# Collaborative Approaches to the Digital in English Studies

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| TITLE | Computing and Communicating Knowledge: Collaborative Approaches to Digital Humanities Projects |
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| OVERVIEW | Two cultural and technological transformations are influencing the move toward collaborative digital humanities scholarship: (1) the abundance of data and (2) Web 2.0, or "the participatory web." This chapter provides compelling examples of how humanities researchers are responding to these transformations and illustrates different approaches both to collaboration and to digital humanities research. Case studies of HyperCities, the Tibetan and Himalayan Library, the Orlando Project, and The Mind Is a Metaphor are presented based on semi-structured, hour-long interviews conducted with project leaders as well as analyses of articles and Web sites associated with the projects. In the chapter's final section, the author examines the challenges that collaborative humanities researchers face and suggests how to better support this sort of work. |
| TAGS | collaborative, community, data, digital, humanities, information, knowledge, participatory, projects, research, scholarship, web 2.0 |
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# Computing and Communicating Knowledge: Collaborative Approaches to Digital Humanities Projects

**Lisa Spiro**

According to stereotype, the humanities scholar works alone, surrounded by books. But a counter-image is emerging of the collaborative digital humanist who participates in interdisciplinary teams and networked communities (Howard, 2009). "Digital humanities," a debated and loosely defined term, refers to a "diverse and still emerging field that encompasses the practice of humanities research in and through information technology, and the exploration of how the humanities may evolve through their engagement with technology, media, and computational methods" ("About," 2009). I selected this definition because it emphasizes both methods and media, as well as digital humanities' concern with understanding (and shaping) the impact of computation and networked information on the humanities. While some argue that digital humanities should focus on harnessing social media to create "a new space for scholarship and public intellectualism" (Parry, 2010), others emphasize that the practical "slow work" of building technologies and methods is likewise important, since digital collections, text analysis software, GIS tools, and the like provide the basis for scholarship (Clement, 2010; Ramsay, 2010b). This chapter takes a wide view of the digital humanities, since computation and communication, method and media, enable us to explore the larger question of how we can employ technology to produce, represent, and exchange ideas about culture. As Stephen Ramsay (2010a) puts it, "technology and discourse are intertwined." Collaborative and multidisciplinary, digital humanities projects bring together cultural data, humanities questions, and computer-based methods for producing, analyzing, and/or representing and disseminating knowledge.

In English studies, digital research can take many forms, such as building editions and collections, using computational methods to produce new interpretations of texts and other cultural objects, examining online reading and writing practices, facilitating participatory knowledge sharing, or producing multimodal scholarship that presents scholarly arguments in a dynamic, interactive fashion. Collaboration is generally vital to accomplishing such projects because of their scope and complexity. As Todd Presner—professor of Germanic Languages, Comparative Literature, and Jewish Studies at UCLA—suggests, "Digital humanities is always participatory and collaborative. . . . No scholar in isolation could have the knowledge, ability, or time to do this work" (personal communication, July 24, 2009).

I want to focus on two cultural and technological transformations that are influencing the move toward collaborative digital humanities scholarship: (1) the abundance of data and (2) Web 2.0, or "the participatory web" ("Web 2.0," 2010). The amount of digital information is massive: 12 million books digitized by Google, 6 million JSTOR articles, at least 21.13 billion Web pages, and petabytes of scientific data (JSTOR, 2010; Oder, 2010; "The Size of the World Wide Web," 2010). In fields such as genetics, environmental studies, and astronomy, the explosion of data is allowing scholars to pursue "information- and data-intensive, distributed, collaborative, and multi-disciplinary" approaches to research, such as conducting longitudinal studies of the environment that draw from multiple datasets (Borgman, 2009). What the availability of huge amounts of data means for humanities research remains an open question, one that is being explored through the "Digging into Data" international competition sponsored by the UK's Joint Information Systems Committee (JISC), the United States's National Endowment for the Humanities (NEH) and National Science Foundation (NSF), and Canada's Social Sciences and Humanities Research Council (SSHRC) (NEH, JISC, NSF, & SSHRC, 2009). At the same time that we are gaining access to massive amounts of data, participatory Web 2.0 technologies are enabling people to exchange information through social networking sites such as Facebook; share, comment on, and remix media through social media sites such as Flickr; and collectively construct knowledge through open content initiatives such as Wikipedia. Invoking the participatory, interactive approaches of Web 2.0, Cathy Davidson calls for Humanities 2.0, which embraces the open exchange of information, values participation by academics and non-academics alike, and "de-centers" core assumptions about authorship, expertise, and status (Davidson, 2008). This call has been echoed by the *Digital Humanities Manifesto*, which advocates for "wiki-scholarship" that is "iterative, cumulative, and collaborative" (UCLA Mellon Seminar, 2009).

As the digitization of the cultural record makes available an abundance of humanities data, and as Web 2.0 technologies connect researchers to each other and to the broader community, digital humanists are exploring new models for producing, analyzing, representing, and communicating information. By examining research goals and practices, this chapter first investigates why the digital humanities tend to be more collaborative than "traditional" humanities. I then provide brief case studies of projects focused on (1) communicating and exchanging knowledge through participatory online environments; (2) building digital collections of primary and/or secondary scholarly resources; and (3) developing computational methods for analyzing humanities data. (For a more extensive listing of different types of collaborative projects in the digital

humanities, see Spiro, 2009b.) These case studies are based on semi-structured, hour-long interviews I conducted with project leaders as well as analyses of articles and Web sites associated with the projects.

The three types of projects listed above can be considered reinventions of traditional humanities work: expansions of the collaborations involved in promoting public humanities, creating scholarly editions and reference collections, and pursuing interdisciplinary approaches to literary criticism. Yet these collaborations also take the humanities in new directions, whether by moving from public to "participatory humanities," where the public become active co-creators rather than passive recipients of knowledge; engaging humanities scholars not only in editorial work but also in encoding and representing knowledge; or applying methods derived from computer science and statistics to humanities questions.

These projects provide compelling examples of the digital humanities, but they also illustrate different approaches both to collaboration and to humanities research. Participatory projects generally take a distributed, community-driven, "loosely coupled" approach to collaboration, so that work is modular, often occurs remotely rather than via face-to-face meetings, and can be done independently (Olson & Olson, 2000). Yet in the participatory projects discussed in this chapter, HyperCities and the Tibetan and Himalayan Digital Libraries, project teams work closely with local communities to produce media representing the communities' own experiences. These projects break down the barriers between scholars and the community by engaging all in constructing intellectual resources. With projects to build digital collections, a large group of content experts, programmers, interface designers, and text encoders together define, produce, and disseminate a common scholarly resource. Projects to create new methodological approaches typically involve smaller interdisciplinary teams of humanities scholars and computer scientists, information scientists, or statistics researchers. In the chapter's final section, I examine the challenges that collaborative humanities research faces and suggest how to better support this sort of work.

## WHY DO DIGITAL HUMANITIES RESEARCHERS COLLABORATE?

Collaboration has become a buzzword, the subject of hundreds of books and a goal touted in many university strategic plans. Collaboration, meaning "united labor" ("Collaboration," 2009) in pursuit of a common goal, can take many forms depending on who is working together (e.g., researchers in the same or different fields, inside or outside of the academy), how the work is done (tightly or loosely

managed), and what is produced (e.g., research paper, software, digital collection) (Palmer, Teffeau, & Pirmann, 2009). Closely aligned to collaboration is participation, which suggests "sharing in an action" ("Participation," 2009); this sharing may be less coordinated than collaboration, but it likewise involves people working together for a common purpose.

