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Digital Humanities and Libraries: A Conceptual Model

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ABSTRACT. *Though there has been much discussion of the connection between libraries and digital humanities (on both sides), a general model of the two has not been forthcoming. Such a model would provide librarians with an overview of the diverse work of digital humanities (some of which they may already perform) and help identify pockets of activity through which each side might engage the other. This article surveys the current locations of digital humanities work, presents a cultural informatics model of libraries and the digital humanities, and situates digital humanities work within the user-centered paradigm of library and information science.*

KEYWORDS   digital humanities, academic libraries, research libraries, services, users, cultural informatics

INTRODUCTION

In 2009, the *Chronicle of Higher Education* called digital humanities "the first 'next big thing' in a long time, because the implications of digital technology affect every field" (Pannapacker, 2009). By that point, several popular books had already been published (Schreibman, Siemens, & Unsworth, 2004; Cohen & Rosenzweig, 2005; Moretti, 2005; Seimens & Schreibman, 2008; Boot, 2009), major journals established (*Digital Humanities Quarterly, Digital Humanities Now, Digital Medievalist, International Journal of Humanities and Arts Computing, Literary and Linguistic Computing*), and dozens of federal grants awarded to projects in the area of digital humanities—not to mention many more ongoing projects at that time.

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While skeptics today remain unsure of the "newness" of digital humanities (DH) or how it will impact the content of scholarship (Fish, 2011, 2012a, 2012b; Marche, 2012), DH has already had significant influence on discussions of scholarly communication, funding, and tenure and promotion. Nearly 300 digital humanities grants and fellowships have been awarded by National Endowment for the Humanities (NEH, 2012a) since 2007 (this figure does not include grants for preservation, infrastructure, and cultural heritage, or funding from other agencies for humanities projects that include a digital component). The Modern Language Association (2012) has issued guidelines for evaluating digital scholarship for the purposes of tenure and promotion, and job candidates lament that many openings in the humanities now require some background in digital humanities (MLA Jobs Tumblr, 2012). For a growing list of DH jobs, see the Digital Humanities Job Archive (2012). Given the impact of digital humanities on these institutionalized processes, it is natural to wonder how DH might be connected to one of the oldest institutions in knowledge work: the library.

Discussion of digital humanities and its connection to libraries has grown rapidly in the past several years, and on both sides of the aisle. Stephen Ramsay (2010) has linked DH to one of the oldest functions of the library, namely knowledge organization:

> Of all scholarly pursuits, Digital Humanities most clearly represents the spirit that animated the ancient foundations at Alexandria, Pergamum, and Memphis, the great monastic libraries of the Middle Ages, and even the first research libraries of the German Enlightenment. It is obsessed with varieties of representation, the organization of knowledge, the technology of communication and dissemination, and the production of useful tools for scholarly inquiry.

Several others have asked if the library can function as a space for the digitization, computation, and preservation work that accompanies DH projects. For evidence of continuing interest in libraries, one need look no further than THATCamp—a series of locally-organized unconferences—attendance at which has been discussed as a defining characteristics of digital humanists. The pop-up topics at THATCamps frequently include the library, and a special THATCamp Libraries was held in November 2012 in conjunction with the 2012 Digital Library Federation Forum.

Within library and information science (LIS), there is a corresponding (if more dispersed) discussion of DH. Though DH is less prominent at national conferences, it has received attention within the field, including major organizations. The American Library Association's (ALA) Association of College and Research Libraries hosts a listserv for digital humanities discussion and recently launched a new blog that includes events, resources, case studies, and tools (http://acrl.ala.org/dh). The Council on Library and Information
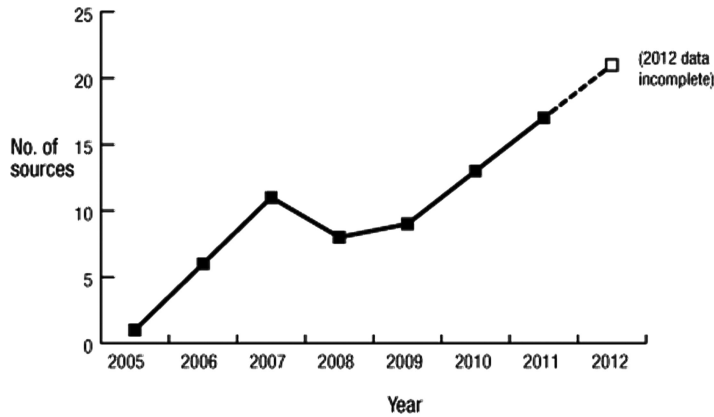
FIGURE 1 Digital Humanities Publications in Library and Information Science, 2005–2012.

Resources and the Association of Research Libraries have both published a major reports on digital humanities centers, which are discussed in section two below. The Institute of Museum and Library Services (IMLS) has also supported collaboration between iSchools and digital humanities centers, including internships for LIS masters students working in the digital humanities (iSchools & The Digital Humanities).

A search for "digital humanities" within library and information science literature reveals a steady increase in publications since 2005 in the Library, Information Science & Technology Abstracts (LISTA) database, which indexes over 700 journals as well as books, research reports, and proceedings. (See Figure 1). It is remarkable that publications on digital humanities have nearly doubled in 2012, with more still being indexed at the time of this publication.

