HUMANITIES SCHOLARSHIP IN THE DIGITAL AGE: THE ROLE AND INFLUENCE OF INFORMATION AND COMMUNICATION TECHNOLOGIES

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HUMANITIES SCHOLARSHIP IN THE DIGITAL AGE: THE ROLE AND INFLUENCE OF INFORMATION AND COMMUNICATION TECHNOLOGIES

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Based on a qualitative case study at the Society for the Humanities (Cornell University), this project investigates how information and communication technologies (ICTs) support research and scholarly discourse by humanities scholars. The research is guided by the principles of grounded theory and social informatics in gathering and analyzing data about scholars' perceptions and accounts of technology use. The research strategy is built on the premise that technologies are mutually constituted by interactions between the properties of technological artifacts and their broader context. The study not only examines the practices of scholars who employ technologies but also attempts to understand the perspectives of those who choose not to integrate them into their workflows.

Several themes emerge to illustrate the situated, fluid, and emergent nature of technology assessment and adaptation. They include the evolving notions of distance and place, the enduring value of the affordances of physical knowledge spaces, the increasing role of search engines in research, and changing patterns of reading and interdisciplinary collaborations. Also considered are the role of multimodal scholarship and social collaboration media in academic practices. The findings not only confirm well-established patterns of ICT use but also demonstrate how interactions with technologies might lead to multiple, unexpected, and paradoxical

effects. There is an inherent tension as the informants' accounts also reveal negative perceptions of technologies and unintended consequences for their scholarship.

The study was designed to interpret the notion of digital humanities from the informants' perspectives and to explore the meanings they associate with this evolving concept. As we envision a digital infrastructure for facilitating and enhancing humanities scholarship, the optimism about the transformative role of new media must be carefully balanced by aligning technological affordances with principal goals and norms of humanities scholarship. Understanding scholars' ICT use patterns and opinions requires a holistic approach that also factors in variances in their technological frames and the structural elements of the academy such as publishing systems, information policies, and institutional support services. The paper concludes with policy and design recommendations to facilitate the construction of e-scholarship systems and services that align with the needs and practice of scholars.

BIOGRAPHICAL SKETCH

Oya Yildirim Rieger is the associate university librarian for information technologies at Cornell University Library. She oversees the Library's resource discovery, digitization, web and repository development, digital preservation, electronic publishing, and e-scholarship initiatives including the development of related organizational policies and business models. Since joining the Library in 1994, she has provided leadership in various library initiatives that explore new modes of scholarly communication. Rieger has served on several national and international digitization and preservation working groups and training programs. She is the author of a number of books, articles, and white papers about planning, maintaining, and sustaining digital initiatives at libraries and archives.

She has a B.S. in Economy and Administrative Sciences (Middle East Technical University, Turkey), an M.P.A. (Public Administration, University of Oklahoma), and an M.S. in Information Systems (Columbia University). She completed her doctoral work in April 2010. Her research interest involves investigating the role of sociocultural factors in appropriation of information technologies in support of learning, teaching, and research.

For my father and grandparents.

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This dissertation has been motivated and enabled through my association with Cornell University in many ways. First, my role at the Cornell University Library inspired me to expand my understanding of how scholarship is evolving due to the increasing integration of new technologies in the information landscape. I pursued a Ph.D. while continuing my position at the Library through the Employee Degree Program at Cornell. I am grateful to Cornell for providing me with this wonderful opportunity and encouraging staff to expand their horizons through the exciting academic programs offered at the university.

Among the many people who have advised and supported me, I am especially grateful to Professor Geri Gay, chair of my special committee. She made it possible for me to turn an opportunity into reality. A simple email exchange in September, 2006, with the subject heading "Ph.D. – not a bad idea," triggered this pursuit. Knowing my long-standing interest in research and pursuing a doctoral degree, Dr. Gay encouraged me to apply for the graduate program and provided unyielding support throughout the many stages. I continue to be amazed with her vision, charisma, insights, and wit.

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semester as I adjusted to being back to school as a mid-career student. I enjoyed our conversations about various scholarly communication issues as he formed an intellectual bridge between the departments of Communication and Science and Technology Studies. I am also very appreciative of Professor Stephen Hilgartner from the Department of Science and Technology Studies for his genuine interest in my research. Because my theoretical perspective is highly influenced and inspired by the viewpoints of his field, he provided an essential angle of expertise and increased my confidence as I tried to grasp and implement new ways of approaching research. He asked questions that helped me position my research domain from new and critical angles.

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I was privileged to meet so many bright and engaging humanists through the Society. They were generous with their time as they shared their opinions on information technologies and their stories about how they use them. I am not able to list their names due to confidentiality considerations but I want to thank each of the 45 scholars who contributed to this study.

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CHAPTER 1: BACKGROUND AND RATIONALE

Purpose of the Study

Knowledge is considered a significant economic, cultural, and political resource and is also perceived as critical to societal innovation and progress. Studying how scholars create and share knowledge is essential if we are to understand the dynamics of an information society. During the last two decades, we have witnessed an increasing reliance on communication and information technologies in knowledge creation and communication processes (Deyrup, 2009; Lytras et al., 2008; Borgman, 2007). In light of such technological immersion, it is essential to understand how scholars work and communicate with each other in order to assess the role of technologies in a broader social and cultural landscape.

This project investigates how information and communication technologies (ICTs) are being used in supporting research and scholarly discourse by humanities scholars. The study specifically focuses on humanists, as I am interested in providing a "thick description" (Geertz, 1973) of ICT assessment, adoption, and usage patterns and the consequences of these phenomena for a particular cluster of disciplines. My study is built on the premise that the social and cultural context of scholarship affects how technologies are assessed, adopted, and used (King et al., 2006; Kling & McKim, 2000).

The study explores how new technologies that bring vast amounts of online scholarly materials and new content creation and sharing tools directly to the scholar's computer screen influence readership and authorship—the core research activities in the humanities. Additionally, it aims to consider how humanists collaborate and whether ICTs modify patterns of cooperation. The study not only examines the

practices of scholars who put technology into practice but also attempts to understand the perspectives of anti-users and non-users.

While we examine the interplay between new technologies and scholarship, it is critical to understand that scholarship is an epistemic, social, and material process. Becher & Trowler (2001) characterize scholarly communication as a process that binds the social and epistemic together. The practice involves the creation, exchange, and dissemination of knowledge within the context of academic discourse. As ICTs proliferate, we can observe increasing interest in comprehending complex reciprocal relationships between social practices and technical tools (Deyrup, 2009; Edwards et al., 2007; Allen, 2005). Based on such a stance, understanding the disciplinary research methods, knowledge production structures, and communication and collaboration patterns of humanists creates a social context within which to interpret the role of ICTs in academic work. It is equally important to understand the material aspects and affordances of ICTs as they are influential in shaping scholarly practices.[1]

Rationale and Merits of the Study

The study focuses on understanding the relationship between ICTs and humanities scholarship. My selection of humanities as a subject area is driven by two factors. First, as discussed in the literature review chapter, extant studies indicate that ICT integration patterns in scholarly communication often mirror differences in epistemic cultures. This research pursues this issue in depth to provide a case study to support comparative studies in this research domain. Second, my review of related research indicates that hard science disciplines such as physics and life sciences are

[1] According to Gibson (1977), an affordance is a quality of an object or an environment that allows an individual to perform an action. Through his book *The Design of Everyday Things* (1988), Donald Norman appropriated the term 'affordances' in the context of Human-Computer Interaction to refer to a set of actions supported by a technology that are readily perceivable by a user as potential features.

often privileged in ICT use studies, especially due to the increasing importance of data-driven science.[2] I have therefore decided to expand this seldom-studied research domain.

My research area has a significant bearing on the development of effective ICT resources and support systems. From an applied research perspective, studying scholars' work and collaboration styles reveals useful design principles in order to construct e-scholarship systems and services that will align with the needs and practices of researchers. This approach recognizes the mutual shaping and mediation process. Affordances of information technologies may effect, shape, or constrain scholarly practices. In the meantime, scholars exercise agency as their specific goals, skill sets, and values shape the appropriation process. Gaining insights into scholarly discourse will support the creation of a framework within which to explain, predict, and control the reciprocal relationships between scholarly communication patterns and ICT use. The policy and design section of the final chapter proposes how the findings of the study can support the development of effective ICT resources and services in support of humanities scholarship.

From a basic research standpoint, investigating the work practices and traditions of scholars helps us form an exploratory basis for observing how the humanities as a subject area is evolving due to social, technical, and political factors. While technologies are being positioned as driving forces behind innovation, it is more important than ever to understand the epistemic and social characteristics of the subject area so that we can assess the virtues of technological improvements within the context of how scholars assess and adapt new media.

[2] Science as a concept is associated with a range of descriptions from a narrow interpretation that limits the notion to 'pure' science to a broader characterization covering the entire gamut of knowledge cultures, including natural and social sciences as well as the humanities. This paper uses the term narrowly, limiting it to pure and applied sciences.

Statements describing the humanities as undergoing a complete transformation and the "inevitable shift to a digital realm" prevail in the literature (Jankowski, 2009; Toms & O'Brien, 2008; Baruchson-Arbib & Bronstein, 2007; American Council of Learned Societies [ACLS], 2006; McGann, 2004; Inman, Reed, & Sands, 2004). These studies often perceive the integration of ICTs into scholarship as a matter of national competitiveness and as a mission that needs to be embraced by scholarly communities for the ultimate sustainability of the humanities disciplines. Also common are statements suggesting that the humanities lag behind, its practitioners being too conservative in adopting ICTs (Davidson, 2008; American Council of Learned Societies [ACLS], 2006; Katz, 2005). Such a perspective brings to mind one of the stances of technological determinism—the assumption that technology's intrinsic characteristics and functionalities control and direct change as an independent agent (Marx & Smith, 1994). One of the questions underlying my research is about the extent to which technological determinism comes into play when projecting the role of ICTs by assigning excessive autonomy to technologies. The innovative and constructive consequences of technology use in humanities scholarship are evident. My goal has been to seek an impartial assessment in order to reveal unintended and negative consequences as well as scholarly processes to which new media have no immediate applicability.

As e-research initiatives proliferate, an increasing challenge will be ensuring that a wide range of scholars are able to use and benefit from the new information and communication infrastructure. Some express concern about the current e-research vision being driven by computer science (Fry, 2006; Merz, 2006; Wouters & Beaulieu, 2006). Woolgar and Coopmans argue that, despite a substantial unfolding investment in e-research, "little is known about how, why and by whom these new technologies

are being adopted or will be taken up" (2006, p. 1).[3] As e-science concepts evolve, it is essential to recognize and factor in variances in research and communication practices in technology development efforts. This research contributes to this domain by broadening the understanding of the relationship between new media and the epistemic nature of scholarly communication in the humanities. Integral to this effort is investigating new ways of theorizing ICT use by taking into consideration the attributes of new media such as their convergent and ubiquitous natures.

Some argue that ICTs are redefining the nature of collaboration among humanists and that interdisciplinary cooperation will be a hallmark of contemporary scholarship (Jakubowicz, 2007; Short, 2006; Unsworth, 2005; Inman et al., 2004). Although one can find references to the interdisciplinary nature of the humanities, only a few studies explore that aspect of its nature and compare it with collaboration in other disciplines. Therefore one of my research goals was to consider the role of collaboration patterns, incentives, and impediments among humanists within the context of ICT use.

Definitions: Key Constructs of the Study

The purpose of this section is to explain the key constructs of the study in order to provide a standardized description of the underlying concepts. The following section will elaborate on the two cornerstone concepts: the humanities, and information and communication technologies (ICTs).

[3] In the related literature, e-science, e-research, e-scholarship, and cyberrinfrastructure are often used interchangeably.

What are the humanities?

According to the American Council of Learned Societies (ACLS), the "humanities comprise those fields of knowledge and learning concerned with human thought, experience, and creativity." Humanists' work involves exploring the foundations of aesthetic, ethical, and cultural values and how such ideals are sustained, challenged, and transformed. In this study, I view humanities as a branch of knowledge composed of a cluster of related disciplines. The *subject area* involves many distinct disciplines including history, philosophy, art, literature, languages, and religion.[4] My study specifically involves scholars from the disciplines of anthropology, comparative literature, history, and languages.[5]

Although I refer to the humanities as a unified academic field, it is important to note that the domain is composed of several disciplines, such as literature and history, with their own traditions and cultures. However, they exhibit unifying characteristics and convergence in their approach to understanding the diversity and complexity of the world by examining historical, cultural, and philosophical dimensions of human experience (Phamotse & Kissack, 2008; Klein, 2005).

What are ICTs?

ICTs within the context of humanities scholarship comprise a range of technologies and associated practices that support creating, sharing, accessing, processing, and archiving information as well as facilitating communication.[6] The

[4] My reference to humanities as a *subject area* is based on Becher & Trowler's (2001) broad taxonomy of knowledge communities into the subject domains of pure sciences, applied sciences, social sciences, and humanities. I will elaborate on this issue further in the next chapter and offer an operational definition.

[5] Anthropology as a discipline can be linked to humanities or social sciences depending on the nature of the studies. This study includes anthropologists who identify themselves as humanists due to their epistemological methodologies and research interests.

[6] Information as a concept has many meanings and is closely related to notions of data and knowledge (1997). Within the context of this paper, information encompasses both the physical and digital sources

term ‘ICT’ is commonly used to represent the convergence of computer and communication technologies (Lievrouw & Livingstone, 2006). When I started exploring my dissertation topic, I operationalized ICTs as a constellation of applications rather than as a specific technology, such as Web search engines, due to the increasingly convergent, embedded, emergent, and ephemeral nature of ICTs. For instance, iPhones combine cell phone, Web browser, and iPod technologies to provide diverse audiovisual content and communication tools. I was also, however, concerned that on this interpretation the construct would be too broad as it would then comprise a wide range of applications, tools, protocols, and standards. Therefore, based on my preliminary interviews and interactions, I decided to focus on three categories of technologies in order to frame my research questions, information-gathering strategy, and data analysis.

- *Digital content* such as digital collections, databases, and repositories that provide access to information representing books, articles, data, audiovisual content, manuscripts, diaries, and photographs
- *Search engines* for searching, discovering, retrieving, and verifying information; increasingly, this category also includes search features that assist users in understanding word use patterns
- *Communication applications* such as e-mail, mailing lists, blogs, and wikis that enable communication and collaboration among scholars

Within this framework of technologies, scholars are both consumers and producers. For instance, a historian may use a blog to post her opinions on a specific topic as well as to learn about other colleagues’ opinions on a particular issue. The definition of ICTs within the scope of humanities scholarship is further elaborated in

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of knowledge that facilitates scholarly work and is manifest in forms such as journals, books, images, data sets, manuscripts, audiovisual content, and physical artifacts.

Chapter 5, which describes how the meaning emerged from my interactions with the informants.

As further described in the theoretical framework chapter, this study viewed ICTs as *sociotechnical systems* that are composed of material aspects of information technologies (features) and associated social and work practices (Bijker, 1995). Hence, the terms *ICT* and *new media* are used interchangeably. This decision is based on Lievrouw and Livingstone's (2006) definition of new media as ICTs and their associated social contexts. Such a characterization incorporates communication artifacts and devices, the activities and practices involved in developing and using these devices, and the social arrangements and organizations that form around the devices and practices.

Research Questions

One of the impetuses behind my pursuing a doctoral degree was my interest in producing a deep investigation of how humanists perceive and use new media and the consequences for these interactions for their scholarship. My preliminary exploration of the related literature led me to concentrate my research perspective on three overarching research questions. Below, I describe the key research domains and further elaborate on them in the theoretical framework section as they were also shaped by the principles of social informatics that informed my research methodology.

1. *What is the role of ICTs in facilitating scholarly communication among humanities scholars?*

The goal behind this research question is to explore how new ICTs are modifying the techniques and structures of humanities scholarship and what the transformation entails. Scholarly communication involves the creation, exchange, and

dissemination of knowledge within the context of academic discourse. Although I observed this complex and rich process as an integrated work practice, I was particularly interested in investigating changes in scholars' reading, authorship, and collaboration patterns. I also wanted to understand the collective impact of changes in these practices on research methods, which I consider in greater depth in the literature review chapter.

The notion of appropriation (Dourish, 2003) captures the core query of this research question. Appropriation is the process by which individuals adopt and adapt technologies, fitting them into their working practices. It is similar to customization (Dourish, 2003), which is configuring a given technology to suit local needs, but also entails making use of the technology in a creative manner that adds new functionality to the original purpose of the ICT.

At a basic and highly pervasive level, online search and retrieval tools have changed the landscape of information. There is a vast amount of scholarly primary and secondary materials available on the Web at researchers' fingertips and communication technologies such as mailing lists are well established in daily scholarly interactions and exchanges. One of the goals of the study was to explore the nature of change and assess the extent to which it can be indeed characterized as *transformation*.

2. *What are the enabling and constraining structural elements of the social and technical context of scholarship for ICT appropriation?*

The previous research question focuses on technology-in-use and explores how new media are being utilized with a focus on their affordances and the appropriation process. Understanding scholars' interactions with ICTs requires a holistic approach that also factors in the structural elements such as social norms, institutional support

systems, and the rapidly evolving information policy framework. The social world is composed of historically constituted structures that may support or inhibit unfolding technological innovations (Klein & Kleinman, 2002). Structures are specific formal and informal "rules of play," which establish distinctive resources, capacities, opportunities, and constraints (Kleinman, 1998).

The humanities as a subject area entails a set of specific characteristics that differentiate it as a distinctive academic domain. These features include the associated disciplines' publishing practices, tenure requirements, and other institutional characteristics. My second research question aimed to keep these important structural elements in mind as I was exploring the uses and effects of technologies.

3. *What are the impediments and negative consequences of ICT deployment in support of scholarly processes?*

ICTs do not simply open up new possibilities for research and communication but also have the potential to alter existing models, causing the *loss* of previously available affordances (Brown & Duguid, 2000). Are technologies enabling new practices and processes at the expense of any unintended negative consequences? I was also interested in investigating how scholars are compensating for shortfalls of this nature and the implications of this for their research.

This research question was motivated in part in my interest in exploring ICT use as a continuum of practices and attitudes, rather than as "use or non-use" or "pro-use vs. anti-use" dichotomies. In the literature, ICT use is framed as a highly desirable and beneficial outcome (Jankowski, 2009; Davidson, 2008; Toms & O'Brien, 2008; Baruchson-Arbib & Bronstein, 2007; ACLS, 2006; Katz, 2005; McGann, 2004; Inman, Reed, & Sands, 2004) and non-users of technology are often negatively positioned and identified as laggards or even defectors (Rogers, 2003). As Selwyn

(2003) points out, what is missing from many existing ICT non-use studies is recognition of the notion of *choice* and the impact of structural and organizational enablers and constraints in determining which choices are made. The goal behind this specific question was to explore a range of factors that determine an individual's engagement with technologies and the role of *choice* in this process.

Digital Humanities & Humanities Cyberinfrastructure

At the heart of this study was my intent to gather insights and information that shed light on my main interest behind this dissertation research, which is to understand the dynamics of *digital humanities and humanities cyberinfrastructure.* The phrase "digital humanities" refers to a range of ICT applications that converge at the intersection of technology and humanities scholarship. It is an evolving notion and conveys the role of information technologies on humanities scholarship through building digital collections and creating analysis and authoring tools for exploration and creative expression (ACLS, 2006). Humanities cyberinfrastructure represents the enabling technical and social configuration that facilitates digital humanities initiatives.[7] It involves more than technologies and standards and entails expertise, best practices, content, and policies that can be broadly shared across communities of inquiry (ACLS, 2006; Atkins, 2003).

Some researchers express concerns that the e-science vision is rooted too firmly in computer science and digital technologies, targeting mainly scholarship in the science, engineering, and life sciences fields (Toms & O'Brien, 2008; Fry, 2006a; Wouters & Beaulieu, 2006). As cyberinfrastructure initiatives proliferate, an increasing challenge will be ensuring the usability of the new information and communication infrastructure by a wide range of scholars. The term *infrastructure*

[7] Cyberinfrastructure is also referred to as e-research or e-science.

represents a broad category of enabling and collective resources such as railroad lines, plumbing and pipes, electrical power plants, and wires (Bowker & Star, 2000; Bowker et al., 2010). Within the context of ICTs, infrastructure refers to the underlying computational systems, services, and policies that support knowledge creation, exchange, and archiving. Fundamentally, infrastructure is a relational concept as it emerges in practice and is rooted in activities and structures (Jewett & Kling, 1991). Therefore, it needs to be examined and defined in relation to specific organizational practices. While e-science concepts are emerging, we need to recognize and factor variances in research and communication practices into technology development efforts. My overall goal behind this research project has been to contribute to this domain by broadening our understanding of the relationship between new technologies and the epistemic and social nature of scholarly communication in the humanities.

Overview of Methodology: Research Perspective

My research is based on qualitative methods as I believe that the phenomena I am interested in are best analyzed through systematic observation and discourse. As I will describe in the literature review chapter, there are several quantitative studies that investigate how humanities scholars use technologies in teaching, creative expression, and research. Some of these studies intend to correlate disciplinary characteristics with adoption patterns. These are informative efforts; however, they are often not descriptive enough to shed light on underlying use and non-use issues beyond indicating usage patterns. To complement such research approaches, my fieldwork focused on the daily practices of humanities scholars without limiting my investigation to a specific realm of interactions with ICTs. My goal was to assess ICT use

holistically as a component of the rich and diverse social and academic life of scholars.

My study investigates an evolving realm so I kept my research lens focused broadly during my fieldwork to allow new themes to emerge through the use of a grounded theory methodology. However, I used social informatics as a heuristic model to enable a deeper and more nuanced exploration of the scholarship landscape by bringing into the discussion the social and structural context of technological innovation and the mediation process. Social informatics is an interdisciplinary framework within which it is possible to analyze the design, uses, and consequences of ICTs. The fundamental tenet of social informatics is that technologies are mutually constituted by interactions of the properties of technological artifacts and their broader context (Tyworth & Sawyer, 2008; Kling, Rosenbaum, & Sawyer, 2005; Lamb & Kling, 2002). Working within a social informatics framework helped me to reveal pertinent elements that need to be taken into consideration in choreographing the communication process in a digital realm.

Scholarly interest in studying knowledge as a critical resource is not limited to understanding how it is produced but also how it is organized, validated, shared, used, politicized, regulated, and archived. Therefore, the specialty has attracted scholars from several disciplines with their own research agendas. My research incorporated various research perspectives through an interdisciplinary angle that combined the related literature from communication, information and library science, and science and technology studies.

Organization of the Dissertation

The remainder of this dissertation is divided into eight chapters (Table 1.1). The theoretical framework of the study is presented in the following two chapters.

First, through an analysis of pertinent literature, I consider how my research questions have been treated in earlier studies and describe findings and methodologies that have shaped the theoretical landscape on which I carry out my work. Building on this conceptual background, the third chapter presents social informatics as a general

Table 1.1. Dissertation Outline

Dissertation Outline
1. Background and rationale 2. Literature review 3. Theoretical framework 4. Research methods 5. Embeddedness: Scholarly practices and technological affordances 6. Configuration: Interpretive flexibility and appropriation 7. Duality: The contingency of structures and information technologies 8. Discussion: Addressing the research questions 9. Conclusion and implications

theoretical framework for the project. Social informatics methodology helps to situate the questions this project seeks to explore. It provides a basis for observing social reality during research and informs grounded theory building based on the main social informatics principles.

The fourth chapter describes the research methods used in carrying out the study. I elaborate on my survey techniques including the research site, survey participants, and the protocols used for observations and interviews. Also included is a

discussion of the supplementary information that supported the research as a part of my work-related responsibilities at the Cornell University Library.

The goal of Chapters 5 through 7 is to present the findings of my study by describing the themes that have emerged from the observations and interviews. I describe, analyze, and interpret the data by using the key tenets of the social informatics framework: embeddedness, configuration, and duality.

The eighth chapter synthesizes the three research lenses used in the preceding chapters. I consider the research questions postulated in the introductory chapter within the framework of the related theories and theoretical assumptions. The discussion leads to a consideration of what digital humanities infrastructure entails for humanities scholars, which has been a premise at the center of my dissertation research.

Lastly, in Chapter 9, I conclude my dissertation by reiterating the focal findings and themes. My goal is to draw together and illuminate the key findings of this study within the context of the research questions posed and the theoretical framework used for this study. I also present the key insights gained to position this study in light of prior related research. There are several limitations that should be considered in interpreting my findings. I draw attention to them before ending with a discussion of the significance of my study and the policy and design implications. I assess how the social informatics and grounded theory methodologies assisted me in the study, describe my potential theoretical contributions to the research domain, and conclude by suggesting potential directions for future research.

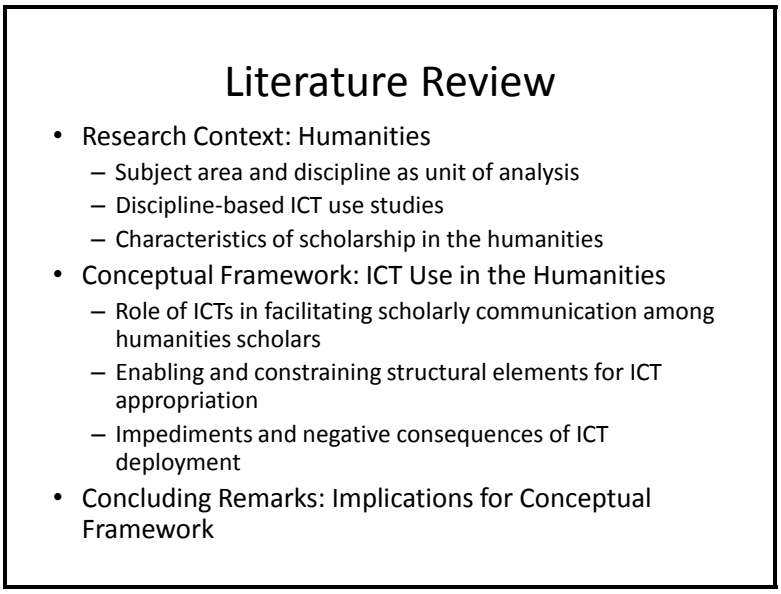
CHAPTER 2: LITERATURE REVIEW

Introduction to the Literature Review

In this chapter, through an analysis of relevant literature, I consider how my research questions have been treated in earlier studies and describe findings and methodologies that have shaped my conceptual framework (Table 2.1).[8] This dissertation research investigates how information and communication technologies (ICTs) play into the scholarly communication patterns of humanities scholars. In designing my dissertation research, I assumed that studies exploring technology assessment, adoption, usage patterns, and consequences must consider specific work practices and cultures. Therefore, the first part of the literature review explains the rationale behind using humanities as a unit of analysis for this study and describes pertinent studies that correlate ICT assessment and use patterns with the disciplinary practices and conventions of academia. Afterward, I present findings from selected studies to describe the characteristics of humanities scholarship, especially those features that differentiate it from scholarship in other disciplines, to provide a research context.

[8] Glaser & Strauss (1967) emphasize that researchers who apply grounded theory should have "no preconceived ideas" when collecting and analyzing data. Some researchers interpret this statement to mean that it is necessary to engage in fieldwork before conducting a literature review (Heath, 2006). However, Glaser & Strauss encourage researchers to "use any material bearing in the area," which can be interpreted as other related research (1967, p.169). Also, Strauss and Corbin (1998) perceive the use of literature as a basis of professional knowledge and refer to it as "literature sensitivity." Grounded theory has been criticized for disregarding existing theories and failing to integrate the emergent theory with existing knowledge. This is partially due to misunderstanding the role of a literature review in research (Heath, 2006; Dey, 1993). I believe that gaining an understanding of related issues through a review of the extant literature does not contaminate a grounded research methodology.

