

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

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**W**ith 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).<sup>1</sup> 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.<sup>2</sup>

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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?”

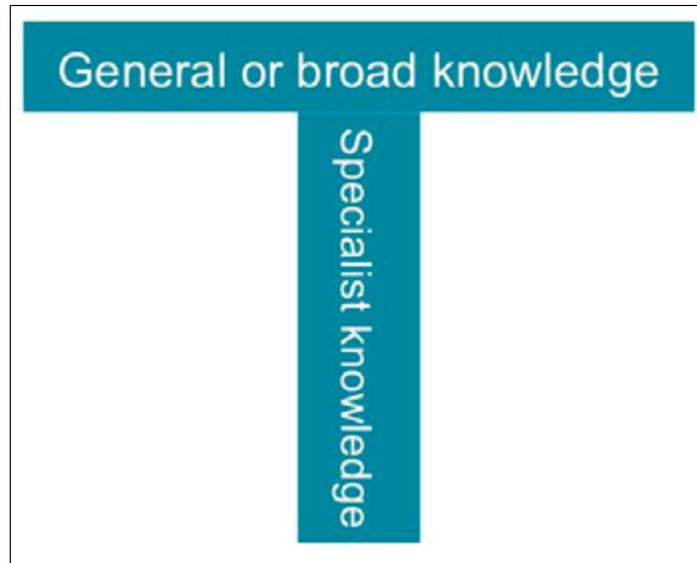


Fig. 1. The T-shaped skill set

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.<sup>3</sup> 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.

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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.<sup>4</sup>

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.<sup>5</sup>

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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.<sup>6</sup> 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.

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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.<sup>7</sup>

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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.<sup>8</sup> 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

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<sup>8</sup> 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