A topic model of the 86 sources returned by the query is given in Table 1. These topics were generated using Latent Dirichlet allocation (LDA) in a free tool based on the popular MALLET toolkit (http://code.google.com/p/topic-modeling-tool). LDA views each document as a mixture of topics and uses word distribution to calculate the probability that each document contains each topic. For example, the concepts LIBRARY and ARCHIVE might be distributed across a corpus such that documents containing the words 'catalog,' 'book,' and 'barcode' would have a probability of 0.6 of being about LIBRARY, while documents containing 'notes,' 'scope,' and 'provenance' would have a 0.8 probability of being about ARCHIVE. In practice, these topics are usually unknown at the start of the analysis and must be interpreted from a list of terms that are found to cluster together. Thus, topic modeling using LDA resembles an exercise in knowledge organization, in which higher-level categories must be created from lower-level "documents" (in this case, word clusters).

TABLE 1 Topic Analysis of "Digital Humanities" Abstracts in LISTA (2005–2012)

Topics	Top 10 terms in topic
Arts & humanities librarianship [1]	Humanities, web, access, scholars, tools, journals, students, art, academic, online
Digital infrastructure [2]	Article, libraries, library, collections, content, national, computer, metadata, researchers, documents
Knowledge production & collaboration [3]	Digital, paper, data, technologies, based, collaboration, knowledge, study, projects, approach
Digital scholarship [4]	Digital, university, information, work, project, science, dh, technology, scholarship, projects
Research communities [5]	Research, resources, text, analysis, twitter, social, conference, including, open, community

Since topic titles involve significant interpretation, it is helpful to triangulate the assignments using a variety of methods. In the case of the LISTA abstracts, five topics were created using LDA, and titles were assigned, first, by examining the term clusters and the abstracts in which they occur. For example, a number of abstracts in the first topic concerned access to arts and humanities collections, as well as online resources. Since these fall under the province of subject librarians, the topic was titled "arts and humanities librarianship." In some cases, it was helpful to examine the full dataset (not just clusters of top ten words) using a network graph (see Figure 2). In this graph, each document appears with its weighted relations (i.e., probability assignments) to topics. Documents and topics that are more closely related appear together, while those that are unrelated or weakly related are pushed apart. This graph helped in assigning titles to topics 1 and 5, which are more closely related to each other than any other pair in the corpus. The titles "arts and humanities librarianships" and "research communities" (respectively) help express this relationship, since subject librarianship is indeed connected to understanding various research communities and their needs, resources, and methods of communication.

The five topics present in the LISTA abstracts show a wide range of engagement with the digital humanities. This interest also seems in keeping with several of the Core Competencies of Librarianship described by the ALA, which "a person graduating from an ALA-accredited master's program in library and information studies should know and, where appropriate, be able to employ" (American Library Association, 2009). Among the most germane competencies to DH are those concerning information resources (esp. digital resources), knowledge organization (esp. cataloging and classification of DH materials), technological knowledge and skills (including the analytical,
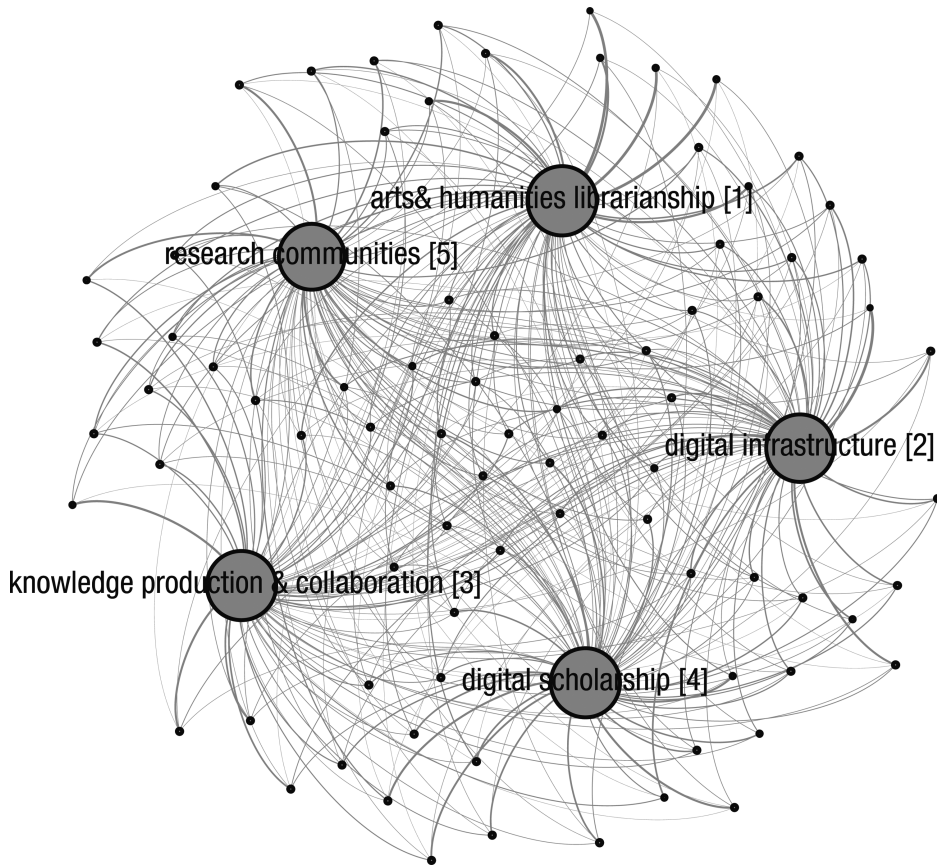
FIGURE 2 Network Graph of Topic Analysis of "Digital Humanities" Abstracts in LISTA (2005–2012).