Table 2.1. Literature Review: Research Context and Conceptual Framework



The second part of the literature review is framed by my research questions. First, I review studies that investigate how humanities scholars use ICTs in supporting their practices. I follow with a synopsis of discussions related to the enabling and constraining structural elements of scholars' social and technical contexts. After reviewing the relevant studies that entail potential impediments and unexpected consequences of ICT deployment, I conclude by pointing out the characteristics of the research domain and suggesting how this study expands the knowledge base at the intersection of scholarly communication in the humanities and information technologies.

Research Context: Humanities

Subject Area and Discipline as Units of Analysis

Science as a concept is associated with a range of descriptions (MacMorris, 1989). Some view science narrowly as a discipline limited to basic physics, chemistry, and biology (sometimes called 'pure' or 'natural' science). Others operate according

to a broader characterization covering the entire gamut of knowledge cultures, including the natural and social sciences as well as the humanities. Becher and Trowler (2001) group knowledge communities into the following *subject areas*: pure science, applied science, social science, and the humanities. In this study, I refer to an academic field as a *subject area* and consider humanities as a cluster of related disciplines.

The term 'discipline' is inherited from the vocabulary of the nineteenth century and is understood as a "branch of instruction for the transmission of knowledge and as a convenient mapping of academic administration" (Dogan, 2001, p. 14851). Studying the similarities and differences among 36 disciplines, Biglan (1973) derived a taxonomy of academic characteristics based on three dimensions: hard versus soft, pure versus applied, and life system versus non-life system. The "hard versus soft" division indicates the degree to which a paradigm exists. The physical and natural sciences are considered to involve more clearly delineated paradigms and are in the domain of hard science. The social sciences and humanities are considered soft sciences due to paradigms that are not so well defined and a lack of consensus on knowledge bases and modes of inquiry.[9]

As illustrated by Palmer and Cragin's (2008) literature review, most of the domain-specific studies of ICT use patterns among scholars take the discipline or subject area as their unit of analysis. Articles and discussions that explore the role of disciplinary differences often refer to individual knowledge domains as "cultures." Knorr-Cetina (2007) provides an account of how the concept of culture entered into

[9] 'Pure versus applied' reflects the extent to which the subject matter is practically applied; and 'life versus non-life' denotes involvement with living or organic matter. Applied fields, such as law, education, and engineering, tend to be concerned with the application of knowledge. Pure fields, such as mathematics, history, and philosophy, are less concerned with practical applications. Life systems include such fields as biology and agriculture, while languages and mathematics are considered non-life disciplines.

the discussion of knowledge creation in the 1970s due to the social constructivist investigation of the process of work through direct observations. Palmer and Cragin (2008) define culture as representing academic practice in rich and complex internal environments and institutional arrangements for exchanging and processing information. Often the terms 'subject area,' 'discipline,' and 'culture' are interchangeably used without clear operational definitions.

Although the articulation of common characteristics across scholarly domains supports the differentiation of disciplines, Palmer and Cragin (2008), noting the evolving nature of disciplinary boundaries and practices, caution against overgeneralization. As Becher and Trowler (2001) state, these attributes are relative and their values change over time and space. Also, some science and technology studies researchers, such as Knorr-Cetina (2007), argue that knowledge creation should be studied at a finer level of granularity than a discipline-based taxonomy permits. Her term 'epistemic cultures' refers to practices, mechanisms, and arrangements used in "machineries of knowledge construction" in a given area of professional expertise.

Another, more specific, possible unit of analysis is the research *specialty*. A specialty is "a self-organized network of researchers who tend to study the same research topics, attend the same conferences, read and cite each other's research papers and publish in the same research journals" (Morris & Van der Veer Martens, 2008, p. 214-215). Specialties exist because a science communication network is vast and complicated and it is impossible for one scholar to cover the entire range both comprehensively and in depth.[10] As Fry (2006b) argues, taking a granular approach

[10] Studies of specialties are carried out under various names and research domains, which makes continuity and comparison difficult (Morris & Van der Veer Martens, 2008). The diversity of research goals and motivations in specialty studies makes it difficult to provide coherence or cohesiveness.

may be problematic because the scholarly landscape becomes more complex as one systematically compares research cultures.

Table 2.2 lists the units of analysis used and referenced in this study. In my research, I rely on the *subject area* as the unit of analysis to characterize the humanities as a distinctive branch of knowledge that is composed of related *disciplines* bound by similar subjects, procedures, theories, and research methodologies. I believe that there are identifiable patterns among the humanities disciplines and the subject area provides a useful basis for guiding this research study.

Table 2.2. Definition of the Units of Analysis Referenced in the Study

Subject Area: Knowledge communities grouped into the broad categories of pure science, applied science, social science, and the humanities based on the characteristics of related disciplines (Becher & Trowler, 2001).
Discipline: Community of scholars within subject areas that are bound by similar research domains, procedures, theories, and research methodologies (Becher & Trowler, 2001; Biglan, 1973).
Specialty: A self-organized network of researchers who tend to study the same research topics, attend the same conferences, publish in the same publications, and read and cite each other's work (Morris & Van der Veer Martens, 2008).

I also acknowledge, however, the disciplinary differences in the humanities, such as history and language, and refer to such characteristics in my data analysis. It is possible of course to draw even finer-grained distinctions within *specialties*, for instance civil war historians or eighteenth-century romance language specialists. I will point out such variations as I report my interactions and conversations with the informants of this study.

Discipline-Based ICT Use Studies

Fry's (2004, 2006b) work on scholars' research and communication practices stands out in domain analysis in its attempt to systematically explore how cultural differences shape the appropriation of ICT tools. Based on case studies of four scholarly communities (physical sciences, applied sciences, social sciences, and arts and humanities), Fry extends Whitley's (2000) organization theory of scientific fields by applying it to assessing the impact of ICTs on informal and formal scholarly communication.[11] She also incorporates Becher and Trowler's (2001) perspective on academic disciplines in her theoretical framework.[12] Fry and Thelwall (2006) apply the same conceptual framework to demonstrate that tools and services need to be refined for the specialized needs of social scientists working on e-research projects so that they fit in with existing work practices and communication and collaboration styles.

A number of disciplinary studies specifically examine information seeking and use behavior on the part of academicians. For example, Palmer and Cragin's (2008) review of scholarly practices describes several surveys that consider disciplinary differences in searching and using digital scholarly materials such as books and journal articles. The articles reviewed often use the subject area as a unit of analysis

[11] Whitley (2000) provides a framework for systematic analysis and comparison of scientific fields as a means to understanding how knowledge communities vary. Based on empirical research, Fry (2004) illustrates how Whitley's notions of 'functional and strategic dependence' and 'task uncertainty' can be used in understanding similarities and differences in information practices across intellectual fields. For instance, her findings indicate that disciplines with a high degree of 'mutual dependence' coupled with a low degree of 'task uncertainty' are adept at coordinating and controlling channels of communication and will be more supportive of developing field-specific shared information resources such as digital repositories. By contrast, the disciplines with opposing cultural configurations, such as humanities (featuring a low degree of 'mutual dependence' coupled with a high degree of 'task uncertainty') are less interested in developing communal digital resources.

[12] Becher & Trowler's (2001) study provides rich descriptions of various disciplinary cultures and communication styles. Based on an ethnographic study representing a dozen disciplines, they show the relationship between disciplinary knowledge methodologies and the social relations of communities that produce knowledge.

and contrast humanists, social scientists, and scientists. Palmer and Cragin point out, however, that only a few of the articles attempt systematically to understand the effects of research cultures on e-resource use configurations. The study by Talja et al. (2007) is unique in that it involves a methodology similar to Fry's (2004) and operationalizes Whitley's conceptual framework of electronic resources use, including both e-journal use and reliance on online current awareness services. The results of the study demonstrate that subject area characteristics have a significant influence on e-journal and alert service use patterns.

An increasing body of research explores disciplinary differences in using digital repositories for sharing and publishing scholarly outputs (Barjak, 2006; Kim, 2006; Allen, 2005; Foster & Gibbons, 2005; Cronin, 2003; Kling & McKim, 2000).[13] These articles compare the publishing and communication practices of diverse disciplines and call attention to the role of disciplinary characteristics in shaping ICT appropriation patterns and faculty attitudes. In pioneering this principle, Kling and McKim (2000) criticize the general tendency to homogenize field differences; the authors promote an institutional social shaping approach in theorizing scholarly communication and new media. Harley et al. (2010) confirm the important role of disciplinary culture and tradition on many scholarly communication habits, including assessing digital publication modes.

A major theme in interdisciplinary collaboration studies is the impact of ICT use on facilitating joint work (Nomura et al., 2008; Sonnenwald, 2006; Haythornthwaite et al., 2006). Some researchers in this domain argue that such tools should be compatible with scientists' values and experiences and can be thoughtfully

[13] Digital repositories are databases that contain and organize a wide range of scholarly outputs such as reports, articles, books, visual images, datasets, course materials, and audio/video content. They include a suite of digital services designed to support submission, discovery, retrieval, management, and archiving of digital content. They are often qualified as institutional, subject, or data repositories to indicate their service types.

integrated into existing work and collaboration activities. For instance, Birnholtz and Bietz (2003) suggest that data sharing via ICTs is easiest in disciplines where there is low task uncertainty and high mutual dependency, including consensus about the types of problems to be researched.

Only a handful of studies explore non-use issues as they relate to disciplinary characteristics. For instance, Talja, Savolainen, and Maula's (2004) comparative study of the perceived usefulness of scholarly mailing lists across four domains describes the reasons that explain non-use, based on factors such as collaboration patterns, the physical proximity of like-minded colleagues, field size, and the desirability of sharing information in public or semi-public discussions. Based on their work on five disciplinary case studies in scholarly communication, King et al. (2006) conclude, regarding non-use, that technical approaches designed to move scholars from their deeply embedded value systems are destined to fail. I believe that King's strong statement aims to counterbalance the deterministic approaches that perceive technologies as driving forces in change.

As indicated in the above discussion, it is a common practice to use the subject area or the discipline as the unit of analysis in comparing scholarly communication practices among different scholarly communities. Existing studies indicate that academic fields matter and are useful in understanding and distinguishing ICT appropriation patterns based on epistemic, social, and cultural practices and characteristics. Comparative ICT use studies reveal useful and interesting patterns; however, they are difficult to generalize systematically in the course of collective theory building. Although they provide evidence that supports the effectiveness of culturally sensitive development and implementation of ICTs, extant studies do not lend themselves to generalization within a heuristic framework that can systematically explain, predict, and control outcomes. This is true in part because only a handful of

empirical studies have attempted to link work practices, social and cultural characteristics, and ICT use within the context of knowledge creation. I believe that qualitative case studies of specific disciplines, such as this research, are important in building a knowledge base for comparative studies as well as expanding our understanding of the dynamics and tensions within specific subject areas.

Characteristics of Scholarship in the Humanities

The sciences and the humanities involve distinct epistemologies reflected in their research methods and theories. There is a rich body of literature articulating and debating the differences and similarities among diverse disciplines (Leach, 2005; Wallerstein & Lee, 2004; Friedman, Galison, & Haack, 2000). For instance, in her comparison of the two subject domains, Mazzolini (2005) notes that the humanities are concerned with aesthetic, ethical, and cultural phenomena, and with reflection embedded in culture and history. The sciences are by contrast concerned with objective and generalizable knowledge. One of the most influential comparative studies continues to be C.P. Snow's 1959 lecture entitled *The Two Cultures*, in which he characterizes the rift between scientists and "literary intellectuals" as a major hindrance to solving the world's problems.

Humanists' work entails exploring the foundations of aesthetic, ethical, and cultural values and learning how these values endure, are challenged, and are transformed. According to Whitley (2000), the characteristics of the humanities discipline include a low degree of mutual dependence, a high degree of task uncertainty, and decentralized coordination of goals. Unsworth (2005) explains that "research" for humanists often denotes the work of an individual (sometimes resulting in publication) or an effort that lays the groundwork for scholarly writing. Borgman (2007) and Brockman et al. (2001) describe humanities research methodologies as

entailing locating sources, reading or viewing those resources, taking notes, and writing in a way that (in part) reflects what has been read.

Interpretation is the key research output and forms the basis of knowledge creation in the humanities (Hockey, 2006; Brockman et al., 2001). The process is cumulative and relies on both current and historic materials and artifacts (Watson-Boone, 1994). Archives, museums, libraries, and personal collections form the scholars' laboratories as discoveries stem from reading, synthesizing, and interpreting materials. Humanities research relies heavily on primary materials such as historical records, works of art, manuscripts, and field notes (Hockey, 2006). As opposed to scientists and social scientists—researchers who create new data—humanists seek to reconstruct, describe, and interpret existing data (Katz, 2005). As Blitzer observes, "the journey is as important as the destination, and an account of the journey is as important as a picture of the destination" (1967, p. 228).

The literature often portrays humanists as solitary scholars who are intensely engaged in reading and browsing with little collaboration with other colleagues (Toms & O'Brien, 2008; Case, 2002; Brockman, et al., 2001). Baruchson-Arbib and Bronstein (2007) cite several studies that relate humanists' preference for working alone to the centrality of personal interpretation of the material in the process of forming conclusions. It is often difficult to divide their work into discrete tasks for distribution among team members. Based on self-ethnography, Abbott (2008a, 2008b, 2008c) offers a sociological analysis of the nature of scholarly knowledge in the humanities and regards library research as "customarily artisanal" in explaining why each project is done by a single scholar to maintain uniformity.

Perhaps humanists are characteristically imagined as lone scholars due to the rarity of joint publications (Brown et al., 2007; ACLS, 2006; Dalton & Charnigo, 2004). Wuchty et al.'s (2007) study, which is based on a database consisting of 19.9

million papers written over five decades, demonstrates that teams increasingly dominate solo authors in the production of knowledge. Single authors still, however, produce over 90% of the papers in the arts and humanities. The authors observe that the humanities exhibit lower growth rates in the fraction of publications done by teams, yet they nevertheless observe a growing tendency towards teamwork.

Unlike the large, multidisciplinary teams of researchers in sciences and engineering (Jones, Wuchty, & Uzzi, 2008), there are relatively few formal collaborations in the humanities (Toms & O'Brien, 2008). Based on their survey of 169 humanists, Toms and O'Brien (2008) argue that humanists communicate rather than collaborate with each other. Collaboration in the sciences involves joint and interdependent work and cooperation, whereas humanities work is based on deconstructing ideas and analyzing texts so as to provide an individual perspective (Chu, 1999).

Humanities scholars maintain an informal communication network by contacting their colleagues or interacting with them during conferences and meetings (Buchanan et al., 2005; Brockman et al., 2001). Such an 'invisible college' is influential in research question formulation and the exchange of information about archival collections (Palmer & Neumann, 2002).[14] Although one can find references to the interdisciplinary nature of the humanities, only a few studies explore that aspect of its nature. For instance, Palmer and Neumann conclude that, compared with scientists, humanists exhibit a distinct dynamic in the use and flow of information due

[14] The phrase 'invisible college' was coined by Robert Boyle during the seventeenth century. It was not until the 1970s, however, that scholars such as Crane (1972) started using it to describe distinctive types of social structures among scientists. She describes the growth of scientific knowledge as a process of social diffusion. First, a paradigm appears with no social organization. During the second stage, the specialty grows and is characterized by a group of likeminded scientists collaborating together in an invisible college. These collaborators play an important role in communicating knowledge and diffusing innovation in their domains.

to the prominent role played by reading, the importance of writing as a creative act, and the use of diverse resources.

As Abbott (2008a) argues, only a few empirical studies of the knowledge production process in the humanities exist.[15] The goal of this section was to provide an operational research context for this study by characterizing humanities scholarship based on the related literature. In Chapter 5, I will expand the research context and further describe the characteristics of humanities scholarship by describing the scholarly practices of the informants of this study, such as their research and collaboration patterns. I will specifically address the following questions that emerged from this literature review:

- What are the characteristics of humanities scholarship that influence the appropriation of ICTs in support of research, communication, and creative expression?
- What does the term "research methods" indicate?
- What does collaboration or interdisciplinarity entail in the humanities?

Conceptual Framework: ICT Use in the Humanities

Role of ICTs in Facilitating Scholarly Communication Among Humanities Scholars

Information and communication technologies support scholarly communication in various ways as scholars discover, gather, create, and share knowledge. To better understand how humanities scholars are using digital resources

[15] Abbott (2008a) observes that sociologists of science have been preoccupied with the natural sciences and their laboratories at the expense of under-representing humanists. He points out that most of the research has been produced in the field of information and library science, which is primarily concerned with collections of information objects and the services associated with these collections. As Marchionini (2008) articulates it, library and information science research angles tend to approach disciplinary practices from a scholarly information perspective. Because this disciplinary approach views information as a commodity, it often lacks the theoretical grounding necessary for understanding basic principles of communication systems such as social values and norms.

to support their research, Segal et al. (2007) investigate the impact of ICTs on scholarship through a questionnaire-based unpublished study. Based on 84 responses from a range of humanities scholars (including graduate students), they conclude that humanities research is becoming faster, more convenient, and more efficient due to ICTs. Their findings indicate that humanists commonly use several technologies such as digital resources, search engines, bibliographic databases, mailing lists, and e-mail. Some recent surveys also demonstrate that scholars have expanded their use of ICTs to include bibliographic software for creating citation databases, image databases for managing their image collections, and scanners and optical character recognition applications for digitizing materials (Toms & O'Brien, 2008; Kirschenbaum, 2007; Segal et al., 2007; Katz, 2005; Palmer & Neumann 2002). These studies also indicate that search engines are rapidly replacing library catalogs for discovering information sources.

Accounts of ICT use in the humanities are increasingly presented under the *digital humanities* rubric. In its broadest sense, this term denotes the use of new media to enhance teaching and research as well as to create new products and processes that transform existing knowledge (Zorich, 2008). The term is often used as a catchphrase and entails a range of ICT-related initiatives such as digital libraries, visualization, text mining, geographic information systems (GIS), multimedia, teaching with technology, and open access. Some interpret digital humanities in a more specialized manner and frame it as building digital collections for creating analysis and authoring tools for collection-building and exploration (Council on Library and Information Resources [CLIR], 2009; Davidson, 2008; ACLS, 2006; Katz, 2005).

The literature is replete with accounts of what the advent of digital humanities entails and how it will transform scholarship (Council on Library and Information Resources [CLIR], 2009; Deyrup, 2009; Davidson, 2008; Green & Roy, 2008; Turkel,

2008; ACLS, 2006; Katz, 2005). These studies tend to be descriptive and are often written in the form of self-ethnographies on the part of pioneers or advocates of digital humanities, illustrating how technologies are being used and their benefits and transformative nature. Also, discussions of cyberinfrastructure in the humanities bring out the need to have shared tools, digital content, expertise, and services in support of digital humanities initiatives (CLIR, 2009; ACLS, 2006).[16] Cyberinfrastructure research tends to focus on how to bring innovation to scholarship through an efficient, scalable, and sustainable system of knowledge creation and transfer. The underlying vision is that ICTs will greatly enhance research and enable new forms of collaborations (Schroeder & Fry, 2007).

Hockey (2006) traces the origins of digital humanities to 1948, when Father Roberto Busa (with help from IBM) created a concordance to the works of Thomas Aquinas based on electronic representation of all his texts. Busa's lead was followed by literary and linguistic academics interested in using computing for analyzing text. Hockey (2006) observes that the early efforts lacked information professionals' involvement and therefore the field developed with less-than-complete awareness of standards for description and documentation. Because the primary purpose of computation was analysis and manipulation, digital data were rarely archived to support future work (Short, 2006).[17]

The question of the academic legitimacy of humanities computing as an independent field continues to be discussed in many forums (Deyrup, 2009; Short, 2006; McCarty, 2002). In response to those who argue against such a possibility,

[16] Cyberinfrasctructure, also referred to as *e-research* or *e-science*, represents a distributed and data-intensive system that supports knowledge creation, processing, sharing, and archiving (Edwards et al., 2007; ACLS, 2006).

[17] It was in the late 1980s that structure, mark-up, and representation issues were introduced to humanities computing, especially with the development of the Standardized Generalized Markup Language (SGML) and Text Encoding Initiative (TEI).

McCarty (2002) suggests that trying to understand common motivations for denying the field's academic status will be useful. He also encourages scholars to discuss and articulate whether humanities computing has its own distinctive research agenda.[18] The following section reviews the themes that fall within the rubric of digital humanities.

*Digitization***.** Digitization is often positioned as one of the key information technologies with significant impact on humanities research (Unsworth, 2009; Davidson, 2008; Borgman, 2007; Katz, 2005).[19] Since the early 1990s, there have been several initiatives designed to digitize primary and archival materials in order to bring together information from diverse and geographically distributed sources (Borgman, 2007; Brockman et al., 2001). Large-scale initiatives, such as those undertaken by Google and the Internet Archive, further expand the representation of scholarly digital content on the Web. The availability of digital imaging technologies has begun the transition from slide-based visual resources to digital image collections, especially in art and art history (Schreibman et al., 2004). Unsworth (2005) argues that digitization also generates new perspectives on familiar materials as the analog-to-digital transition involves novel ways of representing knowledge. The digitization process is often collaborative in nature and involves cooperation among a range of scholars, subject experts, information technologists, librarians, curators, and computer scientists (Schreibman et al., 2004).

[18] Among the goals of *A Companion to Digital Humanities* (Schreibman et al., 2004) are promoting the emergence of digital humanities as a distinct discipline and outlining a research agenda.

[19] *Digitization* indicates the conversion of print and analog scholarly materials (such as books, journals, photographs, manuscripts, and oral history) in a digital form in order to provide online access to these materials that are historically bound by physical location. Borgman (2007) describes two types of digital initiatives. The first category involves creating digital collections from analog source materials, often in collaboration with cultural heritage institutions. The second type is referred to as "thematic collections" and consists of digitized cultural objects and associated interpretations and supplementary materials.

*New Methods for Humanities Research***.** The availability of new applications is introducing an assessment of existing methods in the humanities as computers make more systematic analysis available (CLIR, 2009; Davidson, 2008; Short, 2006; Schreibman et al., 2004). There is a lively discussion among humanists, especially among the pioneers of digital scholarship, about the need to create new research methods. Although significant experimentation has occurred in digital humanities, Short (2006) argues that it falls firmly within existing tradition of textual scholarship; only a few experiments have introduced novel and innovative methodologies. Unsworth (2005), in his address to the National Humanities Center, states that even using words like "method" and "research" in application to the humanities requires some reflection, as many humanists associate these words with "scientific" studies. There is in the humanities a tradition of deep skepticism towards quantitative and empirical methods, as they represent a positivist epistemology (Kirschenbaum, 2007). Interpretation, ambiguity, and argumentation are valued and the humanities embrace a culture of conversation, not problem-solving (Abbot, 2008a). Unsworth (2005) states that the new research methods are driven by a desire to understand the human record or to expand our understanding of that record. He characterizes the technology simply as an "instrument of procedural epistemology" with the sole function of availing humanists' "methods for imagining what we don't know, as well as what we do." Observations pertaining to and insights into the role of ICT on humanities research methods consist largely of anecdotes or commentaries, with little or no grounding in empirical studies.

*Quantitative Research Methods***.** With the availability of large bodies of digital text, we can now use quantitative text analysis techniques to explore linguistic patterns such as the frequency and distribution of words (CLIR, 2009; Rydberg-Cox, 2006; Schreibman et al., 2004; Brockman, 2001). Some humanists rely on specialized tools

to facilitate their scholarly investigations, such as applications designed to facilitate concordance creation and lexical analysis for interpretation and quantitative analysis purposes.[20] This is still seen, however, as a specialized and experimental domain. For instance, of the 84 respondents in the Segal et al. (2007) study, merely 5% of the faculty surveyed used any text analysis tools. New concepts, such as that of "distance reading," which denotes the use of statistical quantitative methods to read large volumes of text computationally using graphs, maps, and trees as forms of abstract representation that facilitate the investigation of patterns over time, are emerging to describe quantitative methods in the humanities (Moretti, 2005). Kirschenbaum (2007) and Moretti (2005) claim that using quantitative approaches could innovate literary studies with the methodology's random and unsystematic methods. They argue that scholars focus currently on a select group of a few hundred texts that are considered canonical, leading to narrow and distorted slices of literary history.

*Digital Media as New Genres***.** An interesting track in the digital humanities literature involves genre-specific discussions of the implications of digital media. For example, Folsom (2007) argues that the database is "the new genre of the twenty-first century," a genre that is opposed to the narrative because it brings together distributed materials and enables reordering and random access.[21] He argues that the "narrative" and the "database" form a symbiotic relationship. Folsom's thesis is similar to Hayles's (2003) assertion that the use of digital media generates new genres rather than replacing existing ones. Murray (2007) argues that databases are not merely

[20] Concordance creation tools allow users to automatically construct alphabetical lists of seminal words used in books and other texts. They enable the analysis and translation of text and it is possible to create indexes and word lists, count word frequencies, compare distinct usages of a word, analyze keywords, and find phrases and idioms. The word "lexicon" refers to a specialized dictionary for the works of a particular author or the words used by a particular audience.

[21] A genre is a category of literary composition based on content and literary technique. According to the *Encyclopedia of Philosophy*, literary genres include narrative, dramatic, and lyric in addition to the more recent emergence of the novel and the short story. More information is available at http://www.iep.utm.edu/l/literary.htm.

technical constructs but represent a set of values. She states that, "since humanistic knowledge is concerned with contextualized, ambiguous verbal and visual artifacts more often than it is with logical datasets, we need our own genres of representation." Citing Bowker and Star's concept of infrastructure, she points out that information infrastructure is a network of cultural artifacts and practices and therefore it is important to factor in the values represented by technologies.

New Modes of Scholarship. It was a decade ago that O'Donnell (1998) outlined the history of writing and media from ancient Greek times to the present and envisioned how the new media are on the verge of transforming scholarship, especially for humanists, into an interactive, dialogic, non-linear, and innovative mode. There is no evidence that scholarship has reached that stage yet; however, some argue that new technologies can deepen our understanding of complex, multi-layered works in unprecedented ways and that the digital representation of information compels and enables new ways of thinking and constitutes a new medium of expression (CLIR, 2009; Cohen et. al., 2008; Davidson, 2008; ACLS, 2007; Short, 2006; Katz, 2005; McGann, 2001). According to these accounts, new media introduce innovative modes of scholarship to allow scholars to explore information in entirely new ways. Katz (2005) and McGann (2001) claim that hypertext and interactivity give scholars a flexible and dynamic means for interpreting expressive works, especially the multimedia materials that combine text and image. Hayles (2008) argues that digital technologies are not simply tools that we use, but tools that we think through, as they provide a range of overt and subtle effects. Her study is unique in the sense that it relies on an empirical methodology and her observations are grounded in her in-depth interviews with twenty prominent scholars in the field of digital humanities. She concludes that digital humanities present a significant challenge to customary modes

of thought and practice and that the humanities are undergoing a broad transformation that challenges existing research paradigms.

Collaboration in the Digital Realm. Some observe that ICTs are redefining the nature of collaboration among humanists and that interdisciplinarity will be a hallmark of contemporary scholarship (Jakubowicz, 2007; Short, 2006; Unsworth, 2005; Inman et al., 2004). Digital humanities initiatives are described as typically multidisciplinary, collaborative, interactive, and complex. For instance, there are several examples in the Council on Library and Information Resources (CLIR, 2009) report on digital scholarship that describe how digital humanities introduce a new type of collaborative culture for humanists, as creating digital collections requires both subject and technical expertise. Humanists, who have traditionally worked alone, now need to team with information technologists and other information professionals such as librarians (Katz, 2005). As Zorich observes in the concluding chapter of the CLIR (2009) report, however, today's digital humanities initiatives continue to face barriers such as siloing within their institutions and redundancies among humanities centers. These characteristics indicate that digital humanities initiatives are often confined within individual institutional settings, lacking the broader and distributed collaboration patterns seen in other disciplines. As Fry (2006b) points out, establishing collaborations in fields with low strategic dependency can be challenging due to differences in community standards. This difficulty is especially demonstrated in the humanities, as standardization efforts are seen as imposing normative practices, which in general conflicts with the nature of humanities scholarship.