Field-specific research practices typically shape whether and how scholars collaborate. In the sciences, collaboration is expected, reflected in the organization of research into labs where a faculty member oversees work by postdocs, research assistants, graduate students, and undergraduates. In the humanities, by contrast, faculty members typically work alone and advise graduate students on their own unique projects. In part, the practice of solitary humanities scholarship may reflect the romantic ideal of the literary theorist as an "isolated poet and thinker" (Gilman, 2004, p. 386). Even as the humanities preach the death of the author, they value the individual subjectivity of the scholar and practice solo authorship (Ede & Lunsford, 2001).

Whereas the "traditional" humanities continue to produce solo scholarship, the digital humanities tend to be much more collaborative. We can see this trend toward collaborative digital humanities scholarship by comparing rates of co-authorship, a typical measure of collaboration. A study of patent records and articles in *Web of Science*, an online citation index that includes the *Arts & Humanities Citation Index*, concluded that in the arts and humanities a single author wrote over 90 percent of the articles, although there is a trend toward teamwork (Wuchty, Jones, & Uzzi, 2007, p. 1037).  In contrast, I found that between 2004 and 2008, 48 percent of the articles published in *Literary and Linguistic Computing* (LLC), a leading digital humanities journal, were written by two or more authors (see Spiro, 2009a). Of these articles, 49 percent were written by scholars from two or more institutions, while about 16 percent involved authors from two or more countries. The relatively high frequency of collaboratively written articles likely reflects the diverse practices of *LLC*'s contributors, including researchers from disciplines such as computer science, linguistics, classics, information science, and literature; indeed, since digital humanities research joins subject knowledge in the humanities and computer-based approaches, it is by nature interdisciplinary and collaborative. Likewise, two or more authors wrote 41 percent of the articles published in *Digital Humanities Quarterly* between [the spring of 2007 and the fall of 2009](#). Typically, single authors wrote articles describing interpretive or theoretical work (e.g., "Interpretative Quests in Theory and Pedagogy" [Howard, 2007]), while multiple authors produced articles describing practical projects to develop collections,

tools, or methods (e.g., "Mining Eighteenth Century Ontologies" [Horton, Morrissey, Olsen, Roe, & Voyer, 2009]). Although this study should be carried out more systematically across a wider range of publications and a longer time span, the initial citation analysis supports the observation by Brett Bobley (2009), director of the NEH's Office of Digital Humanities, that "digital humanities is collaborative and international."

Why do digital humanities scholars collaborate more frequently than "traditional" humanities scholars?  What difference does collaboration make? In part, the traditional emphasis on solitary scholarship reflects how the humanities typically gain access to and make use of information (Toms & O'Brien, 2008). Unlike scientists or social scientists, humanities scholars traditionally have not created data through experiments or elicited data through surveys and focus groups. Rather, they analyze the existing cultural record, which typically does not require collective efforts (Goldenberg-Hart, 2004). Whereas collaboration is common in quantitative, positivist fields like sociology, it is less typical in theoretical and interpretive fields (Moody, 2004)—an observation that likely applies to the humanities as well. According to Andrew Abbott (2008), humanities work is "artisanal" and depends on the individual mind interacting with research materials (p. 533). In contrast, digital humanities work often engages a team of researchers in "building" something (a collection, tool, method, hypermedia publication, participatory platform, etc.), occurs on a larger scale, and demands diverse expertise. A recent survey of digital humanities research teams found that the most common reasons researchers cited for working together are "Team members have different skill sets" and "Collaboration is more productive than individual work" (Siemens, 2009, p. 120).

Yet it would be too simple to say that "traditional" humanities scholars do not collaborate. Even if humanities scholars have tended to conduct independent research and produce fewer co-authored books and articles than their colleagues in the sciences, they actively participate in research communities by exchanging ideas and citations, presenting at conferences, and reviewing essay drafts and journal submissions. Indeed, "[a]t times, the dependence of humanities scholars upon their colleagues can approach joint authorship of a publication" (Brockman, Neumann, Palmer, & Tidline, 2001, p. 11). Scholarship involves a conversation with fellow scholars and with the broader community, past, present and future, as reflected in citations and acknowledgments. Networked technologies such as blogs, wikis, listservs, digital collections, and scholarly networks like Romantic Circles and HASTAC open up, accelerate, and make visible that scholarly conversation.

As humanities scholars gain access to data and embrace the culture of information sharing, collaborative research may become more common in the humanities, even as solitary scholarship will continue to be appropriate for some projects. The tendency to collaborate may not be inherent in the discipline, but is instead a function of the difficulty of accessing and analyzing data. For example, seventeenth-century astronomers such as Johannes Kepler were reluctant to publish and share their data because it was so difficult to generate (Choudhury & Stinson, 2007). In contrast, humanities scholars had long collaborated in copying, illuminating, and "recasting" works such as the *Roman de la Rose*. Choudhury and Stinson (2007) thus suggest that how scholars perform and disseminate their research is determined not so much by "inherent characteristics within specific disciplines" but by "the relative ease or difficulty with which practitioners of those disciplines can generate, acquire or process data." In "big science" projects such as analyzing massive amounts of astronomical data made freely available through the Sloan Digital Sky Survey, interdisciplinary collaborations are common (Borgman, 2009). In twentieth-century humanities research, however, scholars typically built their reputations through their individual efforts, whether by making unique discoveries in archives or advancing brilliant theoretical approaches. Yet the nature of archives is changing, as we move into an era of data abundance (Rosenzweig, 2003). Just as producing manuscripts during the early modern era required the labor of many, so digital humanities projects focused on representing, analyzing, and disseminating data are fundamentally collaborative.

Ultimately, this chapter addresses how modes of knowledge production and dissemination are changing as information becomes networked and digital and as humanities scholars envision new ways of doing their work. In digital literary studies, as in other fields, researchers collaborate because it enables them to accomplish their goals. Stanford University lecturer and academic technology specialist Matthew Jockers suggests, "I think collaboration arises naturally from the pursuit of a particular kind of question. . . . We're going to see more collaboration because the questions we're interested in are changing" (personal communication, June 5, 2009; see also Jockers, 2010). These questions might be

- How can we break down the barriers between "academic knowledge" and "community knowledge" and create a platform for sharing *all* knowledge?
- How do we encode and represent information so that readers can discover new knowledge?
- How can we use computational methods to answer rhetorical, literary, or other relevant questions?

Technology supports performing and delivering such work, but research goals drive it. Although their core questions may differ, these digital humanities projects point toward more interdisciplinary, collaborative approaches to producing humanistic knowledge, approaches that deserve the attention of English studies professionals.

## PARTICIPATORY HUMANITIES

Collaborative open-content projects such as Wikipedia demonstrate the power of peer production, even as they raise questions about authority and expertise. As Cathy Davidson and David Theo Goldberg (2009) argue, our culture is shifting toward collaborative forms of knowledge production, a shift that academic institutions must engage. Through "citizen humanities" projects, academics and non-academics alike are sharing their knowledge and experiences online, providing genealogical information, digitizing and transcribing documents, and creating dynamic maps of local culture. Rather than viewing the public simply as the subjects of research, participatory knowledge initiatives take "public humanities" to a new level, not only reaching out to communities but also "reaching in" and creating channels for knowledge sharing and collaboration (Davidson & Goldberg, 2004).