visualization, and content management tools used by digital humanists), and users services, which will be taken up in the fourth section of this paper (see Table 2).

Given this significant overlap in interests, competencies, and institutional structures, we are left to wonder not *whether* but *how* libraries can join in the work of digital humanities. Some commentators follow Micah Vandegrift's (2012) enthusiastic injunction, "Stop asking if the library has a role, or what it is, and start getting involved in digital projects that are already happening." (For more details on this view, see Vandegrift and Varner (this issue). Others are less sanguine about the realities of librarianship and the possibility for jumping into new, digital humanities projects. Miriam Posner (this issue) highlights important institutional barriers to DH work in the library, including workload, conventions of assigning credit solely to faculty members, and lack of institutional commitment. Further discussions of challenges are found in LibraryLoon (2012), Furlough (2012), Muñoz (2012), and Galina Russell

TABLE 2 ALA Core Competencies of Librarianship Related to Digital Humanities

2A. Concepts and issues related to the lifecycle of recorded knowledge and information, from creation through various stages of use to disposition.

2B. Concepts, issues, and methods related to the acquisition and disposition of resources, including evaluation, selection, purchasing, processing, storing, and deselection.

2D. Concepts, issues, and methods related to the maintenance of collections, including preservation and conservation.

3B. The developmental, descriptive, and evaluative skills needed to organize recorded knowledge and information resources.

3C. The systems of cataloging, metadata, indexing, and classification standards and methods used to organize recorded knowledge and information.

4A. Information, communication, assistive, and related technologies as they affect the resources, service delivery, and uses of libraries and other information agencies.

4D. The principles and techniques necessary to identify and analyze emerging technologies and innovations in order to recognize and implement relevant technological improvements.

5D. Information literacy/information competence techniques and methods, numerical literacy, and statistical literacy.

5E. The principles and methods of advocacy used to reach specific audiences to promote and explain concepts and services.

5F. The principles of assessment and response to diversity in user needs, user communities, and user preferences.

5G. The principles and methods used to assess the impact of current and emerging situations or circumstances on the design and implementation of appropriate services or resource development.

6A. The fundamentals of quantitative and qualitative research methods.

7A. The necessity of continuing professional development of practitioners in libraries and other information agencies.

(2011). These challenges doubtless vary among and within institutions, so a general formula for the connection between libraries and digital humanities does not seem forthcoming.

What remains possible, however, is a sketch of the conditions under which libraries may be more favorable to digital humanities work (and when it may happen elsewhere) and a general conceptual model of libraries and the digital humanities. This latter project has two parts. First, it should be possible to articulate the variety of ways in which libraries engage with DH and to locate these interactions in some larger relational framework. Such a model would provide librarians with an overview of the diverse work of digital humanities (some of which they may already perform) and help identify pockets of activity through which each side might engage the other. Second, it should be possible to situate DH work in libraries within larger paradigms or philosophies of the field. Doing so would integrate DH work more fully into the overall life of the library, providing grounds for establishing priorities and making decisions with respect to levels of commitment, funding, and support. The following sections take up these tasks by surveying the current state of digital humanities work within institutions, presenting

a cultural informatics model of libraries and the digital humanities, and situating DH work within the user-centered paradigm of library and information science.

A SHORT HISTORY OF DIGITAL HUMANITIES, AND ITS CURRENT WHEREABOUTS

Digital humanities focuses both on the application of computing technology to humanistic inquiries and on humanistic reflections on the significance of that technology. Marija Dalbello (2011) traces the history of digital humanities back to mid-twentieth century efforts in humanities computing and, in particular, to early forms of text analysis. With the growth of Internet technology in the 90s, focus shifted to hypertexts, digital repositories, and multimedia collections. The 21st century has seen a dramatic rise in social networks and crowdsourcing, access to digitized cultural heritage materials, and interfaces for archives and collections that exploit the capabilities of linked data and visualization. This long and varied history helps to account for the wide range of topics currently found in digital humanities work, topics ranging from text analysis and visualization to digital pedagogy and new platforms for scholarly communication.

The location in which digital humanities work occurs is similarly varied. Matthew Kirschenbaum, for example, claims that digital humanities is often found within English departments because of historical connections between texts, computing, and composition, as well as interest in editorial processes, hypertext, and cultural studies (2010, p. 60). Though English departments may be among the most prominent, digital humanities now includes faculty from the broad range of arts and humanities departments, including archaeology, art history, classics, comparative literature, history, music, performing arts, philosophy, postcolonial studies, religious studies, theatre, and more.