Digital humanities is spawning an ideology complete with advocates and pioneers; however, what seem to be missing are accounts from a wide range of scholars who are not characterized as "doing digital humanities" to understand what infrastructure entails from their perspectives. To complement the existing research

approaches, my fieldwork focuses on the daily practices of humanities scholars without limiting my investigation to scholars who use information technologies. My goal is to assess ICT use holistically as a component of scholars' rich and diverse social and academic life. While technologies are being positioned as driving forces behind innovation, it is essential to recognize and factor in variances in research and communication practices through in-depth and qualitative case studies. This study specifically aims to contribute in this realm and addresses the following questions:

- Which technologies are considered ICTs in support of humanities scholarship? What are their functionalities and how are they being used?
- What are the variances in how ICTs are interpreted and put into use by scholars?
- What are the characteristics of the new media used in facilitating academic work?
- What are examples of technology convergence?
- Are technologies enabling new scholarly processes and practices such as introducing new research methods?
- Are reading and writing practices changing due to the affordances of the new information environment?
- What does transformation in scholarship entail?
- Are new technologies and associated practices influencing collaboration or interdisciplinarity patterns?
- How are ICT-use patterns evolving?

Enabling and Constraining Structural Elements for ICT Appropriation

The previous section focused on technology-in-use and reviewed the key findings and insights offered by related research. Understanding scholars' interactions with ICTs requires a holistic approach that also factors in the structural elements such as social norms, institutional support systems, and the rapidly evolving information policy framework. The so-called "crisis in the humanities" is a prevailing theme in the humanities literature and discussion lists. Unsworth (2003) relates the crisis to a significant extent to rapidly increasing prices demanded by commercial publishers. University presses have historically played a large role in publishing research, especially in the humanities and social sciences (Brown, et al., 2007). As university presses have experienced waning demand for print publications and as more library acquisition resources are expended on scientific journals by large commercial publishers, publishers are facing a growing set of alarming challenges.

In response to these "crises in the humanities," O'Gorman (2006) states that "it is time for humanities to go digital beyond archiving printed texts and time for theory of digital." Unsworth offers "accepting several scholarly articles in place of a book" as one of the potential solutions to the problem this crisis poses for tenure and promotion. Palmer (2004) also believes that ICTs open up new possibilities. She describes thematic collections as a newly evolving genre of scholarly production that responds to new opportunities and argues that such collections should be considered as scholarly publications during tenure reviews.[22] The academic community, however, continues to grapple with the issue of accepting digital scholarly works in support of promotion and tenure; monographs remain the gold standard, especially for tenure

[22] Thematic collections are digital aggregations of primary sources on a specific research topic and related materials that support description, analysis, and interpretation.

purposes in the humanities (Harley et al, 2010; Davidson 2008; Bazerman et al., 2008; Borgman, 2007; Katz, 2005).

Compared with typical practices in science and engineering fields, there is significantly less self-publishing in the humanities and there is rarely a preprint culture in place (Short, 2006).[23] Allen (2005) concludes that the number of humanities documents in institutional repositories is far lower than that in science and technology disciplines. He also finds that awareness of open access among humanities academics is quite infrequent.[24] As Borgman observes, "information as public good" is a new concept for many humanists as it relates to their scholarly outputs. Davidson says that "once we champion openness, we enter a new world of social, intellectual, and curatorial roles" (2008, p. 711). There are, however, some open access experiments in the humanities. For instance, to challenge the perception that open access journals are less scholarly, the Open Humanities Press aims to develop open access humanities journals in critical theory.[25]

Another common structure-related discussion pertains to the sustainability of digital scholarly content, especially within the framework of digital humanities initiatives. Smith (2004) and Zorich (2008) describe the preservation challenges associated with created digital content and argue that ensuring the persistence of digital information is crucial to the future of humanities scholarship. Projects with digital components generally continue to operate in project mode rather than being established as programs with ongoing institutional support and commitment (Katz,

[23] Self publishing involves the publishing of books, articles, and other media by the authors of those works, rather than by established, third-party publishers. The availability of Web-based content creation and dissemination tools, such as digital repositories and wikis on the Web, promote such independent endeavors.

[24] According to the Budapest Open Access Initiative (http://www.soros.org/openaccess/), open access indicates that a certain body of literature is freely available on the public Web and any user can read, download, copy, distribute, print, or search this information.

[25] Open Humanities Press is an open access publisher of contemporary critical and cultural theory. It is a grassroots initiative undertaken by academics, librarians, journal editors, and technology specialists. More information can be found at: http://openhumanitiespress.org/.

2005; Rydberg-Cox, 2005). The digital humanities field is characterized by grant-funded projects predominantly led by early adopters and enthusiasts. The funding sources are often more interested in sponsoring innovation than in promoting the subsequent management and maintenance processes that take place after an initiative is established (Short, 2006; Katz, 2005; Smith, 2004).

The literature review indicates how humanities scholars function within historically constituted structures that offer distinctive resources, capacities, opportunities, and constraints. The goal of this study is to understand the informants' perspectives on the structural elements that may support or inhibit unfolding technological innovations by exploring the following questions:

- What are the disciplinary structural elements (such as the tenure process and publishing patterns) that influence ICT adoption and use patterns?
- How do institutional factors such as local technology support impact scholars' use of ICT?
- Are the institutional norms of humanities evolving to respond to the affordances introduced by ICTs? For instance, how is digital scholarship factored into the promotion process?
- How do ICTs alter existing academic structures such as publishing?? What are the consequences?

Impediments and Negative Consequences of ICT Deployment

Some humanists have vocalized their apprehension concerning the impact of ICTs on scholarship; however, such accounts are generally anecdotal or critical commentaries. I was able to find only a few relevant empirical studies, mainly in the form of quantitative surveys that address the reasons behind non-use. For instance, the

questionnaire-based study by Segal et al. (2007) cites the concerns of humanists as information overload, increased pressure on productivity, fear of missing relevant information due to copious sources of information, and long-term sustainability of digital information. According to Harley et al.'s (2006) study, which involved 452 social science and humanities academics, the top reason for not using ICTs (cited by 75% of the respondents) was that existing tools have not supported the faculty's scholarly activities and pedagogies. Lack of time (cited by 66%) was also a major constraint. Issues surrounding copyright, rights management, scholarly validity, authority, and privacy are also among those cited as barriers to using digital resources and tools (Jensen, 2007; Katz, 2005).

In the course of this literature review, I perceived a tendency to explain non-use issues based on a technologically deterministic perspective—an underlying assumption that ICT use leads to enhanced scholarship and therefore that non-use patterns may be an impediment to academic advancement. I was not able, however, to locate any empirical studies that shed light on this issue. Only a few papers from science and technology studies scholars point out the socially constructive and contingent nature of ICTs in scholarly communication, but these papers lacked a specific focus on humanities scholarship (Talja et al., 2007; Wouters & Beaulieu, 2006; Fry & Thelwall, 2006; Fry, 2004).

In the literature, lack of faculty interest in change is often cited as a key barrier to wider adoption of ICTs in support of research and teaching (ACLS, 2007; McGann, 2004). Non-use patterns are often interpreted as expressions of disinterest in technologies due to particular disciplinary cultures (Davidson, 2008; Katz, 2005; McGann, 2004). For instance, Davidson characterizes the non-use pattern as the "academic humanist's pervasive stance of isolation" (2008, p. 708). Discussions about the autonomy assigned to ICTs in shaping humanities scholarship is addressed mainly

in blogs maintained by humanists. For instance, Ian Foster (January 2, 2007), a computer scientist, notes in his blog that "the quantitative expansion of information technology in contemporary society is precipitating reflection upon some age-old questions in the humanities . . . [such as] the role of science and technology in cultural production, authorship and creativity, and the conservation of cultural resources for the future."[26] He argues that digital and analog media both prompt such questions and that some of the questions historically become more urgent, but this is not *because of* technology.

ICTs do not simply open new possibilities for research and communication but also have the potential to alter existing models, causing the *loss* of previously available affordances (Brown & Duguid, 2000). In order to expand the understanding of unexpected or undesired consequences of ICT-use, I will explore the following research questions:

- What are the impediments and downsides of technologies that restrict their appropriations?
- Are there cases in which ICTs are improving certain processes at the expense of unintended negative consequences or loss of existing affordances?
- What are the impediments and disadvantages of technologies within the context of academic practices?
- How are scholars compensating for the negative consequences of ICTs in their practices?

[26] Ian Foster's Digital Humanities blog is at http://ianfoster.typepad.com/blog/2007/01/digital_humanit.html. He is the director of the Computation Institute and Professor of Computer Science at the University of Chicago.

Concluding Remarks: Implications for the Conceptual Framework

In this chapter, through an analysis of pertinent literature, I considered how my research questions have been treated in earlier studies and described findings and methodologies that have shaped my conceptual framework and research questions. The existing discussion of the role of technologies in enhancing scholarly communication in the humanities is rich and diverse. Yet the research domain is also fragmented, as articles on the subject tend to isolate the use of specific technologies without grounding their discussions within the context of work practices or articulating both positive and negative consequences. The literature review also demonstrates how rapidly the nature of ICT adoption and appropriation among humanities scholars has become controversial. As Klein (2005) describes in her discussion of the history of the discipline, the dynamics of the humanities is characterized by pitting tradition against change. Therefore, along with favorable perceptions of information technologies, the discourse harbors a range of tensions as humanists explore the impact of ICTs on their scholarship. However, the underlying causes of this tension are seldom addressed in related studies other than attributing it to the "conservative nature" of humanities scholars.

Most studies of humanists' use of ICTs reviewed in this paper come from the information and library science community or from pioneers of digital humanities initiatives who are often members of digital humanities institutes.[27] Although these accounts are insightful, both types are based on the personal experiences of the authors as service providers or digital humanists and are not grounded in empirical research. The related literature often can be characterized as what Wouters et al. (2008) label as

[27] Based on her review of dozens of digital humanities centers at the U.S., Zorich (CLIR, 2009) concludes that a common mission statement of digital humanities centers calls for transforming humanities scholarship to produce and disseminate humanities research in new ways and to new audiences.

"impact talk" with a focus on the inevitable consequences of technology-enhanced research environments for the future of knowledge creation. Such a theoretical stance falls within the *diffusion of innovation* framework (Rogers, 1962), which explains technology adoption as a temporal process marked by stages involving, in turn, innovators, early adopters, early majority, late majority, and laggards.[28]

Although the findings may be confined to the specific sample and therefore may be difficult to generalize, I believe that case studies such as this research will provide deeper insights to help build a knowledge base for this important but understudied research domain. This empirical study therefore contributes to this realm of research by exploring humanists' evolving scholarly communication patterns and work practices and considering how these processes are entwined with the affordances of technologies, existing practices, academic norms, and scholars' needs and opinions. The next chapter will describe my theoretical approach that is built on social informatics, which guides me in addressing my research questions cohesively by considering ICTs as a *sociotechnical system* composed of scholars, their academic and social practices, the norms of academia, hardware and software, and the support structures that aid users.

[28] Although several of the articles mentioned in this review fall within the theoretical framework of diffusion of innovation, Rydberg-Cox's (2005) article is the only one that explicitly uses the theory to explain non-use issues.

CHAPTER 3: THEORETICAL FRAMEWORK

Social Informatics

My analytical approach is built on social informatics to reveal pertinent technical and social elements that must be considered in choreographing the communication process in a digital realm.[29] Social informatics is grounded in Kling and Scacchi's (1982) notion of a *web of computing*, which is further theorized by Star and Ruhleder (1996) in their conceptualization of infrastructure as a relational and embedded practice that emerges in use. Accordingly, social informatics defines information and communication technologies (ICTs) as *sociotechnical systems* composed of an interrelated and interdependent mix of people, their social and work practices, the norms of use, hardware and software, the support structures that aid users, and the systems that maintain the ICTs.

Adopting social informatics as an analytical strategy means highlighting connections between social and technical aspects of ICT design, assessment, and implementation. It provides a basis for observing social reality during research and informs grounded theory building according to the main social informatics principles (Meyer, 2007; Glaser & Strauss, 1967). The strategy shaped not only my research questions, but also how I created categories and associated properties as I gathered data based on interviews and observations. The approach provides a broad interpretative perspective; however, in the meantime it also facilitates using an

[29] Social informatics is associated with the late Rob Kling due to his legacy and efforts to incorporate social informatics principles, concepts, and analyses into ICT studies.

inductive approach to discover new patterns and constructs of interest in an emergent research domain.

Theoretical Underpinnings of Social Informatics

Kling's conceptual model incorporates multiple social and political theories to better explain the role of information technologies in society and organizations (Robbin & Day, 2006). The key theoretical underpinning of his theorization is based on the concepts and methods of symbolic interactionism, which calls for paying particular attention to micro-processes of the social order. Symbolic interactionism derives from the work of John Dewey, George Herbert Mead, and Herbert Blumer and implies the constructed and negotiated nature of social order and human interactions (Van House, 2004). Grounded theory methodology is theoretically related to symbolic interactionism (Wolfinger, 2002), which is therefore the underpinning philosophy informing both my theoretical framework and my research methodology. The focal premise is that individuals construct the social world on the basis of the meaning they associate with it and these meanings are derived from social interactions (Denzin & Lincoln, 2000).

I decided to use social informatics as my heuristic framework because of its ecological view of technology as a component of a complex system with interrelated parts that continue to evolve (Figure 3.1). It entails and incorporates several of the main principles of the theories I have considered applying within the study. Like the social construction of technology (SCOT) model (Pinch & Bijker, 1987), it posits that technology deployment cannot be understood without comprehending how a specific technology is embedded in its social context.[30] It borrows the notion of a *seamless*

[30] SCOT as a theoretical framework provides a model with which to study the social context of technological innovation. Its key assumption is that innovation is a complex process of co-construction

web from actor-network theory (ANT) (Latour, 1992; Hughes, 1986; Kling & Scacchi, 1982) to emphasize how people, artifacts, practices, norms, and power relationships are bound together in situated, mutually constitutive activity.[31] Similar to structuration theory (Giddens, 1984) and adoptive structuration theory (DeSanctis & Poole, 1990), social informatics posits a principle of *duality* to emphasize that human action simultaneously creates and is shaped by structures of social systems.[32]

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in which technology and users negotiate the meaning of new technological artifacts (Pinch & Bijker, 1987).

[31] Actor-network theory (ANT) emphasizes "mediation-in-action" in heterogeneous complexes of humans, tools, and communities (Latour, 1992). Developed by Bruno Latour, Michel Callon, and John Law, ANT maps both human and non-human elements of an activity onto a coherent network.

[32] Giddens's (1984) structuration theory explains the production and reproduction of social systems through members' use of resources and rules that guide their interactions. The structural properties of a social system constitute both the medium and the outcome of the practices they recursively organize. DeSanctis and Poole's (1994) adaptive structuration model is based on the principles of structuration theory and offers a theoretical model for examining the interaction between technology and organizations. It describes the dynamic relationship between human agents, technology, and institutional structures. Similarly, Orlikowski's (1992) technological frames model is also built on structuration theory to offer a theoretical model for examining the interaction between technology and organizations.

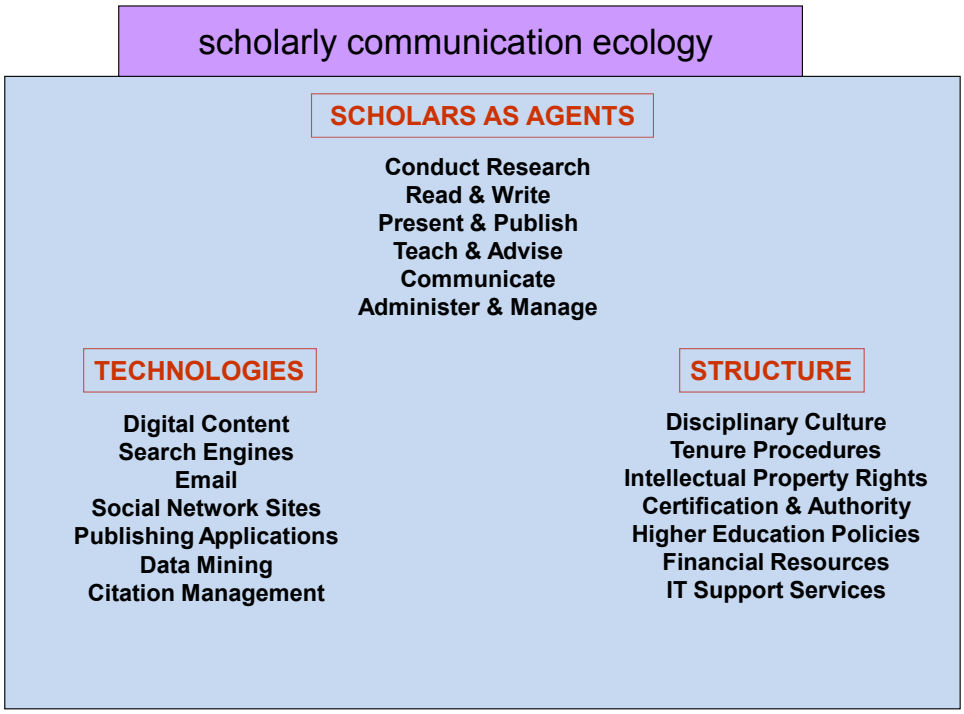


Figure 3.1. Ecology of Scholarly Communication

Social Informatics, ANT and SCOT: Differences

As an analytical perspective and set of principles, the social informatics approach differs from ANT and SCOT in several ways (Tyworth & Sawyer, 2008; Meyer, 2006; Orlikowski & Iacono, 2001). Social informatics is more conservative in attributing agency to non-human agents than ANT. In comparison to SCOT, the framework focuses on configurations of routine use more than patterns of adoption and innovation. ANT theorizes about how new technologies come to be whereas social informatics is more interested in understanding how new technologies come to be *used*. The social informatics framework has been especially of interest to researchers in the fields of information systems, library and information science, education, communication, and organizational studies.

Another distinguishing characteristic of social informatics is its problem-oriented and normative stance (Sawyer & Tyworth, 2006). It is meant to inform discourse so as to help individuals and organizations make better use of ICTs and is intended to improve the work of individuals who design, manage, and use ICTs. It takes a critical stance in challenging taken-for-granted assumptions and questioning conventional wisdom about ICTs (Day, 2007).[33] It allows a "discursive and cultural examination of the construction of meaning and concepts" related to ICTs (Day, p. 43).

Social informatics provides a nuanced characterization of individuals as social actors and describes four overlapping dimensions: affiliations, environments, interactions, and identities (Sawyer & Tyworth, 2006; Lamb & Kling, 2003). Affiliations are the social ties that individuals maintain both within and across organizational boundaries, including their professional networks. Environments represent institutional memberships that both enable and constrain social actors. Interactions are the modes of communication and exchanges in their environments. Identities are both self-constituted by social actors and articulated by their environments. Such a nuanced characterization of individuals for this project has been useful as I view humanists as individual professionals as well as members of their academic institutions, disciplinary groups, and circles of specialties.

Tenets of Social Informatics: Conceptual Scaffold

Social informatics is an approach to understanding and theorizing ICT and is built on the assumptions of *embeddedness*, *duality*, and *configuration* (Tyworth &

[33] Day (2007) describes Kling's notion of the critical stance to differentiate it from 'critical epistemology' that involves conceptual and discursive analysis of historic and cultural concerns. The critical stance in social informatics brings into question established social assumption and values surrounding ICT use and implies the empirical and problem-driven nature of the theoretical framework.

Sawyer, 2008; Sawyer & Tyworth, 2006; Kling, Rosenbaum, & Sawyer, 2005). The following discussion positions these key phenomena within the context of my research. Table 3.1 lists the main tenets of social informatics and Table 3.2 provides examples of research questions that pertain to these specific postulations. These questions were informed by the literature review presented in Chapter 2.

Table 3.1. Tenets of Social Informatics

Tenets of Social Informatics

- Embeddedness – context matters
  - ICTs do not exist in isolation and are embedded in social, cultural, organizational, and institutional contexts
  - ICT deployment cannot be fully understood without comprehending how a specific technology is embedded in its context
- Duality – mutual shaping
  - ICT use is a contingent process mediated by structure and agency
  - Users are active agents, enabled and constrained by their contexts and ICTs
- Configuration – interpretive flexibility
  - ICTs are interpreted and used in different ways (interpretive flexibility)
  - Technologies are adaptive in use and evolve as their specific forms change over time

Table 3.2. Research Questions Framed by Social Informatics

SI Assumptions	Research-Related Questions
Embeddedness	▪ What are the characteristics of humanities scholarship that influence the appropriation of ICTs in support of research, communication, and creative expression? ▪ What does the phrase "research methods" indicate? ▪ What does collaboration or interdisciplinarity entail in the humanities? ▪ What are the disciplinary structural elements (such as the tenure process and publishing patterns) that influence ICT adoption and use patterns? ▪ How do institutional factors such as local technology support impact scholars' use of ICT?
Duality	▪ Are the institutional norms of the humanities evolving to respond to the affordances introduced by ICTs? For instance, how is digital scholarship factored into the promotion process? ▪ How do ICTs alter existing academic structures such as publishing? What are the consequences? ▪ What are the impediments and downsides of technologies that restrict their appropriation? ▪ Are there cases in which ICTs are improving certain processes at the expense of unintended negative consequences or the loss of existing affordances?
Configuration	▪ Which technologies are considered ICTs in support of humanities scholarship? What are their functionalities and how are they being used? ▪ What are the characteristics of the new media used in facilitating academic work? ▪ What are examples of technology convergence? ▪ Are technologies enabling new scholarly processes and practices such as introducing new research methods? ▪ Are reading and writing practices changing due to the affordances of the new information environment? ▪ What does transformation in scholarship entail? ▪ Are new technologies and associated practices influencing collaboration or interdisciplinarity patterns?

Embeddedness implies that ICTs do not exist in isolation but instead are ingrained in social, cultural, organizational, and institutional contexts. Social and technical aspects are mutually constitutive and technology deployment cannot be fully understood without comprehending how a specific technology is embedded in its social context. My initial literature review and data gathering demonstrate how disciplinary characteristics, work practices, and conventions of academia play an important role in researchers' assessment and appropriation of ICT. There is a tendency to frame the influence of technologies on scholarly communication as *effects*, as if "options and outcomes are shaped exclusively by features, affordances, and functionalities of available tool sets" (Cronin, 2003, p. 5). Kling and McKim (2000) characterize this tendency as eliding and homogenizing field differences. It is difficult to make sweeping generalizations that cover scientists, humanists, social scientists, and engineers. ICT adoption and usage patterns in scholarly communication often mirror underlying differences in epistemic cultures and disciplinary characteristics such as research methods, knowledge production structures, and communication and collaboration patterns.

Duality suggests that ICT use is a contingent, mutually shaping process mediated by structure and agency. Scholars are social actors and exercise active agency in constructing their environments. However, they are also enabled and constrained by their social, economic, and technical settings. This concept is useful in uncovering the overarching political and cultural conditions that affect ICT use. Using the duality principle allows me to factor in the impact on scholarly communication patterns of structural and power relations in the academic culture of the humanities, such as tenure reviews, intellectual property policies, the open access movement, and granting agency requirements. Duality also points out that ICTs have both enabling and constraining effects and therefore may also have negative consequences.

Configuration builds on the notion of a seamless web (Latour, 1992; Hughes, 1986; Kling & Scacchi, 1982), indicating that ICTs can be interpreted and used in various ways in diverse settings. This principle is similar to the SCOT's concept of interpretive flexibility (Pinch & Bijker, 1987). ICTs support a wide range of actions and processes but how such potential features are perceived depends on users' specific goals, skill sets, values, and past experience. Appropriation is a related concept and underscores the importance of the process by which scholars adopt and adapt technologies, fitting them into their work practices in support of their scholarship. The notion of configuration also implies that technologies are dynamic and adaptive in use, evolving as their specific forms change over time, as new features and standards are developed, and as they transition through successive versions.

Epistemological and Ontological Stance

My research was based on an interpretive epistemology. Because I explored social and cultural issues, I believed that using qualitative data would best support my theorizing efforts. As Cooper (2001) explains, theories offer us particular ways of viewing the world that shape our empirical research in terms of setting problems, staking out constructs, and leading inquiry into asserted relations. My theoretical approach was built on social informatics as an analytical framework in order to allow richer insights and reveal connections and patterns in the course of my research. As opposed to a positivist stance that privileges the scientific method and seeks generalizations, I focused on the emergent and local understanding of knowledge creation and dissemination practices. The utility of adopting social informatics as an interpretative stance lies in its facilitating an understanding of the *context* of information technologies and the *process* of appropriation.

In their review of communication and information media research in the disciplines of communication and science and technology studies, Boczkowski and Lievrouw (2008) identify polarizations between determination and contingency, production and consumption, and continuity and discontinuity. They recommend building bridges in order to articulate a shared research agenda for this rapidly growing area of study. Adhering to this principle, I made an effort to pay close attention to the mediation and mutual shaping processes.

Garvey (1979) frames communication as the "essence of science" and cautions that, as we investigate the scholarly communication process, we should not focus solely on how scholars seek and process information but also on the *communication system* itself with its technical variables and complex structure of heterogeneous agents. One of the guiding principles of my research was combining functional and constructivist accounts in order to broaden my outlook in considering scholarly communication as knowledge, institution, practice, and material culture.

Suchman (2007) and Orlikowski (2007) observe that materialism is understudied and under-theorized because of an aversion to "being associated with determinism." As Leonardi and Barley (2008) point out, it is possible to talk about a technology's materiality without being deterministic. Information technologies do not merely support everyday lives, they are influential insofar as they may have consequences for scholarly practices. By bringing materiality (features and functionalities) more centrally into my research, I have been able to comment more precisely on how ICTs are used in support of academic work, how technologies are shaping the way in which scholars conduct research and share their expertise, and the unintended consequences and shortfalls of these trends. As Pinch (2010) observes, social constructivist ontology "does not claim that there are no effects or impacts of technologies upon humans" (p. 82). This study reflects my observations about how

ICT features become entangled with academic practices and consequences in terms of the evolving practices, opinions, academic structures, and scholarly outcomes.

An underlying objective behind my research was exploring new ways of theorizing new media. Through the emergent, fluid, relational, and sociotechnical aspects of ICTs, everyday lives are increasingly bound up with technologies. Orlikowski (2007) characterizes this process as *constitutive entanglement* and advocates alternative ways of theorizing technologies by positioning the social and material as inextricably bound rather than privileging one or the other of them.[34] The analysis of my findings brings out the relational and intertwined aspects of new media and work practices and the values of the informants. I show how ICTs are being used and perceived when situated in their everyday practices, based on my informants' interpretations of what information technologies entail for them in pursuing their goals.

[34] Orlikowski (2007) refers to Latour's (1999) notion of a web of human and non-human agents and Bijker's (1995) socio-technical ensemble as successful examples of challenging the conventional distinction between the social and material aspects of technology adoption.

CHAPTER 4: RESEARCH METHODS

Introduction

I employed a qualitative methodology in my dissertation research because I was interested in observing social discourse, studying groups and individuals as they participate in everyday settings involved in daily activities, and seeing themes emerge from this fieldwork. Qualitative research is a situated activity that allows for gathering data in natural settings (Denzin & Lincoln, 2000). The technique supports a naturalistic inquiry in order to understand the embedded practices and meanings associated with information and communication technology (ICT) use within the humanities.

