geographically dispersed; and second, focusing on the roles that the fellows can occupy rather than just on specific skills or subject expertise.

Our third pedagogical goal developed from the question of how to prepare recent PhD recipients to work in libraries. The fellows are tasked in their fellowship with helping to think through how scholarly information should exist in the twenty-first century college and university. But merely having “access to technology does not guarantee access to knowledge” (Balsamo et al. 2013, 6), and the fellows must consider not just the tools, machines, and bytes, but also the kinds of knowledge construction—including the kinds of knowledge workers—that such systems support. One form of knowledge construction to which the program responds is the narrowness of U.S. doctoral education. It fosters the development of deep, but not wide, knowledge; it educates extraordinarily talented groups of people to know the most about the thinnest slice of the human experience, to come out of graduate programs with the surest sense of their fields. But they do not learn much about the context in which they have spent their years in the university. The emphasis is almost exclusively on inherited forms of research, writing, and teaching. This myopic focus has been changing in recent years, as more graduate programs include attention to the conditions of graduate education as well as to new forms of scholarship and scholarly communication. The CLIR Postdoctoral Fellowship Program and seminar have from their inception centered on these issues. More particularly, we asked ourselves how we might design the educational experience to forge new connections between the structure and function of the library and doctoral training. How could the deep subject expertise and rigorous research methods that the fellows have already learned be married to the library's strengths in knowledge organization, retrieval, preservation, and production? The answer was not to replace one narrow kind of training (doctoral training) with another (library training), but instead to work with these brilliant young scholars to recognize their doctoral programs and the library as features of a much larger institutional matrix. Thus emerged our third pedagogical goal: a focus on orienting fellows to the landscape of higher education.

The three pedagogical goals merge in the summer seminar, in which we invite all participants—the fellows and the guests—into a set of conversations about the state of higher education, the research library, and twenty-first century information. The seminar kicks off the several pedagogical components of the Postdoctoral Fellowship Program, each of which supports the participatory, collaborative,

and open-ended embrace of the possibility of inhabiting well-established structures (the university itself) in new ways. The components include: the intense, in-person summer seminar that inaugurates the fellowship and that is the focus of this essay; monthly, online “synchronous sessions” for all current fellows in which we discuss topics selected by them; informal chats through the fellowship website; and two additional, shorter, in-person seminars held in the winter of the fellows’ first and second years. In some ways, the seminar’s pedagogy is nothing new: it evolved by linking the means and modes of education to its purposes. The Postdoctoral Fellowship Program’s curriculum reflects the issues, and at times the methods, of new pedagogical models—from massive open online courses (MOOCs) and flipped classrooms to badges to maker culture and more. What the CLIR seminar has in common with such models a sense of the transformative possibility of higher education in the digital age, and the need for such transformation on the level of the learning experience, of the moment when people turn information into knowledge.

We set out in the pedagogy of this seminar to provide context, to find a common language, to learn from one another and learn to rely on one another. We have developed content modules that ground our project of re-orienting ourselves within the academy: we have discussed how to decode various parts of academic culture and participate in effective communication inside a bureaucracy. We have thought through together how to read the professional literature of librarianship, on one end of the spectrum, and, on the other, to think in terms of data, the conceptual unit of twenty-first century information, within and across disciplines. We have established traditions, such as reading some of the same texts,² and inviting the fellows from earlier cohorts to help prepare the newer cohorts. We have questioned the structures of academic information that underpin knowledge making in the academy through the lens forged by a distinguished group of guests, some of whom have been with us year after year, in dialogue with each year’s new cohort of fellows. We have tried to inspire the desire to change these structures. We have sought answers together, valuing the ideas of the group as developed through the intelligence of the individual. Mikhail Bakhtin argues that tone, particularly laughter, is central to producing an analytical revision that makes the familiar strange. We have encouraged a laughter that “has the remarkable power of making an object come up close . . . where one can . . . doubt it, take it apart, dismember it, lay it bare and expose it, examine it freely and experiment with it.” We have worked to create an intimate, critical space where, with a shared joy in knowledge making, we “clear the ground for an absolutely free investigation” of a world we thought we knew so well, that of the academy (Bakhtin 1981, 23).

2 A common reading has been Battles 2003, *Library: An Unquiet History*.

Building a Cohort

We meet in classrooms at the opening seminar at Bryn Mawr College, but the classroom as traditionally conceived is perhaps the least representative space of the seminar. Even if “flipped” or team-taught, the grounding assumption of the traditional classroom is that expertise resides in the “teacher of record,” a term of educational bureaucracy that captures well the sense that only certain individuals have the requisite authority and expertise to fill in perceived knowledge gaps. The staffing and syllabus of the CLIR seminar challenges this model. It focuses on the value of using partnerships to explore pedagogical practice as described by scholars of academic development, including Mick Healey and Alison Cook-Sather.³ The key notion we draw from this work is that teachers and learners can contribute in equal but different ways to the classroom, to teaching and learning through various forms of collaborative exploration and planning. Thus, even the teaching of the seminar is collaborative: rather than just one or two people holding all the knowledge and dispensing it, the seminar includes a wide range of voices and positions and perspectives to underscore that the work we are undertaking requires more than one body and one mind to succeed. Since the program began, there have been four co-leaders of the seminar: Elliott Shore (2004–2015), Christa Williford (2005 and 2006), Danielle Culpepper (2007), and Lauren Coats (2008–2015). Beyond these “teachers of record,” the collaborative teaching model involves bringing in many guest speakers and the fellows’ supervisors, as well as the fellows themselves. In other words, everyone who participates in the seminar does so as both student and teacher. Rather than conceiving of a knowledge gap that needs to be filled (a passive Fordist model), the seminar’s teaching suggests a collaborative approach to co-creating the pedagogical outcomes.

On a small scale, we introduce activities into the syllabus that foster collaborative problem solving. For instance, we have asked fellows on the seminar’s first day to form small groups and, in the space of just an hour or so, research an issue confronting academic libraries and propose an approach to it. This case study method asks them to become, in the context of the seminar, the authorities on a particular issue. (Topics have included best practices for data publication, the fate of the reference desk, collection development policies for born-digital materials, and the relationship between digital humanities centers and the library.) The fellows are thus introduced to some key topics in academic librarianship, and most importantly, they have the opportunity to think with their cohort about how to address them.

On the seminar’s last day, a follow-up exercise has the fellows propose group projects that they could work on throughout their fellowship. After having known each other for a matter of days, the fellows articulate a problem that is central to their fellowships (and thus to the libraries in which they will work) and develop ways to

3 See Healy, Flint and Harrington 2014, and Cook-Sather, Bovill, and Felten 2014.

address it that call upon their shared expertise. Although the exercise is precisely that—an exercise—we have found the results impressive. Over the ten years of the program, CLIR has built in additional support to enable fellows to develop real projects beyond the seminar's close (often ones whose conception is seeded at the seminar), to activate their cohort to build the library of their future beyond the local limits of their particular institution. One example is the foundation of *Archive Journal*, a project born out of a seminar conversation among fellows and Donald Waters of The Andrew W. Mellon Foundation. Lauren Coats proposed the original idea for the journal, Mellon and CLIR supported it, and collaborations with many colleagues including fellows helped make it a reality. The writing project of which this essay is a part, to give another example, models a form of active, collaborative knowledge making by program participants. The program has also moved to include microgrants for collaborative projects by fellows as a way to structurally encourage the cohort-based collaborations that begin in the Bryn Mawr seminar.⁴

This collaboration depends on creating a community among the participants, most particularly among the fellows themselves. The days shared at Bryn Mawr College help cement this community. The fellows spend an intensive amount of time in close proximity, sharing classroom space, living in shared quarters, eating together, and thinking together. Time outside of the classroom is integral to the seminar's success, such as an annual dinner at Elliott Shore's home that has become a cherished part of the seminar. The in-person aspect forges connections that last beyond the bounds of the seminar. The focus on cohort builds upon the [LEEP Program at the University of Illinois](#).⁵ This first of the online programs in library education from the late 1990s used the power of linked information technologies to create annual cohorts of graduate students by having them meet all together in the summer before they began their formal course work, then put them in classes that met synchronously every week or two, then finally and perhaps most importantly, brought the group face to face again in the middle of each semester for a long weekend of intense teaching and learning. All of these practices found their way into the Postdoctoral Fellowship Program: the main pedagogical experience that is the opening summer seminar; the monthly synchronous sessions throughout the year; and the second, brief, in-person meeting held several months after they first gather in Bryn Mawr College. The synchronous sessions have played an important role in keeping the cohorts together between face-to-face meetings. These sessions include check-ins on how things are proceeding at

4 For more on the microgrants and the projects they have seeded, see the contribution by Tamsyn Rose-Steel et al. in this collection.

5 The syllabus for the first cohort, which has slowly changed over the course of the past decade, was developed by the associate dean for academic programs at the University of Illinois Graduate School of Library and Information Science (GSLIS), Linda Smith, in consultation with Elliott Shore. The technologies that connected the cohort in between our face-to-face sessions were developed by Vince Patone, formerly director of LEEP's instructional technology and an inspired teacher himself, who never asked his faculty what technologies they wanted to use, but asked them how they liked to teach.

each institution, as well as conversations with expert guests chosen and led by fellows. As a coordinated whole, the seminar and other educational components work to build the fellows' community as a resource in itself.

Orientation to the Higher Education Landscape

The seminar's pedagogy embraces teaching and learning grounded in the understanding that knowledge is co-created; that teaching, learning, and research are intricately interwoven; that digital technologies are powerful largely because they connect people and ideas with one another; and that a university is most powerful when all of its constituent parts work together in a collaboration based on mutual respect rather than hierarchy. It is this last point that has become the second goal of the seminar: to orient fellows to the conditions of possibility of the university and the fellowship. What synergies exist between bureaucratically separated parts of the institution that could use the assistance of a postdoctoral fellow who can move easily between and among settled organizational forms? To see such synergies requires the ability to see the institution more broadly. Although doctoral training provides deep subject knowledge, it does not (usually) involve a critical examination of the structures that enable knowledge construction. Borrowing from the insights of critical university studies, part of the fellows' seminar is devoted to a large-scale discussion of how the university and the library work. The discussion provides an institutional context for the smaller scale decisions within libraries, organizations, and programs about how to create, organize, and distribute scholarly information. This is a matter of orientation rather than mastery; it is not expected that over the course of the short summer seminar fellows will master a finite checklist about the institutional system of libraries and higher education, or even of information resources specifically. Rather, the focus is on introducing fellows to some of the ways in which institutions are "mobilizing networks" that "aggregate, coordinate, disperse, balance, and adjudicate complex flows of resources" (Davidson and Goldberg 2010, 129). To redirect these networks, then, requires a practical understanding of how higher education institutions and the library function.

To develop this understanding, seminar participants read about the history of libraries, discuss university budgets, and begin to learn the lexicon of academic librarianship. On what has become the signature day of the seminar, fellows' supervisors and major funders (Donald Waters of The Andrew W. Mellon Foundation and Joshua Greenberg of the Alfred P. Sloan Foundation have been frequent guests) join the seminar to discuss what needs to change in higher education. And—perhaps most important—throughout the seminar the fellows talk with each other across their diverse disciplinary and training backgrounds to identify commonalities. It is here that one

sees most clearly how the individual perspectives of the seminar leaders and participants create a rich and varied sense of the landscape of higher education. At the beginning of the program in 2004, almost all of the fellows came from the humanities and the qualitative social sciences. In the past few years, however, the program has grown to include quantitative social scientists and natural scientists. Glimpses of the kinds of exchanges that take place in the seminar offer some sense of how participants become oriented to, and begin to consider altering, the higher education landscape.

One of the most remarkable moments in a recent seminar involved a question asked by one of the humanists in the group, late in the first week of the Bryn Mawr College experience. She asked to be reminded who in the room was a natural scientist, social scientist, or humanist; the disciplinary differences that are usually taken to be so evident and integral were, we found, not necessarily so when discussing the structures of scholarly information. The commonalities as well as the differences among us enriched our learning as the cohort developed into a cohesive and variegated community. A fellow with a natural science background objected to a very loose, metaphorical use of the term “ecosystem” by the humanists in the room, and we engaged in a deeply thoughtful conversation about who owns which words and how meaning can shift. A computer scientist/philosopher/dean of a library and information science program enthralled a recent cohort with his intensely focused presentation of the intricacies of linked data and the ways in which our choices in this realm are crucial to the future of scholarly inquiry regardless of disciplinary orientation. Funders share with the fellows their interest in supporting ideas with the potential to change a field, emphasizing the importance of a broad impact for local, subject-based, or disciplinary projects. The supervisors and the fellows together engage each year in a tightly organized workshop that shows how the norms particular to each participant’s place in the university shape expectations and hopes for the fellowship.⁶ Discussing these norms not only leads to concrete suggestions for confronting the inevitable bumps that occur along the way, but also provides insight into the distinct cultural practices of different groups within the academy and ways in which they might productively articulate.

Focus on Roles

Although institutions are necessarily conservative insofar as they “validate and impose norms, practices, and beliefs, seeking to ensure orderly interchange through normative interactions” (Davidson

6 The key change of inviting the supervisors of the fellows to share in the experience came from Marta Brunner, now director of the library at Skidmore College, who was a CLIR postdoctoral fellow of the third cohort in 2006. She not only suggested this change, but became a regular participant in that part of the seminar for a number of years. Brunner’s impact on the seminar exemplifies the ways in which the seminar has been shaped by fellows’ input, an example of our pedagogical philosophy that emphasizes the co-creation of the seminar experience and outcomes. Each year, fellows provide feedback on the seminar, which we use to refine the experience.

and Goldberg 2010, 129), they also have potential for change and innovation. The goal of orienting fellows to higher education as a mobilizing network thus also requires situating the fellows themselves within this network, each well positioned and well equipped to make change. In the seminar, we work together to explore the possibilities and limitations of their positions as postdoctoral fellows. The groundbreaking work of Alison Cook-Sather informed from the very beginning the ways in which we engaged in this exploration. Discussion of one of her texts, “Unrolling Roles in Techno-Pedagogy: Toward New Forms of Collaboration in Traditional College Settings” (2001), was a pivotal moment for cohorts in the early years of the seminar. This article, based on a three-year project in which teams of faculty, librarians, students, and information technology (IT) professionals met to discuss how to incorporate technology into undergraduate teaching and learning, was crucial in helping the early cohorts to imagine themselves in the liminal space that they would inhabit. Cook-Sather explains: “Cast in a particular position, members of an academic community enact what they understand to be their prescribed parts,” yet these roles can be “unrolled” to challenge the “traditionally prescribed parameters of participation in educational theory and practice” (2001, 4, 6). This perspective illuminates the ways in which the fellows navigate various roles that they can inhabit—of librarian, of PhD-certified subject expert, of teacher, of outsider, of insider. Although all involved in the program recognize that liminal space has its limitations, the fellowship program is predicated on taking advantage of this “in-betweenness,” the experiential opportunity to see how these various roles do or could support one another.

The focus on roles, principles, and methods stands in contrast to a pedagogy that emphasizes finite skills or resources. The place of skill building has long been a concern in putting together the educational experience for the fellows. We recognize that, to do the work of their fellowships and beyond, the fellows need particular skills.⁷ And yet, for the fellows group—which every year has increased in number and diversity—there has been a marked absence of any single set of skills that every fellow needs. Fellows’ jobs and their professional preparation are sufficiently varied that there is no one skill—how to conduct a data interview with a researcher, how to do text analysis with R, how to implement an institutional repository—that applies to all fellows. Because of the diversity of fellows’ needs, the seminar has developed as a form of nonvocational preparation. In this spirit, the seminar focuses less on a particular skill set than

7 And we recognize that some of the skills they will need are not part of graduate education as currently instantiated. This situation stems in part from the narrowness of doctoral education as well as from its tendency to replicate norms of earlier eras. It also comes from the simple fact that the fellows are being asked to do new kinds of work, following career paths that fall outside the training of most doctoral recipients. On the former point, see Bethany Nowviskie’s call to reformulate graduate training for “21st-century humanities” by introducing graduate students to “research skills, corpora, and trends” that reflect new technologies and possibilities (Nowviskie 2011). On the latter point, see Meredith Beck Sayre et al., “Toward a Trackless Future,” in this collection.

on the structural position of the fellow. As part of the fellowship, fellows are encouraged to identify the ways in which they can define their own roles, which in turn requires them to determine what they will need to learn as part of their fellowship. We often end the seminar by having fellows plan, formally or informally, how they will continue their education over the course of the fellowship. We ask them how they will use the monthly synchronous sessions (e.g., what guests they would like to have, what topics they would like to discuss), as well as the CLIR resources and community to customize their own education. Several fellows, those in data curation fellowships funded by the Mellon and Sloan foundations, receive stipends dedicated to individual training and professional development. For all fellows, the program's educational component is intended to give them the specific tools they need to leverage their structural positions at just the right time. Cook-Sather's emphasis on the issues of labor and role rather than a naïve techno-determinism has been key to developing our pedagogy. She writes about the necessity of redefining the roles of individuals within higher education in order to build more intentional relationships among these differently positioned players, to share responsibilities for the educational project, and thus to enable productive collaboration (Cook-Sather 2001, 5). The summer seminar then becomes an opening orientation to a cohort experience in which fellows are encouraged to imagine—and live—the possibilities of working within and between the library and academic disciplines.

“One Long Muscle”

The summer seminar is the beginning of the path for the fellows. It has changed somewhat each year in response to fellows' suggestions and reflects the changing nature of the world of libraries and the status of the CLIR Postdoctoral Fellowship Program itself. The earliest cohorts were pioneers in a real sense. Over time, the courage of the more intrepid library leaders in hosting these fellows and the accomplishments of these talented individuals, working singly and collectively, have given the program legitimacy and proven its value. As the program has become more established, the seminar has changed in response. We have been able to focus less on the program itself and more on the broad contexts that gave rise to the program's inception and chart its future. Whereas reading essays from the library community that critiqued the program in its early years was once part of the syllabus, we now spend more time with funders, supervisors, and higher education leaders who help us see how the program fits into the puzzle that is higher education. As the number and kinds of fellows continue to grow—with annual cohorts building to 24 and 27 in recent years, from a range of disciplines—we have taken advantage of the increased diversity to use the fellows' own expertise to drive the seminar. We now have more small group sessions or activities in which the fellows themselves serve as experts or

teachers. In the 2015 seminar, for example, we held a THATCamp-style “unconference” for one seminar day in which the new fellows, joined by continuing and past fellows in the Philadelphia area, identified what they need to learn and how they can learn it from each other. The cohort gives fellows a group of people to whom they can turn through their entire career: it allows for a kind of deep networking for people who share a common experience that is significantly different from those of other academics. It is a group of people who have spent a considerable amount of time together in a liminal space where they have allowed themselves as well as been given the permission to question the authority of inherited cultures. As “teachers” of the seminar and as advisors to its educational program, we see our task as helping fellows understand and fearlessly inhabit their new roles. The seminar is the foundation for our shared work, forging a community around a collective identity and oriented to a long view of the academic world.

As the program has matured, and our experience has developed, we have been able to finesse the overall educational program. CLIR staff who have led the program (Christa Williford, Alice Bishop, and Rachel Frick) have spearheaded the drive to ensure that the program’s other educational components—the synchronous sessions and the in-person midyear meetings—are more coordinated with the summer seminar. In the early years of the program, the midyear meeting was held at UCLA, which has hosted many fellows. At the meeting, we would discuss in more detail some of the big issues that had surfaced in the summer seminar. We realized that this sequence of moving from the more general, big picture discussion of the summer seminar to the more detailed conversations of the midyear meetings could be amplified. By holding the midyear meetings in tandem with content-rich conferences (for first-year fellows, the annual membership meeting of the Coalition for Networked Information [CNI] and, for second-year fellows, the annual Digital Library Federation [DLF] Forum), fellows would have the opportunity to come together as a cohort to discuss shared issues and projects, while at the same time having access to much more granular and targeted conversations on particular topics. In other words, what has emerged for us is a deeper understanding of how all of these educational components share “one long muscle.”⁸ It has allowed us to embrace the fellowship program as a transformative learning experience for the fellows, as well as for the institutions and colleagues that they join.

8 “And that’s when you know you will live whether you will or not, one way or another, because everything is everything else, one long muscle” (Oliver 1979, 8).

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The CLIR Postdoctoral Fellowship 10th Anniversary Survey

Jason J. Brodeur, John C. Maclachlan, and Jennifer M. Parrott

The development and implementation of the Council on Library and Information Resources (CLIR) Postdoctoral Fellowship Program 10-year survey illustrates one of the great strengths of the program—bringing together people with varying academic skills and backgrounds in nontraditional settings to foster conversation and idea building. The original concept was to gather the fellows’ reflections on their experiences as CLIR postdoctoral fellows in the program’s first decade in order to celebrate the successes, identify the challenges, and look ahead. In addition, the survey was to explore the role of the CLIR fellowship in the fellows’ personal and professional development. The creators of the survey hoped for a better understanding of how fellows’ experiences were influenced by their participation in three areas: CLIR’s networking opportunities, CLIR’s educational programs, and fellows’ placements as researchers working in academic library settings.

Survey Construction and Distribution

Past and current CLIR postdoctoral fellows were invited to participate in the online survey, distributed via e-mail in late October 2013; a reminder was sent in December 2013. The survey was open for three months, closing in January 2014. After being asked for personal information, such as the cohort year of fellowship and host institution, respondents answered a series of short-answer and open-ended questions that encouraged them to reflect on the challenges and benefits of their fellowships, the relative value of various aspects of the CLIR Postdoctoral Fellowship Program, the skills they learned during their fellowship, and their accomplishments during their tenure.

Survey Results

The survey was completed by 51 of the 89 past and then current fellows, for a response rate of 57 percent. The results of the survey reflected four major themes: the value of the CLIR postdoctoral fellowship to subsequent positions, the overall value of the CLIR postdoctoral fellowship, the challenges faced by CLIR fellows, and the value of various components of the fellowship.

Value of the CLIR Postdoctoral Fellowship to Subsequent Positions. Of respondents who have completed their fellowships and moved on to other positions, 83 percent stated that they found their CLIR fellowship either completely or mostly relevant to their subsequent positions. One fellow explained:

The CLIR fellowship has been critical to my professional development. Although [it] was initially designed to match those with PhDs to library positions, I've found that it also did a great job of preparing me to be a faculty member. One important way that it does this is by raising my awareness of libraries, their needs, and their roles on campus. . . . The fellowship also positioned me to understand how the ecosystem of scholarly communications functions, including scholars, libraries, administrators, museums, and funding agencies; junior faculty rarely get glimpses into this in the way I did as a postdoctoral fellow.

Conversely, 17 percent of respondents classified their fellowships as somewhat or minimally relevant to subsequent positions. A member of an early CLIR cohort responded: "I hope it's changed since I did it. I feel it did little for my career overall."

Overall Value of the CLIR Fellowship. More generally, 90 percent of respondents ranked the value of their fellowship as "high" or "very high," while 10 percent rated the value as neutral; no respondents rated it as "low" or "very low." Fellows interpreted "value" differently; one respondent found value in the freedom and confidence gained through the work:

Through my specific job . . . and my broader engagement with CLIR, I feel I am in touch with a broader spectrum of people. Being able to talk to archaeologists, chemists, philosophers, librarians, computer scientists—to name but a few—allows me to think about my research in new ways and to explore avenues of investigation I could never have dreamed up in isolation. There is a culture of "yes" in CLIR and in the team I'm working with . . . which breeds confidence: I am encouraged to try things, to attend a variety of meetings and symposia, and I am given easy access to the resources I need—this gives me the sense that I can achieve my goals.

Similarly, another fellow specified both the acquisition of new knowledge and the opportunity to enhance the interpersonal skills that are vital to success in almost any career:

The CLIR fellowship has given me the opportunity to gain new knowledge about data curation theory and data curation in conjunction with the library and the campus settings, especially what it takes to help develop a new service. It has also helped me to meet talented people in the library and data world and build new relationships. The past CLIR fellows have been very helpful in giving me feedback on their own career experiences as they have readily answered my e-mails. I have learned many things about the library . . . and the various roles of librarians. At a personal level I've learned a lot about working with and observing people and the skills that are required to thrive and do well in this environment.

Challenges Faced by CLIR Fellows. Although most respondents valued their fellowships and found them relevant to subsequent positions, they also faced a number of challenges (figure 1). The most common were balancing and understanding time expectations (57 percent) and adjusting to a new work environment and culture (49 percent). Regarding the challenge of allocating time, one fellow explained:

Getting used to balancing my time has been difficult. I've been given a lot of freedom to design how I want to work, which on the whole is wonderful, but does leave me anxious as to whether I'm doing the right thing.

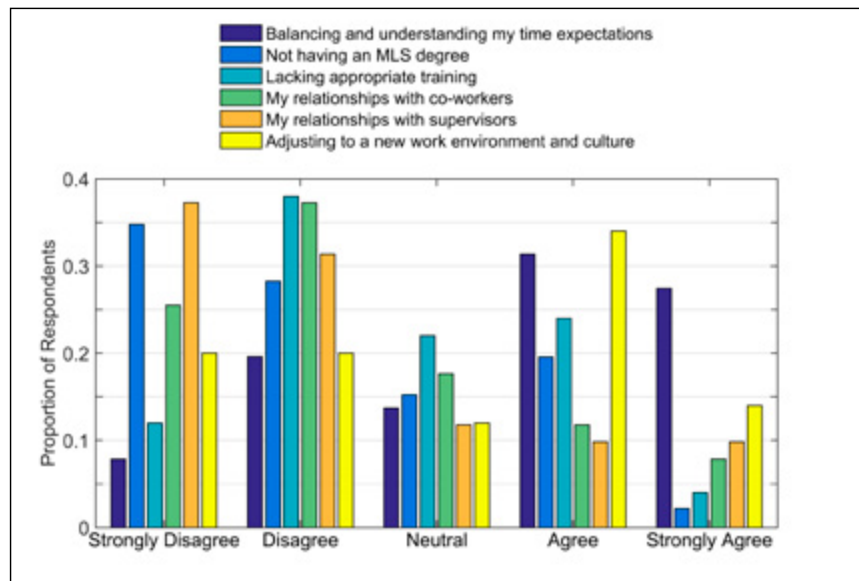


Fig. 1: Histogram of fellow agreement for various potential challenges for the CLIR postdoctoral fellows. Results reflect responses to the prompt: "As a CLIR fellow, I found the following aspects challenging."

Another fellow identified similar uncertainties, specifically in relation to assigned projects and time management: “Fellowship projects were not determined from the start but TBD [to be determined] as the fellowship progressed, making it difficult to know what was expected and how to arrange my time.”

Regarding the culture shift inherent in the fellowship, one respondent noted:

The culture and operations of the library were very different from those I had experienced during my academic research tenure. It took me a long time to understand the internal and external operations of the library.

Yet another fellow “remember[s] being flummoxed by the idea [of] show[ing] up for regular hours and attend[ing] meetings. Though . . . , in retrospect, those weren’t all that challenging to overcome.”

Approximately 30 percent of respondents found a lack of training to be a challenge:

With regards to training, while I [didn’t] feel at a disadvantage, I did feel I wanted to know more in order to be able to communicate effectively in the many different settings I find myself. Therefore, I’ve taken it upon myself in my spare time to learn some things about coding and computer science.

Additionally, 22 percent of those who responded found their relationships with supervisors to present a challenge. On the other hand, the survey revealed that not having a master’s degree in library science (16 percent) and managing relationships with co-workers (19 percent) were less common challenges among fellows.

In the process of facing these challenges, CLIR postdoctoral fellows acquired a variety of new skills and experiences and attained greater knowledge of library-related issues. Respondents noted the many opportunities for collaboration in their fellowships, particularly with librarians and other staff members. One fellow reported an improved “ability to work with others—after a disciplinary PhD that was independent work—and to negotiate challenging workplace politics and personalities.” Another respondent similarly found the shift in perspective, from individual researcher to team member, to be one of the most important take-aways from CLIR: “I think I have become a better researcher, one willing to collaborate with people outside of my discipline.”