In a broader view, several studies have attempted to determine the location of digital humanities within the university at large. In 2007, the Council on Library and Information Resources (CLIR) commissioned a yearlong study of digital humanities centers to explore their financing, organizational structure, products, services, and sustainability (Zorich, 2008). The study defined such centers as undertaking some or all of the following activities:

1. Builds digital collections as scholarly or teaching resources,
2. Creates tools for authoring, building digital collections, analyzing collections, data or research processes, managing the research process,
3. Uses digital collections and analytical tools to generate new intellectual products,
4. Offers digital humanities training,

5. Offers lectures, programs, conferences or seminars on digital humanities topics,
6. Has its own academic appointments and staffing,
7. Provides collegial support for and collaboration with members of other academic departments at the home institution,
8. Provides collegial support for and collaboration with members of other academic departments, organizations or projects outside the home institution,
9. Conducts research in humanities and humanities computing (digital scholarship),
10. Creates a zone of experimentation and innovation for humanists,
11. Serves as an information portal for a particular humanities discipline,
12. Serves as a repository for humanities-based digital collections, and
13. Provides technology solutions to humanities departments. (pp. 4–5)

Though this study did not explicitly address connections between libraries and digital humanities, several of the defining tasks of DH centers could also be characterized as library activities, including the focus on building digital collections and associated tools, using these collections, and serving as a repository (1–3, 12). Many of the other list items are service-oriented: offering training, collegial support, serving as an information portal for disciplines, and providing technology solutions (4, 5, 7, 8, 10, 13). The remaining features are either structural (appointments and staffing) or more oriented towards research and experimentation (9, 10, and to some extent 5). Based on the 32 centers surveyed, the CLIR report concludes that broader-base initiatives, rather than siloed centers, may be more suited for meeting the needs of humanists, leveraging campus resources efficiently, and addressing large-scale community needs, such as long-term digital repositories.

Two more recent studies have attempted to gauge the type and degree of interaction between digital humanities initiatives and libraries. The Association of Research Libraries' 2011 SPEC Kit on Digital Humanities reports on the status of digital humanities within research libraries, with about half of the 126 member libraries responding (Bryson et al., 2011). The report finds that only 8% of libraries host a dedicated center for DH. More commonly, about half of the ARL member libraries responding provide ad-hoc services, such as consultation, project management, or technical support, while one-quarter host a digital scholarship center that provides services to multiple disciplines, including the humanities. The authors suggest that libraries may be most useful for getting new DH projects off the ground (by providing pre-existing infrastructure) and for ensuring the long-term sustainability of projects (by bringing skills in digital management and preservation).

In a separate and ongoing effort, an IMLS-sponsored partnership between three graduate iSchools (University of Maryland College of Information Studies, University of Michigan School of Information, and University

of Texas Austin School of Information) and three nationally-recognized digital humanities centers (MITH, CDRH, and MATRIX) maintains a crowd-sourced spreadsheet of DH centers worldwide, with specific reference to their engagement with academic departments and libraries (iSchools & The Digital Humanities, 2012). As of November 2012, nearly 100 centers are listed, roughly half of them in the United States. Of those centers, nearly half are located within libraries and another quarter maintain some informal relationship with libraries. Outside of the U.S., library-hosted DH centers are much less common, and only a small number report informal ties to their library.

Together, these studies suggest a wide range of models for institutional collaboration between libraries and digital humanities. In some cases, the choice of where to locate digital humanities may be arbitrary, academically speaking. It may have more to do with funding, local politics, or being first out of the gate at an institution rather than the location being chosen for more principled reasons. With this diversity in mind, we may now turn to the actual work of digital humanists to consider ways in which libraries and DH can be mutually supporting.

A CONCEPTUAL MODEL FOR DIGITAL HUMANITIES AND LIBRARIES

As the reports cited in the previous section suggest, the work of digital humanists is diverse, and their collaborations with libraries idiosyncratic with respect to institutions. Still, it is worth considering ways in which the work of digital humanists mirrors activities, resources, and skills found within many libraries. Ben Showers (2012), for example, highlights five areas of overlap between DH and libraries: managing data, "embedded" librarianship, digitization and curation, digital preservation, and discovery and dissemination. Though these and other points of comparison are useful, a more conceptual comparison between DH and libraries would help locate these examples within a common schema and encourage both sides to envision further possibilities.

This section presents a conceptual model for digital humanities and libraries that is founded on a cultural informatics framework. This term was first introduced by Sengers (1999) to describe the "confluence of computation and humanities," including both the ways in which computation could help cultural scholarship and the ways in reflection on cultural background could change the development of technology (p. 7). Furner (2011) connects the term 'cultural informatics' to the specific way in which cultural heritage institutions (including libraries, museums, and archives) create, manage, and organize information artifacts. Some of these artifacts are collected by institutions; others are created by the institutions themselves. This model

stresses a continuum of information content associated with cultural heritage institutions. First, these institutions make available information artifacts produced elsewhere that are deemed worthy of preservation. In some cases, cultural heritage institutions may also create new information artifacts through research, reports, or the creation of digital objects from non-digital ones. All of these documents, broadly construed, represent information; the new products of cultural heritage institutions are no different, in principle, than the familiar sources of books, articles, images, sounds, recording, sculptures, journals, notes, reports, and ephemera. The two are distinguished only by the site at which one is produced. In this sense, cultural heritage institutions create and make available "first-order" content.