Through HyperCities, scholars and citizens co-create knowledge as they contribute their own layers of information to a series of interactive maps that offer different perspectives on the urban experience. HyperCities, "a collaborative research and educational platform for traveling back in time to explore the historical layers of city spaces in an interactive, hypermedia environment" ("HyperCities," n.d.; see Figure 1), has been developed through a partnership of universities and civic organizations, including UCLA, USC, City University of New York–Baruch, Pilipino Workers' Center, and Public Matters, Los Angeles.



**Figure 1**. *HyperCities* Web site.

By using the Google Maps and Google Earth API to create geospatial mashups, HyperCities has created an open, interactive platform where people can explore and contribute information documenting experiences of urban space and time, such as photographs, video, oral histories, maps, stories, and GIS data. Although HyperCities hosts some data, it also aggregates digital media stored elsewhere, so its architecture is based on connecting distributed information.

HyperCities invites open participation, whether through individuals contributing media, archives sharing collections, or institutions collaborating on city-based projects. Users can search by place and time, see both overlay maps and content associated with a particular place and time, and view data generated by the local community and scholarly community side-by-side. According to founder and director Todd Presner, HyperCities aims to "create maps that are different from more traditional historical maps, to interrogate representations, to use knowledge in communities and the repositories in people's heads to contribute to academic content and interrogate it" (personal communication, July 24, 2009). Thus, HyperCities recognizes and values different kinds of expertise, both the knowledge of people who live in communities and of scholars who make arguments about those communities. For instance, users can explore Phil Ethington's *[Ghost Metropolis, Los Angeles, since 13,000 BP](#)*, which provides a global multimedia history of Los Angeles from the age of woolly mammoths to the present, alongside [videos](#) documenting Los Angeles's Filipinotown that were created by students participating in a [program](#) sponsored by the Pilipino Workers' Center and Public Matters.

Although some people complain that putting everything on the same level makes it difficult to distinguish vetted and unvetted material, Presner favors openness, rich juxtapositions of data, and flexibility over locking down information (personal communication, July 24, 2009). According to Presner, exploring HyperCities resembles walking through a physical city, where "there's going to be graffiti on the subway, but there's great stuff too. There are many different modes of expression, some of which you may not agree with, but you sift through them." The user applies his or her own critical judgment in evaluating and applying the knowledge made available through HyperCities. This participatory digital space values experience as well as formal, analytical knowledge and is engaged in the community rather than standing apart from it.

Like HyperCities, the Tibetan and Himalayan Library (THL) re-envisions knowledge creation and dissemination as participatory and collaborative,

engaging the local communities that are the objects of investigation as participants sharing their own knowledge (see Figure 2).
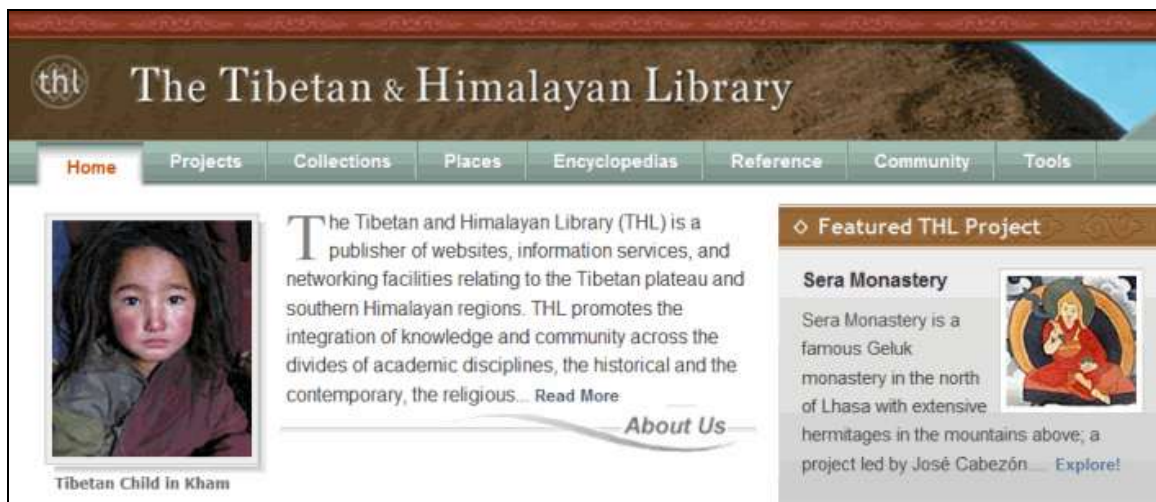


**Figure 2.** *[The Tibetan & Himalayan Library](#) Web site*.

From its start in 2000, THL aimed to "create a collaborative research environment and publishing system for scholars and projects from around the world" ("A Short History of the Tibetan and Himalayan Library," n.d.). Its initial focus included supporting scholarly exchanges between the U.S. and Tibet, developing software for the Tibetan language, and providing access to "collaborative repositories" of XML-encoded texts, images, GIS maps, audio-video resources, and dictionaries (The UVA Tibet Center, 2008).[1] To encourage contributions to its collaborative repositories, THL features a "[Participate!](#)" link in the footer of each page on the site and provides extensive documentation explaining how and why to contribute content.

As THL founder David Germano acknowledges, however, "We didn't create a truly different model for how we can create knowledge in a radically distributed fashion….The work should involve not just elite scholars and students, but really open up participatory knowledge in a broad variety of localities" (personal communication, June 10, 2009). Thus, THL launched its "[Participatory Knowledge Initiative](#)," which aims to document and disseminate knowledge within and beyond local communities. As Germano argues, scholarship suffers when it overlooks the knowledge of local people: "There is a wealth of knowledge about places, communities, practices—but that knowledge is tacit, oral, embodied in character. It doesn't go beyond that community. Participatory knowledge makes

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[1] To facilitate both participation and open scholarship, THL takes a flexible approach to copyright, generally supporting the open content movement but also embracing contributors' needs to make money from their work by offering more restrictive licenses (Tibetan and Himalayan Library, n.d.).

knowledge more migratable, transmitted to others, kept, sustained, transmitted to future generations."

The Participatory Knowledge Initiative is building structures that enable local community members to share their own knowledge and take part in conversations about their communities. For example, it worked with Machik (a non-profit), the Columbia Film School, the Maysles Institute, and Rabsal on participatory projects in Eastern Tibet, where students, monks, villagers, and others were provided equipment and training so that they could produce their own documentaries about their community and perspectives. Students produced "Making Good Choices," a short film that warns against substance abuse among young adults. This work is now being extended in Tibet in partnership with Winrock International to try to create a broader network of partnerships for knowledge creation and dissemination that extend from local communities on the plateau to elite universities in Europe and America and back. These representations support both self-reflection and global understanding as the communities become visible on the Internet, their own cultures documented through multimedia. As Germano argues, "When you use digital technology, you can allow communities to pop up, each distinctive with its own traditions, histories, etc. We then see the world as this heterogeneous stitching together of so many localities" (personal communication, June 10, 2009).