Value and Benefits of the Fellowship Components. Overall, the majority of respondents perceived all aspects of the CLIR Postdoctoral Fellowship Program to be of “high” or “very high” value (figure 2). Most notably, over 70 percent of all responses assigned a “very high” value to the CLIR Postdoctoral Fellowship Program as a whole,

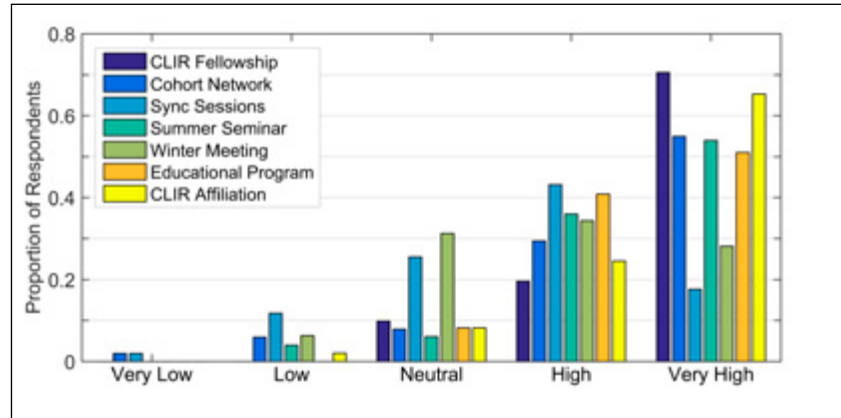


Fig. 2: Histogram of fellows' perceived value of various components of the CLIR Postdoctoral Fellowship Program. Results reflect responses to the prompt: "Evaluate the following aspects of the CLIR fellowship."

while over 90 percent perceived the value to be above "neutral." Elements such as the CLIR cohort network, educational program, and affiliation were also rated exceptionally high.

The perceived high value of the CLIR Postdoctoral Fellowship Program is supported by the many benefits that past and current fellows reported. Indeed, collaboration was one of the most commonly mentioned benefits of the fellowship, with one respondent noting:

Overall, the experience renewed for me the feeling that collaborative work is important and rewarding, and I was grateful for the chance to be a small part of a crucial conversation about the future of academic libraries.

Another respondent discussed the wide range of situations in which fellows could make use of the collaborative spirit fostered within the fellowship:

The connections that I have made both during and since my CLIR postdoctoral fellowship have deeply affected my work and research in the most positive way. Not only have I been almost continuously engaged in rich, rigorous, and enriching collaborative research projects, consulting teams, and other projects . . . , but I have been able to bring what I have learned from working within and around research libraries to my students in the classroom.

Likewise, respondents indicated that they valued the networking opportunities that accompanied their fellowships. These opportunities arise within CLIR cohorts ("my cohort network was valuable during the term of my fellowship, but it is the larger network of fellows and CLIR associates that is valuable to me now"); within the larger CLIR network ("being part of the CLIR network has resulted

in numerous, rewarding, collaborative consulting endeavors with CLIR staff and former fellows”); and beyond the confines of CLIR with the many librarians, technologists, researchers, and faculty members that fellows encounter through their work (“I believe I have become better at networking and forming working relationships with others in my field on account of the [number] of conferences and meetings I attend”). These responses make it clear that CLIR postdoctoral fellowships offer opportunities for personal and professional development to fellows who make the switch from academic to library career paths, as well as to those who ultimately return to academic positions.

In addition to collaboration and networking, many fellows commented on the wide range of tangible hardware- and software-related skills that they developed as part of their fellowships. These digital skills took many forms; for example, several respondents mentioned their engagement with metadata, in the form of advising projects and training graduate students in standards and input. Several respondents appreciated learning the skills necessary to manage and curate data, while others mentioned learning the skills for digital project management and an awareness of the wider infrastructural concerns for digital scholarship. One respondent discussed the importance of experiences with data curation:

In my doctorate experience, I found myself in a position where I encountered incredible resistance to best practices in large-scale data management. My experiences with CLIR, and my interaction with the CLIR fellows, have reaffirmed my beliefs on data management and have inspired me to continue to pursue data management and curation efforts in my research and current library position.

Other fellows specified the importance of learning technologies such as TEI and XML encoding basics, SQL databases, LibGuides, Python, and digitization of audio and text. One enthusiastic respondent proudly exclaimed, “I’ve also had to learn to use a Mac!!!” In short, CLIR postdoctoral fellowships have afforded fellows opportunities both to develop stronger collaborative and networking strategies and to enhance their digital repertoires.

Although fellows reported developing broadly used skills such as networking, collaboration, and a range of technical abilities, they also gained a substantial amount of library-specific knowledge. One fellow summed this up by writing, “I developed an understanding of the challenges facing the academic library community in terms of budget, digitization, and gaps in education.”

Fellows appreciated the firsthand knowledge that they gained about the inner workings of the library, including an awareness of library language, terms, and concepts; the roles of librarians; library budgets; and the history and culture of libraries. One fellow responded:

I had the chance to talk to librarians from other departments to learn the kind of work they do and their role in the library system—this was one of the most exciting things to do. I have talked to conservation and preservation librarians, science librarians, and a special collections librarian. I also joined various library tours to learn about the technical aspects that happen in other areas of the library.

Fellows also commented on their newfound appreciation for archives, specifically the ways that the knowledge of archive management and the preservation of archival material could benefit their work. They appreciated the ability to interact with rare materials and to learn the processes of the special collections reading room. Other fellows noted their growth in the field of content management, as they learned about digital content management, spatial collection methods, cataloging, referencing, preservation, and exhibit preparation.

The most common response was that fellows gained a better understanding of the role of the librarians, followed by a greater understanding of digital content management and cataloging. One fellow explained:

I gained a real awareness of libraries and a respect for the work librarians do. This has enriched my relationships with librarians and technology professionals, made me more earnest about developing these relationships, and conscious of how I advertise the benefits of libraries to my students.

Fellows also seemed to appreciate learning a more modern technique of digitizing data, and they claim to have a deeper understanding of the role of librarians and libraries in general; one respondent concluded, “I now see the production of knowledge from a completely different, higher-level view. I understand more of the ‘big picture’ of how information is created and disseminated.”

Moving Forward from the Results

The survey allowed for both an assessment of the value of specific components of the CLIR Postdoctoral Fellowship Program and a reflection on the ways in which the experience has benefited the fellows personally and professionally. It quickly became apparent that there had been dozens of collaborative efforts among past fellows on projects outside the confines of CLIR. Although not all responses were positive, the overall tone indicated a perception of the experience as beneficial. As put by one fellow:

Personally, CLIR leaders and fellows have been much more supportive and actively helpful than my graduate school mentors, in terms of understanding the stresses of the job market, taking on new roles, and the personal balancing act. Also, in terms of forging an “alt ac” identity.

Another fellow specified the variety of opportunities offered by a CLIR postdoctoral fellowship:

Professionally, it has given me a whole new career that absorbs many of [my] academic skills and interests, plus new perspectives and options. Library-land is not the perfect place for me, but I do have work, opportunities, and abilities that are much more relevant to the real world and problems I care about than I probably would have had as a career academic.

The results of this survey will be used to help the CLIR Postdoctoral Fellowship Program evolve to meet the needs of both fellows and host institutions. More specifically, CLIR will focus on improving communication between CLIR and host institutions, and on clarifying expectations and potential future career paths for the fellows. It is expected that these survey results will play an integral role in the evolution of the CLIR Postdoctoral Fellowship Program in its second decade.

Collaboration in the Evolving Academy: Experiences from the CLIR Postdoctoral Fellowship Program

Tamsyn Rose-Steel, Inna Kouper, Jennifer M. Parrott, and Katie Rawson

With the creation and development of its Postdoctoral Fellowship Program over the past decade, the Council on Library and Information Resources (CLIR) has purposefully seeded the academy with new professionals who have been initiated into the merits of collaborative work. Trained in PhD programs and embedded in or closely connected to the libraries, CLIR fellows are placed in positions that encourage them to break down the silos of individual departments, schools, and colleges. Because of the novelty of their positions, CLIR fellows are often able to help shape their responsibilities and define their roles. They consistently impart a collaborative spirit to their host institutions and respectfully reconstitute traditional boundaries of professional and academic culture to create a more permeable, vibrant community. Furthermore, through the development of a CLIR community, fellows become accustomed to working in groups that cross institutions and disciplines.

In this essay, we build on our own experiences as CLIR postdoctoral fellows and explore some of the successes and challenges of working in groups toward shared goals: how engagement in team-based projects shaped our understanding of the nature of, and necessity for, collaboration in the academy. We argue here for an understanding of research that can encompass both traditional-style solo authorship and new modes and methodologies. More broadly, we consider how the CLIR fellowship experience has molded our views on the future of higher education and reflect on what our collaborative experiences can demonstrate to the wider community.

Collaboration Defined

In a 2015 presentation, Joan Lippincott, associate executive director of the Coalition for Networked Information (CNI), distinguished between co-location, cooperation, and collaboration. The first is merely physical nearness, working in the same environment; cooperation she defined as communication to ensure harmony and to limit conflicts of interest; collaboration, she emphasized, involves several people working together to achieve mutual goals. Shared goals are the hallmark of collaboration. Individuals may have different interests and investments with regard to those goals, but these interests do not conflict with the proposed outcome of the project.

The kind of cross-disciplinary and cross-institutional work espoused by many CLIR fellows is gaining currency in the academy, yet institutions continue to be ranked as distinctly stand-alone organizations, evaluated by their individual contributions and outputs and competing with one another for funding, students, faculty, and prestige. Employees in the academy are often also individually assessed: job search and tenure committees, especially those in the humanities, frequently place greatest emphasis on solo projects and publications. Based on our experience, however, we can state with conviction: collaborative work can generate and address scholarly questions that could not have been imagined or answered alone; it can bring together unique combinations of talent, expertise, and perspectives. How can individuals who are placed within particular institutions and the constraints of their fellowships create collaborative spirit and relationships? How do CLIR fellowships nurture collaborative endeavors, and what methods and approaches are most successful?

In the following sections we reflect on how working together can benefit the future of scholarship and pedagogy in higher education. We look outward from our own experiences to question larger-scale structures of the academic landscape. In doing so, we hope to extend the notion of collaboration beyond research and to present a textured view of the assets and challenges of diverse types of collaborations. We do this to demonstrate how academics—even those trained in programs still tied to romantic notions of the lone scholar—can become productive collaborators and how, through their collaborations, they can expand knowledge and human capacity within and beyond the academy.

Experiences of Collaboration

Although CLIR fellows come from a range of research backgrounds, such as neuroscience, business administration, and the history of colonial America, and they work in many different settings, including archives, digital humanities programs, and data centers, most of the positions in which they are placed are project oriented. The fellows work to improve services, create new tools, and forge new ground in the production and preservation of research. The following four

projects, APRICOT, SEAD, Curating Menus, and Digital Scholarship at Bucknell, exemplify the wide range of endeavors in which CLIR fellows are engaged:

- [A Peer-Reviewed Interdisciplinary Collection of Objects for Teaching \(APRICOT\)](#) is an interinstitutional collaboration among five CLIR fellows. Its purpose is to produce a proof-of-concept site for a platform on which instructors in medieval studies will be able to share high-quality teaching materials, complete with peer review, versioning facilities, and metrics.
- [Sustainable Environments Actionable Data \(SEAD\)](#) is a large cross-institutional project funded by the National Science Foundation (NSF) for developing infrastructure to support data collection, curation, and discovery in sustainability science research. A CLIR fellow was hired to contribute her social sciences and information science expertise to this project. The fellow made the interdisciplinary team of computer scientists, software developers, domain scientists, and repository managers even more diverse in their skills and knowledge.
- [Curating Menus](#) is a small interinstitutional research and data curation project that stemmed from the meeting of a fellow and a librarian at a CLIR event. The project, which researches questions about food and culture using the historical menu collections from the New York Public Library, involves multiple stakeholders in three institutions and produces scholarship, software, curated data, and data infrastructure.
- [Digital Scholarship at Bucknell](#) reflects the most common kind of collaboration experience for fellows: working across departments, libraries, and schools within a single institution to facilitate and improve research. In addition to raising campus-wide awareness of digital scholarship and its potential for faculty and undergraduates working in the humanities, Digital Scholarship at Bucknell established a center in the library and identified faculty whose research would benefit from the resources offered by the center.

Each of these projects demonstrates ways that collaboration can be transformative in higher education and helps elucidate some of the challenges of collaborative work.

Enabling Collaborators: The CLIR Vision

CLIR describes itself as “an independent, nonprofit organization that forges strategies to enhance research, teaching, and learning environments in collaboration with libraries, cultural institutions, and communities of higher learning.” Its vision is to “transform the information landscape to support the advancement of knowledge” (2015a). Working with others is part of CLIR’s stated *raison d’être*, as it stands at a nexus of library professionals, information technology (IT) experts, research faculty and teachers, and administrators. The flagship Postdoctoral Fellowship Program puts this vision into practice by placing recent PhD graduates in the library and other

academic units to work on projects that “forge and strengthen connections among library collections, educational technologies, and current research” (2015b).

An increasing number of institutions seek to place CLIR fellows in digital research-related positions each year. Although the job descriptions for these positions vary, a common role that CLIR fellows are asked to play is that of translator. As recent PhDs, fellows have experience as academic researchers, and they bring their willingness to engage with research technologies—literally and analytically—to their library positions. Consequently, they can mediate between scholarly, library, and technical viewpoints on projects. These translator/facilitator functions range from giving a presentation to interested faculty or teaching technology use, to managing projects or developing tools, to conducting research in order to establish services. Often, fellows facilitate discussions among faculty, technologists, and librarians, with the goal of keeping expectations realistic and keeping projects on track. In this sense, fellows help bridge the many different interests and perspectives involved in large, complex projects.

In addition to supporting intra-institutional teamwork between scholars and librarians, CLIR has also encouraged collaboration among different institutions through the development of fellowships focused on specific areas of interest. This began in 2012 when the Alfred P. Sloan Foundation provided support for a number of CLIR fellows working in the field of data curation in the sciences and social sciences. Although these positions did not come with funding for collaborative work, their creation planted the idea that mutual interests among a subset of postdoctoral fellows could be rewarding.

In 2013, The Andrew W. Mellon Foundation funded a subcohort of fellows with a specialty in medieval studies and provided additional financial aid in the form of a microgrant program to foster collaborative endeavors. According to CLIR President Charles Henry, the subcohort program enables fellows to focus on “better understand[ing] the methodological challenges and strategies that digital data entail, as well as ways to preserve, sustain, migrate, and reuse this information in support of medieval studies” (CLIR 2012). The program has been successful thus far. In addition to engaging in interpersonal, back-channel conversations and scholarly debate, the medievalist group is working on a number of projects together, including an edited volume on medieval studies and digital humanities, and an effort to create a pedagogical hub for their field of study. It was to develop this hub (APRICOT) that the group applied for one of the Mellon-supported microgrants. Continuing the subcohort program, CLIR awarded fellowships to five early modernists in 2014, and in 2015, five specialists in visual culture will join the ranks of fellows. In 2016, with additional funding from the Mellon Foundation, CLIR will award a second cohort of five medieval studies fellowships.

Despite its successful endeavors in forging intra- and inter-institutional collaborations, CLIR has encountered some resistance to its vision of hybrid roles that span traditional scholarship and traditional librarianship and create new kinds of library professionals

and potentially a new kind of academy. Among the main concerns are the lack of standard library science training of the postdoctoral fellows and the fear of replacing traditional library positions with more IT and scholarly oriented positions, which may eventually drive librarians out of the jobs. (A deeper analysis of the critiques can be found in “A Brief History of the CLIR Postdoctoral Fellowship Program [2004–the present]” by Elizabeth Waraksa in this volume.) While having some merit, the criticisms have been mitigated over time by the fellows’ career paths. Some fellows move to traditional academic positions, while many of those who decide to stay in the library seek additional library and information science training and demonstrate their value by maintaining and promoting research library facilities in an evolving scholarly ecosystem. Regardless of their career trajectory, the fellows carry the willingness to collaborate across disciplines and institutions with them.

Developing Collaborative Research

On appointment, CLIR postdoctoral fellows usually shift from working as a lead or lone researcher to working within established organizations with clear missions and goals. Many fellows continue using their subject expertise, but in a different setting. For instance, they may process collections with a group of highly trained catalogers; coordinate public, digital projects with multiple stakeholders; collaborate on an area that the fellow has researched extensively; or conduct surveys on data practices that they themselves have used in the lab for years.

The CLIR program recognizes the value of what is commonly called a T-shaped skill set for effective collaboration (figure 1).¹ The T refers to a deep specialist knowledge in at least one area, coupled with a broad knowledge of other areas and how they interact. Thus, individuals can bring their own specialist knowledge to a collaborative project while understanding how their skills intersect with those of others on the team. The application procedure for a CLIR postdoctoral fellowship is designed to identify candidates who are willing to extend their research abilities to a wider range of problems and who can thus put their areas of expertise to work in a dynamic and multifaceted environment. In some years, for example, applicants have been asked to describe how research methodologies in their field have changed in the past 25 years and how libraries, publishers, and academic institutions should respond to those changes.²

1 For further discussion of T-shaped skill sets and related concepts, see, for example “T-Summit 2016,” available at <http://tsummit.org> and “The Life of Pi: Moving Beyond T-Shaped Skills for Agile Teams,” available at <http://www.davisbase.com/the-life-of-pi-moving-beyond-t-shaped-skills-for-agile-teams/>.

2 For example, in 2013, candidates were asked: “In 1,000 words or fewer, describe some ways that research methodologies and/or the dissemination of scholarship in your field have changed in the past 25 years. What factors prompted these changes? How do you think libraries, cultural heritage institutions, publishers, and/or universities should respond to these changes in order to support the advancement of knowledge in your field?”

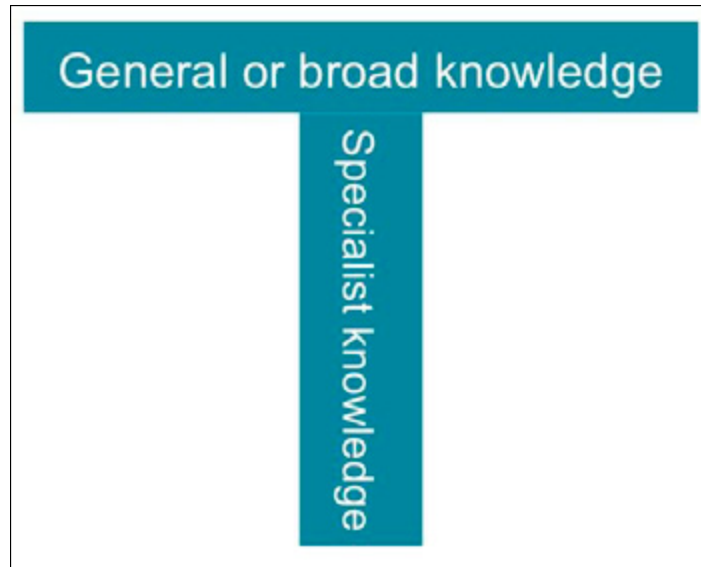


Fig. 1. The T-shaped skill set

These kinds of questions require applicants to think broadly about their work and the evolving scholarly landscape, with a focus on broad stakeholder audiences rather than on specific, peer audiences; they also require deep engagement with research practices and scholarly fields. The application procedure and questions have evolved over time, although final say on the appointment of a fellow rests with the host institution. However, job advertisements for CLIR postdoctoral fellows written by host institutions over the last 10 years reveal a strong inclination to use collaborative vocabulary, referring to team projects and the need to work with a variety of colleagues and stakeholders. (See appendix to this essay for examples of job descriptions from three different disciplines.)

The successful applicants are a diverse group; the 2013–2015 cohort, for example, includes neuroscientists, archeologists, a musicologist, medievalists, environmental scientists, literary theorists, a business studies expert, and a food historian. The preparatory bootcamp held at Bryn Mawr College gives the fellows an opportunity to begin discussions about crosswalking areas of expertise and ways of working; this obligatory intensive course is designed to introduce new fellows to the fellowship program, to questions about the relationship between librarians and scholars, and to the role of libraries in the future of higher education (see “Postdoctoral Pedagogy,” by Lauren Coats and Elliott Shore in this volume). The skills learned there are further developed when fellows are placed in libraries with a diverse array of highly specialized colleagues. For early cohorts, collaborations were more difficult—the positions were unusual, and the relationship between the background of the fellows and the collective goals of the libraries they worked for were sometimes unclear. However, as the program has evolved, there has been more support and training around integrating the fellows into new environments, while maintaining and building on the special skills

of advanced researchers (see “Toward a Trackless Future: Moving beyond ‘Alt-Ac’ and ‘Post-Ac,’” by Meridith Beck Sayre et al. in this volume).

Work carried out by one fellow with the Digital Library of Medieval Manuscripts project involved liaising with programmers and scholars to develop use cases for annotation capabilities in the SharedCanvas viewer. The fellow on this project needed a broad understanding of the different specialties that individuals bring to a project. For example, the issue of page and folio numbering for the books and manuscripts in the collection, which have been ingested in the current viewer with a standardized numbering system, illustrates how a fellow may help articulate scholarly end-users’ perspectives and needs. In many cases, scholars have become accustomed to referring to idiosyncratic foliation. Manuscript Bibliothèque municipale de Dijon 525, for instance, is a case where a folio was misnumbered, perhaps because of damage to the manuscript.³ The folio that has been assigned the identity “146r” is in fact better known to scholars as “145r bis.” For now, scholars using the Digital Library of Medieval Manuscripts must appreciate that it is too time-consuming to correct the error; however, the project’s programmers now understand that when a new manuscript viewer is brought online, this foliation issue must be addressed. Thus, in this case, broad-based skills and sensitivity to the intricacies and needs of each other’s areas of expertise has led to mutual understanding.

In her exploration of research teams in digital humanities environments, University of Victoria public administration professor Lynne Siemens notes that difficulties and conflicts in teams “may be compounded by the ‘I know best’ attitude of many academics” (2009, 229). Although CLIR fellows have a range of scholarly backgrounds and dispositions, they are encouraged both by CLIR training and by the structure of their positions to develop skills in listening, in assessing the expertise and priorities of others, and in negotiating a resolution in the presence of competing value sets. How people define their primary identities and the identities of others (e.g., as scholars, technicians, administrators) may vary from the roles that they play on a given team; however, these kinds of identities often frame the way in which people view their own strengths and responsibilities. It is important to be open-minded and willing to learn the research methodologies, priorities, and values of different communities and team members to facilitate a working relationship with others involved in a collaboration. CLIR fellows are often asked to appreciate that each individual knows his or her own area best, but also to help these individuals work together as a team. At the same time, sensitive collaborators must beware of over-reliance on others’ expertise. It can be tempting to take as gospel assertions or data from another subject area that, in our own areas of competence, we would naturally treat with appropriate caution.

3 “Dijon, 525 f. 113r,” Roman de la Rose Digital Library, available at <http://romandelarose.org/#read;Dijon525.113r.tif>.

Collaborative Teaching and Training

Education and training form a crucial part of the CLIR Postdoctoral Fellowship Program. The manner in which fellows are inducted into the program and the subsequent instruction and guidance that they receive are key to establishing practices for collaborative endeavors. On a more subtle level, the fellowships affect how participants think about and carry out their own teaching and training activities.

The communication and training initiated at the bootcamp are continued through monthly online sessions, in which fellows learn about a particular subject from specialists and from each other. Further, fellows meet in person once a year for supplementary training and group skill sharing, usually at a major conference. Collaboration forms a backdrop to these activities. Lauren Coats, assistant professor of English at Louisiana State University and co-leader of the bootcamp seminar, explained:

The seminar is geared to explicitly and implicitly address the modes of working that the fellowship requires—and collaboration is definitely part of that. From Day 1 when we talk about library culture, to the discussion of transitioning from dissertation writing to working (something like) a 9–5 schedule, to activities in small groups, to workshops that highlight implicitly or explicitly the collaborative nature of fellowship work (e.g., “Project Management,” “Data Management Planning,” or many others), we try to build into the seminar a sense of the intellectual opportunities that the fellowship enables, and that those opportunities are built in part through a different configuration of labor than in graduate study or (most) faculty positions or (most) library positions. Central to the configuration is collaboration.⁴

One exercise at the 2013 bootcamp involved fellows breaking out into groups of five or six to envision a project together. The focus of the exercise was to think creatively about needs to be fulfilled in their fields and to design a project that could meet those needs. Collaborative skills were an implicit part and objective of the exercise. Indeed, the activity has led to actual joint ventures—such as APRICOT—between members of that cohort. Though guidelines for continuing collaboration among the fellows are not explicit, the discourse of the program encourages it. As one fellow noted:

There weren't any specific guidelines about an amount of time we were expected to spend on collaboration, but CLIR has certainly fostered a collaborative foundation . . . by providing in-person time at the Bryn Mawr event and the . . . CNI conference as well as the monthly webinars. These opportunities to meet have led organically to collaborative conversations and plans for future collaborative work among CLIR fellows.⁵

4 Response taken from an informal questionnaire sent to CLIR Postdoctoral Fellowship Program organizers.

5 Response taken from an informal questionnaire sent to current CLIR postdoctoral fellows.

Because CLIR fellows are usually placed in hybrid-style positions, they must thrive in the spaces between and among libraries, digital centers, laboratories, and departments, depending on the exact nature of their appointment. Peer learning from colleagues is a necessary part of the job. Work on collaborative projects often requires learning new skills or bridging divides between other disciplines. The team on the Curating Menus project, for example, did not want to develop a project that divided intellectual and technical work because (1) they found that these elements informed each other, and (2) they wanted to improve their own capacities as well as create a set of products. Therefore, they developed an iterative develop-and-test method. They first decided on features they thought the project needed (ranging from software specifications to historical research). Then each person became responsible for a small number of features, which he or she developed and shared at a weekly meeting. In this way, they learned new skills as they worked, and at the same time, they determined whether they were on the right track. The iterative nature of many collaborative digital projects means constant learning and updating, with the advantage that both the project and its participants can evolve over time.

Although teaching is not a requirement for all CLIR fellows, some have teaching duties assigned or purposely seek them out. Pedagogical philosophy has moved from viewing students as semi-empty minds to be filled with knowledge—what the dean of Johns Hopkins School of Education, David Andrews, describes as the “feeding the chickens approach”—to models of instruction in which the co-construction of knowledge is a natural and desired element of the teaching dynamic (figure 2). In these models, students are collaborators rather than passive recipients of knowledge. Co-construction approaches are based on research into the science of learning, which takes account of recent studies of brain development, neuroscience, and modes of information uptake by different learners.⁶ One CLIR fellow employed a variety of teaching methods in a course that explored approaches to medieval authorship in the digital age. This allowed her to appeal to a range of learning styles while also showing her students the benefits of approaching medieval literature not only through traditional close analysis, but also through innovative digital techniques. Students explored texts by using a variety of media, including digitized surrogates of the original manuscripts. Further, they encountered manuscripts at a local museum, listened to and gave live performances of music, and produced digital exhibitions of their work. The students’ work fed into the instructor’s research, and she is now planning a project with graduate students to produce a multimedia digital edition of a medieval text.

6 See, for example, Cassidy 2004 and Dubinsky et al. 2013.

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Feeding Chickens as Education

1. Put some content in a bucket.
2. Gather the students and throw it out.
3. If the students get a bit of content, they get it. If not, they don't.
4. Continue this practice daily until all of the content has been distributed and it is time to harvest the benefits of instruction.

Fig. 2: Slide/video still by permission of David Andrews. From JHU MOOC on Education Methodology, given via Coursera in 2014 (Jeffries and Andrews 2014).

Collaborative learning models allow instructors to glean more insight into students and their learning styles, so the instructors can mold their strategies more effectively to the needs of individual students. Further, students given tasks to work on jointly with their instructors taste the rigors of a research career. Teaching as collaboration is empowering, but complex. Although it is desirable for students to take charge of their own learning, they are not equal with the instructor, who must continue to set the parameters and evaluate the work. Striking a balance between authority and student initiative requires care and flexibility. To ensure student confidence and focus, pedagogical goals must be clear and contextually appropriate.