I conducted ethnographic research that allowed me to take an inductive and discovery-based stance rather than limiting myself to testing explicit hypotheses (Glaser & Strauss, 1967). Theories typically describe a set of well-developed categories, themes, and concepts that are systematically interrelated (Hage, 1972). With such a methodology I was able to discover hypotheses and theory from systematically obtained and analyzed data. Rather than seeking to demonstrate causal relationships among variables, I was interested in looking at configurations, understanding contingencies, and exploring the mutual shaping process as scholars integrate ICTs into their practices and work flows. My research protocols were approved by Cornell's Institutional Review Board (IRB) in February 2008.

My fieldwork took place during two periods: February through May 2008 and September 2008 through May 2009. It involved participatory observations and interviews. This chapter describes the methods I used in carrying out the study. The

following sections will elaborate on my survey methods including the research site, survey participants, and the protocols used for observations and interviews. Also included is a discussion of the supplementary data that supported the research as a part of my work-related responsibilities.

Qualitative Methodology

Research Site

In January 2008, I began my fieldwork at the Society for the Humanities, Cornell University, to form the foundation of my dissertation research. The Society was established in 1966 as one of the first humanities institutes in North America. Located at the A.D. White House (Figure 4.1), the Society brings a group of distinguished scholars referred to as "Fellows" together each year to pursue research on a broadly interdisciplinary focal theme. The Society provides an ideal research site as it fosters interdisciplinary dialogue and theoretical reflection on the humanities at large. The site makes it possible both to observe scholars' interactions and to engage personally with the Fellows.

Figure 4.1. The Andrew Dickson White House. Commonly referred to as the "A.D. White House," houses the Cornell University Society for the Humanities. The house was commissioned in 1871 by Andrew Dickson White, its namesake, and co-founder and first president of the university.

I was particularly interested in assuming a research perspective based on maintaining an open mind about the co-existence of traditional and digital scholarly practices, depending on the purposes and styles of scholars. As opposed to digital humanities centers that focus on fostering technological implementations, the Society brings scholars of common interests together to explore a given conceptual topic, which was an important factor behind my choosing this particular site. The convenience of the physical site for implementing an extended study also played a key role in my decision to conduct research at the Society.

Prior to my entering the research scene, the director of the Society explained my research goals and affiliation at Cornell and secured permission from the Fellows for me to participate in their meetings and events. They were uniformly welcoming and expressed interest in my study. I felt that my position at Cornell as an associate

university librarian overseeing information technologies further built my credibility as a researcher who is interested in understanding the actual needs of humanists as we conceptualize and develop technical solutions.

My Research Identity

Wolfinger (2002) observes that fieldnotes inevitably reflect the ethnographer's background, knowledge, and tacit beliefs. I would like therefore to offer some background information about my research identity. During the past sixteen years, my career has focused on the creation, use, assessment, management, and archiving of digital information and on the outcomes of such endeavors in learning, teaching, and research. Over the duration of this research, I have been an associate university librarian at Cornell University Library and have overseen the library system's digital infrastructure for a range of library programs and services. My position as the lead of the digital library program at a prominent research institution has provided me with a stimulating and readily available applied research environment and has been a factor in shaping my identity as a researcher. I have the opportunity to observe key players in scholarly activities and often lead projects that focus on specific aspects of these trends. Consequently during this research I was surrounded by data-gathering opportunities both as an associate librarian and as a doctoral student. As Lofland et al. argue, however, I believe that "getting personally involved with research does not contaminate data" (Lofland et al., 2006, p. 16). Because my educational background is in social sciences, my research at the Society was critical in understanding the premises and practices of humanities scholarship.

Participatory Observations

Starting in February 2008, this research involved approximately 160 hours of participant observations including attending seminars, lunches, and the Society-sponsored forums and conferences at Cornell University. During the course of the study, I participated in 34 weekly two-hour seminars and post-seminar luncheons that were attended by the Fellows on Wednesdays. I also participated in five symposiums and forums co-sponsored by the Society during the duration of this research. The goal was to expand my understanding of the research practices of the humanities scholars and to consider the potential and limitations of information technologies in facilitating scholarly communication by taking into consideration routine scholarly interactions and exchanges.

Each academic year, the Society has a focal theme that frames the weekly Wednesday seminars. Every week one of the Fellows presents a paper and opens it up for further elucidation and interpretation. These papers are often works-in-progress reflecting varying levels of readiness to be submitted as a final publication. I was not an active participant during the seminars and seldom contributed to the discussions, as they required background knowledge of the topics studied. However, I sat with the Fellows, listened, and took notes about the topics discussed, their research strategies, and the information sources or technologies mentioned. I also found the conversations during breaks, lunches, and forums useful in validating some of my observations, perceptions, and interview findings. Due to my affiliation with the Cornell University Library and knowledge of information technologies, we often talked about the Fellows' use of libraries and archives, their reactions to new digital humanities initiatives, or their experimentation with new applications such as Zotero.[35]

[35] *Zotero* is a research tool that helps gather, organize, analyze, and share citations and other sources of information. More information about the application is available at http://www.zotero.org/

I opted not to type my field notes and relied on my handwritten notes during the analysis phase of the study.[36] I used a six-by-eight-inch note pad and occasionally made photocopies of the pages to ensure that I would have a backup in case any of the note pads were lost. As shown in Figure 4.2, I filled three note pads during my study. I also read the discussion papers and kept them in a folder to remind me of discussion themes covered during the Wednesday discussions.

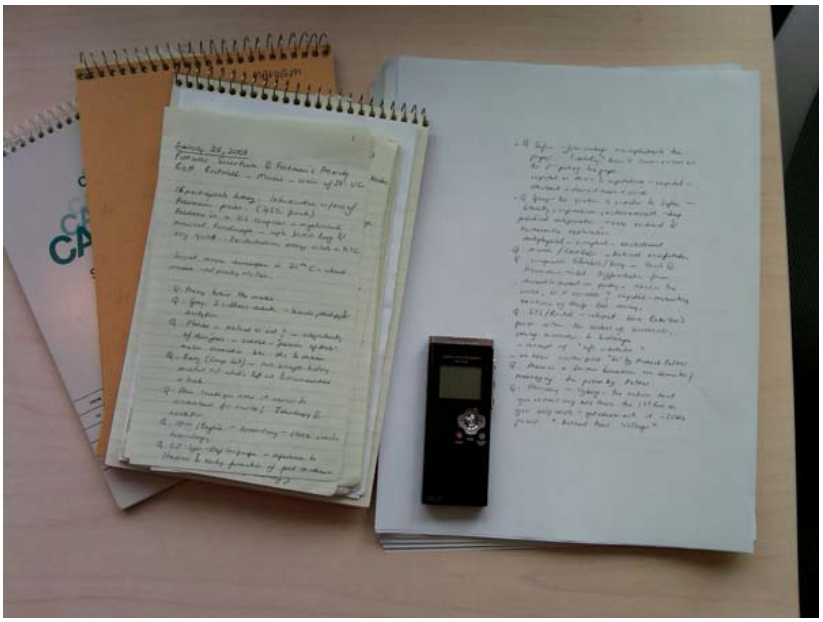


Figure 4.2. Fieldnotes and interview recording device. Shown in the picture are three note pads of fieldnotes, photocopies of the notes to back up the handwritten notes, and the audio recording device that was used to record the interviews.

Interviews

Over the course of the 22-month study, I conducted a total of 45 individual interviews, from February 2008 through November 2009 (excepting the summer sessions). I used a consent form approved as a part of the IRB review process (see

[36] I decided not to type my fieldnotes because I did not use any direct quotes in my data analysis. It was sufficient for me to read the notes and keep track of the main issues in the form of memos that were included in my data analysis.

Appendix 1). During the first year, after announcing my interest in interviewing the Fellows in one of the weekly seminars, I sent a personalized e-mail invitation to 23 Fellows and affiliated scholars in January 2008 (Appendix 2). From February through May of 2008, I interviewed 19 Fellows of the Society, 15 of whom agreed to be audio-recorded. During the second year, using the same protocol, I sent a personalized e-mail invitation to 23 Fellows and affiliated scholars in February 2009. By August 2009, had I completed 18 additional interviews, with informants in 16 of them agreeing to be audio-recorded.

From September through November 2009, I expanded my sampling strategy and conducted interviews with nine additional humanities scholars who were not associated with the Society, from both Cornell and other institutions. I intentionally talked with scholars who are not participating at the Society to test for potential biases introduced by being a Fellow and to understand if participation in the Society was a factor in shaping the emerging themes. These interviews took place from August 2009 through October 2009 and two of them were conducted at locations other than Cornell during my business trips. I recruited the informants through e-mail messages sent to 18 faculty members, 10 of them from Cornell University. Eleven of them accepted my invitation; however, I was able to interview only 9 of them due to difficulties in scheduling meetings and they all agreed to be audio-recorded. Although faculty members were all prior acquaintances, I felt that I had a better success rate with my interview requests with the Society Fellows. I attribute this to the fact that I developed a deeper rapport with the Fellows through my attendance at the weekly seminars and other Society-sponsored events.

The goal of the individual interviews was to gather information about the informants' scholarly practices and use of information technologies. Through an ordinary conversation, my objective was to understand the Fellows' points of view as

to what ICT entails in the humanities, how the Fellows are using information technologies in support of their research, and the changes they are observing in their practices. Using a semi-structured interview technique I was able to conduct loosely guided conversations with the informants (Weiss, 1994). Rather than adhering to a list of specific questions, my interview protocol involved a framework of themes and general questions to be explored. Appendix 3 includes a list of themes and questions used to enable me to formulate probes in a consistent manner. In my interviews, I gave a brief synopsis of what my research entails and then turned it over to the informants with an open-ended question: "Tell me about your typical week and how you go about your academic work." I interjected probes to elicit details and clarifications or to shift conversations to other topics.

I used an Olympus digital voice recorder to capture the interviews, which typically lasted from 35 to 65 minutes (see Figure 4.2). Within a week after each interview, I transcribed the recording as a Microsoft Word document. I organized the transcribed interviews and the audio files in three folders, as shown in Figure 4.3. Depending on the length of the interview, my single-spaced transcripts were from two to five pages long. The final analysis involved 151 pages of transcribed data. I will describe the process used in data analysis in the Data Analysis section.

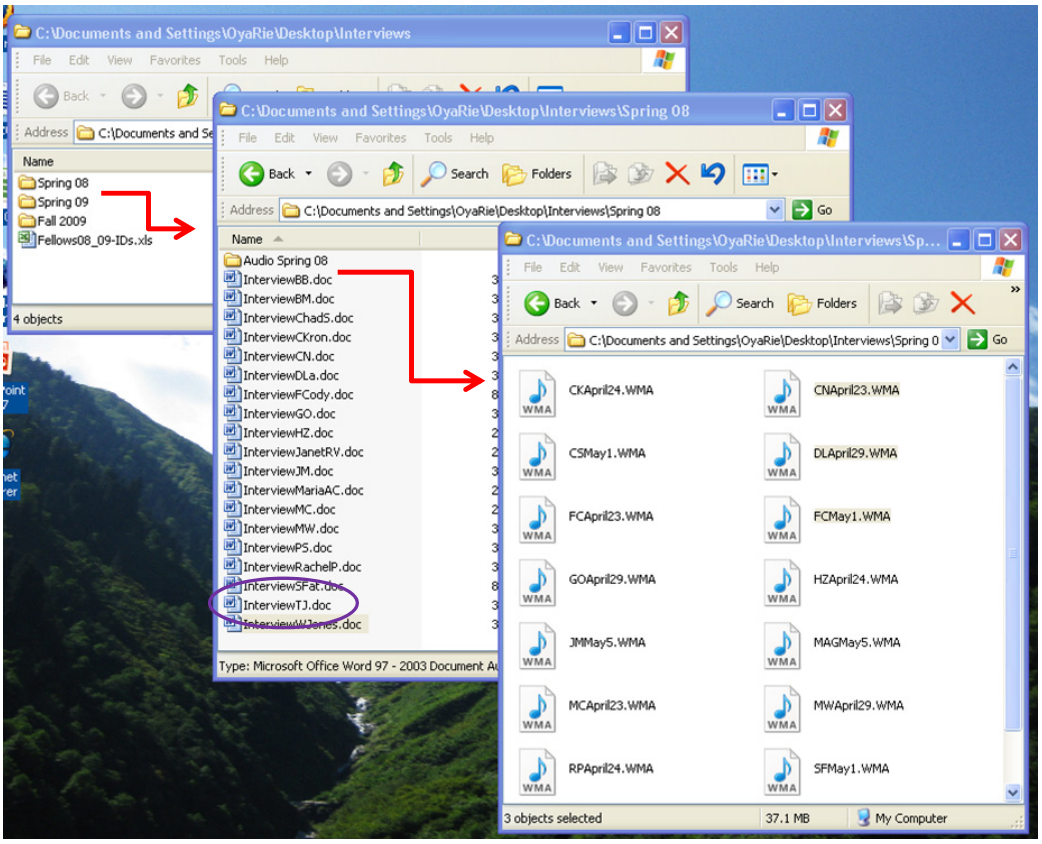


Figure 4.3. Organization of the interview files. I created three folders to organize the transcripts of the interviews and the associated audio files.

My participant observations formed an important implicit explanatory framework in my final analysis. The site interactions and participation allowed me to gather observation-based data that are grounded and confirmed by findings from the interviews. The interview process was a dialogue that provided access to the observations of others through their interior experiences (Weiss, 1994), whereas observations made while attending workshops, seminars, symposiums, and luncheons made it possible to view practices and conversations in situ. My participation in meetings and events of the Society allowed me to clarify or further expand on interview dialogues in order to improve the internal validity of my study.

About My Informants

My informants' demographic characteristics were evenly distributed, representing both genders and various ages and career stages (Table 4.1). There were 24 female and 21 male scholars, including doctoral students (7) and professors at the assistant (13), associate (15), and full (10) ranks. The informants were from several research universities in the United States,[37] including the programs at Columbia University, Cornell University, Emory University, George Mason University, Indiana University (Bloomington), Penn State University, Princeton University, the University at Buffalo, the University of California at Berkeley, the University of California at San Diego, the University of Illinois at Urbana-Champaign, the University of Michigan, the University of Minnesota, the University of Pennsylvania, the University of Pittsburgh, the University of Texas, the University of Toronto, the University of Virginia, Washington University at St. Louis, and Wayne State University. Representing 20 research universities, the informants were from the disciplines of anthropology (6), Asian studies (1), comparative literature (11), English (9), and history (13), history of art (2), literary theory (1), and philosophy (2). Almost all of them had joint appointments or associations, representing more than one sub-discipline. The secondary sub-discipline affiliations of the informants that are not represented in Table 4.1 include American, feminist, German, government, human sexuality, Jewish, Latin, Near Eastern, music, romance, science and technology, and visual studies.

[37] *Research university* is a category used by the Carnegie Classification of Institutions of Higher Education to indicate universities that are engaged in extensive research activities with doctoral programs.

Table 4.1. Informant Profile

Spring 2008						
Primary Discipline	*Female*	*Male*	*Doctoral Candidate*	*Assistant Professor*	*Associate Professor*	*Full Professor*
Anthropology	3	1	1	1	2	0
Comparative Literature	3	1	1	1	1	1
English	3	2	1	2	1	1
History	1	4	1	1	1	2
Literary Theory	1	0	0	0	1	0
Spring 2009						
Anthropology	0	2	0	1	1	0
Comparative Literature	5	1	1	2	1	2
English	2	1	2	0	1	0
History	1	5	0	4	0	2
Fall 2009						
Asian Studies	1	0	0	0	0	1
Comparative Literature	0	1	0	0	1	0
English	1	0	0	1	0	0
History	1	1	0	0	1	1
History of Art	2	0	0	0	2	0
Philosophy	0	2	0	0	2	0
2008-2009 Total						
Anthropology	3	3	1	2	3	0
Asian Studies	1	0	0	0	0	1
Comparative Literature	8	3	2	3	3	3
English	6	3	3	3	2	1
History	3	10	1	5	2	5
History of Art	2	0	0	0	2	0
Literary Theory	1	0	0	0	1	0
Philosophy	0	2	0	0	2	0
TOTAL	**24**	**21**	**7**	**13**	**15**	**10**

Note: Three of the scholars interviewed during Spring 2008 and Spring 2009 for the study were regular participants at the Society as visiting scholars at Cornell but were not considered Fellows.

In my accounts of the interactions with informants, I changed the names of the scholars in order to protect their anonymity, which was a condition for eliciting their candid comments and insights. To ensure that the informants would not be identifiable, I also altered their gender and primary disciplines in a few cases.

Prior to the interviews, I gathered information about each Fellow's academic background, publications, and other scholarly practices through a bibliographic database search as well as by looking at their Web pages and related online information. This information provided me with an understanding of each informant's academic background, research interests, professional contributions, and publishing history. I was able to customize my questions and probes based on these individual facts about the scholars. The interviews took place at the scholars' offices, allowing them to share with me actual examples, such as a book they had marked or a Google search they had conducted, in their immediate work spaces.

Supplementary Data

My position at the Cornell University Library has given me numerous opportunities to gather data based on interviews and observations. Although my data analysis is based on the data gathered specifically in support of my dissertation, my position at Cornell University Library deeply situated me in the circle of exchanges in scholarly communication and provided me with valuable insights in regard to the shifting information ecology. The purpose of this section is to highlight some of these affiliations that helped me assess the generalizability of my observations.

Throughout my research project, I was part of a team that represented Cornell in a Mellon-funded digital humanities planning grant. The team meetings, which involve faculty, librarians, and technologists, present useful opportunities for

expanding my understanding of opinions, interactions, and concerns surrounding the use of ICTs in scholarly communication.

I participate in The Ohio State University's NEH-funded initiative to establish a digital humanities program. I paid a three-day site visit to Ohio State in March, 2009 for interviews and discussions with faculty members involved in the project. The project, led by Professor Loui Ulman, explores a culture for the creation, description, access, and preservation of digital materials that is comparable to that of the print material culture in the humanities. These interactions allowed me to make observations and gather data in an academic setting that is distinct from that of the Society.

Another important source of supplementary data was gathered during my second year of research study at the Department of Communication. I collaborated with Stephen Purpura, a doctoral student in Computer and Information Science at Cornell, to investigate information-seeking behavior on the part of students and faculty. We explored how scholars in diverse disciplines move from a *need to find information*—such as building a literature review—to the *use of a search engine*. We approached the problem with an activity theory lens to acknowledge the contextual and situated nature of information gathering in support of learning and research. The study was based on a Web-based survey (with 96 respondents) and interviews with 32 faculty and students as well as on an analysis of informants' Google history logs. Since search engines are rapidly becoming a preferred method of discovering, retrieving, and organizing scholarly information, it is critical that we understand emerging trends, as search engines may have a tremendous impact on how scholarly information is discovered and retrieved (Rieger, 2009). My involvement in this study contributed to my dissertation research through the experience I gained in studying new media usage patterns and observing interdisciplinary differences reflected in use.

During the Spring 2008 semester, I was involved in a complementary research study that examined interdisciplinary collaborations (Nomura et al, 2008). I participated in the Weill-Cornell distributed interdisciplinary collaborations research, which explored factors that facilitate or inhibit interdisciplinary collaborations. The study was led by the Human-Computer Interaction Group at Cornell University. My participation in the study allowed me to explore the collaboration patterns of medical scientists and biomedical engineers. Although I did not use this data directly in my dissertation research, this research experience has been instrumental in helping me to perceive unique aspects of humanities collaboration patterns by comparing and contrasting the collaboration cultures of the Fellows at the Society and the Weill-Cornell research participants.

In the course of my work at the Cornell University Library, I have contributed to several collaborations and events that relate to my research domain. For instance, I was one of the organizers of the Forum on Scholarly Publishing in the Humanities that was held at Cornell University on November 7-8, 2008 at the Society for the Humanities.[38] The goal of the forum was to examine the future prospects of scholarly publishing in the humanities in light of changes in systems of information exchange in society at large. Another example is my involvement in a newly forming digital humanities collaboration that is led by Professor Timothy Murray, director of the Society for the Humanities. In September 2009, the Society and the Jackman Humanities Institute at the University of Toronto initiated a two-year pilot project in the digital humanities to pool the projects carried out at the two partnering institutions in the digital humanities to imagine how digital culture might reshape the humanities. I represent the Cornell University Library in this joint effort.

[38] The program for the two-day forum can be found at http://www.library.cornell.edu/publishingforum/

Data Analysis: Grounded Theory Implementation

My data analysis strategy was based on a grounded theory methodology. Grounded theory is an inductive method of discovery that allows the development of theoretical accounts of research questions while simultaneously grounding the explanations in empirical observations (Glaser & Strauss, 1967). Grounded theory may be implemented in either of two ways (Hunter, 2004): It can be used as a research philosophy in which a research inquiry is approached without an a priori research framework or theoretical context. On the other hand, as I applied it in my study, grounded theory may also be used as a technique for analyzing data.

Grounded theory's *constant comparative method* involves analyzing and interpreting data through a systematic comparison of observations and accounts (Stauss & Corbin, 1998). This process refines data and allows categories and associated properties to emerge.[39] Through a comparison of interview transcripts, I clarified and narrowed down my broader constructs, such as scholarly practices, in order to gradually sharpen the focus of my research questions, based on empirically grounded definitions and explanations. Constructivist interviews emphasize participants' definition of terms, situations, and events (Charmaz, 2002). Although I used social informatics as a heuristic framework for exploring the dynamics and consequences of ICTs, grounded theory techniques helped me to refine my main research constructs, such as describing ICTs within the context of humanities scholarship, to yield empirically grounded definitions. Implementing a grounded theory methodology in my data analysis enabled me to follow a constructivist method by starting with a central topic and proceeding based on the informants' interpretations of my research goals and terminology.

[39] In grounded theory, a category, for example "reading," is a conceptual element of a theory. Properties describe the conceptual aspects of such a category, such as types of reading. Hypotheses emerge as relations among categories and properties (Glaser & Strauss, 1967).

Theoretical Saturation as Sampling Methodology

Grounded theory entails a unique sampling philosophy. Unlike probabilistic sampling that is designed to yield statistical inferences by giving every unit in the population an equal chance of being selected, grounded theory's *theoretical sampling* strategy aims to gain a deeper understanding of examined cases to facilitate the development of an analytic frame. It is a purposive sampling strategy undertaken to increase the diversity of the cases and interviews in search of a variety of categories and properties. In this way the researcher continues adding data sources (new informants or case study sites) to acquire new data, fill out categories, discover variations, and define gaps between categories until achieving *theoretical saturation*, which indicates diminishing returns after which no additional data are being found to develop new categories or to expand properties (Glaser & Strauss, 1967). Rather than striving for generalizability, theoretical sampling is designed to provide empirically grounded descriptions against which other contexts can be compared (Baym, 2009).

When I started my research, I did not have a predefined number of interviews. I decided to adhere to the main principle of grounded theory and seek theoretical saturation. Although each scholar I talked with provided unique insights, around approximately the thirtieth interview I began noticing remarkable similarities. I appreciate the value of each conversation, as each added depth and color to my analysis; however, I decided to stop sampling when I reached a sense that there was a consistent story (or stories) to share in this dissertation.

During the last phase of my research, conducted from August 2009 through November 2009, I intentionally talked with scholars who were not participating at the Society to understand if participation in the Society was a factor in shaping the emerging themes. My interviews with nine scholars from Cornell University and

elsewhere continued to reveal similar use patterns and perceptions. I decided to stop when I reached the ninth interview in order to channel my efforts into presenting my findings.

Data Analysis

The data analysis process involved three stages (Table 4.2).[40] I present these as discrete stages; in practice, however, they were intertwined. Grounded theory researchers gather data and analyze simultaneously, so observations, conversations, and analyses together form the research continuum (Charmaz, 2002).

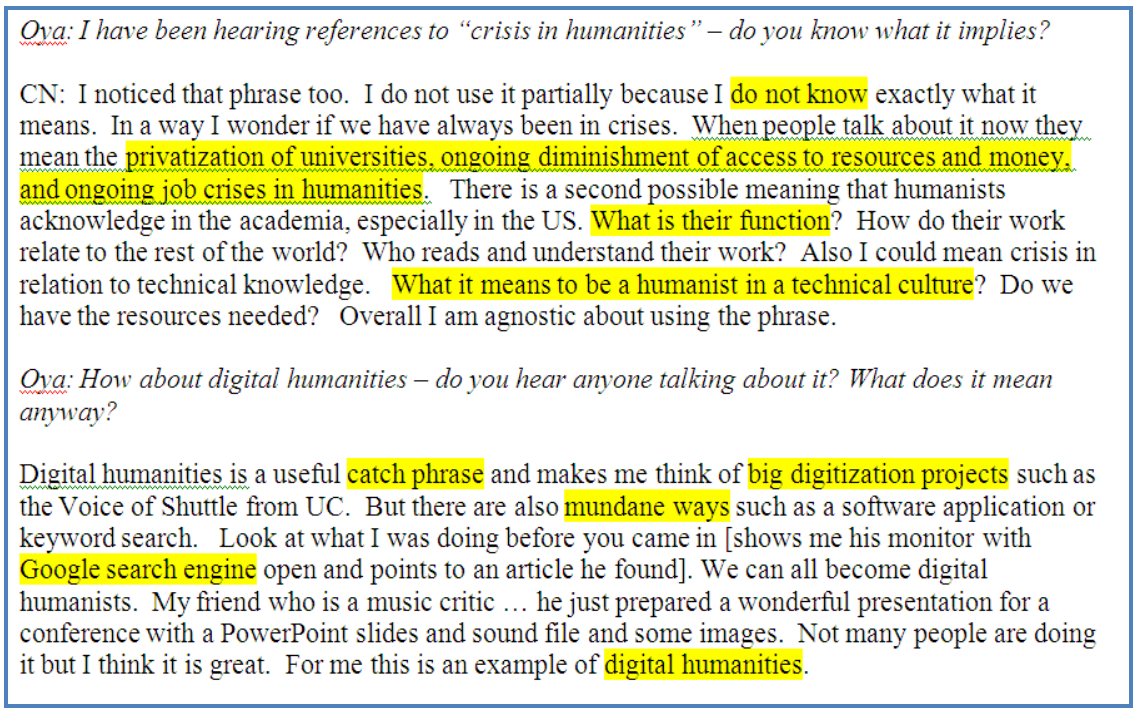
Table 4.2. Grounded Theory Data Coding Stages and Phases of Analysis *(Strauss & Corbin, 1998)*

Coding Stage	Goals
open coding	Read the transcribed interviews and identify relevant sections in the form of keywords and sentences that relate to the constructs of interest
axial coding	Using the constant comparison method, organize the keywords identified during open coding under core categories by merging and modifying them based on comparing the interview transcripts with each other.
selective coding	Analyze the themes that emerged through axial coding in order to allow theories or "stories" to emerge

Open Coding. First, I examined the interview transcripts to code the informants' statements by identifying key words and phrases used as they shared their accounts (Figure 4.4). The goal of the *open coding* (Strauss & Corbin, 1998) stage was

[40] There are several software programs available for analyzing qualitative textual data produced from interviews and observations. The automated content analysis process involves a systematic technique for distilling the text into fewer content categories based on explicit rules of coding. Examples of software in this category include ATLAS.ti 5, MAXqda 2, and QSR NVivo 7. After considering using a content management application for data analysis, I opted for using Excel in organizing and using manually coded data. I decided that reading the interview transcripts and identifying categories and themes would help me take into consideration the characteristics of the informants of the study and enrich my analysis process. It would have been complicated to achieve this goal through an automated data analysis approach.

to find nouns and verbs related to the concepts of interest to me. The coding categories were a combination of pre-designed codes based on my social informatics research framework and codes that were inductively discovered from the data. I also sought out adjectives and adverbs as the properties of these categories. I highlighted the words, phrases, and sentences that contained such properties in yellow.