Second, cultural heritage institutions often work with content of a special type: "second-order" content, or content about the content of other information artifacts. This may include bibliographic records, resource guides, subject analyses, metadata, or even preservation data that facilitates the organization and understanding of information artifacts. (Preservation *data* is included here because it involves information about information artifacts in an organizational sense (e.g., put these documents in an environment below 70°), but preservation work itself seems to combine first- and second-order content by using second-order content to make available the first-order content of found artifacts.) It is worth noting that second-order content is often recorded in first-order artifacts, such as subject bibliographies, keywords, and encoded metadata. This is hardly surprising, since research of any kind (including second-order information) is often worthy of preservation. The work of analysis and organization produces the second-order content; the document itself may be treated as a first-order creation.

Roughly speaking, we have here a distinction between pure content and pure representation, a distinction that often breaks down when examining any particular object. An archival letter may describe a map and how to use it, a scholarly article may point toward other sources via citation, and a visualization may contain as much interpretation and narrative in its design and presentation as it does first-order data that it represents. The point of this distinction is not to determinately classify information sources into one field or another; it is to capture the broad range of activities involved with the work of cultural heritage institutions. In some cases, they facilitate access (in a transparent way) to existing sources. In others, they engage in acts of research, analysis, and visualization—and, in so doing, create new artifacts of knowledge. Along this dimension of first- and second-order content, we can situate the traditional activities of cataloging, bibliography, collection development, preservation, subject analysis, and knowledge organization.

In addition to considering what kind of information is being produced or made available, cultural informatics also takes note of *who* or *what* is doing the producing. At one end, it focuses on human actors who may be involved in communication, instruction, or other "manual labor" tasks at cultural

heritage institutions. At the other, cultural informatics considers computer-driven technologies, such as automatic metadata extraction, online searching, and digital content management. These broad extremes are bridged by studies of human–computer interaction, which examines the many affordances that computing technologies provide to different users (Card, Moran, & Newell, 1983).

On this dimension, it should be noted that many activities which start on the human side of things wind up drifting toward computation: card catalogs give way to search engines, manual classification is replaced by natural language processing. The history of automation suggests that tasks will generally be shifted from humans to computers to the extent possible for any given task. This trend does not imply that there is some fixed directionality to the map dynamics as a whole. On the contrary, each (technological) solution often brings with it a new (human) problem. Technology may become more powerful, but it also brings with it increasingly specialized discourses and the need for teachers and translators of that technology. In some cases, computer innovations may enter the scene abruptly when it suddenly becomes possible to do some task that was impossible with mere human power (e.g., visualization allowing simultaneous representation of a million data points). These reflections suggest an equilibrium within the model: items may eventually accrue on the side of computation, but a snapshot of the field at any given time would probably reveal activities plotted across wide areas of the map. The overall model is thus a dynamic one, ranging over the shifting array of tasks and task locations.

An overview of today's field with respect to digital humanities is given in Figure 3. This model suggests a multiplicity of ways in which libraries and DH may support, engage, and create with one another. Interestingly, current DH activities fall across a wide range of the map—and not merely the computational end. Digital humanists may rely on libraries as much for access to digital collections and tools as they do resource instruction and preservation. This overlap of first- and second-order content, human- and computer-powered work suggests that libraries and DH are indeed engaged in complementary activities—as commentators have suggested—and that DH has an enduring place within the world of libraries.

At the same time, not all digital humanists may engage in the full range of the activities listed in Figure 3. This fact suggests that there is no singular answer from the perspective of library administration about how libraries should engage with DH. In some situations, a library would do well to focus on digitization and digital preservation; in others, it would do better to keep pace with emerging tools for text analysis. Some DH support may be best accomplished by providing large-scale access to collections, datasets, or technology, while other situations may merit individual, customized collaboration with DH researchers (Kamada, 2010).
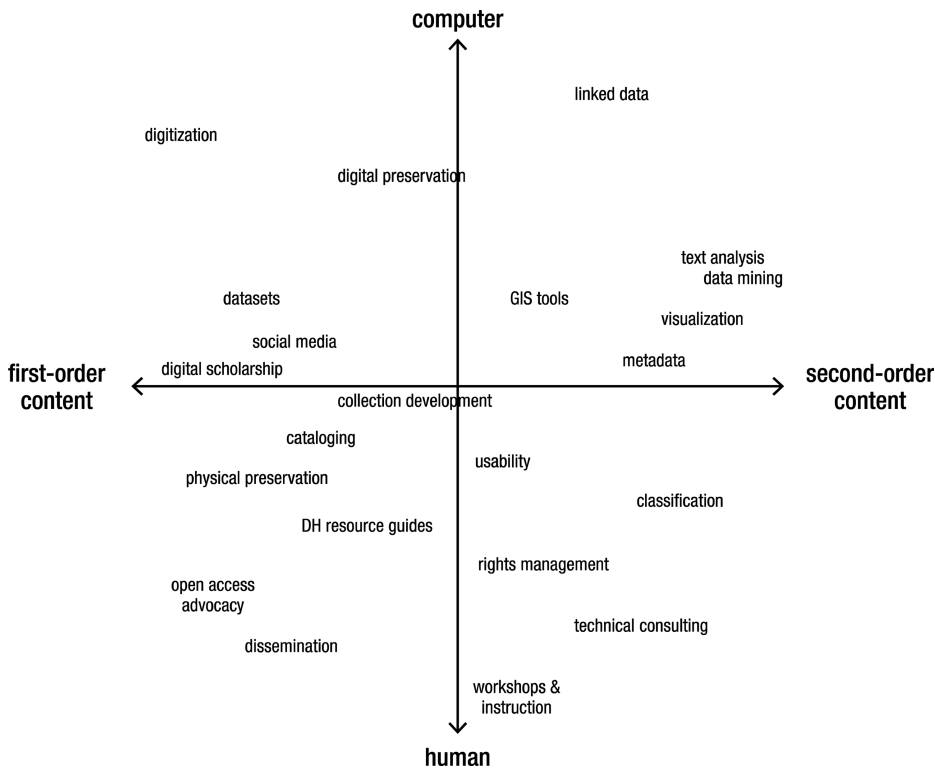
computer