Inspired by the many collaborative aspects of her position, another CLIR fellow employed a co-constructive approach to teaching after her fellowship ended, by allowing students to design their final project for a first-year writing course. Students were divided into groups and provided with a set of parameters that spoke to course outcomes; they were required to make an argument, support it with credible evidence, and include a visual. Given these parameters, each group developed an assignment proposal and presented it to the class. The class voted on the proposal they wanted to complete. The instructor then wrote the official assignment prompt, including a timeline for completion and grading criteria. The assignment was presented to the students at the next class meeting for final input and sanction. After minor adjustments, the assignment was approved, and the groups set to work on their projects. The result was the strongest work the students had submitted all semester. Their motivation for completing this work was significantly higher than that for previous assignments. In fact, the students had given themselves more work and set higher standards than on any previous assignment. On course evaluations, they noted that they valued the

opportunity to collaborate with the instructor on the creation of an assignment and relished having such input into their own education. Such approaches are gaining traction in higher education, but there are still no clear guidelines on adopting them or robust standards for training instructors in them. The way in which institutions are adopting new teaching styles, assessing them, and acknowledging their importance still varies widely.

The APRICOT project focuses on another potential arena for joint endeavors in education by providing a platform in which instructors can share, develop, and assess teaching materials together. Working together in their subcohort, the CLIR medievalists wanted to address the fact that creating high-quality teaching materials is rarely a collaborative process. When the proof-of-concept site is unveiled later this year, APRICOT will allow instructors to work iteratively on lesson plans and syllabi. Versioning and metrics will show them how their plans are being adapted and used by others, and it will enable them to enter into an open and transparent dialog with other instructors about best practices.

Collaboration among Fellows

CLIR encourages collaborative projects among postdoctoral fellows at different institutions and has worked, through feedback from fellows over the past decade, to create better systems for support and guidance around fellowship-based and interinstitutional collaborative work.

External Connections and Institutional Support

Initially—and perhaps most powerfully—CLIR fellows build personal connections through the Bryn Mawr bootcamp described earlier. CLIR fosters the connections created there through monthly online sessions, a message board on the CLIR website, and a shared calendar. The social bonds created at the camp continue through informal channels, such as social media and get-togethers among fellows. Fellows must manage these relationships while cultivating a good dynamic with both the formal rules of their institutions and the more informal sociological parameters and norms that form the professional culture at their place of work. For CLIR fellows, the pull of multiple allegiances can be problematic. Many fellows have two supervisors in two different departments and must negotiate answering to both. In addition, CLIR calls on them to participate in regular online synchronous sessions, to attend in-person yearly training sessions, and to carry out the occasional one-time task. These tasks are, broadly speaking, collaborative, but some fellows are also required to participate in specific joint activities.

The demands and parameters of individual fellowships often determine the extent of formal collaboration among fellows and institutions. Although some are able to engage in projects outside of those established by their host institutions, others have fewer

opportunities to do so, except outside of work hours in their personal time. Thus, not all fellows can actively engage in collaborations with members of their cohort. These differences in the fellows' availability for collaboration result largely from the multiple ways in which host institutions can interpret and implement the parameters of individual fellowships. Some bring fellows on board to carry out a particular task or project and thus require that fellow to focus primarily on this assignment and relegate other activities to spare time. For others, the opportunity to collaborate emerges from the fellow's orientation within their institution; for example, those with joint appointments between a library and an academic department find that these positions are more collaboratively focused. In some cases, a joint appointment can lead to a higher workload, with many different stakeholders calling on the fellow's time and resources.

The track record of interinstitutional collaboration within a particular university or even an individual department or library can also affect the institutional support for collaboration. A fellow entering a place where collaborative enterprises are well established can find possibilities for and encouragement of collaboration. In addition, the management structure of an institution can affect the way in which a fellow engages with others. One fellow employed at a university with a decentralized hierarchy has found a great deal of freedom to pursue her own projects—managers and supervisors can more readily give their consent or approve funds in this dynamic. However, the manner in which a fellow is able to or chooses to collaborate is in itself a collaborative question, namely, how the fellow and the institution work together. The CLIR fellowships are meant to help both the fellows who are building their careers and the institutions that are working toward their goals. Because fellows are employed for the benefit of the host institution, any collaboration outside that institution or main department must be in the interests of the host as well.

The creation of subcohorts and the provision of microgrants for collaboration have allowed projects among recent fellows to be more formalized. They have also enabled the forging of close relationships. APRICOT began, as we have described, as an idea hatched in a bootcamp training session by the medievalist subcohort. It continued for nearly a year as a decentralized, egalitarian joint operation in which the participants exchanged and collected ideas through shared online documents, virtual meetings, and one face-to-face meeting. When the group applied for a microgrant, the nature of the collaboration had to become more formal, with one fellow elected to take on the role of project and financial manager. Mutual enthusiasm for the project, coupled with strong personal bonds forged at the bootcamp, made the change in the collaborative structure almost frictionless. Nonetheless, care is necessary in the assumption of a leadership role. Although one person is nominally in charge and administratively responsible, the generation of ideas is still evenly split among participants, and all must be acknowledged equally for their intellectual contributions. In small group projects founded on personal bonds, team members must

have strong interpersonal skills; such skills are particularly important for the team leader. In such cases, leadership founded in trust is far more persuasive than that founded in authority. Indeed, trust is essential in a project such as APRICOT, because there are no institutional structures to provide encouragement or threaten disapprobation. The principal investigators must rely largely on their ability to generate enthusiasm where needed and to listen to the concerns and problems of their colleagues without prejudice.

Using Technology to Sustain Collaboration

In addition to the numerous collaborations within their institutions, CLIR fellows are involved in some interinstitutional collaboration—not only with other fellows, but also in wider library and disciplinary communities. Even with collaborators sitting in geographically remote places, periodic meetings help to synchronize activities and develop roadmaps. Advancements in technology help maintain long-distance working relationships by coordinating work and schedules across places and time zones. Yet, technologies may set unrealistic expectations about an individual's availability and ability to answer queries quickly. The ubiquitous nature of communications software can fuel these expectations, while impractical suppositions about colleagues can sour otherwise positive rapport. As digital tools for managing communication and collaboration proliferate, it is necessary to negotiate new kinds of divides. Part of collaborative work, then, is not only figuring out the work itself, but also negotiating working styles.

For example, although a face-to-face meeting sparked the Curating Menus project, the collaboration was a long-distance one. Curating Menus developed a routine of weekly Skype meetings, shared Google docs, and use of GitHub, together with occasional meetings in person. In the SEAD project, too, technology assists in maintaining a consistent track of discussions and decision-making. It helps to avoid mistakes and to identify longer term inefficiencies. Informal discussions during breaks at face-to-face meetings and in synchronous online environments, such as chat rooms or Skype, allow the SEAD team to interweave life and work and to develop stronger trust and consensus. Mutual trust and a sense of investment generated by such relationships enable individual members to take the initiative rather than endlessly discuss potential actions and their consequences. In many respects, the effective use of technology in sustaining collaborations remains based on the development of personal connections and the deployment of interpersonal skills.

Confronting a Stereotype

We perhaps owe a debt of ingratitude to Immanuel Kant, who in his *Critique of Judgement* gave credence to the idea of the lone—possibly mad—genius as the primary conduit for original creation (Kant 1987,

181–189). Since that era, artistic transcendence has been frequently associated with this (usually male) individual, who is in some respects indistinguishable from his work (Battersby 1990; McMahon 2013). The humanities and social sciences, too, have their great writers and theorists, who are seen as responsible for moments of brilliant originality or innovation. Even in the sciences, where people are more accustomed to collaborative endeavors as the norm, hero worship of the virtuosos of theory and experiment is common. This cult of genius is a distinct phenomenon that reaches beyond mere authorial attribution. It has filtered into the popular imagination and the academy in such a way that it both localizes and makes inaccessible brilliant creation or insight: only *this* person could have achieved such heights, and he did so alone, like Caspar David Friedrich's "Wanderer above the Sea of Fog," which is often used to visually express both Kant's ideas on the sublime, and Romantic notions of the creator-genius (figure 3).

Although appreciation for talent should never be discouraged, such attitudes belie the moments of breakthrough and innovation that are deeply rooted in previous research, the contemporary academic climate, and the contributions and collaborations of many



Fig. 3: *Der Wanderer über dem Nebelmeer* (Wanderer above the Sea of Fog) 1818, Caspar David Friedrich, ([Public domain], via Wikimedia Commons)

people. Even the touchstone of the humanities, the single-author monograph, must be historiographically situated in networks of production and reception. We have perhaps too readily accepted as unprecedented the work of some great thinkers who have been highly adept at hiding influences on their thought, denying their connections with the history of their fields, or whose subsequent “genius narrative” obscures their intellectual stimuli. For example, Small’s (2001) lucid overview of the philosophical and cultural climate that begat Nietzsche’s writing brings into an intellectual context the supposedly archetypal lone [mad] genius, noting how the traces of influence and debate have been variously overlooked or covered up—sometimes by Nietzsche, sometimes by his editors, sometimes by the historical reception of the texts.

Critical theory has perhaps dismissed its attachment to the Kantian genius figure, but has left us with an uncanny void. Roland Barthes’s “The Death of the Author” (1989, 49–55) and Foucault’s resulting exploration of the author figure (Rabinow 1984, 101–120) leave us not with a seminal writer who generates original thought, but with an equivocal and slippery entity who dissolves along with his output into a web of signification. In “What Is an Author,” Foucault challenges the boundaries of authorship and writing, observing the space that the “deceased” author figure had occupied and “[following] the distribution of gaps and breaches, and [watching] for the openings that this disappearance uncovers” (Rabinow 1984, 105).

Foucault’s point is twofold. On the one hand, we must become aware of the complexity of authorship and the many relations and traditions built into the establishment of the generative name (we need only look to scholarly and public culture centered on Shakespeare): the author becomes the locus of authority around which ideas and disciplines can orient themselves. On the other hand, he brings to light the historical nature of the author notion—how it has changed over time and within different disciplines. In many ways, academia and the communications-heavy world more generally have passed beyond the situation that Foucault described (or could have foreseen). This latter point is of particular interest to the collaborative CLIR fellow, whose role is in part a rethinking of academia defined by disciplinary or institutional boundaries. What are the modern demands that our work can meet—technical, institutional, scholarly—and how can our ways of working address them?

Although a fuller answer to this question is beyond the scope of this essay, it is worth mentioning one aspect of authorship as exemplar: the problematized notion of ownership. In modern academia, we are very conscious of the twin demands of self-assertion and self-negation, that is, in retaining what is ours through publication and control of the release of research, while always providing the context of our work through citation and situating it within a discipline. There are important legal, social, and technical aspects to this. Academics assert their individuality on websites like Academia.edu and via ORCID IDs, and they carefully cite the provenance of their ideas out of fear of accusations of plagiarism; libraries cram metadata into

their systems; and librarians attend seminars on disambiguating writers and works. Legally and practically, the individual author is alive and kicking. Yet, as the number of large-scale, collaborative research endeavors in the humanities increases, the academy is still working out systems of attribution for the many forms of authorship that make up such endeavors.

A more nuanced consideration of collaborative work can help clarify authorship and, more broadly, contributions to scholarly endeavors. Research and publication are pragmatic and socially driven. Therefore, authors must be identifiable and their area of contribution and expertise demarcated, not for the purpose of defining zones of exclusion, but rather to establish markers of intersection. An author's identity has a practical, legal importance, but it is linked to how the work can be used by others, not to the preservation of its purity or sacredness. The identity or status of the author, like the brain, becomes a matter of a multiplicity of living interconnections, not the preservation of a solid state.

CLIR addresses the issues of authorship, research contributions, and the situatedness of the individual and his or her work by nurturing postdoctoral fellows who operate comfortably in hybrid roles and collaborative environments. By placing a greater number of specialists trained to the doctoral level in library environments, CLIR is exposing researchers to the mechanisms of scholarly communication, introducing more librarians and technologists to the thought processes of early career scholars, and giving each group an opportunity to work with differently trained colleagues. At the same time, fellows, librarians, and technologists come to understand the inextricable connectedness of their endeavors and to appreciate how scholarly production is achieved in concert. As CLIR President Charles Henry explains:

[An] . . . aspect of CLIR's work . . . is the focus on the nature of digital networked technology as a means to more effectively, and honestly, trace the provenance of ideas, the research that incorporates and revises past discovery, the data that can ensue from such research, and ways that data itself can then be repurposed and reused as elements of subsequent expression. In this scheme the organization and articulation of knowledge is robust, organic, and fluid: our traditional framing and (literally) shelving artificially isolates and . . . privileges the lone genius concept through a physical demarcation that effectively muffles the conversational, historical dialogue that gives rise to these objects in the first place. Building out . . . "markers of intersection" is a primary goal of CLIR . . . : it's more complex and messy than the traditional approaches we have inherited, but more lively, engaging, and true.⁷

7 From personal correspondence with Charles Henry, responding here to an earlier draft of this essay.

How can CLIR and its partnering libraries continue to foster productive and innovative collaborators and thus shape the future of higher education? Are CLIR fellows really making the boundary between library and faculty more porous, and, if so, how productive has this been?

Some Thoughts and Recommendations

CLIR has a unique opportunity to facilitate sensitive, successful, and agile collaborators who are quickly able to grasp differences among various areas of expertise and coordinate effective team projects. Part of CLIR's mission is to help the academy move away from a model of higher education that pitches university against university and scholar against scholar in the bid for funding, status, and recognition. The kinds of communities that are created via the CLIR Postdoctoral Fellowship Program seem to be ideal for fostering a less competitive and more collaborative academy. Yet our evidence here is anecdotal, our methodology autoethnographic. Questions must be asked about how fellows are creating bridges among librarians, technologists, and faculty with enduring effects and, in cases where this does not happen, about why it does not. We recommend that CLIR, in partnership with fellowship host institutions, consider a long-term study of the fellows' collaborative projects, assessing the success of the endeavors; the way in which their association with CLIR has been of benefit; and the effect, if any, of these projects on institutional policy and support for collaboration. As Siemens notes, "there has been minimal research on the role of teams within academic communities" (2009, 226). Furthermore, it would be helpful for CLIR to create an archive of personal narratives about fellows' projects—indeed, at a recent conference of the Digital Library Federation, a wish was expressed for just such a collection.

A more open dialog is needed with host institutions about the use of fellows' time. Postdoctoral fellowships are by their nature adaptable to the needs and imaginations of host universities, but clear guidelines about other duties and collaborative work within the cohort would be helpful. If CLIR aims for fellows to engage in interinstitutional collaborative activities, then host libraries need to see this as an essential part of fellows' roles. We suggest that CLIR survey the work of its current fellows, particularly the subcohorts who are expected to collaborate on projects, to ascertain the amount of time necessary for such ensemble activities. Further, fellows could be points of contact for potential host institutions, providing information on their collaborative experiences. Indeed, some fellows have already carried out this service informally. We would also encourage conversations all along the chain—from the fellows themselves to the heads of libraries and national organizations—to explore what it means to take seriously the sharing of time, effort, and talent across our universities. We believe that CLIR fellows have stories and results to contribute to this discussion.

The idea of subcohorts has been highly successful thus far. How can these be further developed? One possibility is to bring more discussion on the nature of collaboration into the bootcamp and synchronous sessions. The idea of collaboration already infuses much of the fellows' training; however, sessions devoted to specific discussions of joint endeavors and their impact on the scholarly ecosystem would be beneficial. Certainly, more subcohorts with specific disciplinary interests can be envisioned. Are there other varieties of subcohort that would be helpful? Given CLIR's drive to create interdisciplinary connections, a sciences, humanities, technology, engineering, arts, and math (SHTEAM) subcohort could be useful. A group of forward-thinking libraries might team up to support an arrangement in which representatives from each of several major subject enclaves work together on a large-scale, cross-disciplinary project.⁸ So far, the subcohort collaboration has been the responsibility of the fellows, whose time is used—as we have noted—in different ways by their institutions. Building a collaborative project into the very generation of a particular subcohort could be one way to avoid conflicts of interest between the kind of collaboration that CLIR envisions for its fellows and the practicalities of individual appointments. This arrangement would require planning in advance, with CLIR working with potential supervisors to create a project that would encompass all major disciplinary sectors, but would also leave adequate room for fellows to develop their own research strands within the project.

The assessment of scholarly work has traditionally been the purview of faculty, and it has been carried out by a few select groups, including job search committees; tenure and promotion committees; reviewers for scholarly publications; and committees who distribute grants, fellowships, and other academic awards. One of the greatest barriers to collaborative research projects in the humanities is the difficulty of assessment; most institutions and academic departments in the humanities have an established tradition of evaluating scholarly output in terms of the monograph or single-authored article. The director of the Digital Library Federation, Bethany Nowviskie, addresses this problem in her 2011 article, "Where Credit Is Due: Preconditions for the Evaluation of Collaborative Digital Scholarship." Here, she warns against the tendency, when evaluating scholarly contributions, to judge digital projects, which are almost always collaborative, by the same criteria as traditional print publications, explaining that doing so often results in overlooking collaborative processes inherent in the creation of the digital scholarship. Nowviskie points to "systems of production that require closer partnership than ever before among individual scholars and the technologists, content creators, designers, faculty colleagues, archivists, and cultural heritage professionals who work collectively to generate, assemble, disseminate and preserve new knowledge and new scholarly interpretations" (2011, 169). Essentially, she argues that we must

⁸ Such a subcohort could be envisioned in other ways. For example, a group of fellows could work on a collaborative project that centers around a particular subject in different eras or around methodological or technological overlaps.

acknowledge and appreciate these partnerships by giving appropriate credit to collaborators (within and outside of the academy) and by recognizing that this credit in no way dilutes individual contributions. The challenge is not just how to acknowledge and assess work that has been carried out by more than one person. The issue is more complex. Nowvskie argues that it is necessary to design evaluation structures for work that is ongoing and iterative (i.e., that does not necessarily have a finished end product). She ultimately recommends a change in attitude so that collaborative work is perceived to be legitimate in and of itself and not merely accepted because a tenure or job search committee can easily distinguish an individual's contribution to a publication or project. Collaborative scholarship should be valued because it is continuously reviewed and revised by the collaborators, the end users, or both. Given that hybrid academics working in libraries are particularly likely to be engaged in collaborative endeavors, it seems appropriate that CLIR and its member libraries become more deeply involved in this effort to transform the way that collaborative scholarship is valued and assessed within the academy.

As the CLIR Postdoctoral Fellowship Program continues, the community of former fellows will naturally expand. This community can provide unique opportunities for CLIR and the libraries associated with it. Will collaborating with former fellows become part of the training for new fellows? How can CLIR develop its online environment to create a hub for collaborative investigation? CLIR is already examining ways to take advantage of such opportunities. One aspect of the work of the Council's Committee on Coherence at Scale is a discussion about how the fellowship program can be part of the informational and cultural shifts in higher education that CLIR is helping to enable and to structure (see also "A Brief History of the CLIR Postdoctoral Fellowship Program [2004–the present], by Elizabeth A. Waraksa, in this volume). The Council anticipates that its network of fellows will provide a pool of expertise that can be drawn upon to answer important questions facing the academy and its research libraries. The kind of collaborative work with which current and former fellows are already engaged could provide the basis for a pan-institutional network that is able to erode traditional disciplinary and institutional allegiances to the benefit of the higher education system.

Higher education stands at a turning point, perhaps even on a precipice. Changing cultures in research, teaching, and learning—fueled in no small part by digital innovation—bear witness to the potential of collaborative endeavors to be a significant part of the academy's future. Although respect for high-quality, lone scholarship should never wane, taking advantage of larger-scale networks of research, pedagogy, and technology makes it possible to ask and answer questions in new ways, to potentially be more economical with time and resources, and to create a paradigm of cooperation rather than competition in academia. Although our ability to take advantage of this opportunity is still nascent, CLIR and its fellows' host institutions stand at the heart of an evolving academy, enabling

a greater number of individuals who have the ability and training to create crosswalks among departments, subjects, and people, and to tackle new and difficult questions in mapping the future of higher education. This work will likely be complex and controversial, but it will undoubtedly be collaborative.

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Appendix: Sample Job Descriptions

This appendix contains three sample job descriptions from different fields and years as examples of the collaborative vocabulary typically found in CLIR postdoctoral fellowship job descriptions written by host institutions. Phrases that particularly speak to collaborative work are underlined in the descriptions.

Data Curation for Visual Studies (2014)

CLIR/Duke University

Postdoctoral Fellowship in Data Curation for Visual Studies

Overview

Duke University is offering a Postdoctoral Fellowship in Data Curation for Visual Studies, jointly appointed by the Duke University Libraries and the Department of Art, Art History, and Visual Studies. Eligible candidates will have completed a doctoral program in Art History, Digital Media, Historical and Cultural Visualization, or a related field in the past five years. This is a full-time, two-year appointment, with an annual salary of \$60,000, including full benefits.

With supervision and guidance provided by Duke University Libraries, the Postdoctoral Fellow will work closely with faculty and researchers in their field of research and expertise (for example, with the Wired! Lab for Visualizing the Past) to develop best practices for managing a wide variety of multimedia source materials, especially maps, models, animations, 3D reconstructions, for reuse in teaching and digital project development (see: Wired! Lab Research projects).

The Fellow will explore and analyze tools and platforms, write documentation, and aid in dissemination of best practices to the wider campus community as well as assisting in training in the use of tools. These activities will culminate in defining, modeling, and testing workflows and capacities necessary for sustainable curation and long-term management and re-use of these visual materials.

The ideal candidate will have both relevant academic training and experience with content management and data infrastructure development for humanities projects that have a visual data component. During the fellowship period the Fellow will work closely with the Duke University Libraries and the discipline-matched faculty and researchers to gain significant knowledge of best practices in markup languages, metadata standards, digital humanities curation, and digital repository structures and workflows. The Fellow will be expected to continue to develop his or her ongoing research within a field of study compatible with the faculty/researcher partnership. The Fellow will also participate in the activities sponsored by the Council on Library and Information Resources (CLIR) Postdoctoral Fellowship program.

The CLIR/Duke University Postdoctoral Fellowship in Data Curation for Visual Studies provides an exciting opportunity to contribute to new initiatives at one of the nation's highest-ranked research universities, as well as to gain skills and knowledge related to emerging, innovative areas of visual studies research and teaching as well as to digital humanities curation. Through these fellowships, CLIR seeks to raise awareness and build capacity for sound data management practice throughout the academy. Opportunities to lead, engage, or collaborate in workshops, seminars, presentations, and publications will be strongly encouraged and supported.

Roles & Responsibilities

Reporting to the Associate University Librarian for Information Technology Services, the Postdoctoral Fellow will collaborate with faculty, students, library staff, and technologists to advance the Libraries' data curation strategy for multimedia materials and to support researchers in learning and applying best practices for digital preservation and curation. The Fellow will serve as a liaison to students and faculty, such as within the Wired! Lab, in order to gain hands-on experience working with visual materials as part of teaching and research and to better understand access and use requirements. The Fellow will partner with Libraries staff and technologists to translate these requirements into a sustainable approach to curating visual studies data and to help train graduate students and faculty in data curation. Through this research activity, the Fellow will play a key role in developing a model for visual studies data curation that will be of immediate benefit to visual studies researchers and teaching faculty at Duke University, and will contribute significantly to enhancing the Libraries' services and programs in support of digital humanities scholarship.

Specific areas of responsibility for the Postdoctoral Fellow and related tasks include:

Help to develop a sustainable program for visual studies data curation:

- Explore and assess visual materials curation at peer universities and present a memorandum on best practices in digital multimedia management to Libraries staff and other Duke technologists, and faculty, researchers, and administrators engaged in visual studies data management.
- Survey the landscape of visual materials curation at Duke to determine current practice, including formats used and requirements for access and reuse.
- Research, design, and pilot the creation of a data curation program built upon sustainable workflows for organization, access, and preservation of multimedia-based collections in support of ongoing teaching/research projects. These collection materials might include images, texts, document transcriptions, geo-referenced maps, 3D models, A/V files, and other file types.
- Analyze the pilot data curation program; make recommendations for alterations, sustainability, and lessons learned; and publish or present the outcomes both locally (to Duke stakeholders) and nationally.

Provide researchers with instruction and guidance in visual studies data curation:

- Recommend best practices for standardized description and for resource and data management planning for academic users within the context of multimedia-based visual studies (such as the Wired! Lab and the Ph.D. in Art, Art History and Visual Studies), with the goal of creating templates for management strategies in the following areas of research practice:
 - Collection of material from archives, conducted by individual researchers
 - Collection and management of collaboratively authored datasets, including those created or contributed to by students
 - Researcher exploration of shared content, including faceted search and retrieval as well as large-scale data analysis across collections for visualization purposes
 - Public display of database content, including via web portals, mobile applications, virtual environments, and other locales
 - Authentication and authorization system for external collaborators
 - Create and deliver training for Libraries staff related to the management and curation of visual studies data.

Qualifications

Required:

- Ph.D. completed within the last five years in Art History, Digital Media, Historical and Cultural Visualization, or a related field
- Practical understanding of the research process and research data lifecycle
- Experience or familiarity with using digital media as part of teaching or research
- Strong organizational and documentation skills
- Ability to engage with people in new settings as well as excellent interpersonal and communication skills
- Willingness to participate in teaching and training initiatives related to the fellowship or area of research

Desired:

- Demonstrable strong scholarly research focus on visual data and/or visual studies
- Excellent skills in project management, workflow design and management, teaching and outreach, communication and collaboration with faculty members
- Education or experience in Library & Information Sciences or related field
- Experience designing and implementing databases for scholarly projects
- Experience with digital media production techniques
- Experience coordinating and promoting programs and/or services
- Working knowledge of various content management systems
- Working knowledge of technical implementation of servers, software systems, etc. for the purposes of database setup and delivery
- Working knowledge of web tools, API links etc. for cross-referencing and syndication of content
- Familiarity with markup and metadata standards associated with Digital Humanities projects

Social Sciences Data Curation (2014)

Social Sciences Data Curation Fellow

Penn State University

Position Overview

The Pennsylvania State University Libraries seek a Social Sciences Data Curation Fellow to collaborate with librarians, technologists, and researchers, primarily in the social sciences, on building out a program of services for the lifecycle management of social science research data. The fellow's work will dovetail with an investigation, launched in summer 2013 by the University's Information Technology Services (ITS), into curation needs for restricted data. Penn State has experience handling restricted data, as evidenced by the Clinical Science and Translational Institute, which works with primary data

that carry high-risk identity disclosure issues, yet fall under the NIH data sharing mandate. The Libraries also has a significant university records management program, and in spring 2014 it will house a new Census Research Data Center. Working with ITS, relevant liaison librarians, and research institutes in the social sciences, the fellow will contribute to the overall stewardship of social science research data at Penn State, including consideration of curation issues for public data sets arising from restricted data.

The fellow's responsibilities will focus on three fundamental, interconnected areas: 1) investigation of current research data practices to assess curation needs; 2) collection planning, based on assessment, for local research data sets, exploring approaches to ensuring data quality and optimizing for access, use, and reuse of data; and 3) pilot project investigations of curation processes to inform operationalizing a data curation service. By concentrating on these three areas, the fellow will contribute to our understanding of the costs of implementing data curation services for the social sciences at Penn State. Also central to these efforts will be Penn State's repository service, ScholarSphere, developed in 2012 as a partnership of the Libraries and ITS. As a tool for supporting researchers in data management planning, ScholarSphere is poised for further development as a data repository, especially for data that otherwise have no institutional, organizational, or domain-specific base: it offers state-of-the-art preservation technology, flexible access and permission levels, and robust file versioning capability. The fellow's contributions will test and help expand ScholarSphere to meet the curation needs of research data, initially in the social sciences and potentially extending to data from other disciplines, depending on outcomes from the sets of activities described.

This is a two-year, fixed-term appointment at the rank of assistant librarian. The Data Curation Services postdoctoral fellow will be based in the Libraries and expected to work in collaboration with a range of departments, both within and beyond the Libraries.