The THL has embraced participatory knowledge creation to fulfill ethical obligations and to benefit both society and scholarship, so that higher education "doesn't just extract knowledge and send students to study, but rather engages in truly reciprocal relationships where we take care of how the transmission and the delivery of knowledge impact these communities which we engage with" (David Germano, personal communication, June 10, 2009). According to Germano, such a participatory mode of knowledge production and dissemination should be fundamental to what the university does, since both society and scholarship improve when they respect and integrate local knowledge. Participatory projects reflect the growing understanding of writing as social, connected, and collaborative, as readers become writers and editors—or, in the case of HyperCities and THL, mapmakers and filmmakers (Lundin, 2008). Moreover, they demonstrate the larger value of humanities by recognizing that scholarship is an ongoing conversation with the public and that non-Ph.D.s may have valuable knowledge to offer.[2] Although getting people to participate, crediting

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[2] For example, a comparison of a wiki about Pynchon's novel *Against the Day* produced by non-academics to an academic study of the novel suggests that while the wiki is less consistent and coherent, it is also more comprehensive and less prone to error (Schroeder & Den Besten, 2008).

participation, and ensuring that the content is trusted can be challenging, participatory projects point to ways of making the humanities more engaged in the community and ultimately more innovative, as embedded and expert knowledge are shared.

## BUILDING SCHOLARLY COLLECTIONS

Scholars have long collaborated to construct scholarly resources such as critical editions and reference works. For instance, the credits page for the Northwestern Newberry edition of Melville's *Confidence Man* (1984) lists fourteen people, including editors, associate editors, contributing scholars, an editorial coordinator, and co-authors of the historical note. However, producing a digital collection or edition typically necessitates even more staff than a comparable print edition, as people with both technical and literary expertise work together to develop a model of the text, determine how to apply markup standards (which, as Julia Flanders [2009] suggests, are themselves "collaborative technologies" that communicate ideas so that they can be "reused"), analyze and encode features of the texts, design interfaces, and, in many cases, publish the texts. A glance at the credits page for digital collections reveals the extent of collaborative work. For example, the William Blake Archive lists 70 people, including the editors, technical editors, project managers, bibliographer, project assistants, research assistants, scanning assistants, consultants, programmers, and technical staff.[3]

Differentiating "traditional" from electronic scholarship, John Walsh (2008) suggests, "Electronic scholarship encourages interdisciplinary collaboration and gives scholars control over more aspects of the production and presentation of their work, from writing and editing to design, contextualization, and publication." Whereas in traditional literary scholarship the scholar produces knowledge while the publisher determines how it will be represented and disseminated, creating a digital collection often involves a team effort where the production and representation of knowledge are integrated. Teams not only do background research and encode texts using XML markup standards such as the one developed and maintained by the Text Encoding Initiative but also devise stylesheets for representing the texts, design interfaces for interacting with information, and often serve as publishers or distributors.[4]

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[3] Credits pages for digital projects tend to be more extensive than their print equivalents, acknowledging everyone who made a contribution to the project. Since many digital humanities projects rely on student labor, they typically involve a fair amount of turnover.
[4] Many digital humanities collections are published by digital humanities centers rather than presses, although their creators tend to prefer the word "distribute" to "publish." For example, the Walt Whitman Archive is "freely distributed" by the Center for Digital Research in the Humanities at the University of Nebraska–Lincoln ("The Walt Whitman Archive," 1995) and the Rossetti

Since building digital resources requires extensive teamwork, such projects have caught the attention of those advocating for the humanities to become more collaborative. For instance, Lunsford and Ede (2001) cite the Orlando Project, *Women's Writing in the British Isles from the Beginnings to the Present*, for exemplifying multidisciplinary collaboration, given "[t]he number of scholars involved, the breadth of the goal, and the multiple perspectives necessary to illuminate the writing of women across such a broad span of time" (p. 361). The Orlando Project originated in a print reference book[5] called *The Feminist Companion to Literature in English* (1991), which was so packed with information that there was no room for an index or other research that the editors wished to include. Rather than being boxed in by print, the editors turned to electronic publication—see Figure 3—as a way to offer more information, provide richer modes of access, and, ultimately, realize the "advantages of moveable text that permitted dynamic ordering of materials according to reader's priorities; the dialogism or multi-voicedness that seemed particularly suited to collaboration" (Brown, Clements, & Grundy, 2006, p. 320).



**Figure 3.** *The Orlando Project* Web site.

Here "collaboration" means empowering readers to engage in a dialogue with scholarly materials and participate in the process of building knowledge. As the

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Archive is "freely distributed" by the University of Virginia's Institute for Advanced Technology in the Humanities and the NINES consortium ("Rossetti Archive," n.d.).

[5] Although the Orlando Project is a reference tool rather than a critical edition, both types of projects involve collaborative efforts to develop data standards as well as to encode and represent the data.

editors found, such goals entailed moving to "a new mode of scholarly production" that required intense collaboration, explicitness in devising and documenting standards for representing knowledge, and flexibility in applying these standards (Brown et al., 2006, p. 533). On a practical level, creating a digital resource meant expanding the project team from three co-editors to "two principal investigators, four co-investigators, three postdoctoral fellows, a project librarian, a research collaborator, and eight graduate research assistants" (Brown & Clements, 1998); ultimately more than one hundred people in Canada, the United Kingdom, the United States, and Australia worked on the project.

With its focus on women's writing, the Orlando Project is exploring the "domestication of computing for the humanities," bringing a feminist perspective to using computers to produce and disseminate knowledge (Brown & Clements, 1998). Core to the Orlando Project's collaborative, feminist practice was creating an encoding standard for describing women's literary history "that would valorize and give voice to women and the texts they wrote, and make them susceptible to kinds of historicization, interrelation, juxtaposition, and analysis not previously possible" (Brown et al., 2006). The Team Planning Group, made up of "core project members," developed the Orlando Project's Document Type Definitions (DTD) to encode information included in the project, focusing initially on Events, Biography/Life, Writing and Documentation (Brown, Clements, Grundy, Balazs, & Antoniuk, 2007). For example, the Orlando Project represents the social nature of writing by encoding personal as well as textual relationships: family, friends, influences, reception, and even whether authorship is collaborative (see Figure 4).

<DIV2 ID=chidka-w.sgm:DIV2:1><PRODUCTION><SHORTPROSE>
<P ID=chidka-w.sgm:P:2><PMATERIALCONDITIONS><NAME STANDARD=Chidley, Katherine>**KC**</NAME> **was able to write only because at this time private conventicles (or religious assemblies outside established churches) were tolerated**.</PMATERIALCONDITIONS><PAUTHORSHIP COLLABORATION= COLLABORATIONYES>**She did much of her writing collaboratively. She and her son** <NAME STANDARD=Chidley, Samuel>**Samuel**</NAME>**became an effective writing-publishing team. In composing**<TGENRE GENRENAME= PETITION>**petition** </TGENRE>**s she acted as one of a group of Leveller women**.<BIBCITS> <BIBCITPLACEHOLDER=Gillespie 215,214 DBREF=1483>**215,214**</BIBCIT> </BIBCITS></PAUTHORSHIP></P></SHORTPROSE>

**Figure 4.** How *Orlando* encodes collaborative authorship.

Developing this encoding scheme required a degree of collaboration that distinguishes the Orlando Project from most traditional humanities work: "Instead

of a single researcher needing to communicate effectively and clearly with one or more research assistants, we have a research collective that together had to develop a shared view of the project's research aims" (Hockey, Butler, Brown, & Fisher, 1997). Through a consensual decision-making process, the group could hash out both the scholarly and technical approaches necessary to accomplish the project's goals, explicitly representing the structure and semantics of the text. Such a process had some disadvantages: "it took—literally—years to devise, test, and finalise our tagsets" (Brown et al., 2006, p. 321). Team members applied these tags in authoring "chunks" of text documenting literary history, producing a dynamic resource that brings together a number of authorial voices (Brown et al., 2006). By encoding information such as people, places, and intertextuality, the Orlando Project enables readers to go beyond keyword searches and explore connections among different chunks of knowledge. Readers can even view the SGML (Standard Generalized Markup Language) tags that were used to mark up the information. This open approach invites the reader to become a collaborator in navigating and interpreting both the text and the editorial decisions that inform it (Brown & Clements, 1998).