Oya: I have been hearing references to "crisis in humanities" – do you know what it implies?

CN: I noticed that phrase too. I do not use it partially because I do not know exactly what it means. In a way I wonder if we have always been in crises. When people talk about it now they mean the privatization of universities, ongoing diminishment of access to resources and money, and ongoing job crises in humanities. There is a second possible meaning that humanists acknowledge in the academia, especially in the US. What is their function? How do their work relate to the rest of the world? Who reads and understand their work? Also I could mean crisis in relation to technical knowledge. What it means to be a humanist in a technical culture? Do we have the resources needed? Overall I am agnostic about using the phrase.

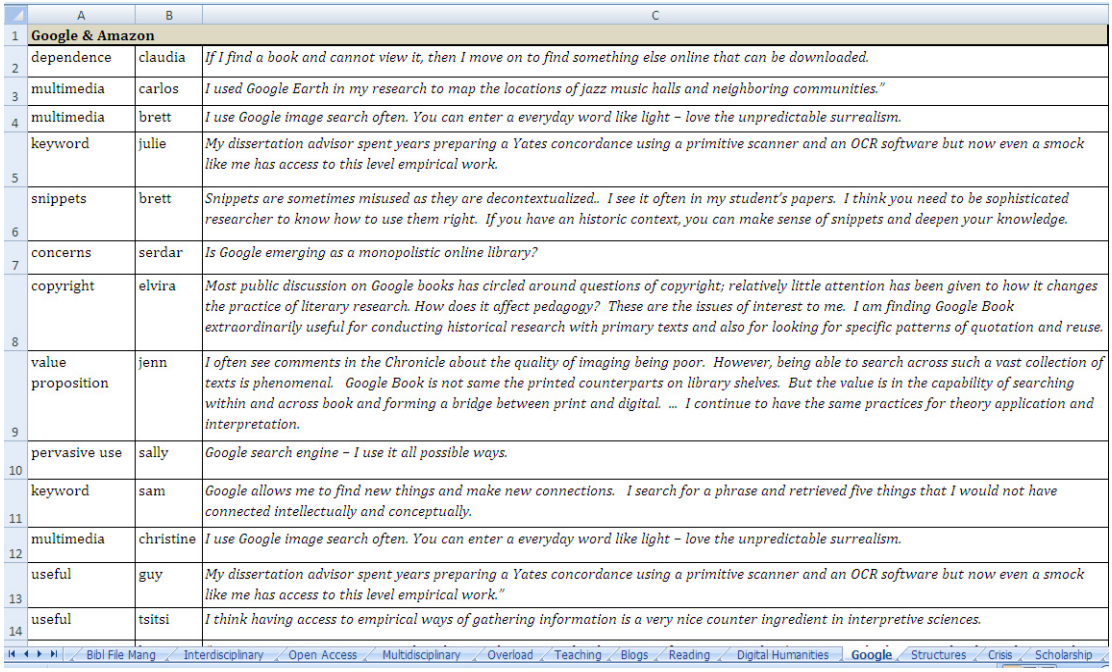
Oya: How about digital humanities – do you hear anyone talking about it? What does it mean anyway?

Digital humanities is a useful catch phrase and makes me think of big digitization projects such as the Voice of Shuttle from UC. But there are also mundane ways such as a software application or keyword search. Look at what I was doing before you came in [shows me his monitor with Google search engine open and points to an article he found]. We can all become digital humanists. My friend who is a music critic … he just prepared a wonderful presentation for a conference with a PowerPoint slides and sound file and some images. Not many people are doing it but I think it is great. For me this is an example of digital humanities.

Figure 4.4. Open coding. Based on my broad research questions and social informatics as my research framework, I read the interviews closely and highlighted adjectives and adverbs as the properties of the interviews. This is an emergent and interpretive act without a predetermined list of keywords.

Axial Coding. During the second phase of analysis, I used the constant comparison method to create core categories by merging and modifying categories based on comparing the interview transcripts with each other. I distilled the open coded accounts of the informants into seventeen broad categories. I created a Microsoft Excel spreadsheet for this purpose and used a separate sheet for each

category. Figure 4.5 provides a screen-shot that shows a portion of the spreadsheet for the category "Google & Amazon." Table 4.3 includes information about the number of quotes in the spreadsheet and how many of them were used in this paper.



	A	B	C
1	**Google & Amazon**		
2	dependence	claudia	*If I find a book and cannot view it, then I move on to find something else online that can be downloaded.*
3	multimedia	carlos	*I used Google Earth in my research to map the locations of jazz music halls and neighboring communities."*
4	multimedia	brett	*I use Google image search often. You can enter a everyday word like light – love the unpredictable surrealism.*
5	keyword	julie	*My dissertation advisor spent years preparing a Yates concordance using a primitive scanner and an OCR software but now even a smock like me has access to this level empirical work.*
6	snippets	brett	*Snippets are sometimes misused as they are decontextualized.. I see it often in my student's papers. I think you need to be sophisticated researcher to know how to use them right. If you have an historic context, you can make sense of snippets and deepen your knowledge.*
7	concerns	serdar	*Is Google emerging as a monopolistic online library?*
8	copyright	elvira	*Most public discussion on Google books has circled around questions of copyright; relatively little attention has been given to how it changes the practice of literary research. How does it affect pedagogy? These are the issues of interest to me. I am finding Google Book extraordinarily useful for conducting historical research with primary texts and also for looking for specific patterns of quotation and reuse.*
9	value proposition	jenn	*I often see comments in the Chronicle about the quality of imaging being poor. However, being able to search across such a vast collection of texts is phenomenal. Google Book is not same the printed counterparts on library shelves. But the value is in the capability of searching within and across book and forming a bridge between print and digital. … I continue to have the same practices for theory application and interpretation.*
10	pervasive use	sally	*Google search engine – I use it all possible ways.*
11	keyword	sam	*Google allows me to find new things and make new connections. I search for a phrase and retrieved five things that I would not have connected intellectually and conceptually.*
12	multimedia	christine	*I use Google image search often. You can enter a everyday word like light – love the unpredictable surrealism.*
13	useful	guy	*My dissertation advisor spent years preparing a Yates concordance using a primitive scanner and an OCR software but now even a smock like me has access to this level empirical work."*
14	useful	tsitsi	*I think having access to empirical ways of gathering information is a very nice counter ingredient in interpretive sciences.*

Figure 4.5. Axial coding. Screen-shot of a portion of the Google and Amazon worksheet. The first column includes a keyword or a phrase as attributes of a given category (Google and Amazon), the second column includes the first name of the informant, and the third column includes a direct quote taken from the interview transcripts that is related to the category. The bottom tabs show how the worksheets were organized under seventeen themes (in this screen-shot, showing thirteen out of seventeen categories).

Table 4.3. Quotes Used in Analysis.

Themes	*Total Number of Quotes*	*Number of Quotes Used the Paper*
ICT	39	19
convergence	28	2
open access	38	13
online information	49	9
online forums	26	13
information management	22	7
interdisciplinarity	53	18
multidisciplinary	23	19
overload	22	5
teaching	24	6
blogs	28	13
reading	89	15
digital humanities	47	5
scholarship	25	6
Google & Amazon	22	3
structures	28	10
crisis	27	5
Total	590	168

Total number of quotes used in axial coding and number of quotes that are used in this study in each category. Each quote was one- to seven-sentence long. The number of quotes used in the paper indicates both full references and also parts taken from a full quote.

Selective Coding. The third phase involved analyzing the themes and matching them to my specific research questions in order to allow theories to emerge (Figure 4.6). Theories describe sets of well-developed categories, themes, and concepts that are systematically interrelated (Hage, 1972). The quotes were organized under theoretical memos. Chapters 5 through 7 describe the key themes that emerged as a result of this three-step data analysis process.

1.3: Are ICTs playing a role in changing writing and reading patterns?

- Several of the informants reported that they observe changes in their reading and writing habits. Screen-based reading is being characterized as facilitating new processes – not fully replacing paper-based reading. References to declined sustained attention, more time spend on online browsing:

I still feel like I am learning to read and comprehend online. B3

I read less broadly because I can go online and find exactly what I want. B5

By downloading and printing, I feel a sense of commitment to read the article. B7

New media have impact on both our notions of textuality and on the context in which these materials are used and consumed. B12

What I find out is that if I check out a book, I'll read a couple of chapters. I tend to be much more selective if I am reading online. B14

I do not do well reading online but it is helpful in determining if I want to get the entire book so I use those – go to the table of contents and select a couple of chapters to skim through a couple of paragraphs so will decide whether purchase the book or get it from the library. B18

A wonderful benefit of Kindle is having large quantities of books available at your fingertips. You do not need to carry them around or leave one of them at home or forget to bring it to a project meeting. But I miss flipping through books. It just does not feel organic. I wonder if this is a generational issue. But my students also share the same concerns with me. Learning still stems in physical interactions with the books through the practiced of markings, highlighting, putting markers. Even I see my freshman students putting margin notes. B21

Figure 4.6. Selective coding. I distilled the coded accounts organized through axial coding into themes such as "changes in writing" guided by my broad research questions. This stage also involved writing brief memos (the first bullet in Figure 4.6) that described the core themes exemplified in sample quotes selected from the interviews. The numbers following the quotes indicate the informants' ID numbers.

Assessing Quality in Qualitative Research

My research involved an in-depth case study based on theoretical sampling and sought to gather detailed knowledge about scholarly interactions with information technologies. The goal was to understand configurations among phenomena of interest rather than to demonstrate direct relationships among variables. Qualitative research is

a situated activity and attempts to make sense of specific settings with complex and evolving social interactions. Therefore, as Maxwell notes, "the cultural analysis is essentially incomplete" (1996, p. 87). This fact does not, however, rule out the importance of implementing some common strategies to assess the quality and soundness of qualitative research. I took the following measures to improve the validity and reliability of my study (Mayring, 2007; Lofland et al., 2006; Ragin, Nagel, & White, 2004; Maxwell, 1996; Kirk & Miller, 1986):

- Provided detailed accounts of my sampling strategy, observations, interviews, and data recording techniques in order to help readers assess the reliability of data-gathering techniques
- Explained my data coding and analysis procedures to allow readers to understand the basis of my description, analysis, and interpretation and how I have reached certain conclusions
- Presented my theoretical framework in relation to the research questions, findings, and implications for design and policy
- Made my research experience accessible to readers of the dissertation by providing descriptions of conversations and observations with direct quotes from my informants
- Included candid remarks about the successes and failures of my case study approach and provided transparency by sharing the challenges I faced during my study
- Triangulated my observations, interview findings, and related articles and supporting documents in order to achieve in-depth understanding
- Compared my findings at the Society from academic years 2007–2008 and 2008–2009 as they entailed two distinct groups of academics and research themes

- Developed analytical (rather than statistical) generalizations about my methodology to demonstrate the replicability of the research procedures
- Offered alternative explanations and reported negative cases to allow readers to evaluate my analysis and interpretations
- Solicited *members' checks*[41] by asking for feedback on my interpretations from selected informants, and sought feedback from my fellow researchers

Although the above research principles may not be sufficient to assure quality, they strengthened my ability to derive conclusions and make assertions. I used grounded theory for inductive coding; however, the tenets of social informatics guided my descriptions and analysis. I did not use the social informatics principles as hypotheses but rather as notions for understanding configurations. They helped me to reveal tensions and ambiguities, which are difficult to articulate as stand-alone presumptions.

Throughout my analysis, I used excerpts from my interactions with the Fellows to provide evidence for my assertions. My goal was to facilitate understanding of the informants' points of views. Although I interpreted their statements, the readers of the dissertation may attach alternative meanings to these accounts.

There are two strategies for including interview excerpts (Weiss, 1994). The preservationist approach presents the original speech by reproducing the sounds on the tape as accurately as possible without correcting nonstandard grammatical constructions. The second approach allows minor edits to make excerpts easier to

[41] *Member checking* involves clarifying statements made by the research participant during the course of a conversation or interview. It also implies reporting back to participants to get their feedback on what was written about them. During my interviews, I often checked to make sure that I was not misinterpreting the informants' comments, such as saying, "If I understand you correctly, you consider writing in different languages as a form of interdisciplinarity."

grasp for readers. I chose the preservationist approach to reflect the conversational tone of my interactions with the informants.

One of the characteristics of qualitative research is that researchers are active partners with research subjects in the construction of descriptive and explanatory knowledge (Hesse-Biber & Leavy, 2006). In taking my research stance I assume that social reality is relational and subjective, produced during the research process. The ultimate value of this research should be based on an assessment of how it adds to our substantive knowledge of humanists' interactions with new media and the dynamics of these associations.

CHAPTER 5: EMBEDDEDNESS—SCHOLARLY PRACTICES AND TECHNOLOGICAL AFFORDANCES

Preface to the Data Analysis

The goal of Chapters 5 through 7 is to synthesize the findings of my study by describing the themes that have emerged from the observations and interviews. I began this study with three broad and interrelated questions that have stemmed from my interest in understanding the dynamics of digital humanities. Also instrumental in the development of the questions were the insights I have gained over the last 16 years as a librarian at a prominent research library. The broad research questions were further considered through a literature review that identifies the viewpoints of related studies on these issues and helps to situate my work within that scholarly landscape.

As previously described, I formulated my research questions broadly to allow themes and more specific queries to emerge based on the data-gathering process. I will present the emerging conclusions by using the key tenets of the social informatics framework: embeddedness, configuration, and duality. Although these principles are distinct in meaning, they are interconnected and interrelated. Therefore, although I made an effort to present my findings under three distinct categories, there are natural overlaps and associations among them, which are often pointed out during my discussion of the findings.

Wolcott (1994) suggests that qualitative data are transformed into interpretations by describing key themes and analyzing them through comparison and contextualization. The discussion over the next three chapters lets the body of data speak for itself through the use of quotes selected from the transcribed interviews.[42] I

[42] I decided to use terms like "a few" or "some" in communicating the proportion of cases that have particular characteristics. This was based on adhering to Weiss's (1994) recommendation that the use of

chose quotes based on three factors. First, many of the chosen quotes illustrate commonly held perspectives indicating the prevalence of corresponding opinions and relationships. Second, I selected certain quotes to illustrate tensions and to reveal variances in opinions. Third, also included are seldom-expressed opinions that were in the minority within the context of my interviews. I adopted a preservationist approach to selecting excerpts and presented the original speech by reproducing the sounds on the tape as accurately as possible without correcting nonstandard grammatical constructions.[43] Although the quotes are primarily drawn from the interviews, my participant observations formed an important implicit explanatory framework in structuring my analysis.

Introduction to Embeddedness

In this chapter, I focus on the *embeddedness* principle, which implies that technology deployment cannot be fully understood without comprehending how a specific technology is rooted in its social and cultural context. As described in the literature review chapter, I view the humanities as a cluster of disciplines to differentiate it as a community of scholars bound within the same subject area, procedures, and theories, using similar research methodologies. Understanding the subject area's research methods, knowledge production structures, and communication and collaboration patterns creates a social context within which to interpret the role of information and communication technologies (ICTs) in academic work. Therefore, I

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more precise figures do not make the study more valuable and they may be misleading in qualitative studies. I agree with his argument that precise statements such as "73 percent" would suggest that the proportion was an important finding.

[43] As noted in the research methods chapter, there are two strategies commonly deployed for including interview excerpts (Weiss, 1994). The preservationist approach presents the original speech by reproducing the sounds on the tape as accurately as possible without correcting nonstandard grammatical constructions. The second approach allows minor edits to make excerpts easier for readers to grasp. I chose the preservationist approach to reflect the conversational tone of my interactions with the informants.

begin by characterizing my informants' scholarly practices, such as their research and collaboration patterns. I then describe what constitutes ICT for the informants within the context of their scholarship, based on their interpretations.

This chapter aims to characterize humanities scholarship to form an interpretive foundation for the following chapters that present a more detailed account of how a discussion of ICTs engenders the following research questions:

- What are the characteristics of humanities scholarship?
- What does the term "research methods" indicate?
- What does collaboration or interdisciplinarity entail in the humanities?
- What are the disciplinary structural elements that influence ICT adoption and use patterns?
- Which technologies are considered ICTs in support of humanities scholarship?

Characteristics of Humanities Scholarship

Humanities Themes

Each year, the Society adopts a focal theme that frames the weekly Wednesday seminars in which one of the Fellows presents a paper that is then a topic of discussion, providing an opportunity for further elucidation and interpretation. These papers are often works-in-progress reflecting varying levels of readiness for submission as final publications. The papers are distributed in advance to allow the Fellows to prepare for the weekly presentations. My participation in the Wednesday presentations of the Fellows provided me with several rich examples of research domains and methodologies of interest to my informants. The discussion topics were extremely diverse, illustrating the creative process behind humanities scholarship.

The focal theme for 2007-2008 was "improvisation." The theme elicited papers exploring tensions between reason and creativity and between improvisation and design. The weekly seminars touched on the friction between "planned and controlled" and "improvisational and spontaneous" dimensions of knowledge creation. The paper topics spanned a broad range, including the role of contemporary Asian art in modernization and cultural production; improvisation of identities in the early modern Mediterranean; exploring computer programming as a space for improvisation; the use of visualization technologies in the Mars Exploration Rover program; Morton Feldman's musical landscape and the impact of postwar scientism on his style; variances in the identity of Cervantes from Don Quixote de la Mancha; and American poet Nathaniel Mackey's *Bedouin Hornbook* (1986).

The focal theme during 2008-2009 was "water" and the papers and discussion topics reflected a broad range of perspectives and topics, including women and historic change in Nigeria, South East Asia sea gypsies, ecology in Japanese art, liminality in maritime archaeology, water management across the French Mediterranean, the earliest hajjis from Southeast Asia, and the privatization and commercialization of water. For instance, one of the papers explored the outbreak of methyl-mercury poisoning in Minamata Bay (Japan) in 1953 and the adventures of Michiko Ishimure, who was transformed by the crisis from a shy housewife into an environmental activist, writing a book about the epidemic that won several awards. Scholars regarded water as a medium of conflict, boundary, cultural division, migration, commerce, performance, and music.

Each Fellow came to these presentations with a printed copy of the paper (often underlined and annotated) to be discussed that week. It was very unusual to use PowerPoint slides and I have not seen anyone taking notes using a computer. During their exchanges, the Fellows suggested related readings to each other, associated the

presented notions with relevant social theory, related presentations to their own projects, and asked questions to clarify or confirm. Although I made a point to read the papers in advance, my background in social sciences did not always enable me to follow and appreciate the main theses of the arguments. I purchased a dictionary of humanities to help me gain familiarity with humanities terminology, including such terms as *textuality*, *third space*, *liminality*, *symbiotic*, *disembodiment*, *posthumanism*, and *semiotic* (Payne, 1997). I also read the seminal works of commonly-referenced social theorists to familiarize myself with their ideas.[44]

During the two years or so I spent conducting this research, attending the Wednesday forums became an intellectual treat for me. I found each topic highly engaging and the introductory presentations and following discussions were captivating, provocative, and stimulating. My participant observations formed an important, albeit implicit, explanatory framework in my data analysis. The site interactions and participation allowed me to gather observation-based data that are grounded and confirmed by findings from the interviews.

The Epistemological and Ontological Basis of the Humanities

It is useful to offer a brief characterization of the epistemological and ontological stances of the humanities in order to situate the following discussion of the subject area's research methods. It is important, however, to note that the scholarship domain is rich and diverse and should not be generalized. My goal in the following discussion is to describe the key characteristics in order to illustrate the epistemic and ontological attributes of the academic domain.

[44] I am grateful to Professor Phoebe Sengers for offering a graduate course that discusses social theory within the context of information science. I took the course, which is jointly offered by Information Science and Science and Technology Studies, during the Spring 2007 semester and found it instrumental in helping me to comprehend the philosophical basis of humanities inquiries.

Qualitative researchers approach their studies from a certain worldview, which is based on a set of assumptions and beliefs that guide their inquiries. From an ontological stance, which defines the relationship of the researcher to the nature of reality, humanities scholars assume that multiple truths exist, as they are constructed by individuals with diverse viewpoints.[45] The goal of researchers is to provide evidence of diverse perspectives rather than to pursue an ultimate universal truth. Humanities research is grounded on a subjective epistemology involving interpretive and critical stances in understanding the nature and origin of knowledge (Creswell, 2007).[46] The knowledge-building process for the Fellows' papers and discussions was often based on a subjectivist stance.

The philosophical cornerstones of humanities epistemology are hermeneutics and phenomenology. Hermeneutics involves interpreting the meaning of texts, symbolic artifacts (such as sculpture or architecture), and social interactions from another individual's perspective and appreciating the cultural and social forces that may have influenced various points of view (Creswell, 2007). The papers and discussions at the Society illustrated the hermeneutic circle, which involves going back and forth between social theory, knowledge, historic settings, and the researcher's own values. Complementing this approach, phenomenology is based on the notion that knowledge is not found in external experiences but in individual consciousness (Hesse-Biber & Leavy, 2006). It revolves around a search for subjective

[45] Miller classifies ontological stances as realistic, nominalistic, and social constructivist. The realist perspective views the world objectively, believing that there is a world outside of our own experience and cognitions. Nominalists see the world subjectively, claiming that everything outside of one's cognitions consists simply of names and labels. Social constructionists claim that reality is neither realistic nor nominalistic but is co-created.

[46] Chua (1986) classifies research epistemologies into positivist, interpretive, and critical. Positivists believe that it is possible to understand and explain the social world by exploring regularities and causal relationships among various factors. By contrast, those undertaking interpretive studies explicitly adopt a nondeterministic perspective, attempting to explore phenomena of interest in their natural settings, consciously avoiding a priori judgments. Critical studies aim, through the exposure of deep-seated structural problems, to critique the status quo and remove contradictions from organizations and society.

understanding rather than for objective, causal, and universal explanations. The basis of knowledge-building for the subjects of this study was primarily individual experiences of things, as there is not "one reality" but multiple ones based on how individuals are creating an understanding of social life.

Research Methods in the Humanities

Research in the humanities often involves the analysis and interpretation of evidence, but the subject matter ranges over constructs that are often not quantifiable or open to experiment. As one of the historian Fellows said, "Humanities research involves examining and interpreting historical perspectives, critical analysis, and expressing insights in a narrative form." Here the term "research methods" essentially refers to the information-gathering process and includes any preparatory work that leads to discovery through reading, writing, and interpreting. When I asked about the underlying knowledge that supports their papers, the Fellows offered a rich set of sources.

The Fellows often referred to the data that supports their work as "evidence" and used the term "project" when they were talking about the research process behind their studies. Evidence is gathered through conducting library research to identify and locate published materials; analyzing primary sources such as manuscripts, oral or visual records, and ethnographic field observations; and using forms of creative expression such as films or art objects. The foundation of many papers presented at the Society was provided through field studies that brought the Fellows closer to understanding social worlds and lives through direct observations.

A few of the informants were involved in teaching courses in research methods in the humanities. They characterized the main purpose of including research methods in the curriculum as that of teaching the skills that are necessary for locating,

evaluating, managing, and using information to emphasize resource analysis, evaluation, and comparison.

Also, it was a common practice to contrast humanities research methods with those quantitative techniques that are preferred by scientists. As one of my informants noted, "Statistical analysis is antithetical" to the scholars' approaches. Social analysis seeks understanding rather than predicting or controlling. Humanities research methods involve the interpretation and application of social theory to bring new insights into the phenomena studied.

Deconstruction

The goal of the Wednesday discussions at the Society was to deconstruct arguments, not to criticize or validate opinions.[47] When Alex said, "The humanities is open for interpretation; computing seeks logic, and reduction, and order," he captured the sentiments of many of my informants. Deconstruction denotes the process of discovering, recognizing, and uncovering underlying assumptions (Culler, 1982). It emphasizes that discourses, meanings, and readings are historical and produced in a process of contextualization and decontextualization. The purpose is not indeterminacy for its own sake; deconstruction is meant to situate concepts differentially and to elucidate the heterogeneity of texts. At the heart of deconstruction is looking at what is pushed aside and making it central by moving it from the margins to the center of focus.

One of the purposes of deconstruction is to bring to the surface and examine concealed hierarchies, oppositions, inconsistencies, and contradictions. The basic premise is that "knowledge claims must be set within the conditions of the world

[47] Jacques Derrida coined the term 'deconstruction,' which refers to a philosophical theory of criticism (usually of literature or film) that seeks to expose deep-seated contradictions in a work by delving below its surface meaning.

today and in the multiple perspectives of class, race, gender, and other group affiliations" (Creswell, p. 79). These conditions are often negative, and are manifested in the form of hierarchies, power relationships, and control.

The Role of Social Theory in Research Methods

Humanities scholars rely heavily on social theory in analysis and representation. Social theory attempts to make sense of the social world and seeks to explain change in society (Kivisto, 2008). The papers and ensuing contemplations I witnessed during my observations at the Society often referred to prominent social theorists such as Jean Baudrillard, Jürgen Habermas, Herbert Marcuse, Max Horkheimer, Paul Ricoeur, Friedrich Nietzsche, Martin Heidegger, Jean-François Lyotard, Jacques Derrida, Michel Foucault, Karl Marx, Sigmund Freud, Butler Benhabib, and Dorothy Smith. The Fellows approached social theory not only as a historic narrative of ideas but also as a set of notions they applied in constructing their interpretations and explanations.

Often discussed was the relevance of the seminal works of influential social theorists for illuminating contemporary matters and social phenomena. For instance, when the Fellows discussed Pierre-Félix Guattari's "The Three Ecologies" (1989), they considered his notion of "ecosophy," which involves three related ecologies of the environmental, mental, and social worlds and their amalgamation into a methodological practice. Guattari argues that the current vision of ecology is flawed insofar as it is commonly characterized as merely an environmental struggle. He argues that only by broadening our views to factor in the mental and social ecologies we will we be able to achieve any enduring changes in our cultural, social, and natural environments. At the heart of the discussion premise was that, just as many biological species are disappearing at an alarming rate, so some areas of human thought, feeling,

and sensibility are becoming extinct through the power of mass media. As the Fellows expressed their perspectives and responded to each other's comments, they were interpreting Guattari's notions differently based on their own stances and reading of the text. The article was originally written in French with multiple English translation editions. One of the issues discussed was the subtle variations in its English versions due to the meanings the translators associated with Guattari's text.

Reading as Core Research Activity

Reading, which is a critical process in research, is a multiply nuanced concept, with each type serving a unique purpose. The scholars I interviewed referred to multiple types of reading such as deep reading, close reading, skimming, or eyeballing.[48] They emphasized that re-reading was a significant part of interpretative work and involved periodic interactions with selected texts. This characteristic of reading is well articulated by Fred, a doctoral student in anthropology: "Knowledge work in the humanities is a different kind of endeavor. We read slowly, reflectively; annotate, and visually memorize." Julie, a professor of history, characterized her reading process thusly:

> One of the things I enjoy about literature is close textual reading. It has been very helpful for me as a historian because I find that you are not only reading facts to confirm what you are trying to make. Sometimes you need to read for the silences—what are the things that are not there and what are the words people are using. They are signifiers of a whole range of things. Literature people do that too, so conversations with literary scholars help me to read the documents—particularly because I am studying the history of people who do not leave a lot of documentary evidence.

[48] Kirschenbaum (2007) and Palmer & Neumann (2002) describe how humanists practice multiple types of reading such as deep reading, close reading, and 'not-reading.' Close reading is a thorough and careful reading process, whereas not-reading involves skimming or eyeballing the text.