Responsibilities

- In collaboration with staff from ITS, conduct data interviews with social scientists to assess current research lifecycle practices, document types of research data available, and evaluate needs surrounding long-term management of restricted data;
- Research various trends and practices at universities for curation of restricted social science research data, with particular attention to the role of institutional repositories;
- Lead one to two small pilot projects to support operationalizing a data curation service;
- Participate in consultations, as needed, with social scientists on data management planning;
- Contribute to design and development of resources, including research guides and workshops, on research data lifecycle practices for faculty, students, and staff;
- Present on above efforts at national conferences and other relevant venues.

Required Qualifications

- Ph.D. in the social sciences; examples include anthropology, economics, political science, psychology, or sociology; or in informatics;
- Ability to organize and develop information resources for workshops and other types of sessions, including consultations;
- Experience working with large data sets using common analytic tools and/or statistical software packages.
- Familiarity with institutional repositories and data repositories (in terms of either retrieval of data/content, or deposit of data/content, or both);
- Excellent interpersonal and communication skills, combined with a facility for working productively with a diverse range of faculty, students, and academic professional staff.

Preferred Qualifications

- Experience collecting or managing sensitive data for research purposes;
- Experience working on cross-disciplinary, distributed, collaborative projects.

Fellowship in Informatics, Data Analysis, and Data Dissemination (2012)**McMaster University****CLIR Postdoctoral Fellowship in Informatics, Data Analysis, and Data Dissemination**

Applications are invited for a postdoctoral fellowship in the areas of data management, data analysis and data dissemination. Reporting to Dr. William Morris, Professor, Remote Sensing and Geophysics, School of Geography and Earth Sciences and working closely with University Library staff in the Lloyd Reed Map Collection, the Sherman Centre and the Lyons New Media Centre, the Postdoctoral Fellow (PDF) will conduct research, make recommendations and oversee the data management plans for the library in how it will acquire, code, organize and distribute research data for the library collection.

Specifically, the PDF will:

- Collaborate with library staff to determine the current state of the Library's ability to acquire, organize and distribute data
- Conduct formative usability studies with various campus stakeholders to identify needs, use patterns and areas for improvement
- Design and develop materials to increase data literacy among faculty and students
- Work with the Centre for Leadership in Learning on blended learning modules to be used in courses throughout the campus
- Develop educational modules for student enrichment and community outreach
- Make recommendations for the software and hardware needed within the library

- Present results to the library leadership team and make recommendations for the future directions the library should take to improve data management
- Complete written reports, summarizing results
- Make recommendations for ongoing improvements
- Present findings through peer-reviewed publications and conference presentations
- Teach INQUIRY 1SS3, ARTS&SC 3CG3 and portions of iSCI 2A18 and 3A12 with topic based specifically on topics concerning data and data analysis.

Required Skills:

- PhD work involved working with large datasets (preferably in science)
- Must have a good understanding of data management
- Extensive experience with data analysis, including proficiency in Geomatics and 3D data visualization
- Technical knowledge of computer networks
- Excellent written and oral communication skills
- Experience working with pedagogical research

Changing and Expanding Libraries: Exhibitions, Institutional Repositories, and the Future of Academia

Amy Chen, Sarah Pickle, and Heather Waldroup

Academic libraries have been, and continue to be, at the vanguard of research, teaching, and learning on university campuses. Libraries continue to develop as multiuse information commons with computer labs, writing centers, coffee shops, and group study rooms to facilitate experiential learning, independent research, and professional development. As Miller eloquently notes in a recent essay, “visitors enter the future university by walking through the front door of its library” (2014, 329). Academic libraries also continue to provide longstanding critical services, such as collecting, organizing, and preserving materials from outside publishers or donors. In recent years, as various scholars have noted, the academic library has taken on the additional role of information disseminator, contributing to the scholarly record the library’s own materials and those of its researchers. Digital libraries, institutional repositories (IRs), and both physical and digital exhibitions are just a handful of the means by which academic libraries are leveraging their collections and institutional expertise to participate more actively in the research output of the academy. This essay explores two specific products—exhibitions and IRs—as analogs for broader movements in academic libraries and academic librarianship.¹

At first, special collections-based exhibitions and IRs may seem to be at opposite ends of the library’s contribution to the campus community. Exhibitions contextualize (and recontextualize) rare historical objects from the library’s collections, including visual materials and manuscripts, while IRs showcase current scholarly communication from the institution’s faculty and, occasionally, from graduate or undergraduate students. The former invites viewers to

¹ This is a broad body of scholarship. For just a few examples in addition to Miller 2014, see Carpenter et al. 2011, Herrington 2013, Lowry and Baughman 2011, MacWhinnie 2003, Ogburn 2013, and Roberts 2012.

consider the materiality of the object, its significance as historical artifact in some cases enhanced by its “oldness,” while the latter draws on emerging technologies of digital librarianship. Still, the juxtaposition of these two forms of library practice reveals the richness of the library’s transformation: trafficking in rare and unique things, moving from provider to provider-and-contributor. Both exhibitions (particularly the new, dynamic forms that these are taking) and IRs are actually working toward similar goals, including dissemination of knowledge, participatory learning, and collaborative scholarship. All of these efforts are, and will continue to be, of great value to the library of the future. Further, because these efforts tie closely with mission statements and strategic plans of the university as a whole, these new directions may also inspire change in how libraries are staffed and in how not only researchers, but also campus administrators view the value of the library.

New Directions for Old Things: Special Collections Exhibitions

Traditionally, special collections preserved, organized, and provided access to both published and unpublished materials deemed to be rare or unique.² But now, the activities of special collections have expanded. Creating exhibitions, previously considered an interpretive activity beyond the scope of repositories or the archivists and librarians who staffed such centers, is now an accepted part of the work that special collections centers perform. This shift in attitude is due largely to the realization that, whether physical or digital, exhibitions generate positive publicity for a repository and can encourage more researchers to visit. They also create opportunities for experiential learning for undergraduates and graduate students and can drive donor support. However, various impediments prevent special collections from developing these projects to their fullest potential. Understaffing, lack of adequate locked or guarded display space, and frequent undervaluing of such projects in tenure and promotion applications—in spite of the fact that library special collections often possess materials of great historical significance—are all barriers. Increasing the number and professional rank of staff members responsible for supervising physical exhibition development and providing opportunities for the hosting of online exhibitions can strengthen the exhibition program so that it will be able to reach more undergraduates, showcase the library’s collections to a broad public, and facilitate donor support. All of these have the potential to enhance the academic library’s impact both within and outside of its home campus.

2 The term *special collections*, rather than *archives*, is used as an inclusive term to designate repositories of rare and unique materials. See page 1 of the Association of Research Libraries (ARL) document, “The Unique Role of Special Collections—Special Collections: Statement of Principles, 2003,” to find a definition of the variety of materials special collections repositories may contain at ARL libraries.

Exhibitions were seen originally as ancillary to the work of special collections and academic libraries. After all, as one commentator put it in 1949, “books do not lend themselves readily to exhibition, since for proper appreciation they must be read rather than gazed at” (*The Library Exhibition 1949*, 151). But even then, library exhibitions had their defenders. A report issued by The British Records Association noted that “if documents deposited by private owners are to remain buried in the vaults of a local Repository, they might almost have been left with the owner” (quoted in Casterline 1980, 7). The earliest writing to describe mounting exhibitions in a library environment appeared in the early 1980s, but these pieces primarily summarized important points for curators to keep in mind.³ It was not until the late 1980s and early 1990s that libraries begin to recognize the pedagogical and public value of displays (Calvert 1992, Saldenberg 1991, Simor 1991).

But those in charge of special collections quickly began to recognize the importance of library exhibitions. A search of articles published in *RBM: A Journal of Rare Books, Manuscripts, and Cultural Heritage* shows that more than 70 articles mentioning the word *exhibition* have been published; the earliest pieces appeared in its first volume in 2000.⁴ One year later, Robert L. Byrd commented on the power of special collections exhibitions in the pages of *RBM*, noting:

Sometimes we in libraries speak of the danger of having special collections become “museums,” as though that were a pejorative term. Anyone who has observed hordes of people swarming through a blockbuster exhibition at a major art museum—or, for that matter, the recent exhibition on utopias at The New York Public Library—knows that exhibiting culturally or historically significant objects can be remarkably popular, entertaining, and educational (2001, 166).

Although traditionally special collections staff shy away from museums in order to distinguish their approach—a researcher can access, handle, and work with the materials in a repository directly, rather than having to work through the system of mediation a museum display represents—Byrd reminds his audience that by refusing to engage in exhibition work, special collections centers lose the opportunity to engage in significant public outreach.

Nevertheless, as exhibition development continued to occupy a tenuous position within the variety of activities required of contemporary special collections centers, the Association of Research Libraries (ARL) decided to conduct a survey to determine how many academic libraries mounted exhibitions. In August 2010, having completed the poll, ARL published a SPEC Kit describing the use of exhibitions by special collections repositories. The survey showed that 78 of the 79 responding institutions had created both physical and digital exhibitions based on their resources (Berenbak et al. 2010,

3 For example, see Casterline 1980 and Hinson 1985.

4 The first volume of this journal includes several pieces that mention exhibitions. See de Hamel 2000.

11). Although these data are now five years old, and the information that they contain reflects only a small subset of ARL libraries that chose to participate in the survey, the SPEC Kit reinforces anecdotal observations that exhibitions indeed have become a standard feature within special collections.

Special collections exhibitions both online and offline are now commonplace because they are perceived as valuable to all levels of the university. For undergraduates, the largest population at most institutions, student-curated digital and physical exhibitions increase the variety of learning experiences in which they can participate on campus. Now that more universities and colleges are focusing on the benefits of inquiry-based and experiential learning (York et al. 2010), special collections are well placed to meet these new pedagogical objectives. Student-curated exhibitions offer a venue for students both to interact with primary sources and to apply their burgeoning writing and research skills. Their original analysis then can be displayed for a wider audience, a prospect that can motivate students to put more effort into their writing.⁵

Graduate students can also benefit from special collections exhibitions. Materials in special collections offer graduate students an outstanding opportunity to build a professional portfolio in either archival or curatorial studies. Unlike traditional "art" exhibitions, which can require the reservation of gallery space months or even years in advance, extensive funding, and complex negotiations for the loan, insurance, and transfer of works, special collections exhibitions offer graduate students the opportunity to work with museum-quality objects from the library's own collection. Whether displayed onsite or featured as a digital exhibition, graduate students gain valuable research and professional skills through exhibition design and installation.

Similarly, faculty members can incorporate exhibitions into their work in many ways. As instructors generate new assignments and syllabi, they could meet with archivists to consider ways to incorporate materials from collections into their pedagogy. Although this approach would seemingly produce more work for overloaded instructors, empowering students to engage in active learning can actually remove some of the burden from faculty by moving away from a unidirectional, lecture-based learning model to a more collaborative approach, which is explored further in this volume in "Collaboration in the Evolving Academy." Although mentoring undergraduate exhibitions may not play a significant role in a faculty member's application for tenure, faculty can include these exhibitions in their annual reports as examples of student-based learning and student research supervision; they can use these projects to apply for pedagogy grants and awards; and they can use them as evidence of learning goal attainment in program assessment. Instructors need to learn to work

5 For just two examples of articles that extol the benefit of student-based exhibitions, see Rockenbach 2011 and Schuchard 2002. Many exhibition projects curated by students are also captured on library blogs rather than in academic journals.

collaboratively with special collections instructors, physical exhibition designers, and digital exhibition designers in order to create these types of projects.

Exhibitions can also enhance the image of host institutions to external researchers and the general public. A well designed, well researched exhibition can demonstrate—in a very public and accessible way—that the host institution contains a vibrant scholarly community and sizable resources, whether those resources include extensive collections, a well appointed exhibition space, or staff with significant skill sets. External researchers browsing through such physical exhibitions will carry their perceptions back to their colleagues at their home institutions, spreading the word that a particular college or university has innovative and rich holdings. Displays can convey the same message to members of the general public, who are likely to discuss their positive impression of the academic library with their friends and family. If included on visits to the library during campus tours, exhibitions can highlight to potential incoming students, particularly high-achieving students interested in research, that the campus supports student intellectual endeavors. Digital exhibitions create similar impressions; further, they remain accessible for much longer than a physical show, offering an even higher possible return in terms of their potential audience engagement over time.

Both physical and digital exhibitions support donor relations objectives. Exhibitions are a substantial subject within the *Chronicle of Philanthropy*: 555 articles and 276 blog posts between 1997 and 2015 discuss exhibitions at a range of institutions supporting stewardship goals.⁶ Shows at academic libraries demonstrate a commitment to the donors whose materials are on display, reinforcing the university's relationship to those individuals.⁷ Dedicating an exhibition to a donor's collection may even inspire additional giving by that person. Exhibitions also facilitate relationships with new donors, who become more willing to give collections when they perceive how a university might broadly promote their materials to enrich the intellectual life of the university and surrounding community (Browar 2004, 53). And, although the ranks of the general public may include many people who will never be able to give to the university or the library, their interest in the institution could be sustained by special collections exhibitions.⁸ Support for these exhibitions realistically may never reach the level garnered by university athletics, but they can play a role similar to that of other arts and cultural events offered on campus and online.

However, creating academically rigorous, visually pleasing, and well-attended or well-viewed special collections exhibitions requires a significant investment in personnel on the part of university libraries.

6 As seen through a keyword search for exhibitions within the *Chronicle of Philanthropy*'s website, available at <http://philanthropy.com/section/Home/172>.

7 Universities already realize the power of using museum displays to stimulate giving. See, for example, Sullivan and Glascock-Broze 2013.

8 ARL's SPEC Kit 317 notes that two-thirds of exhibitions are assessed on their attendance and impact, and 40 percent of these institutions use their assessments to modify their exhibition programs (Berenbak et al. 2010, 12).

Currently, only a small proportion of the ARL libraries that mount physical exhibitions with special collections material have dedicated staffing for this work. According to the 2010 ARL survey, 56 percent of the time, exhibitions are curated by an exhibition committee that consists of staff members from the library whose curricular or subject expertise pertains to the topic of the displays. Only 22 percent of institutions have a staff member for whom exhibitions are a primary responsibility (Berenbak et al. 2010, 12–14). Postings between 2012 and February 2015 at the ARL Position Description Bank Project, which aggregates position descriptions posted by its member libraries, includes only 20 positions at seven institutions whose primary job responsibility is exhibition work.⁹ Within the CLIR Postdoctoral Fellowship Program, which has placed recent PhDs in a variety of positions in academic libraries between 2007 and 2015,¹⁰ only two positions included physical exhibition work explicitly in their list of responsibilities.¹¹

The few universities that designate physical exhibition work as the primary responsibility of an employee demonstrate their lack of support for these roles by ranking these employees below the level of librarian. Employees with librarian status who are responsible for physical exhibitions typically have a number of other unrelated responsibilities. For example, 18 of the positions with responsibility for physical exhibitions listed in the ARL Position Description Data Bank were full-time positions, but only 8 of these full-time positions were considered librarian-level roles. Librarian-ranked exhibition personnel all had additional duties, such as conservator or cataloger, and their job titles reflected this bifurcation. These numbers indicate that only 40 percent of employees responsible for physical exhibitions were granted the highest rank within academic libraries. The two CLIR fellows who had physical exhibition work designated as part of their responsibility also had roles in areas such as reader services, promotion, and instruction that were stressed equally, reinforcing the pattern that staff members responsible for physical exhibitions, if they are eventually to be ranked at a higher level, must also manage other responsibilities seen as more central to special collections.

Digital exhibitions enjoy more support in both staffing levels and status, whether digital humanities centers or digitization departments create them. Digital humanities centers are likely to be tasked with creating and managing online shows. Digital humanists placed within academic libraries¹² enjoy a growing employment rate,

9 Amy Chen obtained access to this database by requesting permission through the University of Alabama Libraries. She thanks Lourdes Santamaría-Wheeler at the University of Florida for alerting her to this resource: ARL Position Description Bank Project, available at <http://www.uflib.ufl.edu/arlpdbank/>.

10 Position descriptions were not available for the years 2004 to 2006.

11 These positions were listed at Bryn Mawr in 2009 and Arizona State Library and Archives in 2010. Many CLIR postdoctoral fellows have done exhibitions even when their job descriptions do not specify exhibitions as one of their responsibilities, but it is impossible to track how many engaged in this type of work without undertaking a full survey of all current and past alumni of the program.

12 Without providing statistics, it is likely that many more digital humanities practitioners are placed in academic departments than in digital humanities centers; generally, the centers are staffed with postdoctoral fellows and other short-term employees, whereas scholars who practice digital humanities are hired into individual departments.

compared with those employees tasked with physical exhibition development.¹³ The ARL Position Description Bank, which, again, is not an exhaustive source, but does provide a valuable introduction to the broad management of these fields, lists 16 positions posted under “digital humanities” between 2012 and 2015, 14 of which are given the status of a professional librarian; thus, an astounding 87.5 percent of positions in digital humanities were given the highest ranking category available within academic libraries.

This trend also can be seen clearly in the range of position descriptions published by CLIR. Out of the cohort of CLIR postdoctoral fellows taking up their fellowships between 2007 and 2015, 69 of 96 fellows were placed in digital humanities centers or similar venues and were tasked with digital projects. These projects likely included online exhibitions. However, only three CLIR postdoctoral fellowship position descriptions specifically mentioned digital exhibitions;¹⁴ interestingly, these were not the same positions that allocated responsibility for physical displays. Although rank is not tracked for CLIR fellows, their background as PhDs makes them more likely to attain higher-level positions in the future.

Digital services divisions may also be responsible for creating digital exhibitions. As digitization is a growing field within academic libraries, many more staff members are allocated to these sectors of the academic library than are allocated to physical exhibition work. According to the ARL Position Description Data Bank, between 2010 and 2015, 129 positions relating to digitization were listed. Additionally, a staff member in digital services who works on online exhibitions is slightly more likely to attain a librarian rank than those personnel creating physical shows. Sixty-two of the ARL-listed jobs in digitization were at a professional librarian level compared with 69 at other ranks.¹⁵ These numbers demonstrate that a total of 48 percent of listed positions within the digitization field are at a professional librarian level. Within CLIR postdoctoral fellowships, 7 of 96 positions were listed as working with digitization; however, most of these positions were listed in 2007 and 2008, indicating that, as the field developed over time, more CLIR fellowships were allocated to digital humanities centers than to digital services. This trend likely occurred as digitization responsibilities became increasingly separate from the creation of digital projects. Nevertheless, as these two sectors work closely together and share similar hiring and status levels, together they demonstrate the relatively higher value placed on digital exhibitions over physical displays.

13 Of course, because of physical space constraints, more digital exhibitions than physical displays can be developed at one time. But even so, these numbers indicate a wide disparity in the rates of hiring between those with physical and digital exhibition responsibility.

14 Positions indicating responsibility for digital exhibitions included the University of North Carolina, Greensboro, in 2008 and the University of Alabama twice in 2013 and 2014.

15 Thirty-nine positions were listed at an “exempt support or paraprofessional” status, 20 at a “non-exempt support or paraprofessional” status, and 10 under an “other professional” category.

Therefore, job descriptions found in ARL's Position Description Data Bank and CLIR's history of postdoctoral fellowships indicate that library administrators do not give physical exhibitions priority when they consider what positions should be created. When physical exhibitions are listed as a responsibility for a new staff member, competency in this area is likely to be considered secondary to other skill sets when the position is designated a librarian. But, when physical exhibitions are the focus of the role, which is rare, the position is likely to be at a support level. The decision to rank physical exhibitions professionals at a lower tier than traditional librarians reflects the relative value academic library administrators place on these skills. In contrast, those charged with developing digital displays enjoy a much higher number of potential jobs as well as the likelihood that they will attain a higher rank.

To expand undergraduate engagement and enrich donor engagement in the future, funding for special collections exhibitions should be directed toward improving personnel levels for physical displays and ranking these individuals at a higher level. Online shows are also an important component to any library's exhibition program, but these displays are already funded and valued highly in contrast to those mounted in campus spaces. Investing more heavily in physical displays does not radically change the priorities of existing institutions, but rather will allow the types of shows that are being created in libraries already to be completed to a higher level of rigor for greater impact.

Shifting priorities across academic libraries in general and special collections in particular will require administrators to value candidates for physical exhibition positions whose training comes from outside a traditional library and information science background. Library administrators already have become more comfortable with the shift in demographics within their set of employees because of the new types of training necessary to manage digital workflows. For example, the staff of digital humanities centers and digitization departments often include a combination of trained academics who have degrees from a range of different disciplines and technology specialists who may or may not have advanced subject degrees, but usually have extensive prior experience in programming, information technology, visualization, and adjacent fields.

Similarly, formal education for exhibition work usually is obtained through master's degrees in art or museum studies rather than master's degrees in library and information science. Advanced degrees in a particular academic discipline may also be useful for curators of collections who can look forward to mounting displays out of their holdings. However, those with library-only backgrounds should not be overlooked; rather, they should be mentored by someone who has prior experience creating exhibitions or who is formally trained to do so, or they should be willing and able to attain further professional development by learning and following the best practices of the field. This openness to a variety of candidates mirrors the larger movement within special collections to realize that "young

professionals hoping to make a career in rare books and special collections must exercise a degree of self-reliance, commitment, and imagination unmatched in other fields of librarianship” (Holzenberg 2006, 12) precisely because they must combine expertise across a wide variety of fields to suit the demands placed on them.

Staff members who manage either physical or digital exhibitions tie special collections closer to the field that has come to be known by the acronym GLAM: Galleries, Libraries, Archives, and Museums.¹⁶ Designating special collections as part of the GLAM cohort moves repositories of manuscripts, archives, and rare books away from their traditional affiliation with libraries and into the wider range of cultural heritage institutions. Robert Byrd acknowledged this shift as a positive one for special collections centers located in academic libraries in 2001. Continuing to support this identity expansion within special collections in general and among both physical and digital exhibition professionals in particular can allow these employees to draw more confidently upon the resources of a variety of disciplines to make shows more innovative and academically rigorous (Marty 2010). In doing so, they will continue to develop and improve the value of such shows for special collections repositories.

Investing in exhibitions aligns special collections with the broader move within academic libraries to promote themselves as producers of research rather than just collectors of research. By producing exhibitions, special collections staff can produce their own narrative of the value of their collection while also attracting more students and donors to work with and support their mission. But, to recognize the value exhibitions bring to libraries and to their universities, more special collections personnel should have roles either partially or fully dedicated to physical exhibition design. After all, according to the ARL SPEC Kit, about half of the 51 universities that complained of outreach barriers named the lack of full-time exhibition staff as a primary concern (Berenbak et al. 2010, 15). Additionally, partnering more closely with digital humanities centers and digital services departments is another way to expand the number of staff members already engaged in this important outreach activity. As a result, special collections staff will be able to work more productively at a higher level, incorporate the expertise of different divisions in the library, and begin to follow the best practices of similar cultural heritage institutions to produce more innovative and widely seen scholarship to audiences both within and outside of the home campus community.

Exhibitions are taking libraries in new directions. Although they may remain object-oriented, even when presented in digital form, exhibitions draw on extant library collections to highlight the library’s

16 Alternatively, and perhaps more widely, this field has been called LAMs: Libraries, Archives, and Museums. However, we prefer the acronym GLAMs, because GLAMs includes galleries, which share a professional interest in exhibitions.

significance as a repository. Exhibitions also produce new knowledge about the institution and offer ways for faculty and students to engage in experiential learning. The special collections division from which the exhibitions originate has significant differences from the IR in the academic library; the special collections staff are committed to meticulous practices of collection care while the IR often ingests objects with little or no mediation. Similarly, special collections staff typically work with materials deposited from outside the current population of the institution, while depositors in the IR are almost always individuals who have an active affiliation with the institution. But this perspective belies the significant point that both the special collections section and the IR are dedicated to sharing unique or, at least, rare materials.

In reference to a repeated claim by Sayeed Choudhury of the Johns Hopkins' Sheridan Libraries that "data are the new special collections," Mike Furlough, director of HathiTrust, has drawn meaningful parallels between the practices of data curation and curation undertaken in special collections, including managing, arranging, processing, describing, and preserving objects (Furlough 2013).¹⁷ To that list of shared activities, we might also add the dissemination of the materials curated by the teams working with special collections and the IR. Considering these two directions of library practice reveals that libraries are not only working at the vanguard of knowledge production, but also are closely tied to the broader mission of the university itself.

Institutional Repositories: Highlighting University Research

Since the early 2000s, research libraries around the world have invested significant financial, technological, and human resources in the creation and development of digital IRs. The founding promises of the IR, as outlined most convincingly in "The Case for Institutional Repositories" by Raym Crow (2002), are that this technology can preserve the digital scholarly record of an institution and can share it with the broader research community. This mission still rings true today. Even at a time when publishers are gradually opening access to scholarly articles and monographs, there is still a critical need for an *institutional* commitment to preservation and access that is not driven by a need to turn a profit. If provided with the resources necessary to fulfill its true potential as it enters adolescence, the IR and its supporting services will become central to the academic library of the future.

To those unfamiliar with it, the IR may appear to be a virtual container for digital copies of the traditional scholarly publications of local researchers—a public storage space for sharing work and highlighting research accomplishments. Yet the effort involved in

17 For more from Choudhury, see Robbins 2013.

preserving IR content and managing the IR platform demonstrates that the repository is far more than a passive container or a replacement for a scholar's personal website. The resources it protects and makes available are typically far more heterogeneous than the products of formal scholarly publishing (i.e., journal articles, monographs). It is both the strength and potential weakness of the IR that it is an active and living technology hosting varied scholarly outputs and demanding significant ongoing attention, because successfully attending to this dynamism requires the academic library to fulfill a set of responsibilities that are both familiar and somewhat new.

A quick tally of the contents of Penn State University's IR, ScholarSphere,¹⁸ reveals that it is home to 356 books and 332 journal articles, and that these are the two most common object types in the repository. Not far behind, however, are the 321 data sets, which are followed by an assortment of presentations, posters, maps, images, software or program code, video, audio, theses, dissertations, and still other types of materials. In total, only 34 percent of the objects in ScholarSphere fall into the category of formal scholarly publications.¹⁹

Like ScholarSphere, most IRs are designed to be flexible enough to host a variety of research outputs. When a 2006 survey asked ARL member libraries what types of materials are included in their IRs, the questionnaire authors offered a list of 22 object types. Even the least commonly included type of material (yearbooks) was selected by 5 percent of respondents (Bailey et al. 2006, 67).

For the IR to be successful, researchers must recognize its value and contribute to it. It is not hard to imagine that, from their perspective, a chief advantage of the IR's flexibility is based on the premise that a research project does not begin and end with formal publications. In other words, all the materials generated between a project's inception and publication may well be worth sharing, too. For instance, a sociologist who recently published a paper describing her findings from a two-year study involving both surveys and interviews of her research subjects may wish to deposit that paper in the IR. Doing so would certainly benefit the greater scholarly community, but how much more of an impact might her work have if she were to create in the IR a fuller "research package" that would include her survey and interview instruments, the databases she used to organize the data she gathered, the code she used to analyze those data, and any other relevant materials? With this research package, other scholars could repeat her approach in other locations by reusing her instruments; they could try to verify her findings through the replication of her analysis; and they could seek to answer new questions by running their own analyses against her data. Not only are these approaches more efficient ways to do research,²⁰ but they

18 Available at <http://scholarsphere.psu.edu>.

19 Figures are accurate as of February 7, 2015. Object type classifications are self-selected by depositors.

20 Financial efficiency is one benefit of data-sharing requirements for sponsored research. Why should a funder pay more than once to collect the same or similar data when researchers can instead share their data with each other and thereby enable new findings to be drawn from previous studies?

are also critical steps toward protecting the integrity of scholarship.²¹ In attempting to provide a safe home for these previously hidden miscellaneous materials, the IR helps make the case for the enduring significance of the academic library.