In 2006 Cambridge University Press published *Orlando* as an online textbase with almost 7.7 million words, but the project team continues to create new content and enhance the technological infrastructure (Brown, Clements, Grundy, Ruecker, Antoniuk, & Balazs, 2009). In particular, the Orlando Project is investigating how to leverage the semantic markup in the texts and provide interfaces that enable readers to study patterns and examine interlinkages such as writers' associations with each other or with a particular place (Brown, Ruecker, et al., 2009). In the future, the Orlando Project plans to facilitate participatory literary scholarship, so that scholars beyond the core team can be invited to modify and contribute to the textbase (Susan Brown, personal communication, January 28, 2010). Implementing participatory scholarship involves complexity both in balancing openness and authoritativeness and in re-designing the workflow management system to make entries easy to edit and to ensure appropriate permissions. Collaboration thus occurs at different levels in Orlando: the team planning group collaboratively developed standards and approaches; the larger project team, including a number of graduate students, together authored and edited entries and applied the tags; and the readers take part in the ongoing scholarly conversation by using the encoded texts to make connections and see scholarly processes at work.

Many groundbreaking digital collections were launched in the 1990s, prior to the emergence of Web 2.0 (Kirschenbaum, 2010), but now scholars are beginning to

explore using open, participatory approaches to create critical editions and other digital collections. Given the expense and time required to produce digital editions, Peter Robinson (2005) proposes embracing a participatory model to produce "fluid, co-operative and distributed editions, the work of many, the property of all." Work would be distributed and shared online, so that some participants would scan the documents, others would transcribe them, and others would provide commentary, notes and emendations, and so forth. Such a collaborative approach would recognize that "any good reader must sometimes be an editor" and enable people to have a common stake in producing and sharing knowledge (Robinson, 2005). Efforts are underway to create the infrastructure that will support collaborative textual editing. For instance, the [TextGrid](#) project is building a "virtual workbench" for "collaborative editing, annotation, analysis and publication of specialist textual data" (D-Grid Initiative, n.d.). Similarly, John Bryant (2008) received NEH funding to develop the TextLab tool, which will open up the editorial process by supporting the collaborative editing of manuscripts. We thus see the creation of editions and reference tools transforming from a hierarchical model whereby an editor oversees work by multiple research assistants, to a cooperative model whereby people with a range of expertise come to common decisions, to a distributed model where contributors together build a common intellectual product.

## COMPUTATIONAL METHODS AND DATA-DRIVEN SCHOLARSHIP

Restricted by the limited availability of information (or access issues) and the time required to analyze material, English studies scholars—and literature scholars in particular—have typically based arguments about complex cultural phenomena on close readings of a handful of texts (Wilkens, 2009). Yet as both massive collections of texts and text analysis tools become available, humanities scholars can draw upon a much wider range of evidence in making their arguments. Humanities scholars can now begin to practice what Franco Moretti (2000) calls "distant reading," looking at large scale phenomena such as "genres and systems" by examining patterns across large text collections. Likewise, they can use computational methods to examine particular features of texts, such as the presence of metaphor or markers of authorship. Recently, *Literary and Linguistic Computing* featured two articles that illustrate both the possibilities of textual analysis and the ways in which collaboration supports such work: Matthew Jockers, Daniela M. Witten, and Craig Criddle's (2008) "Reassessing Authorship of the *Book of Mormon* Using Delta and Nearest Shrunken Centroid Classification" and Brad Pasanek and D. Sculley's (2008) "Mining Millions of Metaphors." These articles not only offer compelling interpretative arguments about the *Book of Mormon* and metaphor but also explore emerging

computational methods for understanding literature and show how collaboration among humanities, statistics, and computer science researchers is essential to developing such methods.

Each article is motivated by a question that it would be difficult to answer without the aid of a computer. For Jockers, Witten, and Criddle (2008), the question is, "Who wrote the *Book of Mormon*, and how can we know?" while Pasanek and Sculley (2008) ask, "Can a machine learn metaphor?" In each article, the authors bring together a lucid analysis of cultural and interpretive contexts with a detailed description of the computational techniques used to analyze texts, producing a sort of hybrid of literary scholarship and computer science that includes features not commonly seen in literary journals, such as formulas and graphs. The bibliographies likewise reveal the conversation among disciplines, as *Joseph Smith: Rough Stone Rolling* appears with "Class Prediction by Nearest Shrunken Centroids, with Applications to DNA Microarrays," and *Truth and Method* joins *Machine Learning*. Through the transdisciplinary dialogue that these articles undertake, readers comprehend the challenges facing computational approaches to literature, such as how to evaluate algorithms for authorship attribution and how to make sense of text-mining data. Data-driven humanities scholarship demands diverse expertise in acquiring, curating, processing, analyzing, visualizing, and understanding data, as well as a keen understanding of the literary and cultural contexts surrounding the data.

"Reassessing Authorship of the *Book of Mormon* Using Delta and Nearest Shrunken Centroid Classification" (Jockers, Witten, & Criddle, 2008) tests two different classification techniques for investigating the authorship of the *Book of Mormon*: delta, which has commonly been used in the humanities computing community to evaluate differences among texts and establish authorship, and nearest shrunken centroid, a more general classifier that has been applied to diagnosing cancer. Such computational methods have wider relevance beyond authorship studies, allowing researchers to cluster texts by categories such as genre, rhetorical approach, and even mood; to hone in on relevant data; and to observe sometimes unexpected patterns. This project not only illustrates computational approaches to analyzing cultural information but also offers a vivid example of how methods originally developed in the sciences have potential relevance in the humanities. The collaboration originated when Craig Criddle, a Stanford professor of environmental engineering and ex-Mormon who was investigating the authorship of the *Book of Mormon*, searched the Stanford Web site for a text analysis specialist and came across Jockers's name. Jockers, manager of Stanford's Academic Technology Specialist Program and a lecturer

in the Department of English, recognized that they needed to add someone with expertise in statistics and machine learning to the team and recruited Daniela Witten, a statistics graduate student whose other publications include "A Recoding Method to Improve the Humoral Immune Response to an HIV DNA Vaccine" (Huang et al., 2008).

In "Reassessing Authorship," Jockers, Witten, and Criddle (2008) first provide a context for their analysis by exploring the history of the debate over the authorship of the *Book of Mormon*, including the flaws in prior work using stylometric methods to automatically classify texts. The article is part methodological primer, part detective story, examining how other researchers misread textual signals and explaining why their own careful, statistical approach produces more reliable results. The section headings are more typical of a scientific article than a work of literary criticism: "Background," "A New Approach," "Source Selection," "Methodology," "Results," "Discussion," and "Conclusions." However, the key question—"Who wrote the *Book of Mormon*?"— is one of literary and religious history and requires knowledge of that history to answer.