linked data

digitization

digital preservation

text analysis
data mining

datasets   GIS tools
                                          visualization
social media
first-order   digital scholarship   metadata   second-order
content   content
          collection development

cataloging
                          usability
physical preservation
                                          classification
DH resource guides

                  rights management
open access
advocacy
                          technical consulting
dissemination

                  workshops &
                  instruction

human

FIGURE 3 A Cultural Informatics Model for Digital Humanities and Libraries

Though the broad question of DH and libraries has no determinate answer, it does not mean libraries are without guidance in how to support DH. After all, they are not without populations of users, users who bring with them particular information needs, and they are not without general strategies for library outreach, a longstanding tool for raising awareness of what libraries may offer. Discovery of user needs and fostering of new user populations both lay at the heart of user-centered librarianship

AN APOLOGY FOR LOCAL SOLUTIONS

The lack of a general answer about how libraries can best engage with DH may be unsatisfying, but this also seems predicted by the user studies paradigm that has dominated the field for the past several decades. As several authors have pointed out, the user-centered tradition can be traced back to studies of scholarly communication in the 1950s and 1960s, which, to varying degrees, took stock of individual scholars' information seeking behaviors (Case, 2002; Bates, 2004; Talja & Hartel, 2007). The user-centered tradition gained full steam with Dervin and Nilan's seminal article, which called for

TABLE 3 NEH Digital Humanities Start-Up Grant Criteria

- Research that brings new approaches or documents best practices in the study of the digital humanities;
- Planning and developing prototypes of new digital tools for preserving, analyzing, and making accessible digital resources, including libraries' and museums' digital assets;
- Scholarship that focuses on the history, criticism, and philosophy of digital culture and its impact on society;
- Scholarship or studies that examine the philosophical or practical implications and impact of the use of emerging technologies in specific fields or disciplines of the humanities, or in interdisciplinary collaborations involving several fields or disciplines;
- Innovative uses of technology for public programming and education utilizing both traditional and new media; and
- New digital modes of publication that facilitate the dissemination of humanities scholarship in advanced academic as well as informal or formal educational settings at all academic levels.

(National Endowment for the Humanities, 2012b)

a shift away from objective, mechanistic, and universal views of information needs toward more subjective, constructionist, and situated understandings (1986, pp. 12–16).

Rather than casting about for a general way in which libraries can fit in the larger DH movement, libraries can (and already do) focus on responding to the needs of their patrons. There is a well-established need for academic libraries and librarians to support faculty activities, most notably teaching and research, as well as student learning. These activities can be given further description within a digital humanities framework by examining the work that digital humanists actually do, much of which is described in the NEH Digital Humanities Start-Up Grants criteria (see Table 3). The guidelines are themselves significant because they reflect state-of-the-art work in DH and have been used to fund hundreds of projects to date—making them responsible, in no small part, for shaping the field. (It should be noted that guidelines for NEH Digital Implementation Grants follow essentially the same criteria but focus more on creating and supporting longer-term initiatives.)

Though the activities listed in Table 3 cover much of the ground of DH as discussed here, explicit recognition of the role of pedagogy is absent from the criteria. Digital humanists are among the forefront of instructors using technologies to engage students in new forms of digital scholarship, communication, and dissemination of ideas. Moreover, digital humanists are often responsible for training others in using particular tools or methods, particularly undergraduates, or for seeking instruction in those areas themselves. Most often, this has been left to extracurricular skill-shares or workshops in which digital humanists can "catch up" on the latest trends. These tasks are far beyond merely providing technological resources, a model that pervades many IT departments; they involve directed and creative uses of those

resources, and the literacies required to sustain them. Libraries and librarians can fulfill a vital need here in supporting instructional technology and working with faculty to use technology more creatively in classroom settings.