Although the more informal research products are generally outside the collection policies of the academic library, their inclusion in the IR and the library's stewardship of them is an extension of the library's traditional collection and preservation activities in the digital medium. And yet, the move to embrace new materials in this new environment brings with it a host of new responsibilities. Simply meeting the bare requirements of the original goals of the IR—access and preservation—is not enough. Because of their informal nature, the data sets, learning objects, lecture transcriptions, conference proceedings, and other research objects deposited in the IR require a great deal of additional support to make them discoverable, understandable, and useful to others. Without this work, the IR is indeed just a container—a silo piled high with miscellaneous objects—and efforts to preserve them and provide access to them might be in vain. Making these objects discoverable and useful is a great deal of work and involves activities familiar to those working in technical services: describing objects in a structured and standard way for interoperability among various systems. But when an IR accepts heterogeneous materials by self-deposit, as most do,²² the writing of those precise metadata is taken out of the hands of information professionals and given to the researcher. This creates a low barrier to participation in the IR and perhaps brings in more materials, but it also leads to two substantial challenges.

The first challenge is the creation of a form for metadata and object description that is both generic enough to apply to the diversity of objects accepted by the IR and specific enough to be helpful to those in each object's ideal audience or related discipline.²³ The quest to find the balance between general and specific is one long familiar to metadata experts, and it is significantly compounded by the second challenge: the "self" in self-deposit. If the ambitions of the IR are to enable the discovery and use of its holdings, then the objects it hosts must be described in standard ways that allow them to be properly organized and searched. Though the researchers filling out the metadata forms are subject experts, they are not information professionals; thus, they

21 For more on open science and the related call for replicability of experimental studies and analyses, see, for example, the December 2, 2011 special issue of *Science*, Data Replication and Reproducibility, available at <http://www.sciencemag.org/site/special/data-rep/>.

22 A 2009 survey distributed to institutions listed in the Directory of Open Access Repositories (<http://www.openoar.org>) indicated that just 33.6 percent of respondents (n=116) had IRs that only accept deposited materials "on behalf of the author." See Hanlon and Ramirez 2011.

23 For more on disciplinary standards, see the Digital Curation Centre in the United Kingdom's guide to disciplinary metadata standards, available at <http://www.dcc.ac.uk/resources/metadata-standards>, or the information provided in Jain Qin and Ruth Small's Science Data Literacy Project, available at http://sdl.syr.edu/?page_id=32.

are liable to generate metadata of varying quality, as judged by the standards necessary for meeting those goals.²⁴

It would be both inaccurate and against the interests of the IR to blame the researchers themselves for not universally succeeding in something that they were never trained to do, something that is difficult even for professional catalogers. The answer to the second challenge, then, is to take advantage of each party's strengths by developing a process for the mediated deposit of scholarly resources in the IR. Particularly for those nontraditional research objects and "packages" of objects, a more involved team will be critical to helping researchers create metadata that facilitate discovery as well as any other documentation (e.g., codebooks, README files, data dictionaries, terms of use) key to the understanding and reuse of those materials. Members of the library side of such a team would likely include a combination of more and less traditional library positions, such as the following:

- A metadata specialist to ensure that the information provided is as standard as possible and in the right place so that the metadata are prepared to be pushed out to selected aggregators as well as crawled, harvested, and shared by search engines
- A copyright specialist to assist with issues of intellectual property rights
- A technologist to pull together and hierarchically organize disparate research objects from the same project
- A digital curation expert who could guide the conversation among team members²⁵

The basic contours of the work described are not entirely new. Libraries have long engaged in these types of cross-unit collaborations and have long puzzled over similar problems of information management; additionally, the benefits of mediated deposit have been extolled by librarians since the early days of the IR.²⁶ Although a handful of institutions have already tested or made available collaborative teams for mediated deposit in their IRs,²⁷ such efforts are still rare, likely because of the enormous investments needed to do that work well.²⁸ Indeed, doing it well would require creating and

24 For a summary of issues related to this topic, including the completeness, accuracy, and consistency of IR metadata, see Park 2009.

25 Although it is clearly impractical to assign such a team to the description of every object deposited in an IR, the availability of such a service is critical. The idea that the IR service must be a team effort—one that truly reaches all corners of the library—with dedicated resources is far from new. Seven years ago, Dorothea Salo convincingly argued this point in the essay "Innkeeper at the Roach Motel" (2008); she also noted that repository services need more resources if they are going to meet future demand in the wake of proliferating open-access policies.

26 See Joint 2006.

27 See, for instance, Johnston 2014, which describes efforts of the University Libraries at the University of Minnesota in this area. As part of the 2009 Association of College and Research Libraries Roadshow on Scholarly Communication, Ann Campion Riley from the University of Missouri Libraries made a presentation on research undertaken to inform an "author-centered approach" to the IR (Riley 2009).

28 Although it is difficult to imagine how an IR might reduce the number of staff providing user support while still achieving success in the ways proposed here, it might be possible to find efficiencies in the IR's supporting technology without sacrificing the quality of the service. Several institutions are already working in this

sustaining a service not just for IR users, but also for content *providers* (i.e., researchers) that would be tantamount to a dissemination enterprise. To find itself on both sides of the scholarly communications spectrum—dissemination and acquisition—is still a relatively new role for the academic library; but for many reasons—the value brought by the IR, library publishing programs, and special collections exhibits chief among them—this dual position seems likely to be a major part of an academic library’s future. With that role come responsibilities that can no longer be focused primarily on preserving scholarly materials and making them accessible; rather, to best support this public-facing, dynamic technology and service, significant attention must be paid to the needs of researchers who desire to share their work and those who may try to use that work.

The pressing question today is what it takes to sustain this service, including the activities already mentioned around mediated deposit, as realizing the true potential of the IR depends so heavily on that deep engagement. How can the library add value to this repository content—essential to preventing the IR from becoming a silo of miscellaneous stuff—so that those diverse scholarly resources and research packages can be discoverable, well described, and helpfully documented (i.e., so that they are given a fair chance to have an impact in the academy)?

Although the library has always been a public-facing institution, the success of the IR as a dissemination service depends significantly more than general library operations do on meeting the needs of those it serves. If the IR is to be sustainable, those in charge will need to devote significant time to what is, effectively, business planning for its long-term viability and usefulness. The development of an effective mediated deposit service forces one step in the right direction, as it inherently requires close attention to the needs of depositors (how to accurately describe and organize their work for sharing) and end users (how to connect them with appropriate resources and how to make those descriptions and ways of organizing resources understandable and useful to them). But how to attract researchers to deposit in the first place?

The traditional repository role of the library involves the acquisition and stewardship of materials acquired from a publisher or distributor of some sort. The IR, however, skips the middleman, leaving the library to do the courting of a publisher.²⁹ Without participation,

direction by consolidating repository efforts within existing organizational structures. One illustration of this is the California Digital Library, which is a central unit of the University of California system and provides the [eScholarship](#) repository service to all scholars, research units, publishing programs, and departments in the system. Another approach some institutions have taken to managing their technology-related resources is to use open-source repository software created and maintained by a community of developers. [Project Hydra](#) is a model for such collaboration.

²⁹ An interesting line of inquiry extending from this point but beyond the scope of this piece would be to examine the role of the IR vis-à-vis the institutional press, especially given the number of presses that now report to their university or college libraries (e.g., Purdue University Press, Penn State University Press). There is likely a great deal about business development and planning that the library can learn from the press and a great deal the press can learn from the library about new forms of scholarly communication.

the IR fails, so the IR team may find itself in the position of researching its audience and, for lack of a better word, competition. A greater sense of the motivations of those who already share their work in the IR (e.g., compliance with sharing mandates? more research output to include in the dossier?) and those who do not (e.g., time investment too great to make it worthwhile?) will help with tailoring services and outreach strategies for ingesting more content and keeping the IR viable. In the course of these investigations, it may be found that some researchers prefer a disciplinary repository, self-“archiving” on one’s own website, or another approach entirely. As a result, additional explorations into competing resources or approaches to sharing could reveal a great deal about how to pitch the IR when trying to increase participation.

A full list of the research and planning that would be necessary to leverage the power of the IR and sustain the services that will make it a significant contributor in the scholarly landscape is beyond the scope of this essay.³⁰ It must suffice to say that the suggestions shared here are informed by the research into the sustainability of digital scholarly resources conducted by the not-for-profit organization Ithaka S+R, where one of the authors, Sarah Pickle, worked for two years after graduate school and before beginning a CLIR postdoctoral fellowship at Penn State University Libraries.³¹

The great significance of an IR is that it extends the library’s traditional role of collector to that of disseminator of content produced on its campus. That development will require libraries to confront a new set of activities related to sustainability planning if it is going to serve confidently as both the purveyor and steward of those resources. Although these new activities are far from small tasks and will require re-evaluation over time, the scholarly contributions that the library will facilitate in these dissemination efforts may well bolster the public’s commitment to a rich future for the academic library.

Conclusion: Libraries and Universities, Working Together

Exhibitions and IRs are only two ways that the library is actively participating not only in the future direction of the library, but also in the future growth and enhancement of the university itself. Programs such as those involving embedded librarians and various forms of outreach and partnership have forged strong bonds with current faculty and students, and the library is often a key site on tours for

30 In addition to research into the users or audience of the service, as well as any barriers to participation (“competition”), the creation of a sustainable IR will require a precise articulation of the goals of the service, a careful understanding of the costs involved relative to IR’s funding sources, and detailed plans for supporting the service should that funding model or the goals of the IR change.

31 For more, see Ithaka S+R’s dozens of publications on sustaining digital scholarly resources, which are available at <http://sr.ithaka.org/research-publications/2>. Ithaka S+R also has tools designed to help leaders and institutional supporters of digital projects plan for the future sustainability of those resources and services. See, for instance, Maron and Pickle 2014.

faculty job candidates. Furthermore, the increased emphasis in the academic library on experiential learning, technology, sustainability, and global awareness articulates profoundly with the missions, strategic plans, and quality enhancement plans of most universities. While retaining its historical role as a repository of knowledge and continuing to develop its new manifestation as a producer of knowledge, the library—or more broadly, the information commons—is a significant physical space on campus. Its often innovative architecture is a draw not only for current students, but also for potential students who might imagine themselves meeting and studying there. A dearth of scholarship on the connections between the library and the university's higher administration suggests that more work must be done to determine the myriad ways in which the library might integrate itself further with other campus entities.³²

Libraries already have a number of initiatives in place that align with the university's academic mission. As noted previously, exhibitions contribute to new pedagogical initiatives based on experiential learning. These projects can also be featured in e-portfolios, used by students to track their progress through vertical learning models, and as forms of self-representation to potential employers that are more academically oriented than LinkedIn and with greater potential for expansion than Academia.edu. University administrators may use e-portfolios for assessment purposes and as ways to keep in touch with alumni. As part of student e-portfolios, library exhibitions highlight both library collections and the dynamic ways that students can incorporate them into their learning process.

Although opening up IRs to every undergraduate student might overtax the system, selecting certain artifacts, such as honors theses, for inclusion in the IR can serve as a way to incorporate the work of top undergraduates. Facilitating access to these documents through the availability of digital copies can help current students remain in honors programs and complete honors requirements by demystifying the thesis process; indeed, misunderstanding of the thesis process is a key barrier to completion. Honors colleges and programs can certainly include theses on their own websites, but incorporating theses into IRs highlights their role as part of the broader intellectual output of the university. They can also be used as recruitment tools for high-achieving students interested in pursuing independent research. In addition, theses can be used as artifacts for university assessment and accreditation applications.

Different campus entities perceive the library in different ways; yet what the library ultimately stands for—research, intellectual inquiry, information retention, and production—is beneficial to all campus agencies. Partnering with campus administrative entities, as well as with faculty and students, can enhance teaching and learning experiences, build a university's reputation, and attract the best

32 There is an emerging body of scholarship on this issue. Some analysis exists on the library's role in institutional assessment; for several examples, see Fraser et al. (2002) and Lakos and Phipps (2004). Franklin (2012) addresses the role that the library can play in advancing the institutional mission, and Kemper et al. (2013) discuss the role of the library as campus community builder.

new students (and faculty) to campus. University administrators—not just library administrators—would do well to pay attention to the forward-thinking nature of the library and consider the role the library can play in university-wide assessment and accreditation, student recruitment and retention, and development. However, the burden may very well rest on libraries to make these connections clear to provosts, chancellors, deans, admissions and development officers, and other members of the university administration.

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Libraries and the Research Data Management Landscape

Jodi Reeves Flores, Jason J. Brodeur, Morgan G. Daniels, Natsuko Nicholls, and Ece Turnator

Across the world, organizations, institutions, and governments are increasingly recognizing the importance of research data management (RDM): the documentation, curation, and preservation of research data. RDM activities ensure long-term value and utility of research data for new analyses and replication of study findings. Stakeholders include research funding agencies, research institutions, and individual researchers. Because of the numerous requirements, mandates, techniques, and tools that make up the RDM landscape, it is difficult for stakeholders to carve out their niche. One of these stakeholders is the university research library. Research libraries have always offered a variety of research services, but as digital data became more prevalent and the need to manage them more pressing, some libraries began incorporating RDM into the research services offered. These RDM services result from the demands of government agencies or university administration; a perceived need to stay relevant in a changing, digital research world; or a thoughtful assessment of the needs of researchers. Often, libraries deal with a combination of all three of these influences and myriad other motivations, making it important to examine the possibilities for incorporating the library as a critical stakeholder in the RDM landscape.

When considering the library's role in RDM development, common themes include activities associated with conducting RDM needs assessment in user communities (Corrall et al. 2013, 646); policy development; advocacy, awareness, and training; advisory services; data repository development (Cox and Pinfield 2013; Jones et al. 2013); helpdesk services; and data management plan (DMP) development (Corrall et al. 2013, 646; Pinfield et al. 2014, 4). In addition to these activities, the RDM pyramid proposed by Lewis (2010) suggests a broader role for libraries and librarians, including integration of RDM into teaching at the undergraduate level and in schools

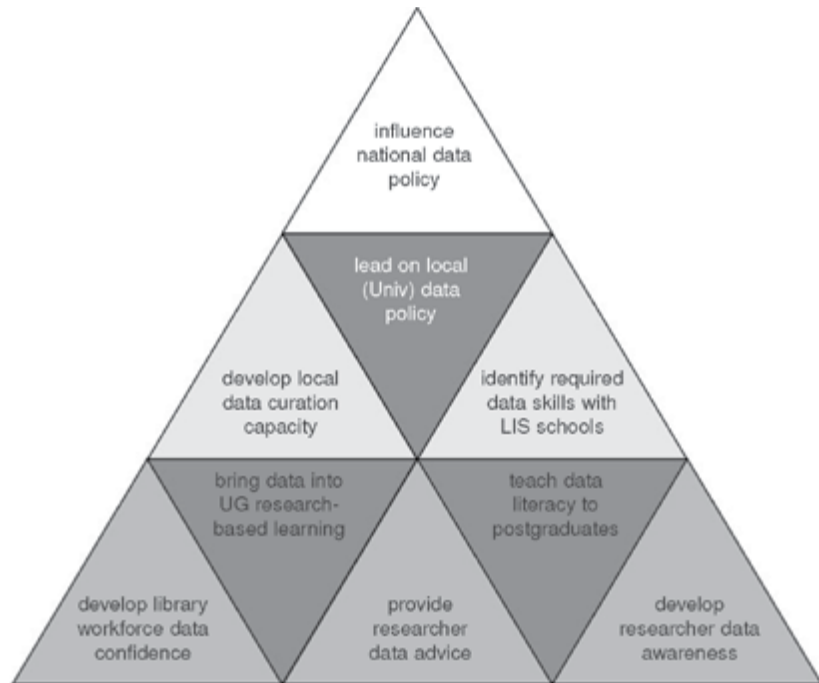


Fig. 1: Research data management pyramid for libraries, as presented by Lewis (2010)

of library and information science, as well as influence and participation in national policy development (figure 1).

As fellows of the Council on Library and Information Resources (CLIR) and the Digital Library Federation (DLF) who have experience within the researcher community and the library/RDM community, we are keenly interested in the role that libraries should assume in building coordination between funding agencies, institutions, and researchers. Research libraries moving into this space increasingly see themselves as major contributors to RDM activity in general and in the design of research data services in particular (Pinfield et al. 2014). However, libraries operate with finite resources, mandates, and limited researcher buy-in.

Taking into consideration these issues, the experiences of library staff from multiple institutions, and our hybrid research/library experiences, we advocate that libraries work to situate themselves in the wider RDM landscape so that they can make strategic decisions about their activities in RDM support development and work with those parties outside of the library best suited to address research needs. In this way, libraries can leverage both their relationship with university leadership and research support units, and their ability to disseminate knowledge regarding requirements, standards, and tools, to assume a leadership role in fostering a more collaborative and navigable RDM landscape for researchers.

The RDM Landscape

Whether viewed at an institutional, national, or international level, RDM development relies on the collaborative and coordinated work of many engaged partners. Considering the role of the academic library in activities at any of these levels requires a general consideration of the current RDM landscape. Establishing the various stakeholders involved in RDM activities and characterizing their interests, roles, and responsibilities makes it possible to identify activities where the library is well situated to facilitate and coordinate RDM development.

RDM Stakeholders

Although the spectrum of RDM stakeholders has been variously categorized in the literature (e.g., Erway 2013, 7; Jones et al. 2013, 3; Pinfield et al. 2014, 4), they can be assembled into four main categories (figure 2). This structure is not intended to denote or prescribe segregation between groups, but rather to align them according to similar interests, roles, and responsibilities in RDM.

As the primary funders of academic research, governments and funding agencies have an interest in maximizing the return on their investments. Properly managed and shared data have the potential to yield manifold benefits when reused in primary research,

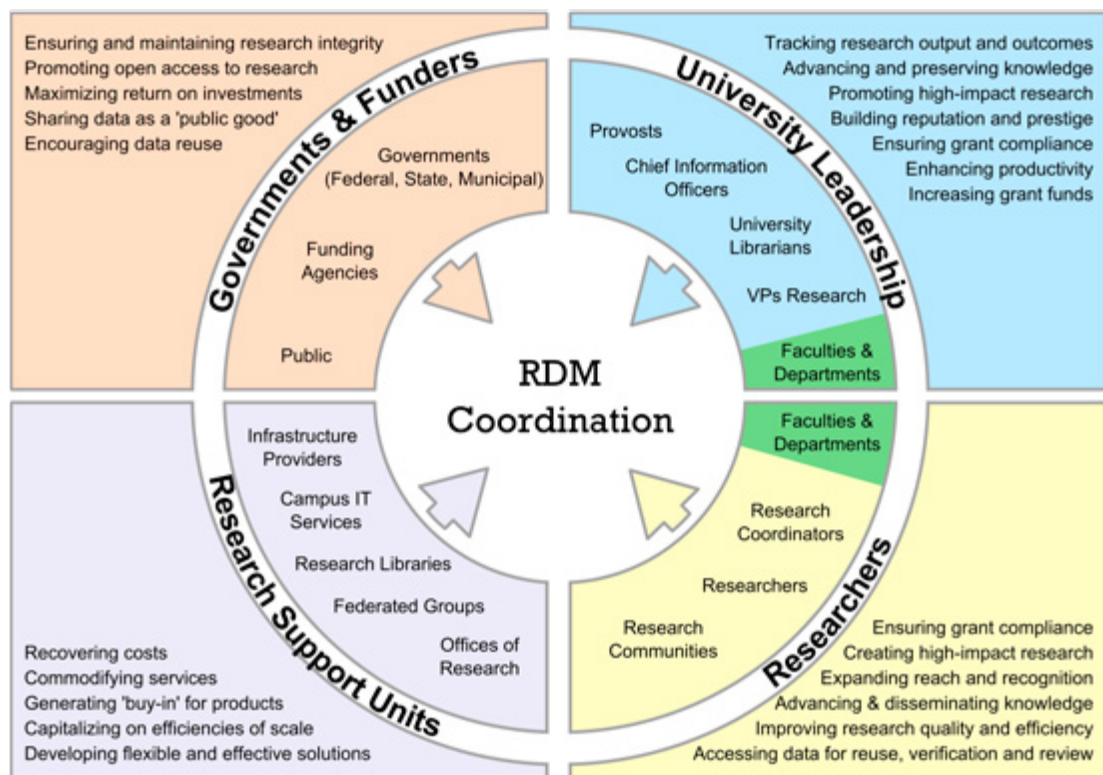


Fig. 2: Partners in RDM development, categorized into four general stakeholder groups. Individual stakeholder units are identified in the central ring, with general group interests listed in the adjacent boxes.

follow-up, and synthesis studies, as well as in interdisciplinary and data-intensive research (Heidorn 2011, 662; Pryor 2012, 1). With varying degrees of response, funders encourage RDM activities to ensure that appropriate data stewardship and sharing are embedded in the research process through one or a combination of high-level government recommendations, requirements for submitting RDM plans with grant proposals, and the sharing of research data products where applicable and appropriate.

The RDM interests of university leadership—university provosts, chief information officers, vice presidents of research, and university librarians—reflect their responsibilities to jurisdictional government agencies and funders, as well as to their institutional researchers, students, and community. These interests include ensuring compliance, advancing the creation and preservation of knowledge, tracking research output, and building the institution's reputation and prestige. Additionally, members of the university leadership group may be researchers themselves and, as such, identify strongly with the research culture in their specific discipline. In view of these factors, the RDM approaches and activities initiated at the level of university administration reflect a combination of requirements imposed by national governments and funding agencies, the awareness and perceived importance of RDM by those in leadership positions, and developments occurring within various departments and service units at the institution (Erway 2013, 7).

As the producers of data and disseminators of knowledge, researchers and their associated communities, departments, and faculties regard RDM as a means of ensuring compliance with funders, increasing the efficiency and quality of their research, and advancing knowledge in their field of study (Erway 2013, 10). The interests, challenges, and needs of researchers with respect to RDM vary by discipline, as well as by institutional and national context.

Addressing the diverse interests and requirements of the other RDM stakeholders takes the combined efforts of several research support units at institutional, national, and international levels. RDM partners at the institutional level commonly include the library, information technology (IT) services, and the office of research, as well as other relevant internal and third-party service providers (Jones et al. 2013, 3; Pinfield et al. 2014, 4). At national and international levels, RDM includes the collaboration of infrastructure providers and is both discipline-specific and cross-disciplinary. These parties have an interest in developing effective RDM solutions and services that are highly used, scalable, and sustainable. Such development needs to commodify or ensure long-term support for services and requires a clear definition of RDM roles and responsibilities among units.

The Need for RDM Coordination at Varying Levels

RDM development takes place over many levels, ranging from international collaborations to national and institutional policy development to efforts within individual research groups. Although each of the previously introduced stakeholder groups has a significant role in RDM development activities, their interests, involvement, and contributions vary with the level. Furthermore, the divergent interests and expertise among these groups present obstacles to the creation of a comprehensive, cohesive data stewardship and sharing ecosystem. Where these differences result in substantial challenges to processes or practices, it is necessary for one or more of the partner groups to assume a coordinating and mediating role in RDM development (i.e., the central position in figure 2). Given the various levels of development and their diverse circumstances and dynamics, opportunities for groups to lead coordination efforts flourish.

For instance, the development of government funding agency RDM policies and requirements is uneven, both within and between nations. Variation in these policies has consequences for all stakeholder groups and presents an important area for RDM coordination at a number of levels.

Additionally, in the United States, data management and sharing policies have been implemented to some extent for all major federal grant funders, including the National Science Foundation (NSF), the National Institutes of Health (NIH) and, most recently, the Department of Energy (Dietrich et al. 2012; U.S. Department of Energy 2014). Although most divisions and programs require DMPs for grant proposals and data access upon study completion, a number of inconsistencies remain among agencies (Dietrich et al. 2012). As stated in the U.S. Department of Health and Human Services Public Access Plan (2015), there is a lack of common standards for data management and archiving, as well as a lack of common requirements and enforcement practices for data sharing across agencies. In addition, a policy comparison by Dietrich and colleagues (2012) highlighted inconsistencies in metadata standards used among NSF directorates and programs, which have led to confusion for the researcher.

Like federal funding agencies, institutions differ in their development and implementation of RDM policies. Although nationally driven efforts have led to widespread institutional policy implementation in countries such as Australia, development in other countries—including the United States and the United Kingdom—is ongoing and often uneven (Horton and DCC 2014). The precise nature of the policy development process differs between institutions because their stakeholder interactions, characteristics, and interests provide a unique context, but recent explorations of these efforts have revealed a number of commonalities.

Supporting Researcher RDM Needs

A great number of coordination opportunities for enhancing data sharing and stewardship activities emerge because, as researchers

commonly identify more closely with their research community than with their institutions, RDM support needs continue to vary among disciplines and within institutions (Akers and Doty 2013, 14; Cox and Pinfield 2013, 19).

Perhaps the most significant opportunity for coordination in managing and sharing data occurs in addressing the considerable variation among academic disciplines in their treatment of and approaches to data organization, documentation, sharing, and preservation. The dimensions of these differences include the quantity, structure, and format of data; the accepted metadata standards in the field; the researchers' interests and requirements to manage and share data; and the discipline-specific norms for sharing data (Cox and Pinfield 2013, 19; Harley et. al. 2010, 4). Disciplines such as astronomy, genomics, ecology, and quantitative social sciences operate within a well-developed culture of data stewardship and sharing, with established metadata standards, tools, and data repositories to support these activities. Conversely, the development of research data standards, tools, and norms has been slower for other disciplines, providing significant opportunities for RDM stakeholder groups to facilitate and coordinate such efforts. For these fields, libraries and library staff—particularly subject specialists—can play an essential role by preparing scholars for new research requirements, such as DMPs, and providing tools and services to support data stewardship activities. Indeed, these actions could help avoid regretful statements such as “had the librarians been involved earlier in the life cycle of the pilot data . . . data preparation and workflows could have been adjusted to accommodate eventual data deposit” (Newton et al. 2011, 15).

Despite the fact that many researchers do understand the importance and academic value of data sharing, there remain several barriers to providing access to data, and this is where many coordination possibilities for enhancing data sharing and stewardship activities lie. By addressing challenges and working to remove barriers, RDM services can enable individual investigators to easily, quickly, and effectively share their primary research data. Such an advancement has the potential to greatly enhance transparency and efficiency, and to foster positive impacts on knowledge advancement in all fields of study (California Digital Library 2014).

One challenge involves determining an appropriate repository for long-term data preservation and sharing. Another is imposed on the data stewards who assist researchers in choosing the right repository. Baker and Yarmey (2009) discuss data stewardship as the tending of multiple related repositories from a big-picture perspective, requiring a broad knowledge and solid understanding of repositories' different features, functionality, fees, and any limits on the number or size of data sets that can be deposited in each repository (MetaArchive Cooperative Outreach Committee 2015). A consolidated registry, re3Data, contains information for more than 1,130 data repositories (re3data.org team 2015).

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publishers are increasingly adopting the practice of publishing data(set) papers in conventional journals and data journals (Candela et al. 2015); therefore, publishers provide authors with instructions for a data set deposit into select trusted/approved repositories. For instance, the *Journal of Environmental Quality*, published by the American Society of Agronomy, currently states in its author guidelines that “dataset papers or collections of datasets integral to a dataset paper can be hosted on the ACSESS internal servers or an appropriate external repository (institutional repositories or another acceptable repository such as Dryad)” (ACSESS Digital Library 2015). The question for both researchers and data consultants is which repository option is better to allow for data accuracy, discoverability, and usefulness.

Some researchers rely on multidisciplinary institutional repositories, which provide publication-related materials from multiple subject areas within a single organization. Researchers in other fields recognize and use common discipline-specific repositories that collect and preserve intrinsically domain- or discipline-oriented research. Prominent disciplinary repositories include the Dryad Digital Repository for scientific and medical publications, The Archive of the Indigenous Languages of Latin America, the Inter-University Consortium for Political and Social Research, and The Digital Archaeological Record (tDAR). In some cases, a consortium of institutions hosts these repositories, while in other cases, a single institution supports the repository. These varied approaches demand an advanced RDM coordination effort.

The Academic Library as a Leader in RDM

Because of their expertise in research methodology and knowledge retention, academic librarians can offer relevant leadership in RDM efforts within their universities. Although collaboration across the institution is key in developing an RDM program, research libraries play an essential coordination role in the process.