I will further elaborate on reading patterns as I describe my informants' behavior in online reading environments.

The reading process is intertwined with writing. Re-reading is a significant part of interpretative work and involves periodic interactions with selected texts. Writing is stimulated through reading and note-taking and annotations are critical to the process.

Collaboration and Interdisciplinarity

One of the goals of my research was to understand the consequences of ICT use on collaboration and interdisciplinarity patterns. However, I first wanted to comprehend what collaboration entails and how it is perceived by humanists. Hence, my questions regarding collaboration and interdisciplinarity were posed as general statements about research partnerships and cross-disciplinary interests without specific reference to the role of technologies. I collected a wide range of interpretations and opinions on collaboration and interdisciplinarity in the humanities.

Interpretation of Collaboration

Claudia, an award-winning assistant professor of English specializing in nineteenth-century British literature, pointed out that she and most of her colleagues never co-author articles. "For me collaboration means participating in a book project or putting together conference panels," she said. Remarks from Carlos, an assistant professor of history, further elaborated on what collaboration entails. Pointing out that there is a social and collegial dimension to the solitary activity of writing, he said, "We have our own traditions of collaboration, or at least of cooperation. We circulate drafts, present papers in panels at conferences, and share citations and ideas." Carlos's comment indicates that the process of collaboration is not uniform but instead falls along a continuum of cooperation manifested in various forms and stages. For him,

even a common communication process such as circulating his draft article for input from his colleagues was a form of collaboration.

It was evident from my observations during the presentations at the Society that humanities research and publishing are essentially individualistic rather than collaborative activities due to the epistemological and ontological characteristics of the related disciplines. "Individuality and uniqueness is the essence of scholarship," said Joseph, an English professor. He continued:

> I am married to a computer scientist. I can see the differences and understand why [humanists] are called lone rangers. Even interacting with students is different. My wife spends an enormous amount of time with her students, advising them and working on joint projects. In humanities you cannot clone your advisor; you need to have independent ideas. Personal interpretation is critical.

As they were describing their daily routines, several of the informants said that although they were currently focusing on research due to their affiliation with the Society, back at their home institutions they spend a considerable amount of time teaching or interacting with students. When they elaborated on their relationships with their graduate students, several of them noted that they encourage their graduate students to be independent thinkers exploring new areas rather than collaborating with them in support of their personal research domains. As Joseph articulated above, scholarly research is often decoupled from student mentoring, a practice that differentiates it from other disciplines in which the work of graduate research assistants is essential for scholars in undertaking experiments and scientific explorations.

Forms of Interdisciplinary Collaboration

Although interdisciplinarity has become a major topic in academic policy and funding discourses, there is not a common operational definition to empirically distinguish it from disciplinary research (Huutoniemi et al., 2010; Klein, 2008).[49] In her discussion of interdisciplinarity in the humanities, Klein (2005) describes two levels of scholarly interactions. *Narrow interdisciplinarity* occurs between disciplines of comparative methodologies such as literature and history, whereas *broad interdisciplinarity* occurs among subject areas or disciplines with contrasting methodologies, such as humanities and sciences. These two levels of interactions were evident in the Fellows' interpretations of interdisciplinarity. Although they felt that the humanities, as a branch of knowledge, has a common set of methodologies and theories, they also perceived their own research domain, such as history, as an individual discipline. There was a prevailing recognition among the Fellows that interdisciplinarity in the humanities involved reading the literature of other disciplines within humanities scholarship. For instance, Elvira, a professor of comparative literature, said:

> In general humanists don't and I am not particularly inclined to co-author a text. But when I say that I do interdisciplinary research basically what I mean is that I try to read quite deliberately outside of my field. I might read books that are not quite in my area. I feel that a part of my job is to create this dialogue. I see this sort of research as a juxtaposition of unlikely encounters. Although sometimes they don't go anywhere.

[49] In their review of definitions of interdisciplinarity, Huutoniemi et al. (2010) conclude that interdisciplinarity takes multiple forms and implies a range of interactions from a simple exchange of ideas to mutual integration of concepts and methodologies. For instance, *empirical interdisciplinarity* integrates distinct types of empirical data in order to investigate relationships between phenomena observed in distinct fields. In *methodological interdisciplinarity,* disparate methodological approaches are combined in a novel, integrated manner. In *theoretical interdisciplinarity*, research blends or contrasts theories or models from more than one field in order to develop new theoretical approaches.

Elvira's account reflects a narrow interdisciplinary approach. Indicating the variance in interpreting what interdisciplinarity entails, Sara, an anthropologist in the process of writing her dissertation on political and economic changes in Congo, had a different take: "I consider learning a language [such as French] in humanities as a form of interdisciplinarity as it opens up new doors for me to be more literary," she said, "It is not only a language but another lens to interpret." For Sally, an assistant professor of English, writing was the essence of interdisciplinarity. She believed that "we need to write for audiences that cannot be predicted."

The Fellows often described interdisciplinarity as "getting out of their comfort zones." Fred described interdisciplinarity as "allowing me to be enriched by others" and "understanding different ways of asking questions, marshalling evidence, and making arguments." Fellows felt that one of the advantages of interdisciplinarity was that it encourages the use of a variety of methodologies as they studied and talked about their evidence. Although collaborations within the humanities (for example, historians working with comparative literature scholars) were characterized as more organic and common, the informants also commented on challenges within the same disciplinary framework. May, an assistant professor of English, said, "There are different approaches to what counts as evidence and what allows you to make certain claims. For instance, literary critics will argue that you are not reading closely enough and my colleagues from the English department would argue that I am not reading enough." Sam, an assistant professor of history, added that interdisciplinarity was difficult and he found it difficult to "forget about the conventions of meaning making" that he acquired.

Only a handful of informants offered examples of what they considered to be emerging patterns of cross-disciplinarity in the humanities. Jenn, an assistant professor of comparative literature, mentioned that in her department they now have quite a few

graduate students interested in eco-criticism. When I asked her what that field entailed, she described it as a form of literary criticism that is based on ecological perspectives to investigate the roles of nature and the environment in the creation and interpretation of culture. She added that this field was attracting interest recently due to the "increased awareness of environmental destruction and techno-scientific focus in the media." Another specialty of cross-disciplinary exchanges came from musicology. Carlos, an assistant professor of history, described how he became interested in exploring the role of culture and biology in shaping musical phenomena and the experience of music. As Jenn and Carlos described these cross-disciplinary projects, I realized that what made these projects interdisciplinary was not the blending of the methodologies of science and humanities but the reformulation of research questions from new angles and the utilization of a broader research lens for gathering evidence in support of arguments and theories.

Challenges Associated with Interdisciplinarity

The Fellows were thoughtful and critical in their assessment of the interdisciplinary exchanges. There were concerns about the "idealization of interdisciplinarity," as several pointed out possible pitfalls. For instance, Sally, an assistant professor of English, said that her project tried to blend literary studies with neuroscience to explore how love is constructed. Although she found her strategy very revealing, she was concerned that she did not have a specific audience in mind for her work due to the blended nature of her specialty. When I asked her what she means by "audience," Sally explained that she was referring to small circles of specialists who build in-depth knowledge in particular research areas. Amy, an associate professor of English, identifying one of the disadvantages of being interdisciplinary, explained that she started in cultural studies and realized that having an interdisciplinary Ph.D. made

it hard for her to get a job. The following account by Christine, an associate professor of comparative literature, also illustrates how the informants needed to balance creativity and innovation in their projects with their need to secure a position:

> People want to do cutting-edge scholarship and that's where creative scholarship happens. But I don't know if it will be the future because they [administrators] want safe and well-established zones. With the recent budget situation, isolated or canonized fields are discouraged—they do not want you to be too experimental and choose a subdiscipline like critical race theory. Racial politics of the Caribbean is just too specialized. I sense a great deal of tension between innovation and what my university can [financially] afford. My work combines history, cartography, and ecology. Some of my committee members have been uncomfortable thinking that I am not doing real history. This worries me. I need to get a job.

Although it was a minority opinion, some of the Fellows expressed doubts about interdisciplinary research that involves collaboration with scholars from the hard sciences such as biology, chemistry, or physics. One of the concerns involved the challenges associated with building expertise in a research domain with an unfamiliar canon and new research methods. Although the process can be seen as a learning opportunity, it required time, commitment, motivation, and diligence. Marty said: "I am suspicious of collaboration sometimes, especially when humanists draw on science. It appears exciting from a distance but you often lack real knowledge of each others' knowledge structures."

Reflecting similar sentiments, Erin, a doctoral student in English, voiced her concern that there was a lot of interest within English now in building bridges to the sciences "partially because science has a higher status in our culture now and that there is a desire to hook up with them [scientists] as students and parents value this sort of thing." Almost fifty years after C.P. Snow's (1959) lecture about the two cultures, in which he views the worlds of science and the humanities as polar opposites, similar sentiments continued to surface in my conversations. Klein, a

professor of philosophy, reflected that there was a "hierarchical relationship that has been created and gets reinforced constantly." The following comments by Chris, an assistant professor of anthropology, further accentuate this observation and also tie it into perceptions of cross-disciplinary collaboration:

> High-level people want humanities, social sciences, and sciences to work together. Because everybody knows that funding sources such as NSF and NEH require that you collaborate and that there is interdisciplinarity in your research. Universities want to see more money coming in.

The informants often contrasted collaboration in humanities field with practices in science-related fields. "Collaborations in our field do not involve too much intellectual dependency," said Pierre, "whereas projects in the sciences are problem-specific and require blending funds and talents." By saying "problem-specific," Pierre was referring to scientific experiments such as measuring the side effects of a new medication. Several of the informants noted that humanists do not have scientific laboratories that foster joint efforts as they carry out complementary phases of research relying on each other's expertise. They pointed out that collaborations among disciplines work and make sense when they originate in mutual interests. For instance, Serdar described how his provost established a new program to foster collaborations between humanists and scientists. Describing his involvement in one of the small teams formed to generate collaboration ideas, he said, "We appreciate the incentive to work together but we have not yet come up with any ideas that excite us." Several of the Fellows pointed out that even narrow interdisciplinary collaborations require an effort to find common ground and do not necessarily emerge naturally.

Collaboration as a Social Communicative Process

Successful collaboration requires motivation, commitment, and work and rarely occurs without special effort. William, an assistant professor of history, expressed this sentiment in saying, "I agree that collaboration open ups new approaches to inquiry but I also know that it takes time, energy, and trust." Several of the informants referred to the social aspects of collaboration, especially across fields. "In most interdisciplinary work, people start working together because they already know each other," said Susan. She added that most of her collaborations resulted from personal connections such as introductions or referrals through common friends.

The invisible college has been shown to be an important part of the information environment in several specialties.[50] My conversations with informants indicated that invisible colleges continue to be influential and that they formed peer groups based on their special interest domains while forming close-knit groups for conversations and exchanges. Almost all of them said that they discuss their work in its early stages with their closest colleagues and that such informal communication often yields ideas that they use in their scholarship. They also reported relying on each other for identifying primary resources. The invisible colleges involved scholars from both the informants' own academic settings and from other institutions, including international academic and cultural establishments.

Table 5.1 summarizes the information I have presented on the characteristics of the humanities culture that emerged from my participation in the Society's events

[50] As noted in chapter 2, the term invisible college was coined by Robert Boyle during the seventeenth century and can be traced back to the Royal Society of London during the seventeenth century. Its members did not belong to a formal institution; however, they referred to themselves as an invisible college due to their geographic closeness and regular meetings based on shared scholarly interests (Price,1963).

Table 5.1. Characteristics of Humanities Scholarship

Research characterized by	• Subjective epistemology involving interpretive and critical stances rather than objective, causal, or universal explanations • Use of social theory as a historic narrative of ideas and a set of notions that apply in constructing interpretations and explanations • Constructivist ontology to provide evidence of alternate perspectives rather than pursuing an ultimate truth • Reading as a core cognitive process in absorbing and interpreting information • Writing as a creative act with both informative and creative features • Evidence as underlying data manifested in various formats such as published materials, observations of individuals, physical cultural objects, and geographic locations
Collaboration involves	• Participating in a book project • Putting together conference panels • Presenting papers in panels at conferences • Circulating drafts of papers or talks • Sharing citations and ideas • Existing connections and mutual interests leading to intellectual and social acts of engagement
Interdisciplinarity involves	• Reading the literature of other disciplines • Understanding alternative ways of asking questions, marshalling evidence, and constructing arguments • Learning a foreign language • Writing for a broad range of audiences • Using the methodologies of multiple fields (e.g., history, comparative literature, etc.) within humanities disciplines • Emerging cross-disciplinary fields such as eco-criticism • Concerns about the challenges associated with interdisciplinarity and its association with technology and science domains

and interviews with the informants of this study. These attributes are illustrative and should not be seen as a comprehensive characterization or homogenization of the nuanced practices and philosophies of humanities scholars.

Commonly Used ICTs

ICTs within the context of humanities scholarship comprise a range of technologies and associated practices to support creating, accessing, processing, sharing, and archiving information as well as facilitating communication. As described in the research questions section, when I started exploring my dissertation topic I operationalized ICTs as a constellation of applications rather than as a specific technology and did not focus on a specific configuration. During the interviews, I framed the goals of my study and the interview topics using the phrase *information and communication technologies* and was curious to see how the Fellows would interpret this phrasing. My approach was consistent with a grounded theory approach in which definitions and constructs are defined and refined through information gathering. I was also, however, concerned that on this interpretation the construct would be too broad, as it would then comprise such a wide range of applications, tools, protocols, and standards.

I was reassured when I began seeing an emerging pattern in which the informants consistently deciphered the phrase to denote technologies such as digital content, search engines, and communication appliances such as e-mail and mailing lists. It was apparent from our conversations that these tools were commonly used and found to be instrumental in facilitating academic work. A fourth category of ICT consisted of content analysis and visualization tools, but only 4 of the 45 informants had direct experience using these tools in support of their work. Although it was recognized as a relevant information technology, the majority of the scholars have not used specialized content analysis tools other than features offered by databases or search engines. Therefore, based on my preliminary interviews and interactions, I decided to focus on three categories of technologies in order to frame my conversations with the informants and the data analysis:

- *Digital content* such as digital collections, databases, and repositories that provide access to information representing books, articles, data, audiovisual content, manuscripts, diaries, and photographs
- *Search engines* for searching, discovering, retrieving, and verifying information; increasingly, this category also includes search features that assist in understanding word use patterns
- *Communication applications* such as e-mail, mailing lists, blogs, and wikis that enable communication and collaboration among scholars

Within this framework, scholars are both consumers and producers of information technologies. For instance, a historian may use a blog to post her opinions on a specific topic as well as using the same site for learning about other colleagues' opinions on a particular issue. Scholars not only use visual image collections such as ARTstor but also contribute their own images to expand coverage.[51] I will describe how these technologies are used and their implications for the informants' academic practices in the *Embeddedness* section.

Perceptions of Information Technologies

Many of my interviews began with the informants apologetically explaining to me that they made very limited use of technologies and that our conversations might not be useful for my study. Interestingly, whether they identified themselves as enthusiastic users or technophobes, they all use Web-based digital content discovery and access tools, which is an amalgamation of a range of *digital content* and *search engines*. All the Fellows interviewed were regular users of e-mail and mailing lists and

[51] ARTstor is a nonprofit digital library of more than one million images in the arts, architecture, humanities, and social sciences with a suite of software tools to view, present, and manage images for research and pedagogical purposes. More information is available at http://www.artstor.org.

appreciated the role of these applications in facilitating communication and collaboration with their colleagues and students. These communication technologies were well established in daily scholarly interactions and exchanges. They appear to be so ordinary that I often needed to probe informants by asking questions such as, "How do you search for books and articles?" Their self-identification as "technology laggers" implied that they were expending little effort to keep up with and explore new applications that are not already integrated into their everyday practices.

Several informants indicated that they would like to spend more time exploring emerging technologies and understanding how they might be useful for their work. A few, such as Carlos, even expressed concern about the consequences of not systematically taking advantage of technologies. He said, "As a scholar, is the quality of my scholarship suffering because I do not use ICT? I think the honest answer is yes—it impedes me." He went on to explain how he is impressed with his colleagues who are now taking advantage of tools such as digital cameras to capture their field notes and how they are using image databases and repositories in organizing and annotating their images. When I asked what was impeding his incorporating such tools into his work, he plainly explained that he has limited time and other priorities such as making time for his young children.

Often, the informants equated ICT with expediency and productivity. For instance, when I asked what information technologies imply for him, Carlos said, "I guess it means anything I am using as a scholar to make my work and life productive . . . I would even include something as basic as e-mail." Ease of use and convenience emerged as important criteria for selecting and using ICTs. Although informants acknowledged and admired affordances that offered innovative features, their appeal did not appear to be strong enough to make adapting ICTs a priority for them.

In commenting on the ways in which they manage their citations, informants also indicated how they associated ICT with the notions of productivity and convenience. During our conversations, several of the scholars also appeared to consider bibliographic file management applications such as RefWorks or Zotero as examples of ICT. However, they consistently complained about difficulties associated with learning and remembering how to use these applications, shedding more light on why they avoided using the applications. Jack said, "I have started a Zotero bibliography but cannot remember to use it as it is just not a part of my routine yet." Steve, an anthropologist, admitted that he would forget how to use the application if he had not regularly added citations to it. Reacting to the challenge of learning specialized citation management software, several of the informants said that they save articles as PDF files and have their own methods of organizing them. They noted that they found it more advantageous to use generic, non-structured tools such as Microsoft Word, as they can perform quick cut-and-paste operations and keep unstructured notes without much disruption to their flow of thinking, reading, and writing. They realized that they were missing out on some advanced features offered by bibliographic file management applications, but for them convenience and ease-of-use were critical factors in deciding what to integrate into their work flows. Only a handful of informants reported regularly using a bibliographic file management application.

I found it revealing that when I asked informants about digital humanities, I needed to give examples of what digital humanities might involve before they were able to comment. There were four groups of responses. 1) Most of the informants had not heard of the terminology. 2) Some of them had familiarity with the phrase but they did not know exactly what it meant. 3) Only 4 of the 45 informants reported that they were involved in an initiative that can be broadly categorized as a digital humanities

project. 4) Four indicated that they did not have any digital humanities experience but knew of a colleague who was engaged in such a project. Overall, the phrase was a piece of unfamiliar jargon to most with no applied meaning within the context of their scholarship. This suggests that conversations involving digital humanities appear to be confined to specific communities with no common appeal. I will elaborate further on the topic of digital humanities in the next chapter.

Some of the Fellows thought that there were pedagogical advantages to integrating technologies into their teaching; but they did not appear to be fully convinced or motivated to expend the effort needed to increase their involvement in digital pedagogy. For instance, May noted that one of the conferences she attended last year had a series of presentations on digital Shakespeare. "It should be my job to figure out what it means to me," she said, "because so much of my students' learning interactions happen online." This is a common reaction regarding integrating digital media and techniques into their research or teaching.

The availability of a large corpus of digital text makes it possible to employ quantitative text analysis techniques to explore linguistic patterns involving, for example, the frequency and distribution of words. Although all the informants were familiar with the features and functionality of content analysis and visualization tools, as I noted above, only a few used specialized applications in analyzing textual information. Some opined that quantitative text analysis applications and search algorithms should not be seen as computer-generated meaning but rather as another form of information to help triangulate multiple sources of interpretation. Robert, a tenured historian of music, said, "There is a general tendency in our society predating the Web to compartmentalize out of context. The Web reinforces this perspective." Many associate the use of content analysis tools with positivist and quantitative research methods. This finding supports Unsworth's (2005) anecdotal observation as a

digital humanities advocate that even using words like "method" and "research," when applied to the humanities, requires some reflection, as many humanists associate these words with "scientific" studies featuring distinct epistemologies that do not conform to humanists' ways of articulating and justifying. I will expand on the role of search engines further in the Assessing Transformation section.

Another attribute that emerged from my conversations and observations is that of the increasing convergence of ICTs that we have seen taking place during the last decade. For instance, when the informants talked about their use of Google, they were referring to the technology as an amalgamation of a wide range of digital content, databases, content creation tools, and search algorithms represented by the search engine. Convergence in this context represented the unification of separate technologies such as publisher Web sites, visual image databases, and searching functionalities—allowing synergistic interactions and creating new efficiencies. With such a convergence, Google was not only a form of ICT but also was forming a context for their interactions with various information technologies.

Summary

This chapter began with a characterization of the scholarly practices of my informants as summarized in Table 5.1. The second section provided an analysis of the informants' perceptions of what ICTs entail and the attributes of the interpretive framework for assessing and using ICTs. My interviews and observations indicated that technologies such as digital content, Web search engines, e-mail, and mailing lists were indispensable and that their use was organic, characterized as a part of the scholars' daily work flow. Adoption patterns appeared to be well-distributed regardless of specific discipline, gender, or tenure status. My inferences in regard to how ICTs are perceived included the following observations:

- ICTs are often equated with expediency and productivity
- Ease of use and convenience are important criteria for assessing and using ICTs
- Many of the informants characterize themselves as technology laggers, indicating that they either are not sufficiently interested in or do not make the time to explore new ICTs
- The scholars are both consumers and producers of digital information as they not only use but also create information through their scholarship
- Some of the scholars question what they are missing by not integrating more ICTs into their work flows; however, they do not appear to be motivated strongly enough to make an effort to expand their tool sets
- The phrase "digital humanities" is perceived as jargon without an applied meaning for the Fellows' scholarship
- Content analysis tools tend to suggest the use of positivist research methods
- Some express doubts and concerns about the supremacy of quantitative methodologies in academia
- There is convergence among information and communication technologies as some of the tools seamlessly merge the features of several stand-alone applications

The next chapter will continue my exploration of the informants' interactions with new media by examining how the scholars adopt and adapt technologies, fitting them into their work practices in support of their scholarship.

CHAPTER 6: CONFIGURATION - INTERPRETIVE FLEXIBILITY AND APPROPRIATION

This chapter presents my findings from a *configuration* perspective by focusing on how ICTs are being interpreted and used and on the consequences of the findings for scholarly practices. Building on the characterization of humanities scholarship provided in the previous chapter, I will describe and analyze the implications of information and communication technology (ICT) adoption on the daily work routines of my informants to shed light on the following questions:

- What are the variances in how ICTs are interpreted and put in use by scholars?
- Are technologies enabling the use of new scholarly processes such as introducing new research methods?
- Are reading and writing practices changing due to the affordances of the new information environment?
- Are new technologies and associated practices influencing collaboration patterns or interdisciplinarity?
- How are ICT-use patterns evolving?

The principle of *configuration* builds on the seamless web notion (Latour, 1992; Hughes, 1986; Kling & Scacchi, 1982), which recognizes the importance of the social context (*embeddedness*) and acknowledges that technologies and users are in a

relationship of mutual shaping and mediation (Pinch & Bijker, 1994).[52] *Configuration* underscores the importance of the appropriation process by which scholars adopt and adapt technologies (Dourish, 2003), fitting them into their work practices in support of scholarship. The affordances of information technologies may effect, shape, or constrain scholarly practices. In the meantime, through interpretive flexibility (Pinch & Bijker, 1987) scholars exercise agency as their specific goals, skill sets, values, and past experiences shape the appropriation process. I conclude the chapter by offering examples of what may be considered transformation due to the integration of ICTs into scholarly workflows.

Evolving Notions of Distance and Place

As the scholars I interviewed marveled at the virtues of having access to digital content in digital collections, databases, and repositories, they remarked about the ways in which information technologies enable them to bring together content that was once dispersed across many geographic locations and was confined to physical spaces. "Internet culture crosses, redefines, and modifies the notion of distance," said Lilly, a professor of history. "I cast a wider net than I would." Almost all of the scholars included in the study remarked on the changing perception of distance and research environments. During a Society-sponsored symposium on digital archives and the future of trans-Pacific studies, one of the fellows with a joint appointment in Asian Studies and Comparative Literature described how "technological innovations are transforming the global context of areas studies." As he put it, "Transpacific studies are not any longer limited to the original narrow national boundaries." He was

[52] The notion of configuration also implies that technologies are dynamic and adaptive in use, evolving as their specific forms change over time, as new features and standards are developed, and as they transition through successive versions. This aspect of configuration was not an initial area of interest in my research, but it emerged often as an attribute of ICTs during my exchanges with the informants.

referring to the availability of vast amounts of digital information on the Web as well as on the availability of digitization technologies that enable scholars to contribute content to this growing corpus of multimedia materials.

From an access perspective, scholarly knowledge that was once captured and organized in archives, libraries, or bookshelves and file drawers in analog format now exists virtually, distributed among various repositories, databases, and Websites. Libraries and archives as *places* set boundaries for scholars in defining the parameters of the research environment. The *place* also signifies authority and credibility. The new knowledge production and dissemination system promotes multiple distribution channels, sometimes challenging the traditional norms of *finality* for scholarly publications. For instance, one can find an article searching by key word on Google, going to the author's Web page, or sometimes from a publisher's Web portal. Also, the same article may appear as a pre-print in an online repository or in multiple formats such as a PowerPoint slide set from a conference presentation. Several of the informants remarked on the fluidity of versions and what is considered the authoritative final copy of a scholarly work.

The Materiality of Books and the Importance of Physical Context and Place

My interviews often took place at the offices of the scholars. Typically their desks were covered with books and journals and were surrounded by piles of material on the floors. One of the issues often brought up in my interviews and observations was that of the role of the materiality of books in cognition and knowledge production. As Robert said, "When I underline and take notes, I feel that I am learning better." Tahira, a comparative literature doctoral student who was working on her thesis on the African Diaspora, expressed a common sentiment:

> I do not find online books useful. I do not like scrolling through them. I need something that I can page through and can remember how knowledge looks like on a page. If I find a book that I like on the Web, I buy it for my library. When I browse through my bookshelf, I can remember by seeing the spines and titles which one I am looking for. It is a visual and spatial experience for me. Seeing the color and thickness of materials.

Tahira's comments also illustrate the concept of *duality* in social informatics as she points out the potential shortfall introduced by digital media due to the loss of a visual aesthetic. I did not observe a variance by age or discipline as my informants were describing the role of material attributes and configurations in the reading and writing process. The common sentiment was that learning still stems from physical interactions with books through the practices of marking up, highlighting, and so on. "If I need to read anything closely, I print it so that I can mark it up," said Faat, a historian who was putting the final touches on her new book on documentary filmmaking in Egypt. She continued:

> If I do not have a physical copy, I do not remember what is in it. When I write, everything needs to be spread out so that I can remember "oh yeah there was a chapter in this book." And when I open the chapter, I see my notes and underlines. It is tactile. Online, everything looks similar, especially with PDFs. Lacking any visual clues to remind me of things.

The accounts I heard during my conversations made me reflect on our need to better understand the physical contextuality and spatial aspects of knowledge spaces. It is common for humanists to work in physical settings such as archives with boxes of information artifacts such as photos, manuscripts, diaries, letters, and finding aids (see Figures 6.1 and 6.2). These materials have varying colors, textures, containers. In their accounts of interactions with digital content, several of the fellows called attention to the ways in which the physical world assisted them in their conceptual linking. The

Figure 6.1. Physical context of research. It is common for humanists to work in physical settings such as archives with boxes of information artifacts including photos, manuscripts, diaries, letters, and finding aids

Figure 6.2. Physical context of research. The three-dimensional aspects of physical learning research environments featuring variations in color, texture, dimension, and depth facilitate mental processes of perception, memory, judgment, and reasoning.

physical context of research was characterized as an important cognitive element in the research process.