In addition to capturing the current work of DH, the activities listed in Table 3 also reflect a new type of academic library user that has emerged in the past decade, one that is focused on digital scholarship and research. This new type coincides with trends in other fields in terms of big data, access to datasets, and support for technology, including instruction. In this respect, a scientist seeking access to large databases for research and a digital humanist interested in text analysis using large corpora are quite similar in terms of information needs, and the role of libraries in providing such resources is basically the same. The major difference seems to be a historical one; science and technology-related fields have received this type of support more frequently in the past decade, while support for the humanities has been limited still to print collections or electronic journal articles. The growth in digital humanities offers an important opportunity to provide renewed support for the humanities and to bring library resources across the board up to speed with digital scholarship for the 21st century.

Though the possible roles for academic libraries within digital humanities seem relatively clear, engagement with DH in other types of libraries, particularly public libraries, may be quite different, at least from a user perspective. Academic settings, particularly the institutions where digital humanities is growing, often have user populations that are technologically skilled, relatively speaking. Members of the public may also want new and exciting access to information—the very kind that digital humanities often brings—but others may simply rely on their libraries for more basic access to information, including job searches, research on immigration and legal procedures, Internet and email, or child and youth programming. In some cases, these users may comprise a larger segment of the overall population, and there is a strong case for prioritizing these more basic needs over those of the most tech-savvy users. Support for DH in non-academic libraries must be part of an overall needs assessment and may wind up taking a backseat to initiatives that serve a wider population of library users.

CONCLUSION: FROM THEORY TO ACTION

The foregoing sections have attempted to locate digital humanities within the world of libraries in several ways: first by examining the institutional location of DH work, then by presenting a conceptual model of DH and LIS, and finally by locating digital humanities within the overall user-centered paradigm of the field. At each turn, the points of connection between libraries and DH were varied and often dependent on the needs of particular

faculty members (i.e., users) within an institution. Though a general, cultural informatics model was presented, this model stresses the diversity of activities involved in DH and cultural heritage institutions and avoids totalizing recommendations about how such work is to be pursued. While this article has been focused on conceptual ties between libraries and DH, it is worth concluding with some more practical considerations about how such a model can be enacted.

First, librarians (esp. subject librarians) can discover which of their users are working in digital humanities. Resources such as the Humanities, Arts, Science, and Technology Advanced Collaboratory (HASTAC) directory (located athttp://hastac.org/members), which includes over 8,000 members, as well as social media sites (esp. Twitter) can be useful for identifying local faculty with an interest in DH. Second, librarians can attempt to survey the needs of these users (formally or informally), as well as faculty members in general, some of whom may be interested in digital humanities but unsure where to start. As part of this needs assessment, measures such as cost and impact may be considered. This method, again, suggests that different needs will emerge in different settings, even if faculty members bring diverse projects and issues with them. Some of these needs may already be met by preexisting resources; others may require new purchases or changes in staffing. These needs and others may be compared to those plotted in Figure 3, and some libraries may find it advantageous to focus on particular clusters of the grid, while others may find a more scattered approach to be justified. In particular, libraries would do well to identify mutually supporting activities, such as purchasing GIS datasets together with offering GIS workshops.

Although the landscape of digital humanities is complex and changing, libraries are well positioned to meet the needs of many digital humanists, both by expanding current offerings and by promoting existing skills and services that lie squarely within the field of library and information science.

REFERENCES

American Library Association. (2009). ALA's core competencies of librarianship. Retrieved from http://www.ala.org/educationcareers/sites/ala.org.education careers/files/content/careers/corecomp/corecompetences/finalcorecompstat09. pdf

Bates, M. J. (2004). Information science at the University of California at Berkeley in the 1960s: A memoir of student days. *Library Trends*, *52*(4), 683–701.

Boot, P. (2009). *Mesotext: Digitised emblems, modelled annotations, and humanities scholarship*. Amsterdam: Pallas Publications.

Bryson, T., Posner, M., St. Pierre, A., & Varner, S. (2011). *SPEC KIT 326: Digital humanities*. Washington, DC: Association of Research Libraries.

Card, S. K., Moran, T. P., & Newell, A. (1983). *The psychology of human-computer interaction*. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Case, D. O. (2002). *Looking for information: A survey of research on information seeking, needs, and behaviour*. London: Academic Press.

Cohen, D., & Rosenzweig, R. (2005). *Digital history: A guide to gathering, preserving, and presenting the past on the web*. Philadelphia: University of Pennsylvania Press.

Dalbello, M. (2011). A genealogy of digital humanities. *Journal of Documentation*, *67*(3), 480–506. doi 10.1108/00220411111124550

Dervin, B., & Nilan, M. (1986). Information needs and uses. In M. E. Williams (Ed.), *Annual Review of Information Science and Technology (ARIST)* (Vol. 21, pp. 3–33). White Plains, NY: Knowledge Industry Publications.