Campus stakeholder groups such as university administrators, researchers, and research support units all have an interest in how RDM services are designed for their institution. It is the library’s unique position, as both a facility with staff who have expertise in many of the issues surrounding RDM and a campus-wide service with relationships among these many stakeholder groups, that favorably positions it to lead the RDM effort (Erway 2013; Shaffer 2013): “The library is well situated to be a key player in data management, curation, and preservation, given its extensive experience with selection, metadata, collections, institutional repositories, preservation, curation and access” (Erway 2013, 10–11).

Academic libraries have a history of provisioning data for research use, giving many librarians a familiarity with the reuse requirements and concerns surrounding research data. Humphrey notes that data services librarians “often assist with locating data, interpreting data documentation, retrieving data files, and providing

the data in a format that can be directly loaded into analytic software” (2014). Experience helping researchers use data sets can be leveraged in the provision of data management services. In addition, academic librarians are masterful at designing and delivering educational content tailored to the research practices of members of various disciplines, at varying levels of expertise. Their fluency and flexibility as instructors equips them to educate members of the university community in RDM issues.

Research library staff have existing relationships with researchers, other research support units, and leaders across the university, making them well situated to coordinate services, such as RDM services, that are offered horizontally across the institution (Humphrey 2014). As institution-wide resources, libraries can coordinate services across disciplines, helping researchers in many disciplines meet best practices in data management. Most researchers are amenable to receiving librarians’ expert assistance with multiple aspects of data management, particularly given their own limited resources and the many other demands on their time and energy (McLure et al. 2014). With their connections to faculty and their disciplinary knowledge, subject specialists can raise awareness of RDM services across campus—once they themselves are provided with a background on RDM. Perhaps this is why many academic libraries, including those at the University of Michigan, Purdue University, Baylor University, and the University of Maryland, have focused on data education and training for their own subject specialists before they reach out to academic departments and researchers (Zilinski et al. 2013). With the help of data education and training to develop new skills and knowledge appropriate to data management responsibilities, ongoing communication between subject and data curation specialists in libraries can facilitate the flow of information about researcher needs and RDM capabilities throughout the university as a whole.

In addition, academic librarians can coordinate RDM efforts beyond their institution, sharing lessons learned in professional groups and building partnerships with other universities to develop and test RDM solutions. A number of cross-institutional partnerships have been developed via the E-Science Institute (sponsored by the Association for Research Libraries [ARL], Digital Library Federation [DLF], and DuraSpace); the DLF E-Research Network; the Association of College and Research Libraries (ACRL) Data Management Working Group; the New England Collaborative Data Management Curriculum; and the Virginia Data Management Bootcamp, to name only a few. Librarians are taking advantage of these and other interinstitutional collaboration opportunities as they develop RDM capabilities.

An important part of the coordination work needed to develop an RDM program is advocacy on behalf of researchers as key stakeholders and toward data stewardship as a goal. Advocacy is a multidirectional process: learning about researcher needs and requirements and taking them to university leaders to plan for RDM services, while communicating campus policy back to researchers and research support units. Librarians need to start discussions

about RDM across campus stakeholder groups, which may have their own preexisting goals regarding RDM. Conducted by ARL, a review of a group of library, IT, and university strategic plans among member institutions found that RDM goals cut across both library and IT plans (ARL 2014). Through outreach, libraries can leverage this mutual interest to build partnerships to develop policy and planning at the university level.

Research Data Management Services

Table 1 describes many of the services that can make up RDM offerings within an academic institution, lists the stakeholders concerned with each offering, and suggests activities potentially undertaken by libraries to coordinate these services. This list is neither exhaustive nor prescriptive. It does not capture the full range of services considered RDM. It will expand and change as the RDM landscape changes. It is not intended to tell research libraries what services they *should* offer. The suite of RDM services offered to a given campus community should be tailored to the needs of that community's researchers, in consideration of the organizational and technological resources available.

One major question that arises as RDM teams develop their suites of services on campus is whether to provide an institutional data repository. Although some libraries find that data sets fit easily into the infrastructure of an existing institutional repository, others consider building or licensing a standalone data repository for research data sets produced by the campus community. Some institutions have taken this route, but survey results published by the Digital Curation Centre (DCC) in 2014 underscored many institutions' preference for collaborating with other organizations to provide a research data repository (Whyte 2014). In alignment with this sentiment, some institutions and support groups opt to create federated, shared repositories. Examples include development led by the DCC in the United Kingdom and work under way in the United States by the California Digital Library and Texas Digital Library. There are, in addition, initiatives among the library and the research community for sharing metadata across institutional and disciplinary repositories. For instance, the SHARE project, cofounded in 2013 by ARL, the Association of American Universities, and the Association of Public and Land-grant Universities, is building notification tools and services to make research outcomes and outputs widely accessible, discoverable, and reusable across repositories.

Although institutional data repositories may be part of RDM services offered on campus, we believe they should be offered primarily as mechanisms to preserve and publish data that do not already have a natural disciplinary home. Institutional repositories focusing on more traditional, text-based scholarly output may seek to be comprehensive, collecting all research publications generated at their institution. However, they cannot offer the features and visibility to researchers that disciplinary repositories specializing in data sets for

| Service | Key Stakeholders | Library's Coordination Role |
|--|---|--|
| Access control | Researchers, research support units | Advise on data embargoing and access control issues |
| Awareness of RDM mandates and services | University leadership, researchers, research support units | Coordinate with research office staff and administrators across campus to raise awareness of RDM mandates and services |
| Data citation | Researchers, research support units | Provide persistent identifiers, including digital object identifiers (DOIs) for data sets |
| Data documentation | Researchers, research support units | Help researchers determine how best to document their data at the beginning of a project, following disciplinary standards |
| Data management planning | Governments and funders, researchers, research support units, university leadership | Provide outreach to university leadership and research support units to develop data management plan assistance processes on campus; connect researchers with local and disciplinary resources to meet funding agency requirements |
| Hosting data | University leadership, researchers, research support units | Work with university leadership and research support units to provide infrastructure for hosting data (institutional data repositories), or helping connect researchers with available infrastructure (disciplinary repositories) |
| Intellectual property and copyright | Researchers, research support units | Provide guidance on intellectual property and copyright matters surrounding research data |
| Preservation | Researchers, research support units | Advise on appropriate data formats for preservation, preparing data sets for long-term preservation |
| Privacy and confidentiality | Researchers, research support units | Advise researchers and research office staff on privacy and confidentiality issues in data management |
| Repository selection | Researchers, research support units | Help individuals select trusted digital repositories for preserving data sets, whether those are disciplinary repositories or institutionally managed repositories |
| RDM workshops | Researchers, research support units | Communicate best practices developed by the RDM community to groups of researchers |
| Scholarly impact | Researchers, research support units | Promote mechanisms to track the impact of data sharing—downloads, citations, etc. |
| Scholarly output | Researchers, research support units | Help connect data sets to other scholarly output through linked data and citation mechanisms |

Table 1: Research data management (RDM) service offerings

a specific audience are able to provide (e.g., tDAR and the Archaeology Data Service for archaeological data). On the other hand, institutional data repositories perform an important service by archiving materials related to a research project that are not within the collecting focus of a disciplinary data repository, providing important context to research data (Strasser 2014). Although a library may decide to offer an institutional data repository as a core RDM tool in a particular university community, it is unwise to make that tool comprehensive of the entire output of research data sets on campus.

Academic libraries may choose to configure RDM services in any number of ways, given the array of tools and services that support RDM. Most campus libraries today are structured by discipline to support academic departments. However, RDM support requires activities that cut across this departmentally aligned organizational structure. Just as many academics find themselves challenged to adjust to new requirements in order to continue funding their research (Akmon et al. 2011, 330), libraries are challenged to develop RDM support that cuts across their own organizational structure. As they establish partnerships to offer RDM services in collaboration with other campus stakeholders—including offices of research, offices of sponsored programs, technology service units, research compliance offices, and academic departments—they must work broadly across disciplinary and functional units (Humphrey 2014). This breadth renders the development of RDM services an organizational challenge within research institutions.

Activities Supporting the Development of RDM Service Offerings

Given the assortment of potential and ongoing RDM activities, many libraries are currently in a state of redefinition with a reduced budget (Lewis 2010; Lyon 2012; Shaffer 2013). Needing to create services that will be truly useful to the campus community, libraries must carefully consider their role in developing and offering RDM services. Many RDM teams undertake a number of activities to structure their service offerings. The order in which these structuring activities take place varies a great deal among universities. Some may choose to complete each of these activities prior to rolling out RDM services to the campus community, while others do them concurrently. The “right” way to combine these structuring activities with service offerings can only be decided contextually, by considering the needs of researchers, readiness and capabilities of on-campus partners, and available infrastructure on a particular campus.

As figure 3 (adapted from Akers et al. 2014) illustrates, universities have taken different paths to an RDM program, including such milestones as providing data services to researchers, building an institutional repository, performing assessment activities, offering RDM services, and providing a data repository. These components came at different times at the universities surveyed by Akers and colleagues, and not all universities completed each of these milestones

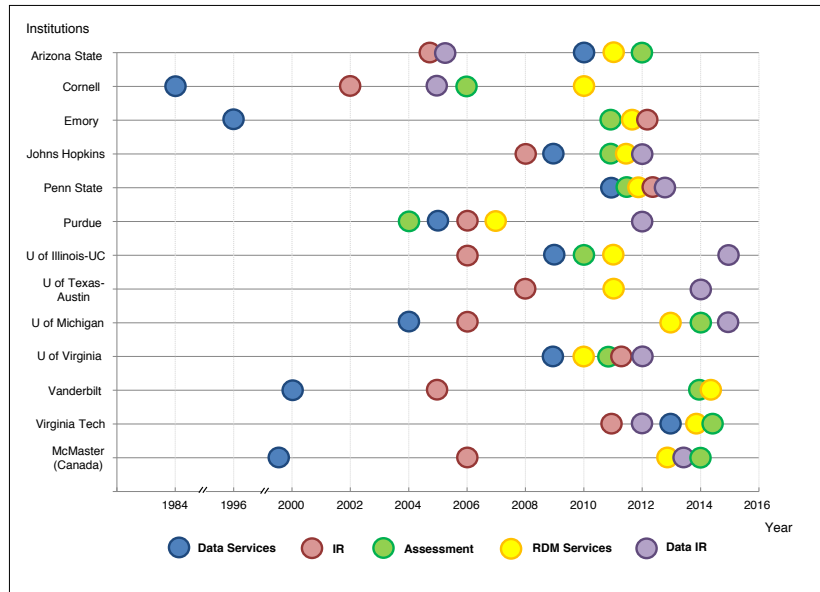


Fig. 3: Institutional timelines for building RDM services (adapted from Akers et al. 2014; timelines in five criteria for the eight institutions are revised, and five institutions are added where authors are currently affiliated)

in their development of RDM services. Each path is unique to the institution itself.

Many library RDM teams tend to undergo a number of common activities in the process of developing RDM services; the activities are often iterative, with the team revisiting them multiple times. These common milestones include building partnerships, conducting an environmental scan, assessing needs, and forming policy. Although many activities are inherent in building and providing RDM services, there is no one linear path.

Building Partnerships

Within a campus community, many stakeholders play important roles in planning RDM services. In their discussion of eight research universities' approaches to RDM, Akers and colleagues note that RDM activities have been initiated by reaching out to numerous groups on campus, "with university research offices, advanced research computing facilities, and campus information technology departments being prominent library partners" (2014, 184). Campus research offices such as an office of sponsored programs are essential partners, as they support grant proposal preparation and submission. Such partnerships are likely to be new, but very important, relationships for libraries building RDM services. Partnerships with campus information technology and high-performance computing centers are also vital to establishing RDM services, as these support units provide data storage and computational resources that enable data capture and analysis for research. RDM librarians should work with these units to establish mechanisms for data transfer.

As libraries develop and propose RDM services, identifying and

creating relationships with these and other stakeholders become essential. Partners' ongoing roles may range from advisory to participatory, and they can include working to develop campus policy regarding the disposition of research data sets, advising the library's RDM team, provisioning computing infrastructure needed for data management, reviewing DMPs, and joining the RDM team as active members supporting specific projects.

Conducting an Environmental Scan

Often an ongoing process, an environmental scan that supports RDM services may take place both internally and outside the institution. On campus, an internal environmental scan of the resources available and in use to support RDM in various departments serves several functions. Not only can it help identify potential partners across the university that are already considering or supporting RDM to a subset of those on campus, but also it can help map existing and potential RDM-related services and resources on campus. An external environmental scan helps RDM service providers keep current on the topic, learn from peers through reading the data management literature, participate in online discussion forums, and attend conferences organized on the subject of data management. Regular environmental scans outside the institution are essential to keep RDM librarians aware of new developments in RDM and opportunities for collaboration. Librarians can then convey these developments to campus stakeholders through ongoing education, training, and outreach.

Assessing Needs

Assessments of needs, undertaken primarily through surveys and interviews with researchers on campus, have taken place at many universities to help RDM librarians determine how campus constituents manage research data and how RDM services might help. Resources such as the DCC's Data Asset Framework and the Data Curation Profiles Toolkit developed at Purdue University are openly available to help RDM service developers collect information through interviews with researchers about the data sets they produce and the resources they currently use to manage them. RDM assessment surveys reveal researchers' awareness of DMPs and identify individual and community practices of data documentation, sharing, and preservation. Surveys and interviews may also suggest departments or disciplines on campus that are potential partners for an RDM pilot project, often because of distinct data support needs discovered through the needs assessment process (e.g., Nicholls et al. 2014).

Assessment can identify and document underlying concerns of researchers, such as the degree to which DMP quality affects funding decisions and the way in which post-award compliance monitoring of data management would be carried out (Lalwani 2015). Some researchers have had NSF proposals conditionally accepted until their DMPs are revised and resubmitted, or have been informed by reviewers that their DMPs must be improved before the proposal can

be funded (personal communication, Sayeed Choudhury, 10 March 2015). In response to the varied requirements of DMPs, a number of libraries have proactively developed discipline- and NSF directorate-specific resources, effectively coordinating the RDM interests of funding agencies and researchers by offering more tailored RDM support to principal investigators (Nicholls et al. 2014).

Forming Policy

Policy development is a cross-institutional process, but by initiating the conversation about RDM policy, libraries can ensure that they have a voice in the discussion (Erway 2013). Although many RDM providers feel that policy development must have a top-down component involving the university leadership, they observe that bottom-up engagement is also essential to build buy-in among stakeholders (Pinfield et al. 2014). With their cross-institutional connections throughout campus, libraries are in a good position to help manage and represent stakeholder interests to a policy development group.

Qualitative analysis conducted by Pinfield and associates (2014) showed that the policy development process typically involves consultation with RDM stakeholders across the institution, that it is often iterative in nature, and that policymakers commonly adapt elements from other institutions to suit their own needs. In many of the U.K. institutions investigated in the study, libraries and librarians actively participated and facilitated RDM policy development (Pinfield et al. 2014). These findings support recommendations made by previous authors (Erway 2014; Jones et al. 2013; Lewis 2010) that libraries should be active leaders and coordinators in these efforts. The University of Alberta's Research Policy (2015) is an excellent example of the library's potential role in institutional data policymaking and RDM support. As part of the policy framework, the library assumed a leadership role as one of the offices of administrative responsibility supporting the Research Records Management and Preservation Guidelines (University of Alberta 2013).

Deciding which of these RDM activities to undertake first presents a daunting task to university library leaders and librarians. Many are taking advantage of federated RDM support groups and other resources beyond the institution for guidance in their efforts. Two such federated approaches are the E-Science Institute (ARL/DLF/Duraspace) and the DLF E-Research Peer Network Program. More than 50 college and research universities have participated in either or both of these two programs over the last few years. Through participation in these programs, librarians built connections with peers, including CLIR fellows, and took inspiration from advances in RDM made by other academic libraries. More importantly, though, participation helped build dialog between campus leaders and librarians and often resulted in new hires designated to work on RDM service development and implementation. The E-Science Institute, in particular, required representation from library leadership, librarians, and campus IT from each institution. Participation also served as a training opportunity for liaison librarians with new data responsibilities and offered

a way to identify potential partnerships and investigate relationships among stakeholders through interviews of researchers and campus administrators. Librarians at Montana State University and the University of Manitoba mentioned their attendance at the E-Research Network (DLF) specifically as playing an important role in helping them bolster their support for RDM (Clark 2015; Ishida 2014).

How Can RDM Services Help Libraries Enlarge Their Role?

Academic libraries find more and more opportunities to provide services throughout the different phases of the research life cycle: RDM is one of these areas, as are digital humanities, digital projects support, and others, where libraries can help academics as they produce and disseminate research. We believe that RDM offers an opportunity for libraries to reformulate their role in the life of the university.

Libraries offering RDM services can have a great impact on their campus communities by supporting communication among researchers, enhancing knowledge of the data life cycle, providing disciplinary and institutional resources, and emphasizing the importance of documentation of data sharing (McLure et al. 2014, 158). Within and beyond the institution, many libraries and associated entities work to bring together the various RDM stakeholder groups to create collaborative and cooperative solutions (Tenopir et al. 2012). At the institutional level, the establishment of hybrid positions for researchers in the library has removed barriers between the librarians and the researchers when they are developing RDM services and solutions, as illustrated by the Sloan Foundation-supported Data Curation Fellows for the Sciences and Social Sciences program that places academics in research libraries (CLIR 2013). Through a cohort of postdoctoral fellows placed at universities around the United States and Canada, more than 20 participating universities are working to develop their RDM programs while taking advantage of the ongoing learning activities of fellows.

Beyond the institution, libraries play an active role in developing national and international federated RDM support groups, which have been formed to encourage data stewardship and to share efficiencies of scale. National groups such as the Australian National Data Service and the United Kingdom's DCC seek to support and enhance national research data environments by providing a range of resources, services, and tools that facilitate data curation, connection, discovery, and reuse. At an international level, communities such as the Committee on Data for Science and Technology and the recently formed Research Data Alliance seek to improve the quality and accessibility of data across technologies and countries in science and across all disciplines, respectively.

Without doubt, the library is well situated to be a key player in data management, curation, and preservation. Because best practice in RDM dictates that research data be actively curated, not just

stored or backed up, librarians are positioned to train and assist researchers in long-term curation of data (Erway 2013, 10–12). Recent studies show that academic researchers, however, are uncertain of their responsibilities regarding data management and unsure where to seek help (Mischo et al. 2014; Parham et al. 2012; Steinhart et al. 2012). Although RDM outreach efforts can alleviate this problem over time, several questions remain. Are academics ready and open to being trained by librarians? What are the barriers to further engaging researchers at the faculty level? Can programs like CLIR's Postdoctoral Fellowship Program help bridge the library-researcher gap where it exists? Perhaps the biggest challenge in all this is to change the perceptions of overworked academics who have no time or desire to undergo any kind of training and view depositing their work or data in a repository as nothing more than an administrative function (Jones 2007, 9, 16–17; Pinfield et al. 2014). The library can change these perceptions by actively helping researchers navigate the requirements, demands, and tools that make up the RDM landscape, particularly when it comes to the organization, preservation, and sharing of research data.

The library can play a key role in the move toward research data stewardship, one of many changes to research practice enabled by digital technologies. However, although “many research processes have transitioned from print to digital, the standards and training used to ensure research integrity have not” (Coates 2014, 598). Librarians can help researchers navigate these “changing cultures of research.” As Coates argues, “culture change is complex and slow, so we first need to understand which research practices are effective in promoting integrity and then determine how to encourage and reward those practices” (599).

In this same context, it is important to note the power and influence of established networks of field-specific social influence among peers, mentors, and senior scholars that often determine the amount of trust given to a certain repository and the research data that the repository accumulates (Roland and Lee 2013; Yakel, et al. 2013; Yoon 2014; Zimmerman 2007). Despite entrenched challenges in a changing landscape, libraries play a role—promoting the principle that data sharing enhances the integrity of research by permitting results to be reproduced and reexamined, directly supporting the academic enterprise. By offering data management training and services to researchers, particularly early career researchers and graduate students, libraries can help encourage a cultural shift toward effective data stewardship and value to data sets, making them meaningful and useful digital objects into the future.

Librarians do need to recognize that they are not the only group increasing their involvement in the research life cycle. Funding agencies, through DMP requirements, and publishers, through software managing the publication process, are other stakeholders recognizing and acting on parts of the research life cycle beyond the point of publication. Librarians, however, are offering their services from the position of a trusted institution and from an embedded understanding of

the university context. If libraries actively take advantage of this position, they can possibly transform their relationships with the larger institution they serve and with researchers, tying RDM to the changing role of the academic library. In addition to the important role of educating researchers about the RDM landscape, libraries can, and should, take on the role of advocate. Building on knowledge gained of researcher needs and requirements, libraries can take these issues directly to campus administrators in order to plan for RDM services. And they can do this while communicating campus policy back to members of academic departments, helping to complete the RDM feedback loop. Because of their ability to help coordinate between different stakeholders and foster collaborations, no matter what RDM or other research services individual libraries choose to offer, academic libraries should remain a vocal and critical part of the discussion.

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Toward a Trackless Future: Moving beyond “Alt-Ac” and “Post-Ac”

Meridith Beck Sayre, Marta Brunner, Brian Croxall, and Emily McGinn

Doctoral students, especially those in the humanities and social sciences, have long been groomed for tenure-track faculty careers, whether or not there are enough such positions available for all who go into the job market. Over the last five years, the chatter about alternative career paths for PhDs has grown into a full-scale conversation. Although the pursuit of these different career tracks is not new, two terms—*alt-ac* (referring to non-tenure-track careers in academia) and *post-ac* (referring to careers outside of higher education altogether)—have recently come into widespread use to describe the phenomenon.¹ While the assumption persists that the tenure-track is the gold standard for employment, doctoral students are increasingly aware of the options available to PhDs. Moreover, they are becoming aware of this multiple-choice future at an ever-earlier stage in their graduate programs. Some conversations about alternative careers continue to be centered on the vague idea of a “think tank” or the tenuous connection of research skills to private sector jobs, but a more focused discussion with concrete options has emerged.²

Persistent obstacles make it difficult, if not impossible, to have a conversation about alternative career paths for PhD holders, including “the conservatism of graduate education, the stricken job market, graduate student funding (and with it, the deplorable use

1 The term *alt-ac* was coined by Jason Rhody, of the National Endowment for the Humanities’ Office of Digital Humanities, in 2009 (Nowvskie 2014). According to English professor Marc Bousquet (2003), the number of doctorates earned has consistently exceeded the number of available jobs in his field since 1968.

2 Because many of the conversations about alternative paths take place in the blogosphere, this essay heavily cites blog posts and other online content. Topics often included in these discussions are: taking stock of the skills acquired in humanities training, such as writing and research; lists of general resources available to graduate students; or rudimentary ideas for exploring private sector options, such as joining LinkedIn. See, for example, Bethman and Longstreet 2013, Sanders 2014, and Castro 2014.

of contingent labor in the American university), the increasing time to degree, and the role of collaboration in our individualistic graduate school culture” (Cassuto and Jay 2015, 81). Graduate curricula, especially in the humanities, are not well aligned with career options other than the tenure track.³ Although, as Marc Bousquet asserts, there are actually plenty of jobs for all of the doctoral candidates currently ready to join the job market, more and more of that work is being shunted into low-paying teaching assistantships, lectureships, visiting professorships, laboratory staff roles, and other contract positions (see Bousquet 2002; see also Bousquet in Gee et al. 2010). Colleges and universities have come to depend upon this contingent labor, and because the pool of laborers is plentiful, these institutions have little incentive to change.

Despite increasing awareness of the serious structural challenges within the academy, very little has been done to change the situation; indeed, since the 2008 recession, the problems have accelerated with more and more tenure-track positions being cut in response to shrinking endowments, vanishing state funding, and national conversations about “shovel-ready” job skills. It seems that the structural situation with the higher education labor market is problematic and ultimately unsustainable. In the meantime, however, the alt-ac and post-ac sectors stand to benefit from the skills and expertise held by those with the doctorate. In turn, those of us in these environments can help PhD holders get a better return on the costly material and intangible investments that they have made in the course of their graduate careers.

In light of the number of talented PhDs who will not get tenure-track jobs, we believe there are abundant opportunities to create more programmatic ways to channel good people into other sectors, whether within or outside the academy. The Council on Library and Information Resources (CLIR) Postdoctoral Fellowship Program is one example of such a programmatic approach—in this case, one that matches the skills and expertise of doctorally trained individuals with the needs of academic libraries. Normalizing such programmatic efforts would help define graduate education less by tracks and more by a matching of higher education training with the needs of a variety of sectors.

Context

The National Science Foundation’s *Survey of Earned Doctorates* tells us that 5,662 people graduated with a PhD in the humanities in 2013 (National Science Foundation 2013). According to the survey, 2,074

3 Some critics have called into question the role of the dissertation in perpetuating this disconnect, arguing that a book-length monograph on a single, exhaustively researched subject really prepares individuals only for the books they must write on the tenure track. Broadening the options for a capstone project for the PhD, the arguments suggest, will open pathways for those who want to pursue additional opportunities outside academia. See Smith 2010; Modern Language Association 2014b, 14-15; Cassuto and Jay 2015.

of these graduates found some form of employment; 82.7 percent of these found a position within the academy (whether in a tenure-track position, a postdoc, lectureship, or contingent), and the rest found a home in private sector or government positions. Another 560 made other plans or decided to pursue an additional course of study. Of those who responded to this question, 2,130 graduates were without a job and without definite plans following graduation.⁴ These new graduates joined the previous year’s 2,830 PhDs who did not immediately find a job. In short, there were more people who did not get jobs in the academy than did, even if one includes the positions that are not sustainable in the long term. These data on PhD placement in the humanities, although slim, make it plain that “alternative” career paths to the tenure-track are not—and may never have been—unusual, but are the norm for approximately one-third to one-half of all PhDs.

According to the Association of Departments of English and the Modern Language Association (MLA) surveys of PhD placement rates, the numbers seen in the NSF’s survey are in fact typical.⁵ Between 1977 and 1997, the rate of tenure-track placement for PhDs in English averaged 44 percent in the years surveyed, with a high of 51.1 percent in the 1991–1992 survey and a low of 35 percent in the 1996–1997 survey (Laurence 1998). The MLA’s final report of this kind for the 2006–2007 year showed a rate of 49.2 percent (Modern Language Association 2011).

The story is similar across the humanities. One analysis of data compiled by the American Historical Association (AHA) suggested that only 29–55 percent of graduates from the 20 largest history departments in the United States went to tenure-track positions between 1989 and 1998, while graduates from smaller departments fared less well (Margadant 1999). Another, more recent, analysis of 2,500 PhDs who earned doctorates in history between 1998 and 2009 found that only 50.6 percent were employed in tenure-track positions in a four-year institution (Wood and Townsend 2013). These studies support the remark of Anthony Grafton and James Grossman that, since 1972, “the number of openings in history departments has consistently fallen short, sometimes by a very wide margin, of the number of doctorates awarded” (2011). A recent report from the Council of Graduate Schools, *Understanding PhD Career Pathways for Program Improvement*, surveyed the available data across the humanities, social sciences, and sciences, to echo these numbers: “Roughly one-half of PhD holders find their first jobs in non-academic sectors such as nonprofits and governmental agencies, corporations, and startups” (Allum, Kent, and McCarthy 2014, iii).⁶

These kinds of statistics lend credibility to the “crisis” talk that

4 Eight hundred ninety-eight respondents did not answer this particular question.

5 According to the 2014 *Report on the MLA Job Information List, 2013-14*, roughly one-third of PhDs end up in non-tenure-track positions with an average of 12 percent landing in what is designated as an “alt-ac” position between 1977 and 1997 (Modern Language Association 2014a).