Although there appeared to be undisputed support for the virtues of discovering and accessing information online, informants often took pains to explain the role of books and libraries in their scholarship. For instance, Mia said, "One area that humanists are going to come across as reactionary is how they romanticize physical books and other artifacts. Lots of us like books as objects too." Several of them referred to libraries as their laboratories and expressed concerns about the trend to move books to storage units with an assumption that the online versions on the Web are sufficient to support their scholarship. Many of them related stories about the libraries at their home institutions and the conflicts that arise between faculty and library staff due to mismatched views on the role of digital books and their counterparts. Knowing that I am a librarian, they often asked me for my opinions and tried to understand the underlying assumptions and factors behind the proposition that "digital is better."

The informants characterized physical archives and libraries as *places* that bring individuals with similar academic pursuits together for both social and academic exchanges. Their accounts helped me better understand the difficulty of separating the epistemic aspects of scholarship from its social dimensions. Archives, libraries, books, individuals, cafés—they collectively provide an inspiring and motivating context within which to pursue knowledge and contemplation. They form a *seamless web* (Latour, 1992; Hughes, 1986; Kling & Scacchi, 1982) of scholars, artifacts, practices, and cognitive processes.

Almost all of the Fellows at the Society were engaged in research domains that required them to visit local libraries, archives, museums, public record offices, or to spend time in the settings they were studying. During the Wednesday discussion

sessions at the Society, the Fellows often mentioned how they encountered and studied evidence in various physical knowledge settings and referred to serendipitous encounters that led to breakthroughs during the research process. For instance, Alex described research that he conducted in the United Kingdom and recalled that his review of boxes of archival materials and conversations with the staff of the public record offices allowed him to immerse himself in the materials and encouraged deeper engagement with the research materials in context. He described how a black whip he found in a big box of archival materials helped him to make sense of the evidence he had been gathering.

Although the physical contextuality and spatial aspects of knowledge spaces are mentioned as supportive factors in cognition, there is no evidence in my study to support the claim that online content environments limit knowledge production. Also, it is difficult to detect how scholars' conceptual processes might evolve as they become accustomed to new information infrastructures. For instance, the informants frequently mentioned that their ICT-use patterns are changing and that they are becoming accustomed to reading online or relying merely on electronic journals, sometimes to the point of canceling their print subscriptions. As Nardi and O'Day (1999) point out, elements of the information ecology depend on one another and must co-evolve together in order to create an enabling knowledge-creation environment. I will further expand on this theme in Chapters 8 and 9 as I reflect on the potential implications of my findings for humanities infrastructure.

The Use of Search Engines

Almost all of the scholars who contributed to this study remarked that search engines, especially Google, have changed the landscape of information. They often acknowledged and marveled that there was a vast amount of scholarly archival and

published materials available on the Web, literally at their fingertips. The following quote from Kenz, an assistant professor of history, captures the sentiment aptly:

> The biggest change in my short scholarly life time is the way people do research in cultural history. Now one has access to so many databases. I work on nineteenth-century literature with tons of newspapers and magazines. They were formerly un-indexed and I used to sit with microfilm and read . . . . Now you can do a cultural history of happiness driven by a keyword search. Otherwise, how would you find hundreds of articles on the topic?

Almost all the informants told a story similar to Kenz's account to illustrate their appreciation for search engines, which have dramatically changed how they search, discover, retrieve, and verify information. Jenn claimed that her dissertation would not have taken its current shape without using the Japanese Diet Library. She said that she used the keyword search function to track the usage of words and phrases in context as she was studying the self-described narratives of Buddhist monks. She noted that it was "impossible to do the same level of analysis with print materials."

Online access to information makes it possible to find smaller units of information such as specific pages, paragraphs, images, sentences, even words. Although this feature is often deemed valuable, some commented on the value of context in understanding and interpreting. Amy said, "Snippets are sometimes misused as they are decontextualized." She noted that she often observed this trend in her students' papers. She added, "I think you need to be a sophisticated researcher to know how to use them right. If you have an historic context, you can make sense of snippets and deepen your knowledge." Her observations underscored the role of context as an interpretive framework for knowledge processing and also indicated the *duality* of technologies that can be used to access subunits of information objects such as books. The Fellows found value in accessing smaller units of information, however, also point out to a potential downside of such an affordance. The ease in

which segments of information can be found on the Web also may lead these units to be cited or interpreted without their original context.

Multimodal Scholarship

McPherson (2009) describes *multimodal scholarship* as the activity of exploring new forms of literacy that include authoring and analyzing visual, aural, dynamic, and interactive media. Several informants pointed out the importance of having access to digital content in multimedia format, which enables multimodal scholarship. Amy, a professor of English literature, praised the use of audio and video for adding depth and intimacy to oral history. She said, "Working in the field of oral history, you can now capture evidence in multiple ways and each catches different analytical strings of our imagination." Amy's account illustrates how scholars find great value in various formats due to their intrinsic characteristics in encapsulating and presenting knowledge. Another example is provided by Kim, a professor of Asian studies. She said, "New media channels provide us with new experiences and impact our perceptions, feelings, aesthetic experiences, and knowledge acquisition process." As she elaborated on her take on new media, she described how using various media involves a range of senses and leads to richer and novel forms of interpretations.

Multimodal environments require distinct modes of engagement from writers and readers. Here is Edward's opinion on this issue:

> Today most literary productions are communicated via film and the Internet. This profoundly shapes the literary life, as sometimes literary text cannot be grasped in its entirety without audiovisual elements. Literature can no longer be decoded solely on a hermeneutics basis. We need to reposition literary studies in light of the Internet.

He explained that it was increasingly important to engage popular new media such as video games in research environments as they reflected the new learning and

exchange forums. Such comments indicated the informants' interest in taking into consideration the media preferences and communication patterns of students as they created course materials.

Another characteristic of the new knowledge production system is the availability of technologies and standards that allow one to present and share underlying data and evidence that form the basis of analysis and interpretation. This trend, which is more evident in science and technology domains, was illustrated by Edward, a professor of comparative literature:

> *Renaissance Studies* [see Figure 6.3] is a multi-disciplinary journal about all aspects of Renaissance history and culture ranging over history, art, architecture, religion, literature, and languages. As someone who was involved in making this possible, one of the things I am very happy to say is that the online version includes sounds and images referenced in the articles. The images are of much higher quality than those found in printed books and can be studied in detail. This is inevitable and that's how we should work.

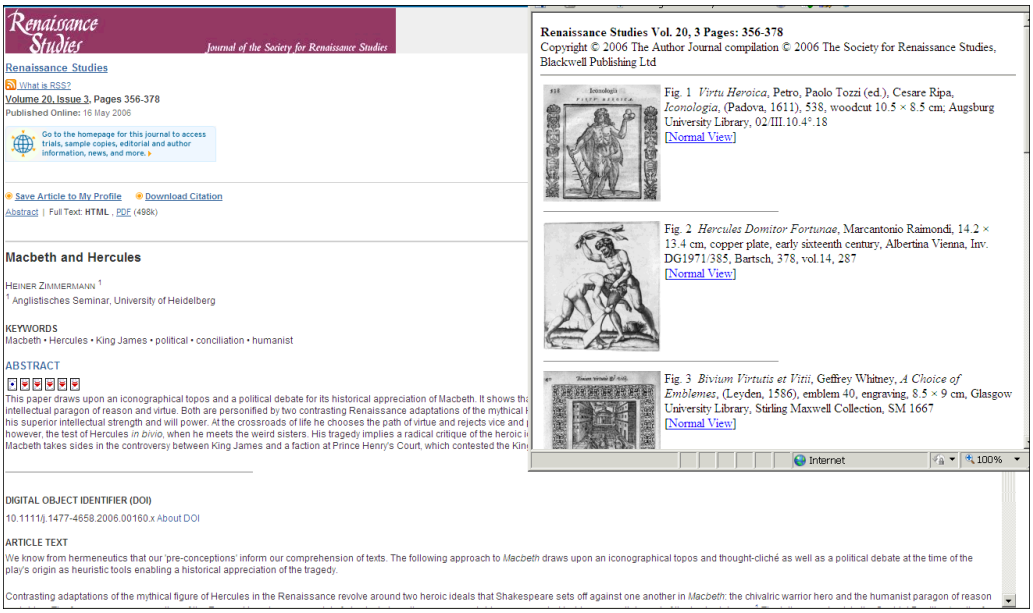

Figure 6.3. A sample screen from Renaissance Studies. This figure illustrates the online publication that Edward mentions in his account. The article database has a feature making it possible, as an article is viewed, to open a window to view the evidence referred to in the discussion, such as the images mentioned.

Edward's endorsement of this technology was not shared by all my informants. When I asked Emily, an associate professor of the history of art, what she thinks about making her field notes and images available, she said, "It really requires a change in my mindset. Raw evidence is very close to you, it is personal. I also worry about how it will be used and contextualized and generalized." She continued, "We have always shared but usually within our professional networks to ensure appropriate understanding, use, and reciprocity." Like Emily, several informants questioned the consequences of making previously private background scholarship visible for sharing and further analysis. Although digital media have streamlined the sharing process through the availability of digital content creation, dissemination, and archiving (such as digital repositories) mechanisms, such affordances do not always dovetail with the Fellows' professional aspirations, habits, and norms.

Changes in Reading

A natural and common conversational theme during the interviews involved the informants' online reading environments and habits. My informants uniformly reported that they had observed changes in their reading and writing habits due to their increasing interactions with digital content and search engines. However, opinions and perceptions about screen-based reading cannot be generalized, as the quality of the reading process can be assessed differentially depending on users' specific goals and experience.

Several of the scholars indicated that, when they read online, they tended to skim and not read closely. Often I heard references to declining sustained attention and increasing time spent on online browsing. Susan, who just completed her doctoral work in comparative literature, described her interactions with digital texts by saying, "I still feel like I am learning to read and comprehend online." She said that she increasingly found herself reading less broadly as she could go online and find exactly what she needed. Amy elaborated on this tendency by saying, "What I find out is that if I check out a book, I'll read more." She noted that she tended to be much more selective if she were reading online. Fred, a doctoral student in anthropology, described the variations in his reading style by saying, "When I read economics articles for my research, I usually browse them online—I do not understand the math anyway. I only read the main thrust of articles. Reading intensity depends on my purpose."

Fred's account illustrates the interpretive flexibility associated with ICT appropriation. Fred differentiated between the requirements involved with two types of reading—the deep reading functionality of print media and the skimming feature afforded by online reading. Ally, a doctoral student of English, said that she uses online books primarily for a quick review to screen whether she is interested in

purchasing or borrowing them from the library. Digital content on the Web enables multiple affordances, from discovering books of interest through keyword searches to confirming a fact in a given chapter or looking at the works cited in the references section.

The *configuration* principle also applied to how my informants searched for information on the Web. They employed multiple techniques based on their information needs and purposes. Pedro, a professor of philosophy, illustrated this principle when he observed that he is more likely to go to Google Book or Amazon when he is working on a course. He said, "Because I sometimes teach courses without in-depth knowledge, it is useful to see chapters to help me create a lecture palatable for an undergrad audience." He added that, for his own research, he relies heavily on several journal databases such as Muse and JSTOR. Another example is provided by Edward's following comment:

> For what I do, digital books are almost as good as having it in print. I am looking for core content. I know that other scholars will not want to rely on online versions because they are looking for differences among editions and even small variances such as punctuation mistakes or spelling errors. These are the folks who worry about how Google is digitizing the materials. You know, the fingers covering the publication date or missing pages [during the scanning process].

The Fellows' testimonies demonstrated the various affordances provided by online and print reading environments. Although they often compared these two environments, they found value in both set of features depending on their purposes. I will expand on the implications of evolving patterns of reading later when I discuss *duality*.

Interactions with Social Collaboration Media

During my interviews, I did not limit my question on social collaboration to any particular social collaboration media, as I was interested in informants' general remarks as well as in the range of their experiences. Social network sites represent a diverse domain of online forums such as content-sharing platforms like YouTube and Flickr and networking sites such as Facebook and MySpace.[53] The opinions I gathered pertaining to social network sites were mixed and represented varying levels of experiences and interest.

Opinions on Social Collaboration Media

A few of the Fellows perceived humanities-related social network sites, such as Digital Heritage, as a form of collaboration and openness to entering in dialogues with others. "Knowing that there are ways to distribute our thoughts, online motivates me to write and share time-sensitive things on my blog," said Ivy, an anthropologist who recently completed her dissertation research in East Asia. Tahira, a doctoral student, expressed her enthusiasm by describing how she is using Facebook in connecting with young scholars in her field. These were, however, minority opinions.

Although most of the informants were familiar with the use of blogs to facilitate scholarly exchange and collaboration, they tended to be skeptical about the enduring value of blogging and referred to the medium as an "experimental technology." Contrasting with Ivy's account, Mariel, a historian and musicologist, stated that she does not read blogs, as she finds "blogging personal thoughts are a bit too self-indulgent." Reflecting a similar opinion Claudia observed, "I do not follow blogs, they

[53] Boyd & Ellison (2007) define social network sites as "Web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system."

are too opinionated for me." Burcu, a doctoral student of philosophy, commented that some blogs are very informal and opinionated and there were rivalries and snide remarks were being made. I also heard several negative characterizations of blogs, such as "blogs being sink holes for a lot a negative feelings." Some of the informants indicated that the only sites they followed were ones authored by close colleagues. Such remarks indicated that invisible colleges continue to manifest themselves on digital communication forums. The reliability, authority, credibility, and track record of the communication mode and participants mattered.

Several of the informants characterized blogs as potentially useful but considered them a potential source of distraction. Alex explained his non-use patterns by saying, "Blogs can trigger nice exchanges but you can get caught up and [it] becomes an occupation." Many of them said that they need to spend their time doing their "own serious reading and writing." This is another example illustrating how comments on cramped schedules, overdue papers, and other forms of over-commitments permeated our conversations.

It appeared to me that the informants' opinions of blogs were based on trying out and assessing the utility of such forums for their own scholarly work environments. Informants were not merely dismissing a new communication medium but making deliberate decisions based on their assessments of the value of the medium in supporting their communication patterns. They also noted that their opinions formed and changed over time based on how these communication forums have evolved. For instance, Christine said that, ten years ago, she found mailing lists very valuable, representing "intimate circles of conversations." She noted that now the main value she gets out of them is to see announcements for conferences or new publications. Another attribute of social networking environments was characterized by Jenn when she remarked, "Some may think that academic online communities are

more democratic but I think they also represent the academic hierarchies and power lines." The comments from Christine and Jenn reveal that my informants continued to choose intimate conversations and exchanges over electronic forums that enable large-group interactions.

The Use of Social Network Sites as Sources of Evidence

Almost a third of the fellows interviewed reported that they use content from social network sites for their research. Praising such data-access opportunities, Rich said, "I wrote a chapter based on the criticism of a popular performer that appeared in tens of blogs and mailing lists after she published a new album." The following account by Susan highlighted the increasing reliance of the Fellows on online content produced by the general public and illustrated how Susan uses popular interpretations found on social network sites to triangulate her own analysis of novels that she studies:

> The fans of the classic Chinese novel I am studying are creating Websites putting all different versions of his writing on the Web. Digital versions and all kinds of comments, stories, and myths. We are talking about 200 years of history contributed by [hundreds of] people. Now I can focus on theoretical interpretation and rely on these popular interpretations.

Peter said that his last lecture at an annual meeting was based on his analysis of YouTube video comments for popular music videos. Amy noted that she practices online ethnography by studying blogs and other such open online platforms about gay rights. She characterized the process as one that involves an "abundance of accessible data on a low budget." It was this ease and increasing profusion that made Diane, associate professor of anthropology, uneasy about online ethnography. She said, "I am concerned that there will be less incentive to go to the actual sites and meet the people

we study." This is another example of the duality principle that illustrates the challenges posed by unilateral characterization of the role of a given technology in facilitating work practices. I will expand on this issue in the *Duality* chapter.

The Impact of Information Technologies on Collaboration and Interdisciplinarity Patterns

As described in the previous chapter, although I initially operationalized collaboration and interdisciplinary research as distinct research constructs, these terms were often used interchangeably by the informants during the course of their interviews. Illustrating the notion of interpretive flexibility, the informants had their own views about what collaboration entails and how ICTs are shaping collaborations and interdisciplinarity patterns. The following discussion illustrates the richness of these perceptions and opinions.

Several of the Fellows pointed out that online information environments are introducing and enabling new ways of collaboration. For instance, many referred to the role of burgeoning collaborations on transnational initiatives. These projects often involve creating online archives of multimedia and interdisciplinary content contributed by partnering scholars. Mariel noted that social and national identities as they had traditionally been studied were bounded by categories of nation, race, ethnicity, and class. She said, "Maybe this was partially due to the physicality of archives." Transnationalism focuses attention on movements and connections among people and ideas that are not limited by national boundaries or specific historical periods. She felt that collaboratively developed digital archives enable and promote such collaborations and connections by bringing various specialists and areas of language expertise together in virtual space.

Online communication channels appeared to encourage new ways of joining forces. Jenn described, for instance, how she put together a conference panel with a senior scholar when she responded to a call on an H-Net mailing list. She was quick to add, "In person or online, it takes incentive to make new connections and commit to working with people you have never interacted with." However, she also noted that the mailing list facilitated this joint project that turned out to be a great professional opportunity for her. As I pointed out in my discussion of the social network sites, these comments on social aspects of collaboration indicate that technologies in and of themselves are not sufficient to induce collaboration although they offer tools with which it is possible to facilitate and enrich interactions.

As expressed earlier, at the heart of interdisciplinarity in the humanities is the activity of reading the literature of other disciplines. Most of the Fellows observed that convenient online access to a wide range of information is allowing them to be more interdisciplinary by making it easier to read scholarship from other disciplines. The "Google search engine is helping me to be broader in my work," said Xin, a full professor in History; "I am now not limiting myself to JSTOR and reading materials from other domains."[54] This was a common observation made by the informants as an example of an influential affordance provided by the online information environment.

As described in the literature review chapter, digital humanities initiatives are typically characterized as multidisciplinary, collaborative, interactive, and complex—creating digital collections requires both subject-specific and technical expertise (CLIR, 2009; Katz, 2005). This theme also emerged in my study. I noted earlier that only five of the Fellows were involved in an initiative that can be broadly categorized as a digital humanities project, although several of them knew of a colleague who was engaged in such a project. They pointed out that such undertakings often required

[54] JSTOR is a full-text archive of key academic journals in several humanities and social sciences areas.

access to technological expertise and necessitated broad collaborations, including working with faculty, information technologists, librarians, programmers, and Web designers. “When I was working on my project, I worked closely with folks from our learning center and a group of programmers and Web designers from the academic technologies unit,” said Peter, an associate professor of history. His project involved mapping out the history of a Native American tribe in temporal and spatial dimensions. For Peter, the project in its essence “denoted the importance of merging various skills and was inherently collaborative.” He reflected on the manner in which initiatives with digital components are introducing new patterns of collaboration due to a variety of pedagogical and technical skills required for creating and managing learning and research environments.

Although they did not have any personal involvement, some of the informants had success stories to share in regard to their colleagues’ collaborations in what they characterized as the digital humanities domain. The following account from Edward illustrates the appreciation:

> I do not have any personal experiences but a very good friend of mine who is a Shakespeare scholar worked with two old-fashioned literary scholars and a computer specialist to study his [Shakespeare’s] poetry and sonnets. They looked at all the exceptional and rare words and tracked how they appeared and came to an astonishing conclusion about the time lines of the sonnets. They thought they were early works but due to computer correlation they were able to discover when they were published.

In my conversations informants often mentioned that experimentation with technologies required a willingness to acquire new skills and a readiness to work with others. Marc described how he learned about text encoding standards from the library

folks and characterized collaboration as inevitable.[55] He explained that the collaboration in his case entailed the creation of a scholarly edition and complemented his knowledge of the scholarly work with the digital content creation skills provided by the librarians and Web designers on the team.[56] William, a historian and science and technology studies scholar, characterized digital projects as "a trading zone between scholars, librarians, and technologists."[57] Such collaborations involved relying on team members' skills and performances in getting the work done.

Making Scholarship Accessible to the Public

As I spoke about interdisciplinarity with the Fellows, several made strong connections between working across disciplines and communicating the outcomes of scholarship to the public. "For me what is interdisciplinary about new media is the public outreach potential," observed Peter. "[It is the] ability for social scientists and humanists to make their information understandable and digestible to the general public." He went on to add that scientists had been far better than humanists had been at making their scholarship accessible to the public. Echoing a similar feeling, Amy stated, "The essence of interdisciplinarity is carrying on a dialogue and this is what we do at the Society, communicate to expand our horizons." She continued:

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[55] Mark-up is a technique used to reproduce text with greater visual fidelity and also to enable its examination in much more complex ways. One could, for example, search only the footnotes or captions for a particular word, or for a particular illustration.

[56] Scholarly editions involve the preparation of editions and translations of pre-existing texts and documents that are currently inaccessible or available in inadequate editions. Digital environments enable new forms of scholarly editions, for instance by presenting digital copies of a manuscript with its transcription and other related multimedia information. For an excellent example of an online scholarly edition, see *Roman de la Rose*, which is the product of collaboration between Johns Hopkins University and the Bibliothèque Nationale de France. The site is accessible at http://romandelarose.org. One of the fellows interviewed for this study has been a participant in the project. The project team identified on the Project History page demonstrates the rich set of skills and backgrounds that support the initiative.

[57] Galison (1997) coined the term *trading zone* to characterize collaborations in science and technology. The basis of the metaphor is found in anthropological studies of how different cultures are able to exchange goods, despite differences in language and culture.

> We need to reexamine our relationship with society in general. A part of this process is showing an interest in understanding other fields and break[ing] down disciplinary walls—especially between science and the humanities. Technologies can support both of these goals. Working side-by-side with scientists is likely to increase the appeal of our work and now there are numerous ways we can present our work on the Internet.

A couple of the Fellows viewed digital publishing as a form of collaboration, as it brings individuals with complementary skills in humanities scholarship, information technology, and publishing together. They wondered if digital publishing initiatives will help to encourage humanities scholars to become more accessible to the general public. For instance, Eric believed that open access is increasing his reach and that it creates a more diverse audience for him.[58] He said, "I had an article published both in a paper journal and electronically at the same time. I got more comments because people can find it on the Web. It increased my reach and creates a larger audience for me." In saying "larger" he was referring to the Web's ability to make his research more accessible to academics from other disciplines as well as exposing his work to a variety of readers including hobbyists and non-specialists.

On the other hand, for Faat, having more humanities content online was not sufficient to remedy the problems faced by humanists. "It is a crisis of language; we do not know how to explain what we are doing, which scientists can do so well," said Faat. "It is a crisis of translation." She explained that her work and projects undertaken by many of her colleagues were too sophisticated for the public to understand. Like Faat, several of the informants, bashfully but not apologetically, characterized their research domains as highly specialized. Pierre said, "I know that my book will be read only by a handful of researchers who can follow and understand my deep research."

[58] According to the Budapest Open Access Initiative (http://www.soros.org/openaccess/), open access indicates that a certain body of literature is freely available on the public Web and that any user can read, download, copy, distribute, print, or search this information.

He concluded with a strong statement, "There is so much self-indulgence in my field." I would not characterize Pierre's comment as representative of the informants' opinions on this topic; however, similar remarks were not rare in my conversations. Although digital media make new forms of online sharing possible, whether such content is made accessible to the public has less to do with the characteristics of technologies than with the nature of the content itself. Also influential is the capacities of audiences in understanding and interpreting scholarly work on a specialized research domain.

Revisiting Appropriation

As described earlier, appropriation is a process by which people adopt and adapt technologies, fitting them into their working practices (Dourish, 2003). It is a fluid process and ICT-use patterns evolve based on shifting goals and priorities as well as on the changing features of ICTs. Opinions and use patterns transform as technologies cycle through successive versions and forms with changing functionality. This pattern was demonstrated in my earlier discussion of informants' opinions on social network sites that had formed and changed over time based on how these communication forums had evolved. A good example of this principle is demonstrated by the following account given by Sara:

> There was a period a couple of years ago when there was a ton of independent blogs in my area. I spent a lot of time online, following links. We now migrated our blogging activities into an official Web site under poetry culture. Do-it-yourself blogging is dying down—maybe these things come in circles. I am now back to reading articles. I would not call it a fad, though. It is testing a new form of communication and exhausting its ability before you move on.

Referring to changing practices, Mariel said that for a while she subscribed to every possible table-of-contents service and discussion list with the excitement of

keeping up to date in her field. Then she said, "Now I kind of reached a saturation point and I'm feeling the burden of too much unscreened information." Several of the Fellows reported that their practices are evolving and that they adjust them often based on the characteristics of current projects to reflect the difference between writing a book, for example, and developing a syllabus for a new course. It came through clearly that time is a precious resource and the Fellows pick and choose technologies that fit their workflows and support their immediate goals.

My two-year case study was implemented during an active application development-and-release stage. For instance, during this time the iPhone was released, and the Google digitization project has created close to two million digital books online. YouTube and Facebook have shifted from representing a new technology to being ubiquitous as applications with communication implications for the larger society. I observed changes in opinions even during such a short time span. For instance, increasing reliance on mobile phones with wireless Web connectivity has introduced the need for online service providers to offer hand-held device interfaces for commonly used information portals such as online catalogs or journal databases.

Assessing Transformation

One of the goals of this study was to explore the nature of change in scholarly practices due to deployment of ICTs and to ask whether such change can indeed be characterized as transformational. As described in earlier sections, the informants marveled at the vast amount of primary and secondary scholarly materials that is available on the Web. They described some of the ways in which online search and retrieval tools have changed the landscape of information, noting that these ordinary technical features were supporting new ways of filtering vast bodies of scholarship. For instance, Rich, a scholar of comparative literature, said, "The ability to search by

word is very important, and it will decisively change scholarship." As he showed me some Google searches that he had conducted immediately prior to our meeting, he went on to explain:

> The Google search engine allows me to create concordances and alters the nature of literary scholarship. There is an empiricist strain that enters literary criticism as an important tool. Now you can search to see how John Ashbery uses the word "sunset" in his poems. It would have taken me ten years to compile this information.

An unexpected finding for me was how extensively the Google search engine and the tools available with it were being used in making new literary connections and mapping information in new and innovative ways. For instance, Robert explained how he uses Google Earth in his research to map the locations of jazz music halls and the data he gathers through interviews in neighboring communities. Ivy pointed out, "I think having access to empirical ways of gathering information is a very nice counter ingredient in interpretive sciences." Such accounts from my informants led me to conclude that innovation entails the use not only of sophisticated methods that are similar to text mining but also of common tools that facilitate deeper or more novel ways of performing content analysis.

Although there was broad agreement on the conveniences and new functionalities introduced by ICTs, some of my informants were quite reflective on whether there were indeed associated improvements in their scholarship. They found it difficult to identify any tangible results such as their writing "better" articles due to the affordances of new technologies. Several of the fellows stressed that exposure to more information and sophisticated tools do not necessarily lead to higher-quality scholarship. Pablo, an associate professor of comparative literature, said:

> I experimented with text analysis kind of concordance tools. It abstracts significant features by generating frequency analysis of words. It is

> useful if you can use this information contextually but I cannot see how it can advance knowledge if it is not grounded in deep expertise. I know it can be useful but not in my interpretive circle of analysis.

I heard several examples from the informants illustrating the effects on and improvements in their research processes due to the ease of discovering and accessing digital information through search engines and other online portals such as library or publisher Websites. They often commented, however, on the importance of separating the effects of ease of access and discovery from its impact on the information consumption and application process. After expressing his appreciation for the technical tools that allow him to bring efficiencies to his research process, Sam was quick to note that "the mental effort that goes into deep reading and mental processing has not changed." Such comments indicate the importance of not conflating the increasing ease with which relevant information can be retrieved with expanding cognitive capacity for processing information. The following quote by Elvira, a professor of comparative literature, captures the common opinion held by the informants:

> I would not say that finding the book online revolutionized my work. I would have gotten the book anyway and use it the same way. The results would not have been different. But what happened is that the access piece was revolutionized. When you are busy shuffling multiple tasks, it really matters when you can get to a document in a timely fashion.