Through this collaboration, each team member was challenged to explain his or her assumptions and to understand how the other disciplines approached problems. Whereas humanities scholars "tend to seek the complications in things, the scientists and mathematicians… are adept at honing in on revealed sorts of moments, sifting through the complexities and finding things that one could say with a degree of certainty" (Matthew Jockers, personal communication, June 5, 2009). For some, focusing on what can be proven and quantified may threaten the foundations of humanities scholarship, which resists positivism and values argument and interpretation over certainty. However, putting the two approaches into dialogue can foster new insights, challenging humanists to be precise in defining their methods and scientists to acknowledge the importance of interpretation in evaluating humanities data. According to Jockers, working with Witten "has been one of the most enriching moments of my academic career. It's incredibly fun to sit down with someone who sees the world completely differently," someone who takes an objective perspective and demands proof for conjectures (personal communication, June 5, 2009). This collaboration has led to further work between Jockers and Witten, a comparative analysis of machine learning algorithms for authorship attribution (Jockers & Witten, 2010).

Whereas Jockers, Witten, and Criddle's (2008) article uses statistical methods to evaluate how the use of common words reveals authorship, Brad Pasanek and

D. Sculley's (2008) "Mining Millions of Metaphors" examines how machine learning and natural language processing techniques can be used to understand metaphor. Invoking Gregory Crane's (2006) question "What do you do with a million books?" Pasanek and Sculley shift the focus to a more granular, semantic level, seeking to explore the history of metaphor. The project originated in Pasanek's dissertation, *Eighteenth-Century Metaphors of Mind, A Dictionary*. To support his research, Pasanek set up a database called *The Mind Is a Metaphor*, where he hand curated nearly 9,000 examples of metaphors of the mind harvested from electronic text collections.

Collecting these metaphors was time- and labor-intensive and required deep literary knowledge. When Pasanek ran into his friend D. Sculley, who was working on a Ph.D. in computer science, and told him about the database, Sculley suggested that his "hunt and peck methodology was in part insane. But he said we could automate a lot of what we do" (Brad Pasanek, personal communication, June 15, 2009). Pasanek and Sculley decided to collaborate, since Pasanek offered a compelling project as a subject expert, while Sculley provided technical expertise. While not every literary scholar has a friend who happens to be a computer scientist, their partnership illustrates that literary problems can lead to engaging research for a computer scientist and that computational methods for literary analysis—and the transdisciplinary conversations that it takes to develop such methods—can produce new insights.

Challenging Aristotle's notion that expertise in metaphors cannot be learned, Pasanek and Sculley asked, "Can we teach a computer to learn metaphor?" (Brad Pasanek, personal communication, June 15, 2009). In order for Sculley to develop and apply algorithms that detected metaphor, he used Pasanek's hand-curated collection to train an automatic classifier to recognize more examples of metaphor in a larger set of data. Pasanek and Sculley found that their classifiers could detect examples of metaphors of the mind in works by other authors, so that the model developed for Shakespeare can be applied to Pope. Such an insight, tested across eight authors from Shakespeare to Keats, suggests that metaphors retain some continuity through literary history, whether because of the tastes of canon-making critics or poets' attempts to fit themselves into the literary genealogy through quotation and allusion.

Even though the article is presented in the unified voice of "we," Pasanek and Sculley (2008) reflect on the dialogue between disciplines and find that learning about the other's perspective generates new ideas. For example, they acknowledge that "manually mining this data still introduces potential for what

the computer scientist recognizes as human biases into the analysis," so they examine automated, probability-based techniques to categorize metaphors (p. 354). By employing probability to measure the importance of a word to the author's style, Pasanek and Sculley generated a ranked list of the words that Shakespeare and Pope used in creating metaphors of the mind, body, soul, and heart. Although Pasanek found it "alienating" to examine charts rather than poems, they "quickly realized that just this sort of defamilarization is a good thing" (p. 355). Indeed, the *defamilarization* resulting from applying statistical methods to literature forces the critic to direct attention to features of the texts that might otherwise have remained invisible, such as Pope's use of language drawn from eighteenth-century brain science and Shakespeare's references to heat (p. 355). Using computational methods, literary scholars are pressed to find "objective" ways to describe data, to remove bias as much as possible and look for what can be stated with certainty. At the same time, Pasanek and Sculley acknowledge that the study of literature is ultimately interpretive rather than empirical, as how the researcher chooses to represent the data determines what conclusions are generated by applying the algorithm. Even if the methods for automated classification of literature derive from mathematics and computer science, the data still require analysis and interpretation by a literary scholar.

Pasanek and Sculley's collaboration challenged them to explore how techniques developed in computer science can be applied to literature, enlarging their understanding of both domains. As Pasanek explains, when he and Sculley run experiments they discuss what is happening and "spend a lot of time calibrating, one against the other" (personal communication, June 15, 2009). By explaining assumptions, theories, and practices to someone from another discipline, they also come to understand their own disciplines better. According to Pasanek, the work "helps [him] think about Derrida, and I'm sure it helps [Sculley] to sort out algorithms" (personal communication, June 15, 2009). Pasanek and Sculley identify productive differences in method, such as the computer scientist's sense that more objective means need to be used to test interpretations of differences in language between Shakespeare and Pope, and the literary scholar's need to place data generated through automated means in context.

Pasanek and Sculley have faced some challenges, particularly figuring out how to find time for their collaboration and where to present their work. They get much more accomplished when they meet face to face, but coordinating schedules is difficult since Sculley now works for Google in Pittsburgh and Pasanek is an English professor at the University of Virginia.[6] Pasanek and Sculley's research

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[6] Does collaboration demand frequent face-to-face collaboration? That depends on whether tasks can be modularized and completed independently or need to be worked on jointly. With

is an example of a "tightly-coupled" collaboration, since it is ambiguous, requires intense communication, and depends on the expertise of each team member (Olson & Olson, 2000). Without the collaboration, Pasanek doesn't think he would have been able to accomplish what he has, and he doubts that Sculley would have pursued the project on his own. Since their work crosses disciplinary boundaries, it is not clear where they should publish it. To date they have published two articles in *Literary and Linguistic Computing*, a major digital humanities journal that represents a sort of hybrid between humanities and computer science. To publish in a computer science journal, they would need to come up with a problem and approach that computer scientists would find interesting and innovative. To publish in a mainstream humanities journal, they would likely need to strip out many of the technical details. Yet their work has generated wide interest perhaps because it is interdisciplinary, appearing in *Chronicle of Higher Education* and the *San Jose Mercury News.*

Instead of taking a proprietary approach to the data he has collected, Pasanek is sharing it through *The Mind Is a Metaphor,* an online database that uses an Attribution-Noncommercial-Share Alike Creative Commons license to enable other researchers to reuse the data as long as they cite it (see Figure 5). Pasanek and Sculley (2008) acknowledge that metaphors of the mind have broad relevance to a number of disciplines, including linguistics, rhetoric, history, psychology, philosophy, neuroscience, and literary criticism. They advance their own metaphor for the interdisciplinary collaborations that can take place around commonly available information: the library. They explain, "A library is not just a collection of books—nor even a collection of metaphors—but is also a meeting place for researchers to come together and share ideas, questions, thoughts, and conversations" (p. 359). Thus the library is envisioned not as the place where humanists go to work alone with their books, but as a community that comes together through shared discovery—an apt rethinking of the literary scholar at work. The THL uses similar language in describing the library as a "knowledge community" (Tibetan and Himalyan Library, 2010).

collaborative digital humanities projects such as the Blake Archive, MONK, and the Text Alliance Developers Association (TADA), distributed teams come together physically for occasional meetings and "hackfests," which participants view as essential for defining project goals, working through problems, and making progress on design and programming work (Eaves, 1997; Ruecker, Radzikowska, & Sinclair, 2008). A recent study of digital humanities research teams indicated that face-to-face communication is important to collaborative projects (Siemens, 2009). Project teams maintain continued contact using collaborative technologies such as listservs, project management software, wikis, and instant messaging.