6 This figure is supported by both the NSF survey and the data collected by the AHA and MLA, cited earlier.

has emerged online and in print, where fears that the academy is producing too many PhDs run rampant.⁷ Although it is clear that structural issues within academia lie at the root of these fears, it is still all too easy to conclude, at least on an unconscious level, that the 50 percent of PhDs who do not end up in tenure-track jobs are failures (see Croxall 2011; Schuman 2014). In this climate, graduate students often feel that discussing the possibility of a non-academic career track is taboo among their colleagues and that actually pursuing non-tenure-track employment is tantamount to quitting, heresy, or both. As both recent and historical data suggest, however, that only half of PhDs end up in tenure-track jobs, the alt-ac and post-ac tracks are not only necessary options, but pathways that a significant portion of all humanities PhDs travel.

Thanks in part to people like Bethany Nowviskie, a thriving online dialog has developed, primarily in the blogosphere, which has attempted to bring the discussion of alt-ac and post-ac into the open and combat the notion that anything short of a tenure-track job means failure. A growing number of websites—#Alt-Academy, for example—provide free, focused alt-ac content, while paid services, such as *The Versatile PhD*, offer general professional advice for PhDs. Costly career counseling services, such as *theprofessorisin.com*, have also proliferated in response to the need for practical advice for job seekers both in and outside the academy. The growing availability of these resources, produced by a recent generation of scholars who have charted new territory, helps make visible the models for success beyond the traditional academic world that have always existed. Moreover, the “mainstream” academy is starting to recognize the importance of alternative trajectories, as evidenced by articles such as “No More Plan B: A Very Modest Proposal for Graduate Programs in History,” written by the prominent historians Anthony Grafton and James Grossman (2011), or the recently released “Report of the Task Force on Doctoral Study in Modern Language and Literature” from the MLA (2014b).

Complexities and Limits of the PhD Outside the Academy

Although removing the stigma of pursuing alternate career paths and offering additional training for graduate students will benefit all of academe, there is a danger of promoting the PhD as overly versatile. The rigorous and highly specific training of graduate school is not immediately analogous to the skills typically required outside of the academy. While the larger skills of research, writing, and analysis are valuable in a wide range of occupations, it is not always

7 Crisis-centered narratives, while bleak in tone, are not necessarily inaccurate or misinformed; see Benton 2009, 2010; Flaherty 2012; Covey 2013; Peabody 2014; and Cuthbert and Molla 2015. (Thomas H. Benton is the former pseudonym of William Pannacker, who now tends to write under his own name). Although real, the crisis is also rhetorical, as has been explored by Hamilton and Roach 2003, Schmidt 2013, and Drakeman 2013.

self-evident how to translate those skills for a position outside of the traditional academic environment. For this reason, discussions of alternate careers for PhD holders often begin with a list of jobs that might use the same skills that were acquired in graduate school. For instance, the website *Beyond the Tenure Track* offers a list of the “top 45 jobs for PhDs” in exchange for signing up for the site. The first three, nominally the top choices, are “social impact or social good careers,” “public policy” and “think tanks” (Castro 2014). As is often true with these kinds of lists, these categories are elusive, broad enough to sound plausible as new careers, yet so open that there is often no obvious path to entering this field. Although sites like *Beyond the Tenure Track* work to offer supportive guidance and a broader perspective on the job market outside of the academy, concrete advice is often lacking. Where would one find a job listing for a career in “social good”? What skills would these employers be looking for exactly? What would a compelling resume look like for such a job? In a difficult act of self-translation from academia, where a CV and job letter are matters of formality with a prescribed format, PhDs now have to write materials for an unknown audience with unknown expectations. This step is exactly where many graduate students need the most help, particularly in the humanities, where skill sets are deep but difficult to describe to a non-academic audience.

Advice from potential employers can be the most helpful in charting a new career. One of the few studies to collect data from employers of PhDs outside the academy is Katina Rogers’s 2013 report “Humanities Unbound: Supporting Careers and Scholarship Beyond the Tenure Track” for the Scholarly Communication Institute (SCI). Rogers drew on existing scholarship on alt-ac positions, but also collected new data through two phases. The first was a public-facing [questionnaire](#) that solicited information from self-identified alt-ac professionals, while the second phase collected confidential reports from the employers of these same professionals (Rogers 2013, 3). These surveys offer insight into how the PhD and those who hold it are perceived outside the walls of the academy. Because the collection of employer information was confidential, the responses are frank in a way that would be difficult to obtain through other means. Although Rogers’s report represents a small sample set of employers in an undefined population, it is some of the only data available on this topic and can at least provide an inroad for further exploration.

The SCI team received employee responses to their survey far beyond their expectations. They had planned for 200 responses and received nearly 800, suggesting that those in alt-ac positions are eager to talk about their experiences. The numbers reveal a deep dissatisfaction with graduate training. The response rate may also signify an impulse to make a positive change for those who might follow them. Even for those surveyed—people who already had found employment in an alt-ac position and were, therefore, successful in the job market—38 percent of the 773 respondents were “not satisfied at all” and another 18 percent marked “not very satisfied” with the career advice they had received as a graduate student. A mere six

percent reported being “very satisfied” with the advice they had received (Rogers 2013, 13). These data suggest that many on the alt-ac track had to forge a path on their own with little guidance or input from advisors or institutions. This is a key theme in any conversation of alt-ac jobs and one that needs to be continually addressed as more and more graduate students move in this direction.

Perhaps the most intriguing result of this survey was the discrepancy found between an employee’s perception of the importance of certain skills or competencies and that of the employer (figure 1). These competencies are valuable in nearly any position, but the survey revealed the priorities of the employer as well as the gaps in graduate school training. For example, although 61 percent of the employees surveyed thought project management was the most important competency, only 37 percent of employers agreed, instead giving more weight to collaboration.⁸ Employees may have put a high value on this skill because it seemed the most out of reach or difficult to attain. From the employer's perspective, it is a lower-level priority, yet it is where 85 percent said that they will have to invest the most time and energy into training an alt-ac employee (Rogers 2013, 15).

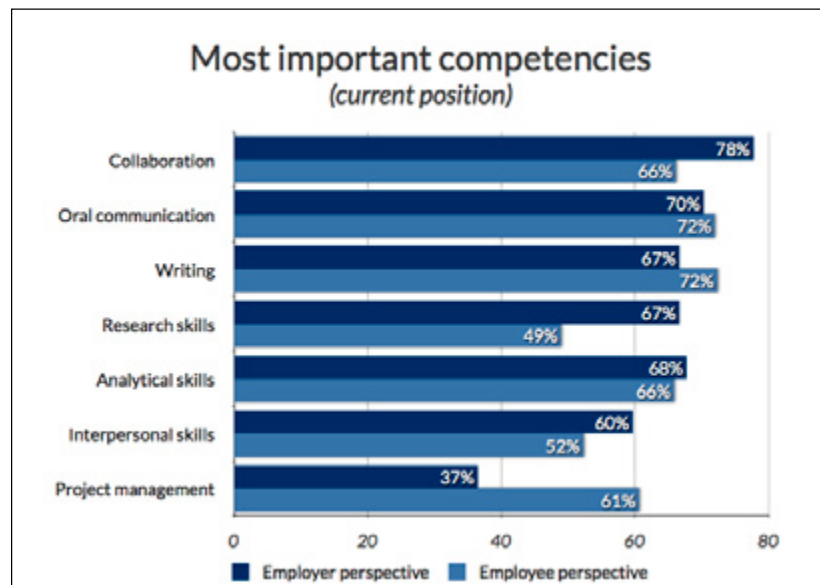


Fig. 1: Most important competencies of the current position (reproduced from Rogers 2013, 14)

When the space between need and required investment is large, the employer takes a greater risk in bringing an employee into the organization. The most effective way to address this gap and reduce the risk level is for the potential employee to confront these issues head on and assuage the concerns of the employer. For a graduate student, however, it can be difficult to know exactly where these issues lie and how to address them effectively. Despite the need for

⁸ There were only 73 completed surveys on the employer side, a number approximately one-tenth the number of employee respondents, which may account for some of this discrepancy.

more specific information regarding a transition from the academic world to the private sector, there is little available beyond generalized suggestions. Departments are beginning to keep better records on the placement of all of their graduates, but this information is still difficult to find in a single location or is not readily available to the public. When only the tenure-track placements are visible or accessible, potential networking opportunities are lost and it reinforces the notion that other employment is inferior or not worth noting. Other notions that networking, commercial writing, or shifting focus to private sector jobs constitute “selling out” or are acts contrary to the vocational idea of a PhD sometimes contribute to the lack of information as well. For some, the pursuit of knowledge is the highest goal (an idea likely to be fostered by those already in tenured positions). When advisors or department heads hold these notions of the academy, it can be hard for graduate students to ask for help or have these conversations in the open; they often must find resources on their own.

Adding to this difficulty is the fact that there is little guidance on how to gain experience in these competencies, from the practical skills such as project management and leadership to the less tangible factors such as interpersonal skills, communication, and adjustment to a 9–5, 12-months-a-year schedule with external deadlines. Many graduate students leave school with little or no job experience outside of academia and may never even have applied for a private sector job, making it particularly difficult for them to anticipate employer expectations.

The SCI report offers a glimpse at some of the risks employers see in taking on PhDs. In addition to the quantitative data collected, there are two questions at the end of the employer survey whose free-form responses reveal key employer anxieties that affect hiring decisions: (1) How are PhDs valued at your workplace? and (2) What recommendations would you make? Although this sample set is small and the responses are anonymous, several consistent threads emerge in these comments that are useful for grad students in the job market.

First, the more closely affiliated to academia the position, the higher the value of the PhD. The most common reason for placing a high value on a PhD is that the PhD holder can be an effective liaison between faculty members and the organization. (In this survey, academic administration and libraries were the most common organizations.) The “cultural capital” that the PhD holds is most useful in a setting where that particular degree and the deep research that it represents is understood. The PhD holder can anticipate the needs of faculty in terms of both research and pedagogy, and faculty often offer a greater degree of respect to employees with a PhD. If the position is in a specific field, the deep subject or content knowledge of the PhD holder also increases the value of the degree in the specific position. This cultural capital is a key difference between an alt-ac position and a post-ac one.

A post-ac job, or a job post-academy, is a new category that has emerged in this discussion. No longer a position housed within the greater body of a college or university, a post-ac job is a departure

from that world. Those pursuing a post-ac career must recognize that this move constitutes not just a change in direction or purpose, but a career change that may require additional training or a new start from an entry-level position. For those transitioning to an alt-ac career, CLIR functions as a bridge from graduate school, providing additional practical training to augment the PhD and hands-on experience during the fellowship. The American Council of Learned Societies (ACLS) Public Fellows program functions in a similar manner for those looking to move out of the academy entirely. Funded by The Andrew W. Mellon Foundation, the program “aims to expand the reach of doctoral education in the U.S. by demonstrating that the capacities developed in the advanced study of the humanities have wide application, both within and beyond the academy” (American Council of Learned Societies 2015). Whereas CLIR offers positions primarily in academic libraries and archives, ACLS Public Fellows receive two-year placements in nonprofit organizations and government agencies. Programs like this, though rare, help to identify the space between the classroom and the workplace. Helping graduate students understand what employers in the wider job market are looking for and how they can best describe their own skills in a way that is comprehensible to private sector employers helps them to launch a successful career outside of the academy.

Second, outside of the academy, an employer may see an applicant with a PhD as overprivileged and underqualified in a way that may be surprising to some recent graduates. The isolating, singular mode of research most common in the humanities results in an individual who has little experience in working on a team or reporting to others. One employer summarizes the general sense across those surveyed that the PhD “has high prestige value, but many of the PhD students have spent too long in school, become too narrowly specialized, and been trained to write for a very narrow audience” (Rogers 2013). When an employee approaches a private sector job as if it is an extension of graduate school, focusing on personal research and operating in isolation, that approach can often seem disconnected from the shared goals of the organization and may suggest a lack of investment in the job itself. One commenter went so far as to say that a PhD was detrimental to hiring, describing the candidates as “too interested in research” to be able to accomplish the project-based goals of the position. Employers need people who can step into their new role, learn new tools and processes quickly, and work well within the pre-existing structures of the company or organization. Collaboration and teamwork are more highly valued here than any individual course of study.

Simply recognizing this perception of PhDs can affect an interview. Instead of spending time talking about the specific details of their dissertation, candidates would do well to directly address the nature of graduate study and how it has prepared them to meet the new challenges of the position for which they are applying. If an applicant lacks specific training or experience in project management or collaboration, it is better to address this lack directly and discuss an

interest in working on these skills on the job. Demonstrating a willingness to be a team player can alleviate employer concerns before they become an issue. Identifying such needs is the first critical step in repositioning an academic career for a post-ac position.

The most difficult work for a humanities graduate student is often translating the skills intrinsic to research and writing into practical skills. Research, analytical skills, and writing are often heralded as qualifications that can enable scholars to transition out of the academy. These broad categories are helpful, but only to a point. When not attached to specific examples, projects, or results, these terms lose their strength. Many of the employer respondents in the SCI survey acknowledged the talents of PhD holders in these areas, but were quick to note that those employees in their organizations who held master's degrees or had experience in the field were often just as proficient at research and writing as their PhD peers and had the advantage of needing less training in the more practical aspects of the job. A hiring committee for a position that typically requires only a bachelor's or master's degree will have to be persuaded that the PhD can bring something new and valuable to the table and is truly invested in the work. To best confront these obstacles and to most clearly identify employers' needs, more studies like the SCI survey would be helpful.

The Recruit UT program at the University of Texas at Austin offers its graduate students interested in non-academic positions a wealth of resources, including events like a Graduate Professional Development Week and recruiting events with UT alumni. They also offer access to the Liberal Arts Career Services, which provides specifically alt-ac career advice, including information on how to convert a CV to a resume and how to market a graduate student's skill set (Recruit UT 2015). Other institutions, including Emory University, UCLA, Stanford University, and Syracuse University, offer similar programs, inviting their graduate students to networking events that typically include guest speakers or panelists who are degree holders working in non-academic or non-teaching academic jobs.

For those not at one of these schools, graduate students can seek out information on their own by working through alumni networks or career services, and more generally by being open to refocusing their own perceptions of their work, skills, and abilities. The ability to communicate and explain their work outside the community of scholarly experts in a particular field is helpful not only in shifting a career trajectory, but also in shifting the conversation about the humanities in general. The work PhDs do is valuable and the skills they have are transferable, as long as they can articulate that work and those skills clearly to the professional world.

One Response: the CLIR Postdoctoral Fellowship Program

One program that has successfully mapped the knowledge and expertise that PhD holders acquire to the needs of academic libraries is the CLIR Postdoctoral Fellowship Program. Now in its twelfth year, the program places recent PhDs from all disciplines into academic libraries across North America, where they use their field-specific expertise to “develop research tools, resources, and services while exploring new career opportunities.”⁹ The program aims to match fellows’ subject-based knowledge with institutions and projects where it will be well valued and used. Since 2004, 130 fellows have been awarded fellowships of one to three years in academic libraries, where the recipients have engaged in collaborative digital humanities projects, done subject- or language-specific collection development and archival processing projects, created research tools and resources, overseen special libraries, built digital scholarship centers, edited and contributed to significant library publication projects, established data curation practices, and expanded instructional technologies.¹⁰ The CLIR fellowship program, however, is not about creating and sustaining an alternative career track or trying to solve the problem of PhD glut; rather, it is a model that succeeds on the premise that PhD holders have valuable skills and competencies from which host institutions can genuinely benefit (CLIR 2014c).

The CLIR program directly addresses the graduate students’ need to acclimate to a new kind of working environment by bridging the gap between individualistic, focused study and the collaborative, project-based nature of an academic library position. From the initial meeting of the new fellows at intensive summer training sessions on the Bryn Mawr College campus, the focus is on building a cohort and fostering collaboration. There, fellows are introduced to library culture and learn about some of the challenges, expectations, and tasks that they will face on the job. Moreover, fellows participate in yearly meetings and cross-cohort collaborations, such as the writing project that produced this volume. Overall, the program is designed not only to provide temporary postdoctoral employment in libraries, but also to equip fellows with additional skills that will help them establish long-term careers well beyond the limits of the fellowship.

The goals of the CLIR program and other alt-ac training programs (e.g., the ACLS Public Fellows Program) are not to establish the PhD as the base criterion for hiring in these alternative fields or to place more value on the PhD than on experience, but instead to help graduate students find a way to put their degree to good use. When the CLIR program was founded, the notion of taking PhDs into academic libraries that have traditionally been run by

9 Although the CLIR Postdoctoral Fellowship Program initially placed humanities PhDs in academic libraries, the program expanded to formally include scientists and social scientists in 2012; for a complete program description, see CLIR 2014a.

10 For a more complete list of CLIR postdoctoral fellows’ work descriptions, see CLIR 2014b.

professional librarians with MLIS degrees was a risky proposition. The inclusion of PhDs ratcheted up fears of credential creep that would dilute the value of the MLIS degree, forcing MLIS holders to pursue an extra degree in order to obtain jobs that were being given to, in this perspective, PhD holders desperate for employment. Moreover, there was concern that, although PhDs were well versed in a narrowly defined field of study, they had not sufficiently demonstrated a commitment to librarianship or trained in the functions of a library and job skills of a librarian. Some of the employers in the SCI survey shared these concerns. Although CLIR can help train PhDs to investigate alternate career paths, it remains critical that the degree holders themselves learn to articulate their value in a way that is productive, illustrating their willingness not just to retrain and refocus their goals, but also to be an active and committed participant in their new workplace. Fears about the program have receded and will continue to abate as the fellows add to the culture of the library without threatening its core foundations.

Much of the work that CLIR postdoctoral fellows do is related in some way to expanding digital research and tools within libraries and, more generally, in the academy. At the 2014 Coalition for Networked Information (CNI) meeting, CNI Director Clifford Lynch specifically cited CLIR fellows as a significant influence in moving digital scholarship forward in academic libraries. The connection that Lynch made between digital scholarship and libraries is crucial. Paralleling the increasing awareness of non-tenure-track careers for PhDs, there is a growing number of opportunities within the alt-ac stream for digital humanists, whose technical skills and interest in innovative research and pedagogical methods have not only helped open doors, but have also created the opportunities. As Miriam Posner (2013) has noted:

Alt-acs need not be digital humanists, but digital humanists have found the term to be particularly congenial, since many of us happen to hold these hybrid jobs, and since a founding principle of digital humanities work—that one can think through and articulate humanistic principles in unconventional ways—complements the nontraditional, praxis-based scholarship that many alt-acs perform.

The CLIR Postdoctoral Fellowship Program is an example of how CLIR is carving out new opportunities for PhDs that simultaneously complement their highly specific subject training, while arming them with innovative professional tools.

As an organization, CLIR has been a leading advocate for the twenty-first century research library, where digital scholarship and pedagogy are central.¹¹ The postdoctoral fellowship program is one of the ways that the organization builds interdisciplinary and

¹¹ For more information on this vision for libraries, see “Changing and Expanding Libraries” in this volume.

cross-institutional collaborations situated “at the nexus of libraries, scholarship, and technology” (Henry and Smith 2013, 64). With their extensive subject expertise related to research and teaching, PhDs help strengthen the connection between scholars and the library as a research institution, providing new insight into the latter’s role in the academy. Many of the current fellows are focused on developing specific digital projects at their host institutions. Others are working on broader projects aimed at strengthening the presence of digital humanities initiatives on their campuses, while data curation and digital pedagogy are two other important areas in which the fellows are working.

A significant number of host institutions have regularly indicated that CLIR fellows are a valuable asset to their libraries by offering permanent positions to fellows. At least 11 CLIR fellows—approximately 15 percent of those who have finished the program—took permanent positions at their host institutions upon completion of the fellowship. Coauthors Marta Brunner and Brian Croxall, for example, both worked at the institutions that hosted their fellowships—UCLA and Emory University, respectively. Brunner’s recent appointment as the new college librarian at Skidmore College suggests that her experience in the CLIR program, as well as her subsequent time at the UCLA Library, positioned her to succeed in a library environment. Similarly, former CLIR fellows have indicated that the program is generally a successful bridge between completing their doctoral work and full-time employment.

It should be noted, however, that 36 of the 130 CLIR postdoctoral fellows are current fellows. Although there is a small number unaccounted for, most former fellows—82 percent—are employed in full-time careers.¹² Approximately half of former CLIR fellows have continued to work in libraries or digital humanities centers, and the other half generally returned to their academic field, most landing tenure-track jobs (CLIR 2014b). With respect to the traditional academic job market, many fellows reported that the CLIR program was beneficial. In her 2009 report, Marta Brunner notes that, of the fellows she interviewed, several found their CLIR postdoctoral experience key to tenure-track employment because it provided them with concrete skills, such as grant writing and scholarly communication expertise, to which they did not have exposure in graduate school (Brunner 2009, 172).

Regardless of where they ended up, former fellows credit the program with deepening their understanding of the way information and research are organized and curated. The importance of good data curation as a research practice prompted CLIR to initiate a new track of fellowships devoted to data curation in the sciences and social sciences in 2012; the program has been recently expanded to data curation in the humanities and the visual arts. These postdoctoral positions, in particular, highlight data management as crucial in the era of digital scholarship, not simply a storage and preservation issue facing libraries.

12 At the time of writing, we were unable to find the current job positions of 13 former CLIR fellows.

Perhaps more compelling than the statistics about the fellows' career paths is the anecdotal evidence provided by fellows about their experiences. Current and former CLIR fellows were attracted to the program for a number of reasons, but frustration and lack of offers on the tenure-track job market are common factors that motivate applicants.¹³ Andrew Asher, an anthropologist and CLIR fellow from the 2010 cohort, said that he initially felt that his first year on the academic job market was a "failed search" and that he only reluctantly applied to the CLIR program (Asher 2014). His fellowship, however, made him realize that he could treat libraries as a kind of "field site," engaging his ethnographic training to ask "anthropological questions about the nature of information use and its interrelationships with other cultural processes" (Asher 2014). He now occupies the hybrid role of an anthropologist-librarian at Indiana University. Similarly, Brian Croxall initially applied only for tenure-track jobs in his final year as doctoral student in English at Emory University. As a graduate fellow in Emory's Center for Interactive Teaching, however, his vision of academic work expanded, and he began applying for both traditional teaching positions and alt-ac jobs. With a PhD in hand, he landed interviews for every alt-ac job that he applied to, securing a CLIR fellowship at Emory in 2010 (Croxall 2011). Other fellows have noted that the CLIR postdoctoral positions immediately appealed to them as a good match for their expertise and interests. Marta Brunner's survey of the program suggested that former fellows were especially attracted to placements on very specific, bounded projects (2009, 167). Likewise, current CLIR fellow and coauthor of this essay, Meridith Beck Sayre, was delighted to see a position announcement at Indiana University on the Chymistry of Isaac Newton project; as a historian of science with a strong interest in book history and experience working in a rare book library, Beck Sayre could not have envisioned a more suitable postdoctoral opportunity.

Regardless of how they initially came to the program, CLIR fellows generally report that they used various aspects of their academic training in their fellowships, including their research skills, ability to communicate effectively with faculty, and teaching expertise, and that they gained additional experience leveraging digital and administrative skills. Moreover, CLIR fellows report that they gained valuable experience that helped them secure jobs in both academic libraries and on the tenure-track market. As noted, about half of all previous CLIR fellows are now employed in libraries. Obviously, the program does a good job of training PhDs for this kind of work by giving them hands-on experience in the library environment.

Although there has been some controversy over whether this type of fellowship can replace a traditional library degree, most CLIR fellows reported in Brunner's study that they did not assume the program provided adequate training to pursue a career as a librarian (2009, 173). Patricia Hswe was a fellow at the University of Illinois at Urbana-Champaign in the Slavic and East European Library between

13 The following section draws on both formal reports and published remarks that have appeared in print and online by former and current CLIR fellows.

2004 and 2006, where her work on creating digital resources led her to complete an MLIS at the same institution. Hswe is now the digital content strategist and head of [ScholarSphere](#) User Services at the Penn State University Libraries.¹⁴ Similarly, Amanda Watson completed a library degree after her postdoctoral fellowship and is now a humanities subject specialist librarian at the Elmer Holmes Bobst Library at New York University. For Brunner, who has not pursued a library degree, the CLIR fellowship experience gave her not only on-the-job experience with collection development, outreach, instruction, reference, and other professional functions, but also a higher-level perspective on academic libraries. This tandem expertise prepared her to take on leadership roles at the UCLA Library and to become the college librarian at a liberal arts college.

Increasingly, there is a need for people who can inhabit the traditional roles of the scholar as teacher and researcher, as well as that of the information professional. As the space and place of libraries change with a greater focus on digital knowledge production and dissemination, and as centers of digital scholarship emerge, CLIR fellows are well positioned to occupy hybrid positions as scholars who have a deep understanding of how to preserve, access, curate, and circulate information. Of course, PhDs in the humanities and social sciences are only one potential source of this kind of expertise, but their abundance can be a valuable resource for libraries. Over the last two years, the CLIR Postdoctoral Fellowship Program has grown significantly, granting new fellowships to more than 40 recent PhDs. The program's growth is evidence of an increased interest in, and need for, graduates with both technical and humanistic skill sets. In other words, the expansion of the program is, itself, evidence that *someone* thinks the program is working.

Conclusions and Recommendations

Clearly, those in higher education and prospective graduate students themselves need more and better data before they can fully grasp the current state of graduate education and determine how best to improve career placement for PhD students across the disciplines (see Pannacker 2013). The Council of Graduate Schools has made a good step in this direction with its recent study, *Understanding PhD Career Pathways for Program Improvement* (Allum, Kent, and McCarthy 2014). In the meantime, we offer the following observations and recommendations.

Cultural Reorientation

One of the reasons that the current state of doctoral education has become a crisis is that the cultural expectations, at least in the humanities, have included an assumption that doctoral training is

¹⁴ Hswe described her CLIR experience, along with former fellows Amanda Watson, Amanda French, and Christa Williford, in Watson et al. 2011.

valuable only if it results in a tenure-track faculty career. Given the success stories of doctorally trained individuals who find meaningful employment outside the tenure track, this assumption is not consistent with reality. Thus, according to Anthony Grafton and James Grossman, “A first step towards adjusting graduate education to occupational realities would be to change our attitudes and our language, to make clear to students entering programs in history that we are offering them education that we believe in, not just as reproductions of ourselves, but also as contributors to public culture and even the private sector” (2011).

There is no failure in graduating with a PhD and going on to an alt-ac career. In fact, as Cassuto and Jay point out, this diversification of “occupational realities” is very much in line with the original mission of the American graduate education system. They observe, “The job of these public universities was, from the beginning, to advance all kinds of professions in utilitarian as well as theoretical ways” (Cassuto and Jay 2015, 87). Although there will still be disappointment for those graduate students who pursued a PhD solely for the purpose of becoming a tenure-track faculty member but did not find such employment, having conversations much earlier in their graduate careers with faculty advisors about a broader range of career options may shift the conversations about graduate study in higher education away from crisis talk.

Acknowledging the broader usefulness and applicability of doctoral training opens the way for fresh thinking about the graduate curriculum and the kinds of culminating work—besides the traditional dissertation—that could produce the skills needed in a variety of jobs besides college-level teaching and research. Cassuto and Jay and others pin a significant portion of the responsibility for ushering in these changes on existing tenured faculty (Cassuto and Jay 2015, Grafton and Grossman 2011, and Pannapacker 2013). Nevertheless, there are things that others can do both to recognize and to take advantage of the incredibly rich pool of talent and expertise that is the unemployed and underemployed PhD holders.

Skills Realignment

The CLIR Postdoctoral Fellowship Program has shown that holding a PhD does not make one a librarian or even a valuable library staff member. Skills and knowledge make an individual a valuable addition to the library organization. In the humanities, these skills have traditionally included the ability to teach, do intensive research, think analytically, and distill new knowledge into written form that others can use. But are these the skills that employers outside the tenure track need most? According to Cassuto and Jay, “Any realistic twenty-first-century approach to graduate education in the humanities needs to recognize that such an education involves the teaching of practical, transferable skills that can prepare graduates for a wide range of jobs outside higher education” (2015, 89). Similarly, in his 2012 speech to the Council of Graduate Schools, MLA President

Michael Bérubé suggested that graduate students ought to be taught the practical skill of collaboration, though he acknowledged that “the question will be how it’s valued by future employers” (Flaherty 2012).