Digital Humanities Job Archive. (2012). Retrieved from http://jobs.lofhm.org

Fish, S. (2011, December 26). The old order changeth. *The New York Times*. Retrieved from http://opinionator.blogs.nytimes.com/2011/12/26/the-old-order-changeth/

Fish, S. (2012a, January 9). The digital humanities and the transcending of mortality. *The New York Times*. Retrieved from http://opinionator.blogs.nytimes.com/2012/01/09/the-digital-humanities-and-the-transcending-of-mortality/

Fish, S. (2012b, January 23). Mind your P's and B's: The digital humanities and interpretation. *The New York Times*. Retrieved from http://opinionator.blogs.nytimes.com/2012/01/23/mind-your-ps-and-bs-the-digital-humanities-and-interpretation/

Furlough, M. (2012). Some institutional challenges to supporting DH in the library. *On Furlough*. Retrieved from http://www.personal.psu.edu/mjf25/blogs/on_furlough/2012/08/some-institutional-challenges-to-supporting-dh-in-the-library.html

Furner, J. (2011). *Cultural informatics*. Retrieved from http://furner.info/?page_id=121

Galina Russell, I. (2011, August). The role of libraries in digital humanities. *World Library and Information Congress: 77th IFLA General Conference and Assembly*. Lecture delivered from Universidad Nacional Autónoma de México, San Juan, Puerto Rico. Retrieved from http://conference.ifla.org/past/ifla77/104-russell-en.pdf

iSchools & The Digital Humanities. (n.d.). Retrieved from http://www.ischooldh.org

iSchools & The Digital Humanities. (2012). *Digital humanities centers*. Retrieved from https://docs.google.com/spreadsheet/ccc?key=0Alb9djE8v3nCdFJuZF-VaZGpOVEFoaF84dWRVQ2RsQnc#gid=6

Kamada, H. (2010). Digital humanities: Roles for libraries? *C&RL News*, *71*(9), 484–485. Available at http://crln.acrl.org/content/71/9/484.full

Kirschenbaum, M. (2010). What is digital humanities and what's it doing in English departments? *ADE Bulletin*, *150*, 55–61. doi 10.1632/ade.150.55

LibraryLoon. (2012). Additional hurdles to novel library services. *Gaiva libraria*. Retrieved from http://www.inthelibrarywiththeleadpipe.org/2012/dhandthelib/

Marche, S. (2012, October 28). Literature is not data: Against digital humanities. *Los Angeles Review of Books*. Retrieved from http://lareviewofbooks.org/article.php?type&id=1040&fulltext=1

MLA Jobs Tumblr. (2012, September 21). [Web log post.] Retrieved from http://mlajobs.tumblr.com/post/31991562450/digital-humanities-asst-prof-in-american-or

Modern Language Association. (2012). *Guidelines for evaluating work in digital humanities and digital media*. Retrieved from http://www.mla.org/guidelines_evaluation_digital

Moretti, F. (2005). *Graphs, maps, trees: Abstract models for a literary history*. New York: Verso.

Muñoz, T. (2012). *Digital humanities in the library isn't a service*. Retrieved from http://trevormunoz.com/notebook/2012/08/19/doing-dh-in-the-library.html

National Endowment for the Humanities. (2012a). Information about grants made by the National Endowment for the Humanities [Data files]. Retrieved from http://www.data.gov/list/agency/139/*

National Endowment for the Humanities. (2012b). *Digital humanities start-up grants*. Retrieved from http://www.neh.gov/grants/odh/digital-humanities-start-grants.

Pannapacker, W. (2009, December 28). The MLA and the digital humanities. *Chronicle of Higher Education*. Retrieved from http://chronicle.com/blogPost/The-MLAthe-Digital/19468/

Ramsay, S. (2010, October 8). Care of the soul. Lecture conducted from Emory University. Retrieved from http://stephenramsay.us/text/2010/10/08/care-of-the-soul.html

Schreibman, S., Siemens, R., & Unsworth, J. (Eds.). (2007). *A companion to digital humanities*. Oxford: Blackwell. Available at http://www.digitalhumanities.org/companion/

Sengers, P. (1999). Practices for a machine culture: A case study of integrating cultural theory and artificial intelligence. *Surfaces* VIII. Available at http://www.cs.cmu.edu/~phoebe/work/papers/surfaces99/sengers.practices-machine-culture.html

Showers, B. (2012). Does the library have a role to play in digital humanities? *JISC Digital Infrastructure Team*. Retrieved from http://infteam.jis–cinvolve.org/wp/2012/02/23/does-the-library-have-a-role-to-play-in-the-digital-humanities

Siemens, R., & Schreibman, S. (Eds.). (2008). *A companion to digital literary studies*. Oxford: Blackwell. Available at http://www.digitalhumanities.org/companionDLS/

Talja, S., & Hartel, J. (2007). Revisiting the user-centred turn in information science research: An intellectual history perspective. *Information Research*, *12*(4) paper colis04. Available at http://InformationR.net/ir/12–4/colis/colis04.html

Vandegrift, M. (2012). What is digital humanities and what's it doing in the library? *In the library with a lead pipe*. Retrieved from http://www.inthe–librarywiththeleadpipe.org/2012/dhandthelib/

Zorich, D. M. (2008). *A survey of digital humanities centers in the United States*. Washington, DC: Council on Library and Information Resources. Retrieved from http://www.clir.org/pubs/reports/pub143/reports/pub143/pub143.pdf