**Figure 5.** *The Mind Is a Metaphor* Web site.

## SUPPORTING COLLABORATIVE WORK IN THE DIGITAL HUMANITIES

Although collaboration is essential to many digital humanities projects, such as the examples discussed, would-be collaborators face significant challenges, including infrastructure and technical support, funding, tenure and promotion policies, getting credit, and establishing a common language. As experienced collaborators recognize, "collaboration is immensely enriching, but it is also both time-consuming and inevitably involves lots of administration, communication, compromise, and some relinquishment of scholarly autonomy" (Brown et al., 2006). But obstacles to collaboration can be overcome through institutional support, clear communication, effective management practices, and a common interest in achieving a goal.

Under the solo model of humanities scholarship, producing research is relatively inexpensive, requiring funds for a salary and, perhaps, a research assistant, travel, and research materials. Often, internal funds can cover these costs, which means that humanities scholars are not always working on and worrying over grants (Ayers, 2009). Yet many digital humanities projects depend on grants, since these projects require significant funding for salaries, technology support,

facilities, access to data, and sustaining the project. Compared to the sciences, much less money is available for humanities research. For example, the NSF was allocated $6.49 billion for fiscal year 2009 (National Science Foundation, 2009), dwarfing the total NEH 2009 budget request of $144.4 million, of which $2 million was designated for the Digital Humanities program (NEH, 2008).[7] Some projects, such as Orlando, establish partnerships with publishers to raise funds and disseminate their content, but many aim to make their work available without a subscription. Not only is funding scarce, but applying for grants takes significant time and resources. Less wealthy institutions may lack funding for staff and infrastructure, limiting their ability to participate in digital humanities projects. Describing how liberal arts institutions struggle to provide staff for digital humanities projects, David Green and Michael Roy (2008) argue, "anyone can see that it 'takes a village' to produce this type of cyberscholarship. . . . One obvious worry is that this sort of endeavor is so expensive that it will become the exclusive enclave of the richest of institutions." Green and Roy suggest that colleges and universities can accomplish more by sharing the burden across institutions. Funding agencies such as the National Endowment for the Humanities encourage cross-disciplinary, cross-institutional, and even international collaboration through programs like the Collaborative Research Grants, Digging into Data Challenge, JISC/NEH Transatlantic Digitization Collaboration Grants, and DFG/NEH joint grants.

Despite such opportunities for external funding of collaborative work, institutional norms tend to favor solitary scholarship in the humanities. Can a graduate student earn a Ph.D. for collaborating on a dissertation?[8]  How many universities offer a collaborative sabbatical?  How about a collaborative appointment?[9] Even the physical layout of humanities departments reflects the focus on solo scholarship, since humanists typically hole away in individual offices rather than working in large collaborative areas such as labs. To provide institutional support for collaboration in the digital humanities, universities are founding centers such as the Institute for Advanced Technology in the Humanities at the University of Virginia and the Center for Digital Research in the Humanities at the University of

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[7] I was not able to find out how much the NEH was actually allocated in 2009.

[8] However, the MLA is advocating collaborative scholarship. For example, 2010 president Sidonie Smith suggested alternatives to the long-form dissertation in languages and literatures, such as "an ensemble of forms" that might include a collaborative project (Smith, 2010).

[9] Judd Ruggill and Ken McAllister together run a research group in the interdisciplinary field of game studies. They collaborate because "we've learned that we do our best work when we do it together. Our articles are smarter and better written, and we write a lot more of them" (Ruggill & McAlister, 2004). When they tried (and failed) to find a joint position as an "academic couple," joined not by romance but by their collaborative work, commentators suggested that it was a joke and even hypothesized that they had a sexual relationship (Ruggill & McAlister, 2005). The idea of a collaborative pair seemed too strange.

Nebraska. Such centers provide technical, intellectual, and managerial support for digital humanities projects, organize colloquia and other events, sponsor training and educational programs, and often provide both physical and virtual spaces where those interested in digital humanities can come together. Diane Zorich's (2008) study of digital humanities centers suggests that one of their core principles is "collaboration and cross-disciplinarity," as they aim to move beyond "divisions between the arts, sciences, and humanities; between the academy, industry, and culture; between practitioners and theorists" (p. 11).[10] However, as Mark Sample (2010) points out, many digital humanists work at institutions without digital humanities centers. Further, some of these centers have a precarious existence subject to changes in academic focus and funding. Thus he urges people to create their own "network of possible collaborators." Even without the support of formal centers, digital humanities researchers can and do work with collaborators, such as their institutions' libraries or information technology departments, colleagues in other departments or at other institutions, and community groups.

While funding and infrastructure challenges may limit the ability of humanities scholars to launch collaborative digital projects, tenure and promotion policies may reduce their willingness to participate in such initiatives (Friedlander, 2009). Most existing models for evaluation in the humanities assume that research is done solo, reflecting the discipline's focus on individual interpretation rather than collective effort (Cronin & La Barre, 2004). Yet there are efforts to change how collaboration is rewarded. For example, the MLA's 2006 *Report on Evaluating Scholarship for Tenure and Promotion* recommends developing protocols for evaluating collaborative work. And in 2009 the MLA and HASTAC launched an initiative to establish guidelines for the evaluation of digital works (Jaschik, 2009).

Collaboration requires clear agreements about who does what, sharing of data, allocation of credit, and management practices (Borgman, 2008). Figuring out exactly how to award credit remains an issue. For interdisciplinary projects, definitions of what qualifies as research vary by field, so that collaboration may lead to publishable research in one field but not the other (Paepcke, 2008). As Bethany Nowviskie (2009) points out, many digital humanities projects

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[10] According to Zorich (2008), 78 percent of digital humanities centers said that they had experienced unsuccessful partnerships because of staff issues, poor communication, mismatched expectations, partner failures, and external factors such as lack of funding. Although Zorich does not cite a corresponding figure for the number of digital humanities centers that have experienced *successful* collaborations, she does suggest that centers have collaborated effectively by building trust, securing the appropriate infrastructure, sharing goals, communicating effectively, and nurturing the collaboration.

necessarily involve collaborations among tenured faculty, graduate students, research faculty, and staff. Sometimes such collaborations involve inequities in which the faculty member claims the greater share of the credit as well as intellectual property rights, but Nowviskie argues that the most successful projects typically take a more egalitarian approach. To define how to manage collaborations fairly, participants in the "Off the Tracks" workshop hosted by the Maryland Institute for Technology in the Humanities (MITH) developed a "Collaborators' Bill of Rights" that emphasizes the importance of providing a "legible trail" of credit and of treating all contributors equally with regard to intellectual property policies (Kirschenbaum et al., 2011). Project teams should engage in open discussions about intellectual property and credit and ensure that the contributions of all members are acknowledged and rewarded. Aiming for transparency, some scientific publications spell out the specific contributions of each author. Since individual reputation can be built on collective achievement, scholars may find that participating in collaborative work brings greater scholarly credibility (Shanks, n.d.).