Although current tenured faculty may be most responsible for updating graduate curricula, this question of “practical, transferable skills” suggests that libraries and other institutions that seek to draw on the pool of otherwise unemployed and underemployed PhDs ought to take steps to ensure that doctoral programs, especially in the humanities, are *aware* of opportunities outside academia and understand what skills and expertise are most valuable in those settings. Furthermore, if graduate programs are going to overhaul their curricula, potential alt-ac employers should communicate with those in higher education about the skills and expertise that they will be looking for in 5–10 years. At the same time, potential employers ought to find out what PhDs in relevant fields are actually learning and producing these days in order to better understand their value to the organization and the potential for a good match.

Things That Graduate Students Can Do

As for graduate students, one way to ensure that they are more likely to finish their doctorate with “marketable” skills and expertise is to think beyond the limits of their degree program’s discipline. Bérubé suggests that an important way to prepare PhDs for a more diverse set of career options is to encourage interdisciplinarity (Flaherty 2012). Working across disciplines may expose graduate students to a wider range of research and professional contexts, and they may develop a broader, more versatile skill set along the way. Furthermore, the creativity involved in working across established disciplines may help students and their mentors to forge new, unforeseen avenues for the doctorally trained.

In a recent *Chronicle of Higher Education* article, Julie Miller Vick and Jennifer S. Furlong (2015) map out a strategy and timeline for graduate students who want to simultaneously pursue both tenure-track and alt-ac job opportunities. Part of their advice regarding the non-academic job market is to “start reaching out to people in fields of interest with whom you might conduct informational interviews” (Vick and Furlong 2015). Many successful applicants to the CLIR Postdoctoral Fellowship Program spoke at length with previous fellows to learn more or met with librarians or archivists beforehand to learn more about the profession.¹⁵ In these conversations, it is important to make an effort to really understand the other field’s or profession’s context. What are the burning issues and trends affecting that field or profession? What is the field’s core mission? What are the current and emerging staffing models? Are there brand new, trailblazing or otherwise nontraditional positions being created that might suit a PhD holder, or would a PhD holder be more likely to fit into a traditional role?

15 The authors of this essay have personal experience and anecdotal evidence based on their experiences with subsequent CLIR fellow cohorts to support this claim.

Closing

To sum up, it will take bold action on a number of fronts to unravel the Gordian knot of structural conditions and cultural practices that constitute the so-called crisis of graduate education. In the meantime, though, the pool of PhD holders who have not found tenure-track jobs ought to be considered a resource rather than a liability. After all, as William Pannacker asserts, the tenure track cannot now be understood as the just reward for the excellent few: “I have known too many extraordinarily talented and productive long-term adjuncts to believe that academe is a meritocracy” (Pannacker 2013). We miss great opportunities if we assume that those who do not land tenure-track jobs are damaged goods.

The very talk of tracks—tenure, alt-ac, post-ac—may itself be part of the problem. As the CLIR Postdoctoral Fellowship Program has demonstrated, there is not one, or even three, tracks that fellows take from their postdoctoral experience. Instead, there is a productive matching of needs with relevant knowledge and expertise that in most cases benefits both the host institution and the postdoctoral fellow. Indeed, our collective goal should be to make this matching process less serendipitous and more programmatic. Increasing the number of opportunities like the CLIR Postdoctoral Fellowship Program could have a significant, positive impact on graduate education and on the sectors in which newly minted PhDs find their first homes. The CLIR program has worked because it recognizes that academic libraries actually benefit from the skills and expertise that doctorally trained individuals bring to library work. The success of the program suggests that we ought to have a broader concept of what a PhD is for. Ideally, we should be collectively working toward a normalization of what are now viewed as alternatives.

Imagine that we have been in a drought situation with a full cistern that is overflowing. The CLIR program has essentially been trying to sponge up that overflow and squeeze that moisture on library crops rather than letting it evaporate. As important as that effort has been, the goal should not be a proliferation of mop-up services. The longer-term goal should be to re-pipe the cistern so that the water flows directly to whichever crops could use the moisture. In other words, successful normalization means that the CLIR program might actively be rendering itself unnecessary over time because more PhDs would be coming out of their programs trained to be library professionals. Programs in other sectors could prompt similar kinds of reforms that, over time, produce PhDs who are ready and able to work in their organizations. Thus, alt-ac or post-ac become regular ac.¹⁶

To be sure, the mere mention of PhD holders emerging from their graduate work “trained to be library professionals” will raise once more an enormous red flag for academic librarians who, as credentialed professionals, have been concerned that (1) the MLS or MLIS would be displaced as the professional degree of choice for librarian positions, resulting in a pool of unemployed library degree holders,

16 Thanks to Peter R. Murray for the cistern metaphor.

and (2) libraries would no longer be staffed and led by library professionals who understand and value the core tenets of librarianship (i.e., information literacy, access, privacy, preservation). However, the CLIR program has demonstrated that an influx of 130 PhD holders into libraries over the past 12 years has not resulted in a marked displacement of MLS or MLIS holders. Institutions that have hosted CLIR fellows may be taking library work in new directions—into data curation, for example—but library schools are also moving in these directions as more courses are being offered in these areas.¹⁷ Not *all* PhD holders need to be qualified to work in libraries; however, those graduate students who view academic library work as a potential career option could work with their advisors to cultivate the skills and expertise needed in libraries *before* they graduate rather than with an additional degree or a postdoctoral program.

Furthermore, the CLIR model should not be limited to the library sector. Employers in a broad range of professions and sectors could and should become more closely connected to higher education, first through structured programs like the CLIR Postdoctoral Fellowship and then through the normalization process.

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¹⁷ Information Studies programs at the University of Illinois, the University of North Carolina, and the University of Maryland all offer tracks in data curation, for example. See Keralis 2012 for a more detailed description of data curation education.

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Where Next?

In choosing a title for this volume, the editors borrowed the expression “process of discovery” from Charles Henry’s introduction because it evokes the principal concerns of CLIR’s postdoctoral fellowship, while at the same time communicating the unresolved nature of those concerns. The term works equally well describing CLIR’s experience administering the program. Deadlines and decisions fill the program team’s busy calendar, with each succeeding year introducing new opportunities to learn. After 12 years, the program is not as experimental as it was in its early days, but each year new host partners, new funders, and new fellows bring with them a richer appreciation of the complex environments that today’s researchers navigate and the equally complex responsibilities that today’s academic and cultural heritage institutions assume in support of their research. The program is very much a “process” of continual, often surprising, “discovery,” requiring substantial commitment, yet never failing to yield rewards many times greater than the organization’s investment.

The development of this publication has mirrored CLIR’s overall experience with the program in several ways. What was at first a vague notion has through patient nurturing and the warm enthusiasm and generosity of colleagues become something much bigger and richer than anyone at CLIR would have dared to dream at the outset. Those named on these pages as contributors to and supporters of the publication—as well as the many unnamed individuals who reviewed and offered suggestions for improvement—deserve all the credit for the merits of this project. It has been CLIR’s privilege to convene this talented group and watch them as they work; we hope that there will be many more such opportunities in the future.

As Lauren Coats and Elliott Shore describe in their contribution to this volume, it is the energy and expertise of individual fellows that drive and continually refresh the ongoing conversation about the future of libraries, cultural heritage institutions, and higher education. In program seminars and meetings, allowing this conversation to grow and develop organically requires Coats and Shore to do far more listening and responding than “instructing.” This approach calls for considerable wisdom and even a healthy dose of humility. In administering the postdoctoral fellowships, CLIR staff are most successful when following this example. Not one of the achievements connected with this program would have been possible without the continued engagement and leadership of all host partners, funders, and, of course, fellows.

When CLIR launched the Postdoctoral Fellowship in Scholarly Information Resources in 2004, it was impossible to imagine that within a dozen years

the program would mature into one of the organization's flagship initiatives with widespread benefits that speak to the heart of CLIR's mission. Over the fellowship's history, the recipients have made substantial contributions to CLIR's publications and most of the organization's other programs, including Cataloging Hidden Special Collections and Archives, the Mellon Fellowships for Dissertation Research in Original Sources, the Digital Library Federation (DLF) program, and the DLF E-Research Network. Fellows have offered their perspectives in strategic meetings, designed and executed important assessment projects, and represented CLIR at numerous professional and scholarly conferences. Some have continued their leadership training with CLIR and EDUCAUSE within the Leading Change Institute. In recent years, some have even supervised new CLIR postdoctoral fellows.

So where next? Now that CLIR's community of "new kinds of scholarly information professionals" is no longer all that "new," now that the "digital" in "digital scholarship" is more or less understood, and now that "alt-ac" no longer seems especially "alt," what should be CLIR's priorities for the postdoctoral fellowship? Academic libraries, and the academy, will continue to evolve in tandem with rapidly changing research, teaching, and collecting methods, and many academic and professional networks are working to support these transformations. CLIR will seek more opportunities to engage its network of fellows in these national and international conversations. Some meaningful engagement has happened organically—recent fellows' contributions to the Research Data Alliance make up one example—but CLIR can do more as an organization to support the continued professional growth of current and former fellows by helping them find and pursue opportunities offered by other organizations. As part of a strategy for engaging former fellows in ongoing work of national significance, CLIR has discussed building from the fellows' ranks a formal network of expertise that could be made available to academic and cultural institutions seeking short-term professional help with expanding collections, systems, and services.

The program's recent emphasis on research data curation, made possible with funding from the Alfred P. Sloan and Andrew W. Mellon foundations, has brought to the surface the possibility of engaging multiple fellows to work at multiple locations on issues that transcend institutional boundaries. In 2015, CLIR is welcoming the fourth set of Fellows in Data Curation for the Sciences and Social Sciences and a third set of data curators in the humanities. By cultivating meaningful, mutually supportive relationships among these fellows, CLIR aspires to cultivate stronger ties and a beneficial interdependence among host institutions that has the potential to last well beyond a fellowship term. It is still too early to judge whether these efforts have been successful, but given the urgent financial problems now facing institutions of higher education, the model of the fellowship may be one low-risk, moderate-cost strategy that could help.

Finally, CLIR might offer advice to other organizations seeking to establish similar kinds of professional transition programs that could enrich the talent pool available to educational and cultural institutions. CLIR's focus on bringing recent PhDs to libraries has been an important part of the success of its fellowships, but post-master's programs, postdoctoral programs targeting a broader range of post-PhD careers—as Meridith Beck Sayre, Marta Brunner, Brian Croxall, and Emily McGinn suggest at the conclusion of their essay

in this volume—or networking programs designed for young professionals on fixed-term appointments in the educational, cultural, or nonprofit sectors might have similar value for establishing new professional roles quickly while meeting institutions' urgent, short-term needs. If today's young scholars and professionals are indeed facing a "trackless" future, they will need to develop strong professional "orientteering" skills as they chart their own courses through their professional lives.

Whatever may come, what the postdoctoral fellowship teaches us is this: The Romantic myth of the lone "creator-genius" (see the essay by Rose-Steel, Kouper, Parrott, and Rawson in this volume) and our naïveté as we bathe in oceans of digital information in hopes of "Eureka!" moments have done us no favors. These fallacies obscure the toil, dedication, and creativity of information professionals; scholars and educators ignore these efforts at their peril. When given the opportunity to contemplate the broader landscape in which they have been trained, however, researchers can make both tremendous progress in their own intellectual development and valuable contributions to the development of others. Understanding the motives, methods, and obstacles to human inquiry is vital to all scholarly and information professionals, in whatever context they work. In other words, behind every "discovery" is a "process."

—Christa Williford

Appendix 1: Postdoctoral Fellows Host Institutions

| | |
|---|--|
| Appalachian College Association | Swarthmore College |
| Arizona State Library, Archives and Public Records | Temple University |
| Arizona State University | University of Alabama |
| Brandeis University | University of Alberta |
| Bryn Mawr College | University of California, Berkeley |
| Bucknell University | University of California, Davis |
| California Digital Library | University of California, Los Angeles |
| California Institute of Technology | University of California, Santa Cruz |
| Carnegie Mellon University | University of Colorado at Boulder, National Snow and Ice Data Center |
| Claremont University Consortium | University of Illinois at Urbana-Champaign |
| The College of Physicians of Philadelphia | University of Miami |
| Duke University | University of Michigan |
| Emory University | University of Minnesota |
| Folger Shakespeare Library | University of Nebraska-Lincoln |
| Harvard Business School | University of New Mexico |
| Indiana University-Bloomington | University of North Carolina- Greensboro |
| Internet Archive | University of North Texas |
| Johns Hopkins University | University of Notre Dame |
| Lafayette College | University of Pennsylvania |
| Lehigh University | University of Rochester |
| McMaster University | University of Southern California |
| Middlebury College | University of Texas at Austin |
| North Carolina State University | University of Toronto |
| Occidental College | University of Virginia |
| Pennsylvania State University | Vanderbilt University |
| Pepperdine University | Villanova University |
| Princeton University | Virginia Tech |
| Purdue University | Weill Cornell Medical College |
| Southwestern University | Yale University |
| St. Lawrence University | |
| Stanford University | |

Appendix 2: Contributors to the CLIR Postdoctoral Fellowship Educational Program 2004-2015

The following individuals have generously shared their time and expertise with CLIR's postdoctoral fellows by serving as guest speakers or panelists at program meetings, seminars, or online discussion sessions.

| | |
|---------------------------|----------------------|
| Benjamin Albritton | Mark Colvson |
| Susan Allen | Alison Cook-Sather |
| Kristen Antelman | Will Cowan |
| Katherine Moore Arrington | Jon Crabtree |
| Andrew Asher | Tom Cramer |
| Erin Aspenlieder | James P. Danky |
| Barbara Bair | Nancy Davenport |
| Cheryl Ball | Gabrielle Dean |
| Matthew Beacon | Richard Detweiler |
| Karl Benedict | Mark Dimunation |
| Sanford Berman | Elizabeth Edwards |
| Matt Beth | Michael Eisen |
| Lois Black | Richard Ekman |
| Jon Mark Bolthouse | Sharon Farb |
| Zoe Borovsky | David Farneth |
| Tamar Boyadjian | Kathleen Fitzpatrick |
| Jason Brodeur | Julia Flanders |
| Marta Brunner | Mitch Fraas |
| Debra Bucher | Fenella France |
| Jake Carlson | Amanda French |
| Gloria Chacon | Rachel Frick |
| Daniel Chamberlain | Amy Friedlander |
| Sayeed Choudhury | Nadina Gardner |
| Mary Chute | Susan Garfinkel |
| Euan Cochrane | Jill Gengler |
| Dan Cohen | Susan Gibbons |
| John Cole | David Gift |

| | |
|--------------------------|--------------------|
| Alexandra Gillespie | Eric Pumroy |
| Todd Gilman | Katalin Radics |
| Michael Goodchild | Hannah Rasmussen |
| Joshua Greenberg | Allen Renear |
| Genie Guerard | Daphnée Rentfrow |
| Marianne Hansen | Mary Robertson |
| Charles Henry | Rex Robison |
| Claudia Horning | Mark Roosa |
| Robert Horton | Tamsyn Rose-Steel |
| Patricia Hswe | Katherine Rowe |
| Ben Huang | Christine Roysdon |
| Charles Humphrey | Jentery Sayers |
| Lori Jahnke | Dawn Schmitz |
| Rebecca Johnson | Susan Schreibman |
| Alan Jutzi | David Seaman |
| Ryan Kashanipour | Jennifer Serventi |
| Michael Keller | Roberta Shaffer |
| Spencer Keralis | Cindy Shelton |
| Delphine Khanna | Matt Shoemaker |
| Robert Kieft | Sarah Shreeves |
| Matthew Kirschenbaum | Stéfan Sinclair |
| Inna Kouper | Greg Skutches |
| Dean Blackmar Krafft | Mackenzie Smith |
| Melissa Kramer | Laura Stalker |
| Michael Lauber | Michael Stephens |
| John Lehner | Libbie Stephenson |
| Martin Levitt | Victoria Stodden |
| Amy Lucko | Carly Strasser |
| Clifford Lynch | Karla Strieb |
| John Maclachlan | Gary Strong |
| Deanna Marcum | Elaine Sullivan |
| Maura Marx | John Sullivan |
| Jane McAuliffe | Richard Szary |
| Mary Patterson McPherson | Winston Tabb |
| William Miller | Wendy Thomas |
| Kelly Miller | Jeff Treziak |
| Lori Miller | John Unsworth |
| Michelle Morton | Jennifer Vinopal |
| Kevin Mulroy | Jon Voss |
| Trevor Muñoz | Heather Waldroup |
| Stephen Nichols | Elizabeth Waraksa |
| William Noel | Donald J. Waters |
| Bethany Nowviskie | Duane Webster |
| Megan Norcia | Carole Wedge |
| Trevor Owens | Jennifer Weintraub |
| Susan Parker | Dana Wheelles |
| Lorraine Perrotta | Antony Williams |
| Susan Perry | Christa Williford |
| Tom Phelps | Jena Winberry |
| Miriam Posner | David Zeidberg |
| Alice Prochaska | |

About the Authors

Meridith Beck Sayre is a historian of science and was a CLIR Postdoctoral Fellow in Data Curation for Early Modern Studies; she is also a visiting scholar in the Department of the History and Philosophy of Science at Indiana University in Bloomington. At Indiana, she worked on the Chymistry of Isaac Newton project and supported data curation initiatives for humanities scholars. She holds a PhD from the University of Wisconsin–Madison, where her research focused on the production and circulation of anthropological knowledge through missionary texts.

Jason J. Brodeur manages the Maps, Data & GIS Department at McMaster University in Hamilton, Ontario. He holds a PhD from the same institution, where his research focused on quantifying and constraining uncertainties associated with forest-atmosphere greenhouse gas exchanges. As a CLIR postdoctoral fellow from 2012 to 2013, he worked to strengthen the McMaster University Library's connection to undergraduate teaching by developing resources and strategies that leveraged library resources for instructional purposes.

Marta Brunner is the newly appointed college librarian at Skidmore College. Prior to her move to Skidmore, she was based at the University of California, Los Angeles (UCLA) Library, serving most recently as interim director of teaching and learning services and head of the Powell Library at UCLA; before that, she was a subject specialist and head of collections, research, and instructional services in the Charles E. Young Research Library at UCLA. She began her career at UCLA as a CLIR postdoctoral fellow in the 2006–2007 cohort. She holds a PhD from the History of Consciousness Program at the University of California, Santa Cruz.

Amy Chen is currently a special collections librarian at the University of Iowa Special Collections & University Archives, where she manages instruction on behalf of the repository. Previously, she served as a 2013–2015 CLIR Postdoctoral Fellow in Academic Libraries at the University of Alabama's Division of Special Collections. There, she coordinated instruction, exhibitions, and social media outreach in addition to writing a book-length guide to the Wade Hall Collection. Her appointment at Alabama built from her five years of experience working in arrangement and description, exhibitions, and curation in the Manuscript, Archives, and Rare Book Library (MARBL) of Emory University. She obtained her PhD in English in 2013 on the topic of academic libraries' growing investment in twentieth-century literary collections.

Lauren Coats is an assistant professor of English at Louisiana State University. Her book project, *Archives of Discovery: Mapping North America 1728–1900*, examines the long, transnational literary life of North American discovery and

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Brian Croxall is the newly appointed digital humanities librarian at Brown University. Prior to accepting that position, he worked at Emory University Libraries, most recently as digital humanities strategist and lecturer of English. In this dual appointment, he designed and managed digital scholarship projects in the Emory Center for Digital Scholarship and taught classes on digital humanities, media studies, and American literature. He began working at Emory Libraries as part of the 2010–2012 CLIR postdoctoral fellow cohort and holds a PhD in English literature from Emory University. In addition, he is coediting a book on steampunk, is a cluster editor at #Alt-Academy, serves on the executive councils of the Modern Language Association and the Association for Computers and the Humanities, and is a writer for the group blog ProfHacker.

Morgan G. Daniels is the CLIR Postdoctoral Fellow for Data Curation at Vanderbilt University, where she develops services to help Vanderbilt researchers manage and share their research data. She received her PhD in information from the University of Michigan in 2014. Her research on data practices has examined the work of researchers and data curators in several communities, including archaeology, materials science, the quantitative social sciences, and natural history museums. She holds a Master of Science in information, also from the University of Michigan, with a concentration in archives, records management, and library and information science.

Jodi Reeves Flores holds a PhD in archaeology from the University of Exeter (2013). She received a CLIR/DLF Postdoctoral Fellowship in Data Curation for the Sciences and Social Sciences, which was hosted by Arizona State University (ASU) from 2013 to 2015. While at ASU, she served a dual appointment with ASU Libraries and the Center for Digital Antiquity. During her fellowship, she developed seminars and workshops on data management and curation, supervised the curation of digital archaeological data into the Digital Archaeological Record (tDAR), and collaborated on digital humanities projects. She is also on the secretariat for the International Organisation of Archaeological Open Air Museums and Experimental Archaeology (EXARC), the International Council of Museums-affiliated organization representing archaeological open-air museums, experimental archaeology, ancient technology, and interpretation.

Charles J. Henry is president of the Council on Library and Information Resources, where he oversees and provides strategy for the organization’s mission. He serves on the advisory board of Stanford University Libraries, and is also a board member of the Center for Research Libraries and a member of the Scientific Board of the Open Access Publishing in the European Network (OAPEN) project. He is a coauthor of *Our Cultural Commonwealth: The Report of*

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Inna Kouper is a research scientist and assistant director of the Data to Insight Center at Indiana University, Bloomington. Her research interests focus broadly on the material, technological, and cultural configurations that facilitate knowledge production and dissemination, with a particular emphasis on research data practices and the sociotechnical approaches to cyberinfrastructure and the stewardship of data. She has a PhD in information science from the School of Library and Information Science at Indiana University, Bloomington, and a PhD in sociology from the Institute of Sociology, Russian Academy of Sciences, Moscow. She was a CLIR/DLF Postdoctoral Fellow in Data Curation at the Data to Insight Center from 2012 to 2014. She is also involved in the National Science Foundation–funded project Sustainable Environment Actionable Data (SEAD) and is a co-chair of the Research Data Alliance Engagement Interest Group.

John C. Maclachlan is an assistant professor in the McMaster University School of Geography and Earth Sciences as well as a research fellow in the McMaster Institute of Innovation and Excellence in Teaching and Learning. He was a CLIR postdoctoral fellow at the McMaster University Library Lyons New Media Center and Lloyd Reeds Map Collection from 2010 to 2012. Since completing his fellowship, he has stayed involved with numerous CLIR initiatives and has given lectures at both the summer orientation and the winter meeting. His research interests lie in both the natural sciences and pedagogy. Specifically, he has conducted research on glacial sediments and geomorphology in areas such as Iceland and Ontario, Canada, as well as on pedagogical topics such as the implications of improving experiential learning opportunities in a curriculum.

Emily McGinn is a CLIR Postdoctoral Fellow in Digital Humanities at Lafayette College (2014–2016). She supports small-scale digital projects in the classroom and also serves as a faculty liaison for the Digital Scholarship Services team. She holds a PhD in comparative literature from the University of Oregon, and her research focuses on the intersections of science, technology, and literature, particularly in Irish and Latin American modernist texts.

Natsuko Nicholls holds a PhD in political science from the University of Michigan. She joined the faculty at Virginia Tech as the research data consultant in the university libraries in the fall of 2014. She brings significant experience in data management and digital scholarship to Virginia Tech and dedicates her efforts to developing and implementing the libraries' research data services with a focus on data management instruction and consulting. She received a CLIR Postdoctoral Fellowship in Data Curation for the Sciences and Social Sciences, hosted by the University of Michigan (2012–2014).

Jennifer M. Parrott is an assistant professor of English at Clayton State University, where she teaches digital writing and first-year composition courses. From 2012 to 2013, she held a CLIR Postdoctoral Fellowship in Academic Libraries in instructional technology at Bucknell University. In this position, she worked with faculty, administrators, and instructional technologists to design and implement a digital scholarship initiative encompassing digital pedagogy, faculty scholarship, a digital scholarship center, and an undergraduate research program in the digital humanities. Her research interests include twentieth-century and contemporary British and Irish fiction and drama, travel writing, and hybrid pedagogy.

Sarah Pickle is the assessment librarian at the Claremont Colleges Library. She came to this role after serving as the CLIR/DLF Social Science Data Curation Fellow at Penn State Libraries. She began her fellowship in 2014, after working for two years as an analyst at the not-for-profit organization Ithaka S+R; there, her research focused on the sustainability of digital resources and the efforts that academic and cultural heritage institutions have made to support digital scholarship. Prior to joining Ithaka S+R, she completed her PhD in comparative literature at Cornell University. Her doctoral dissertation concentrated on the dissemination of political information and ideas in literature from the former Eastern Bloc.

Katie Rawson is the coordinator for digital research at the University of Pennsylvania. She supports digital scholarship—organizing research groups like Word Lab, managing digitization, and working with faculty and students to explore and employ new research methods. She became the CLIR Bollinger Fellow in Library Innovation at the University of Pennsylvania in 2013 after earning a PhD from the Graduate Institute for the Liberal Arts at Emory University, where she was a fellow in the Emory Center for Digital Scholarship and the managing editor of *Southern Spaces*. She has published and presented on food in the writings of William Faulkner, gender in cookbooks, labor at Waffle House, open-access publishing in the academy, and data curation in the humanities. Curating Menus, her current work with Trevor Muñoz, is at www.curatingmenus.org.

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Elliott Shore is the executive director of the Association of Research Libraries, a presidential fellow at CLIR, and professor emeritus of History at Bryn Mawr College. He has published on the history of the radical press in the United States, the history of advertising, and German-American history, as well as in the field of the alternative press and libraries. He has held library positions at Temple University, the Institute for Advanced Study, and Bryn Mawr College, where he also served as chief information officer. He has taught at Rutgers University, the University of Illinois, Temple University, Temple University Japan, The New School, The University of Cologne, and Bonn University. He is on the boards of the American Council on Education and the National Humanities Alliance.

Ece Turnator received her PhD in medieval (Byzantine) history from Harvard University in 2013. Her dissertation is an interpretation of the thirteenth-century Byzantine economy through an analysis of archaeological (coins and ceramics) evidence. Since September 2013, she has worked as a CLIR/Mellon Foundation Postdoctoral Fellow at the University of Texas, Austin, in medieval data curation, studying and learning about digital humanities, best practices for data curation, and visualization, in addition to teaching and researching in her area of expertise. Her interests include world economic history and material culture.

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Elizabeth A. Waraksa is an independent consultant with several years' experience working with the CLIR Postdoctoral Fellowship Program. She has also conducted research for a variety of grant-funded initiatives, including the Association of Research Libraries' recent Strategic Thinking and Design process. As a CLIR postdoctoral fellow at the University of California, Los Angeles (UCLA) Library from 2007 to 2009, she worked on subject-specific projects, including the *UCLA Encyclopedia of Egyptology*. From 2009 to 2011, she held the position of librarian for Middle Eastern studies at UCLA. She holds a doctorate in Near Eastern Studies with a specialization in Egyptian art and archaeology from the Johns Hopkins University and has taught extensively in this field. She has also participated in archaeological excavations in Egypt, Italy, and Israel, and published on a range of topics, from Egyptian female figurines to the benefits of collaboration.

Christa Williford is director of research and assessment at CLIR. A theatre historian trained at Indiana University, she joined the first cohort of CLIR postdoctoral fellows in 2004. After her two-year fellowship at Bryn Mawr College, she joined the Haverford College staff as user services librarian while completing a master's of library and information science degree at the University of Washington. Since joining CLIR's staff, she has contributed to a number of programs, most notably Cataloging Hidden Special Collections and Archives,

Digitizing Hidden Special Collections and Archives, and the Postdoctoral Fellowship Program. She also works with colleagues and partners on a variety of research projects; these have included an assessment of the first Digging Into Data Challenge, undertaken through a cooperative agreement with the National Endowment for the Humanities Office of Digital Humanities. The results of this assessment were published in 2012 in a CLIR report titled *One Culture*. She volunteers for the American Theatre Archive Project, an initiative dedicated to helping theatre practitioners create and manage their own archives.

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