Just as desktop publishing software enabled users to be designers and the Web gave those with access the power to become publishers, so collaborative technologies and increased access to information can make researchers out of non-academics—a prospect that both opens up the humanities and raises profound anxieties about the nature of scholarly expertise. For projects that depend on community contributions, soliciting public involvement requires hard work in raising awareness of the project, coordinating with local communities, developing an easy and meaningful way for people to participate, and rewarding participation. But, in the sciences as in the humanities, a number of participatory resources, such as blogs and wikis, demonstrate little evidence of participation, perhaps because there are few incentives to participate and academic culture hasn't yet embraced participatory scholarship (Butler, 2005; Harley, Acord, Earl-Novell, Lawrence, & King, 2010).

The academy structures itself around discipline-based expertise validated by a Ph.D. and research record, but opening up participation in scholarly work to those outside the academy raises fundamental questions about incentives for participation, authority, and trustworthiness (O'Donnell, 2008). Can the contributions of an amateur without disciplinary training have the same value as those of someone who has been working in the field for many years?  What kind of quality checks can be put into place? Moreover, the tenure and promotion process typically judges *unique* contributions. Are those contributions devalued if anyone can participate?  How can unique contributions be identified and valued?

Such questions remain to be worked out. Kathleen Fitzpatrick (2009), for example, proposes peer-to-peer review, whereby members of an online scholarly community earn credit for commenting on and reviewing works by others. Even initiatives committed to a participatory model of knowledge production and dissemination distinguish between "expert" and "popular" contributions, apparently so that they can persuade scholars to contribute work. For example, THL emphasizes that scholarly work will be reviewed by a prestigious editorial board and that "publication within THL is equivalent in academic worth and prestige to publication in a major journal, academic publishing house, or prestigious reference work" (Tibetan and Himalyan Library, n.d.). Even as HyperCities serves as a "participatory platform," it facilitates the peer review and publication of scholarly "geo-temporal arguments" that meet criteria such as the originality of the argument, the effective use of hypermedia, and success in engaging diverse audiences and enabling them to develop new insights (Presner, 2010).

In my interviews with humanities researchers, I heard skepticism toward *interdisciplinary* as a buzzword and suspicion that work identified as interdisciplinary doesn't represent a convergence of methods, but rather an awkward yoking together of different approaches. However, interviewees testified to how effective *their* interdisciplinary projects were, in part because they made a serious effort to understand the other discipline. Cathy Davidson argues that collaboration by difference—collaborations involving people with different expertise and perspectives—creates new knowledge, since participants don't get stuck in the rut of shared assumptions but can engage in exchanges that lead to new understanding (qtd. in Bass & Schlafly, 2009). Likewise, Matthew Jockers reported that one of the joys of his collaboration on the *Book of Mormon* project was learning how other fields operate and getting what amounted to a seminar in statistics. Those with experience in interdisciplinary collaboration emphasize the importance of having a "translator" who can rephrase technical discussions and ensure that there is common understanding. Through interdisciplinary collaboration, new ideas are generated as participants explain their own methods and assumptions and are exposed to others. Collaboration recognizes and values the social nature of knowledge, as understanding is built through conversation and sorting through different perspectives.

Not all work should be collaborative, and we need to continue to value the small, individual, and idiosyncratic. Sometimes collaboration can result in research being diluted as participants work toward consensus and overlook challenging ideas, aiming for "the lowest common denominator" (Nentwich, 2003, p. 449).

One interviewee who asked to remain anonymous described the frustrations of working on an article with two research collaborators who had opposing perspectives. The interviewee was put into the awkward position of having to negotiate between the two, and the resulting article took longer to write and was watered down. She suspects that the two collaborators will publish their own interpretations of the data separately. Yet the interviewee described another experience where collaborating with someone with different but complementary skills enabled both to see the data in new ways. One raised questions that the other, immersed in her own disciplinary expertise and assumptions, hadn't considered. As a result, they were each challenged more and spent more time thinking about the questions, opening up new perspectives and resulting in better research. Collaboration "brought up a whole bunch of new ideas I hadn't thought of before, so I could say a lot more than what I could say on my own." Collaborating increases the complexity of managing a project, but it can also result in more nuanced, sophisticated research that has a greater public impact.

Despite the challenges of performing collaborative research in the humanities, many digital humanities scholars pursue collaboration because it is central to their goals. A single scholar is limited by both time and expertise in what he or she can accomplish. Teams of researchers, on the other hand, can complete large-scale, ambitious projects by dividing up responsibilities (Blackwell & Crane, 2009). The availability of data and collaborative technologies has lowered the barriers of entry to participating in research. Open source software development provides a model for collaborative scholarly work, as it makes knowledge production modular and provides access to a range of expertise. Such approaches may lead to a greater "economy of scale," reducing the duplication of effort and providing a check on quality (Fanderclai, 2004, p. 318). Given the new research possibilities opened up by access to vast databases and collaborative networks, we may be seeing the rise of "big humanities," large-scale projects that aim for a "big picture" view of significant research problems. Just as massive initiatives to produce and analyze astronomical and genetic data required collaboration, so interpreting huge collections of cultural data necessitates a collaborative effort. Excited by the possibilities of collaborative digital humanities to make the work of the humanities participatory and visible, Cathy Davidson (2008) calls for "big humanities" (p. 714).  Several digital humanities centers explicitly identify themselves as practicing "big humanities," including UC San Diego's Software Studies Initiative [Cultural Analytics](#) project and, formerly, the Stanford Humanities Lab (Franklin & Rodriguez, 2008).

**CONCLUSION**

What difference has collaboration made in the digital humanities? To some extent, collaboration is a hallmark of the digital humanities because this broadly defined field weaves together at least two strands crucial to the contemporary culture of information: networked communities and data-driven research. By building digital collections, humanities scholars develop techniques for making explicit the structure and semantics of texts; make information available to be used for research, education, and personal enrichment; and enable users to interact with information in dynamic ways. Participatory knowledge initiatives such as HyperCities and THL democratize knowledge by engaging people in documenting their own communities. By devising methods for detecting and analyzing patterns in collections of cultural data, scholars are examining their own disciplinary assumptions and beginning to ask questions that it would be difficult to answer without the aid of a computer. All of these collaborative projects engage the fundamental humanities problem of representation, both how scholars represent information and how citizens represent themselves through the production of media.

Perhaps the digital humanities point to a future for the humanities in general to be more open, engaged, and transdisciplinary. While not every scholar will build a digital collection or define new text-mining algorithms in collaboration with a computer scientist, all are facing the data deluge, and all are part of a knowledge society that is transitioning rapidly to the digital. Thus digital humanities scholars are at the leading edge of a transformation that will affect everyone, but ultimately I believe that the digital humanities will simply be the humanities. Most of the research sources will be digital, as will the publishing environments. Scholars will need to devise methods to harness abundant information, explore new questions, and represent their ideas in electronic publications. In the face of skepticism of the value of the humanities, many digital humanities projects demonstrate how the humanities can be more interactive, interdisciplinary, and engaged, enabling scholars and the public alike to create and share knowledge (Davidson, 2008).

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