On the other hand, some of the informants contextualized the significance of having information technologies at their disposal on their scholarship. For instance, Jenn indicated that she would have written her dissertation on Japanese art and ecology differently if she were doing it all over again. She described how the journals and books that were available only by going to a research library in Japan as she was working on her doctorate are now available online. She went on to say:

> My writing has gotten better. I feel so much better informed. I now can link ideas in larger schools of thought better. My mind feels clearer as

> the range of my reading broadens. I can get a better picture of the authors' work and how they relate to each others' projects.

When Edward described the impact of the new information landscape on the academic realm, she said, "Because of the availability of so many documents on the Internet many of us are doing more documentation and [are] more historically oriented now." He said that he became interested in economic history and its relation to literary studies, which would not have happened otherwise.

In the literature, changes in research patterns and outputs introduced by ICTs are widely characterized as transformational. However, the examples offered in this section illustrate the subjective nature of assessing what transformation entails for scholarship. I will further discuss this issue in Chapter 8 as I address the core research questions of this project.

Summary

The themes presented in this chapter have revealed some ways in which the informants are considering, trying, and putting into use information technologies based on their specific needs and circumstances. The scholars I have studied came across as discerning and astute consumers of technology. Overall, I observed a uniform level of enthusiasm about and openness to the role of information technologies such as digital content and search engines in enhancing scholarship. The Fellows' accounts, however, reflected the highly situated nature of their perceptions as they described their ICT use in a contextualized manner by relating use patterns and consequences to their goals and practices. Using the notion of *configuration* as a research angle brought out the fluid and emergent nature of technology development, assessment, and adaptation. Use patterns change over time due to the evolving requirements of individuals as well as modifications in ICT features and policies. In sum, the following themes emerged in this chapter:

Online Research Environments

- The notions of distance and place are evolving due to the availability of vast amounts of digital information on the Web as well as the availability of digitization technologies that enable scholars to contribute content to this growing corpus of multimedia materials.
- Physical interactions with information objects such as books and manuscripts support cognitive processes, and spaces such as libraries and archives are "places" for stimulating intellectual pursuits and connecting with peers and fellow researchers.
- The accessibility of a large corpus of digital text and commonly available search features make it possible to explore linguistic patterns such as the frequency and distribution of words to discover new associations among scholarly works.
- Digital content on the Web enables a rich set of practices, from discovering books of interest through keyword searches to confirming a fact in a given chapter or looking at the works cited in the references section.
- The ability to locate smaller units of information such as specific pages, paragraphs, images, sentences, and even words influences how information is found, compiled, used, and interpreted.
- Online reading environments with their various affordances support particular reading habits and configurations:
    - a tendency to skim and have difficulty in concentrating, which is required for close and deep reading
    - reading less broadly because in online search environments one may find exactly what she needs through a keyword search

- relying on digital books primarily for a quick review to screen and evaluate a book before purchasing it from a bookstore or borrowing it from a library

Collaboration & Interdisciplinarity

- Some perceive humanities social network sites such as blogs as a form of collaboration and openness to entering into dialogues with others, whereas many perceive them as opinionated forums that can be distracting
- Online communication applications and environments allow broader participation; however, the informants continue to prefer intimate conversations and exchanges to large-group interactions that are enabled over electronic forums
- Social network sites not only provide new venues for communication but also constitute virtual research environments for evidence-gathering, such as conducting online ethnographies
- Online information environments are introducing and enabling new ways of collaboration such as transnational initiatives, by bringing various specialists and areas of language expertise together in virtual space
- Convenient online access to a wide range of information is allowing humanities scholars to be more interdisciplinary by reading scholarship from other disciplines
- Digital initiatives such as online editions are inherently collaborative and interdisciplinary as they require merging various skills
- Some point to the public outreach potential of new media in extending humanities scholarship to broader new audiences outside common academic circles

Opinions on Technologies

- Some associate digital humanities with quantitative methodologies and efficiency-and-productivity-oriented principles of quantitative computer and information science
- There are concerns about the positioning of interdisciplinarity as a competitive edge or as an indicator of cutting-edge and innovative scholarship

The next chapter will build on the discussion thus far to further elaborate on the dynamics of the scholarly landscape and the potential consequences of ICT implementation that may not be desirable for scholarship.

CHAPTER 7: DUALITY – THE CONTINGENCY OF STRUCTURES AND INFORMATION TECHNOLOGIES

Duality is a twofold principle. First, it implies that technology use is mediated by structures and agency. Scholars are social actors and exercise active agency in constructing their environments. Yet scholars are also enabled and constrained by the social, economic, policy, and technical frameworks of the academy and their home institutions. Hence, in the first section of this chapter I discuss the following research questions:

- What is the role of existing academic structures on the assessment and appropriation of information and communication technologies (ICTs)?
- Are the institutional norms of the humanities evolving to respond to the affordances introduced by ICTs?

The *duality* principle also points out that ICTs have both enabling and constraining effects and therefore may also have negative consequences. The second part of this section illustrates how ICTs also may have unintended or unexpected consequences and investigates the following matters:

- What are the impediments and disadvantages of technologies within the context of academic practices?
- Are there cases in which ICTs are improving certain processes at the expense of unintended negative consequences or a loss of existing affordances?
- How are scholars compensating for the negative practical consequences of ICTs?

The Role of Academic Structures in Information Technology Assessment

Chapter 6 focused on technology-in-use and explored a range of ways in which new media are being utilized within the context of research activities. Understanding scholars' interactions with ICTs requires a holistic approach that also factors in structural elements such as social norms, institutional support systems, and the rapidly evolving information policy framework.[59] The primary structure-related theme that emerged from my research was that of the evolving nature of publishing as an enterprise and the consequences of this evolution for humanities scholarship. A related discussion topic was the ideology of open access. Also, there were remarks about the technological infrastructure required to encourage and support experimentation with new media. Hence I will report on these three emerging themes associated with academic structures.

Evolving Structures of Publishing

During my interviews and interactions with the Fellows, I often heard remarks about their home universities and departments, tenure committees and procedures, and the editorial policies of publications of interest to them. Their observations confirmed that peer review continues to lie at the heart of many scholarly activities such as promotion, grant evaluations, publishing opportunities, and job interviews. They often alluded to the role of status in scholarly publishing efforts and observed that job title and institutional affiliations continued to matter in securing reputable publishing channels.

[59] Information policy includes strategies and guiding principles that relate to information collected, created, organized, stored, accessed, disseminated, and retained. Examples include protection of personal privacy, intellectual property rights, document retention, and information rights.

Several of the scholars I talked with mentioned the state of university presses and increasing challenges in getting their books published. Chris said, "There is incredible pressure on the humanities and the presses are in a difficult situation and seeking marketable titles." He talked about the small but well respected scholarly society he was involved in and how its members were trying to compete with well established publishers with large endowments as they had access to sophisticated online publishing systems. He stressed that the expectation that their journal should also be published in electronic format had put a tremendous amount of pressure on their low-budget operation.

In the literature review chapter, I described the so-called "crisis in the humanities" invoked in Chris's comment as a prevailing theme in the humanities literature and discussion lists. The crisis to a significant extent is related to rapidly increasing prices demanded by commercial publishers for licensing their digital content. As more library acquisition resources are expended on scientific journals by large commercial publishers, university presses, which have historically played a large role in humanities publishing, are facing a growing set of alarming challenges.

The informants' comments illustrated the paradox associated with the role of going digital: Digital publishing represents both a cause of and a remedy with which to fix the current situation. The following account from Kate, a doctoral student of comparative literature, touches on the opinions expressed by several other Fellows:

> Some believe that digital publishing can enable new channels in a more cost-effective way and in a more timely fashion. Academic institutions are conservative structures with historical values and principles. When you are trying to introduce a change, you often run into institutional barriers. You cannot have it top-down or bottom-up. There needs to be synergy coming from both directions.

The informants acknowledged the need to introduce new modes of publishing but uniformly noted that doing so required alternative academic configurations. Klein said, "The perception is that academics are resistant to change . . . not because they are rigid but they function in organizations with deep-rooted traditions." As Steve was talking about institutional norms and expectations, he gave an example to illustrate how he was often bound by scholarly protocols. "I sent an article to a journal a couple of months ago," he said, "and got a request from the editor to replace the digital version of the eighteenth-century book I cited with its print counterpart." My exchanges on this topic were limited to a small number of informants; however, their comments illustrated the need to situate change by taking into consideration the current configurations and policies of scholarly communication networks.

Although only a few of the informants commented on this issue, it is worth noting that digital scholarship initiatives were characterized as grant-funded projects led predominantly by early adopters and enthusiasts. They noted that funding sources were often more interested in sponsoring innovation than in promoting the subsequent management and maintenance processes that take place after an initiative is established. They questioned the long-term viability of these initiatives due to the administrative and technical challenges associated with their upkeep and continued development. For instance, Marc described a start-up grant that he secured from the Office of Digital Humanities (National Endowment for the Humanities) about a couple of years ago. The goal was to reconstruct ancient monuments in online environments based on existing digital images, videos, and archeological reports as well as artifacts from the historic sites. He was concerned about moving forward with the project after the pilot implementation that is funded by the Office. Unlike research papers or patents that come out of grant-funded projects, the outcomes of the project Marc described are produced in the form of Web-based systems that need to be maintained

and kept up to date in the face of changing technological components such as file formats, storage systems, and database models. Such sustainability-related responsibilities require either securing additional research funds or relying on technology support systems provided by home institutions.

Reactions to Open Access

In the past decade, the proliferation of online tools for sharing and creating knowledge and the exponential growth of freely accessible digital content across the Web have begun to redefine the concept of *openness* in scholarship. There has been an intense debate between proponents and opponents of open access principles involving librarians, information scientists, publishers, and domain scientists. So I asked my informants whether they have been involved in such discussions with their colleagues and whether they held a perspective on the issue. Most of them had formed opinions on the topic but they often prefaced their remarks by noting that their understanding of open access matters was tangential and that they were not involved seriously enough to defend an informed position. I felt that they were observing developments from a distance rather than being active participants in the evolution of the issue. Only two of the scholars wanted to engage in an extended conversation with me about the pros and cons of open access principles. When I asked how they became interested in the topic, one of them reported that her association with the library advisory group helped her understand and appreciate the issues. The other Fellow said that he was coming from an institution where this topic was brought to the faculty senate for discussion and deliberations.

The opinions of the Fellows presented below reflect the characteristics of the open access discussions that are taking place in academic and information policy circles such as universities and federal funding agencies. Although there is a founding

definition provided by the Budapest Open Access Initiative,[60] open access is an emergent concept that defies simplification. As Herb (2010) articulates the issue, the open access agenda has a diverse range of underpinnings including public access to federally-funded project outcomes, equal access to scholarly information as a means of reducing disparity, and lowering subscription costs by eliminating formal publishing expenses. A full discussion of such issues is beyond the scope of this paper. My goal is to illustrate the interpretive flexibility associated with the terminology among the Fellows.

Several of the informants associated open access with science and technology fields. For instance, Ally, a doctoral student of English, said, "Open access is important in the sciences because the publication costs are very expensive." She added that scientists' work requires costly laboratory settings and there are high operating expenses that are reflected in final publication costs. She concluded, "For me $400 that I paid for clearing an image right was the only cost I accrued for publishing my recent article." Ally's association of open access with disciplines that involve expensive research processes is worth noting because, contrary to her opinion, the publishing costs are not directly associated with research expenses. For instance, Waltham (2009), based on her research that involved eight humanities and social sciences publishers, concludes that a shift to a new funding model based on open access is not currently a sustainable option for any of the journals included in her study because of longer article lengths and lack of federal support for humanities publishing.[61]

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[60] As referenced earlier in a footnote, information about the Budapest Open Access Initiative can be found at http://www.soros.org/openaccess

[61] Waltham (2009) argues that the gold approach to open access (the author pays) that has been experimented with in the science, technology, and math publishing area would not fit the humanities mode because articles in the latter are longer and feature a relatively high proportion of non-peer-reviewed content. Also, there is federal agency support for some of the successful open access initiatives in the sciences. For instance, the National Institutes of Health pays for BioMed and such a

Almost uniformly the informants questioned the implications of open access for their careers and emphasized that they need to publish in peer-reviewed, well established, respected journals. May, an assistant professor of English, told me, "Whenever I am listening to conversations about open access, I am listening to it from the perspective of a junior scholar who is not tenured yet." When I asked about his opinions on open access publishing, Kenz said that his friend got mixed advice about making her dissertation available online. He said, "She knows that it will be read and is likely to be cited more but she wonders how it will hinder her chances to publish in respected journals." Holding a similar opinion point, Susan said, "I cannot be a trailblazer—it is difficult to break away from traditional forms of publications." She went on to explain:

> As scholars one of our key values is communication. It is scholarship when our work is shared. However, the tension is also nurturing a successful scholarly career. There is competition and rivalry. It is not a utopian view of let's share everything. There is something so personal and instinctual about intellectual property. It is naïve to think that academics have purely altruistic pursuits.

Susan's remarks also demonstrated how for many of the informants the subtext of open access was "deep sharing." My informants expressed varying feelings about providing primary information (such as field notes, images, and other unprocessed evidence that supports their work) with their publications for broader use. Julie said, "When you ask them, most scholars happily embrace the idea of sharing. It opens up your data for additional interpretation and introduces you to new networks." She went on to explain that these advantages are idealized and in practice are counterbalanced by concerns about misused data, rights, and "potential embarrassment due to full

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broad level of support for publishing humanities research may not be available. She concludes that there is a need for vigorous research into the implications of open access for the humanities.

exposure." When I asked what he thinks about making his field notes and images available, Alex, a professor of history, said:

> It took me several years of visiting archives and historic sites to build my image collection. I use these materials in my teaching, too. I see two problems in sharing them broadly. First I am terrified with the complexity of the copyright issues . . . . [Also] I cannot spare time to go over them and tag [them] so that they are usable by others too.

There were also comments regarding the virtues of open access for finding new readers and opening up to new audiences. As described in the interdisciplinarity section, some found value in the public outreach potential of open access. However, several informants made comments similar to May's, pointing out that "we all want our works to be read but what we really want is for the people who are active in our field to read it so that we can be a part of the specialized scholarly conversations." Kim said, "Of course it will be great to have a public following but my scholarship is not written to engage with the public but to engage with serious specialists." I sympathized with her remarks as this was my sentiment during the Wednesday seminars at the Society. The papers presented and the subsequent discussions often involved complex interpretations informed by various social theories and deep knowledge of related streams in the literature. I felt that it was essential to understand the underlying historic arguments and terminology in order to comprehend the intellectual thread of the discussions.

Although the informants felt that they were not knowledgeable enough to grasp or critique the open access model, several of them remarked about its possible impact on the stability of the current publishing system. They indicated that, based on their limited knowledge of the issues, they were concerned that open access principles may have the potential to undermine the credibility and sustainability of the scholarly publishing enterprise with unintended consequences for scholarship. For example,

Pedro said, “I heard someone arguing that open access will open a floodgate and cause unparalleled increase in information at the expense of watering down quality.” He felt that the current publishing model with its review process and entrenched stakeholders was able to monitor and maintain the appropriate volume and quality of publications. Few informants questioned the financial viability of the open access model. Chris commented that “publishing on the Web does not mean that no one needs to pay.” He said that “someone still needs to take care of the bills, right?” This was indeed a query rather than a statement, indicating that the informants had more questions than opinions regarding open access and its implications for their practices.

The general preference of the informants for small-group interactions and exchanges among trusted circles of colleagues again resurfaced within the context of open access. Susan said, “Open access may change the nature of close circles of specialists. I worry about this because I still rely on the intimacy and immediacy of these contacts.” Her comment illustrates that the informants’ perceptions were grounded in their need to maintain the time-honored communication structures and patterns they value.

Although several of the informants commented on open access, the topic did not surface as an issue of important concern or interest to them. It is my conclusion based on this research that conversations about topics such as digital humanities, the so-called crisis in publishing, and open access are taking place predominantly in research circles outside of those populated by subject domain scholars. The proponents of the open access movement characterize digital culture as a liberating environment marked by broad sharing, innovation, and reliance on collective intelligence. This stance did not, however, appear to dovetail with the established scholarly communication patterns and social organizations of the humanists who were the subjects of this study. The informants were not necessarily against open access

values; however, they stressed the importance of preserving cherished academic values (such as selective small-group interactions) that may not be equally appreciated by open access supporters who foster broad and open scholarly communication patterns.

Technical Infrastructure for Digital Humanities

As I noted earlier, one of the questions I asked during the interviews pertained to digital humanities; the vast majority of the informants said that they had heard the terminology but did not know exactly what it meant. Only four of the informants had hands-on experience with what can be characterized as a digital humanities project; however, almost all of them offered insights into projects that require technology support. Humanities projects with digital components appeared to be strongly associated with funding issues and information technology support services offered by their home institutions. Robert captured this sentiment aptly when he commented, "When I hear 'digital humanities,' I think about funding. Only those with connections to established centers are able to do it." He went on to explain his interest in exploring how he might improve his research or teaching through the integration of new media but noted that he was from an institution with a weak service framework for academic technology support.

Joseph said that he had not been involved in any project that could be considered a digital initiative and added that he would not even know where to start. He said, "Nothing exists at my home institution to inspire or guide the academic staff with technology use." Another detriment of digital humanities that was mentioned involves the time commitment required for such undertakings. Marc said, "My first involvement with a digital humanities project was a disaster for my productivity." He found himself spending more time experimenting with and assessing applications than

carrying out his core tasks such as reading, reflecting, and writing. He noted that he was fascinated by various digital projects during his brief tenure at George Mason University but was now trying to "establish groundwork to control time spent on using technologies." Marc's comments were interesting in the sense that he positioned ICTs as an intriguing and captivating set of tools that held an attraction to him that was similar to the draw of computer games.

A common issue raised pertains to the challenges involved in ensuring the maintenance and continued development of these initiatives, especially after the active development phase. As McGann (2008) comments, even the best-funded digital humanities projects "get born into poverty." Illustrating this point, Steve described how he had been maintaining a server in his office to participate in a cuneiform tablet digitized project. He noted that it was expensive for him to hire help and that he was trying to rely on his graduate assistants to maintain the system. When I asked him if he had considered moving the database to the library or to another IT unit, he indicated that he preferred controlling the system and that he was not committed to opening up the contents for public consumption.

There were also comments regarding other structural elements that empower or limit digital scholarship. For instance, Pablo said that he knew of many digitization projects that were devoted to the study of nineteenth-century literatures and cultures, as working with these materials did not involve any copyright restrictions. One of the informants described his interest in exploring the potential of game design in teaching history but said that his department chair disparagingly associated the genre with "popular culture" and discouraged him from pursuing such a project. He said that he felt hindered and discouraged, noting that this was why some portrayed his discipline as a conservative domain.

Impediments and Negative Consequences of ICT Deployment

The informants' enthusiasm for technologies was tempered by their insights into potential undesirable consequences. This tension should be evident in the discussion thus far; however, in this section, I will further discuss the anxiety and unease that came through in our conversations. I have expanded the focus to include negative or unintentional consequences, at the expense of some repetition, in order to bring new insights to the often under-represented perspectives of non-users or anti-users. As pointed out in the literature review, most of the accounts in the literature that mention humanists' use of information technologies either report and emphasize positive consequences or cite the conservative nature of humanists in explanation of non-use or under-utilization. Insight gained through this case study indicates that ICT-use patterns and opinions fall along a fluid continuum and are complex, defying a binary generalization of opposing categories such as users and anti-users.

Potential Information Overload

While existing search engines have been instrumental in making it possible to search for information much more efficiently, my interviews revealed that there are concerns about the information management challenges associated with having access to large and diverse corpuses of digital information. Sara, an anthropologist in the dissertation-writing stage, said, "We moved from information scarcity to abundance without having time to readjust our cognitive abilities." Several of our informants described the problem space as that of assessing and using the information found rather than that of the actual discovery process undertaken through search engines.

Sensitive to this information overload, several of the Fellows expressed their anxiety about catching up with the literature in their fields. "I have hundreds of PDF files stored on various directories of my computer," said Peter, "but when I need one

of them, I go back to Google as it is faster to find and download it than identifying it in my folder of stuff." Eric said, "I keep on saving files and checking out books [pause] they sit on my desk like unpaid bills bugging my conscience." The remarks indicated that the ease of finding information tempted them to spend more time in searching and finding information, potentially reducing the time that can be devoted to reading, contemplating, and interpreting.

Referring to his concerns about spending too much time checking and reading e-mail messages, Fred complained, "I am on a million mailing lists which I want to be on. I find it frustrating and unpleasant." Sara said, "If you are interdisciplinary, you get more e-mail as you try to keep up with too many things. I get announcements from four different departments." Claudia pointed out that we are facing a "burgeoning world of information" but continue to "have the same amount of time to scan through literature and follow mailing lists and look at some blogs." Based on what I heard from the informants, I felt that the new frontier is mastering the art of digesting and organizing the vast amounts of information that is easy to locate and retrieve. When I asked them if they were considering unsubscribing from some of the mailing lists to reduce the time commitment, several noted that they preferred to monitor the messages selectively rather than leaving these online communication environments altogether.

Reactions to Online Reading Environments

My informants agreed that they were becoming increasingly comfortable with online reading environments. Several, however, brought up negative consequences of this process and complained that they had observed some "loss" and a shifting balance between reading and writing in the process. For instance, although online reading is bringing in new features such as "focused reading" by keyword searching of pertinent

information, it is also causing a temptation to browse rather than read thoroughly. The following comments from the Fellows illustrate a range of undesirable outcomes:

> I would love to spend more time on writing but with the abundance of things to read around me, I am more and more drawn into reading. Am I now writing better articles because I am surrounded with information? I don't think so. (Sally, English)

> This has been the information age—breadth, no depth. Nobody reads an article closely any longer. People used to read what makes sense to them. Digital media streamlined [the] scholarly process. There is rapidly growing information out there and a perception that we can have a mastery of it. Diplomatically speaking, this is very ambitious. (Rich, Comparative Literature)

> I have increasing difficulty in immersing myself as I am getting used to skimming. If I need deep and contemplative reading, I need to shut off other media around me including my e-mail account. (Terry, History)

Another noteworthy aspect of online reading environments was the role of interactions with hyperlinks. "When I am using my computer, I tend to switch activities by following hyperlinks or checking references to citations and other relevant works," said Marty. He went on to explain that there was a paradox in this, as the connections among pages and documents made his work more efficient but also was more likely to sidetrack him as he followed links that might take him away from the immediate topic about which he was reading. Marty's experience is likely to be associated with the centrality of reading for humanities scholars and with the grounding of their cognitive processes in the linear reading of text that is situated in relation to physical hierarchies such as page numbers and sections.

There is also a prevailing recognition that there is an increasing expectation, especially among students, that information should be easily accessible on the Web. "If the article is available online, I read it," said Marty. "Otherwise I tend to ignore it." Sara expressed similar sentiments: "Are we going to be increasingly ignoring

materials that have not been put on the Web yet?" There were concerns about digital information being privileged due to the ease associated with discovery and access in online environments and the underutilization of other rich sources of evidence manifested in physical environments and knowledge sources.[62]

While I was conducting my research several different models of e-book readers were introduced to the market and the features have continued to evolve. For instance, Amazon's Kindle was released and attracted considerable publicity, especially in the fiction market. Several of the informants asked me about e-books and my experience in using them. The comments were generally neutral and exploratory rather than prejudiced or pre-determined. There were, however, exceptions. Alex said, for instance, that he was "weary of the hype about e-books." He then described his participation in the Mellon-funded Gutenberg project.[63] He commented that e-books "often fail to deliver a reliable and functional reading environment." He added that he "experienced reader fatigue as there were many links and accompanying materials on each page." Overall, I felt that e-books and online reading environments will continue to evolve and present an open interpretive space for the appropriation of these devices for scholarly purposes.

Insights into Online Research

During the course of my study search engines have become an integral part of our information environment. Googling has become synonymous with doing research, increasingly replacing the role of libraries in facilitating information discovery and

[62] There are several studies that investigate citation patterns of online versus print materials to test the premise that materials published online are more likely to be cited than print publications. The role of 'ease of access to online materials' on citation behavior remains on the open research agenda. For instance, McDonald (2006) concludes that this hypothesis could not be confirmed for most disciplines because the patterns are not apparent yet to drive any conclusions.

[63] Gutenberg was a Mellon-funded project, an experiment to give scholars and publishers a chance to see how one can produce Web-based tenure-worthy e-books out of dissertations.

access. Although there was deep appreciation of search engines, particularly Google, I also want to bring into my discussion a strain of criticism of search engines. The following account by Serdar illustrates the concerns about evolving Web-based information structures and how they may also impede some of the principles of scholarly work that are supported by traditional research environments such as libraries and archives:

> I am concerned about too much use of Google as an instructor. I understand how great it is to search and find so much information so quickly. But I think it impedes my students to develop a comprehensive understanding of the canon of our topic. What I mean is a range of discussions around a given certain topic—not information on a specific matter. Google is still not good in this aspect. You can go to library stacks and by browsing through the shelves get a sense of how the topic has been treated and how it branches. I asked my students to name me the top ten journals in our field. They had no idea of figuring out. If you go to a library and visit the reading room, you'll find them all next to each other with the last year's issues to browse.

The above comment by Serdar illustrates the importance of observing boundaries between information spaces that separate knowledge domains and signify the credibility and authority of scholarly resources. Digital library environments take pride in seamlessly incorporating a large corpus of information from a wide range of sources. Although such a feature may be beneficial for certain types of information discovery, it may also cause difficulty in assessing and understanding knowledge domains due to disappearing boundaries. In this regard, Mia commented on the new Cornell University Library catalog that retrieves materials not only from the library on campus but also from hundreds of other library collections. She said, "Now one of the hardest things for me to do is to find if my library has a copy of a particular book I am looking for." Although the system was rich enough to retrieve an array of associated information from diverse sources, it failed to provide the specific information she needed to support her information request. When I explained that it was possible to

limit the search to the Cornell holdings, she indicated that the new catalog had too many features to learn. Such remarks demonstrate the tension between information systems that feature limited but easy-to-learn (and remember) features and those that try to engage a range of user behaviors resulting in multi-purposed but complex and arduous information environments.

As I noted earlier, although there is great interest in utilizing blogs and other online exchanges such as mailing lists as sources of abundant and easily accessible data, there are also associated anxieties about how these tools will change research practices. Emily worried that it was becoming increasingly difficult to justify travel funds. She said that her recent request to visit an archive for research purposes was denied because there were alternative sources of information available online. Also, a couple of the informants articulated their unease about the increasing reliance on online information for evidence-gathering and the possibility that this trend would lead to lowered incentive to "go to the actual sites and meet the people they study." Although the informants realized and acknowledged the cost-effectiveness of such online research interactions, they wondered about the possible consequences for in-person and onsite interactions that define the essence of certain humanities specialties.

The Ephemeral Nature of Digital Content

A prevailing unease among the humanities faculty I interacted with concerned the ephemeral nature of digital content and technology appliances and applications. There was concern about the constant hardware and software updates that lead to obsolescence of storage devices, applications, and file formats. Mariel captured this concern when she stated, "I don't know how one will use my dissertation in a couple of years as it includes a digital component with music notations." As Diane was describing a scholarly edition that her colleague is developing, she remarked, "There

is a tendency to over-design with trendy features without thinking through how the [Web] pages will be maintained." Fred made a similar comment: "There are many creative methods emerging for storing digital texts electronically but so far, paper is the only commonly used medium that we know can preserve texts for hundreds of years." There were several related remarks questioning the overinvestment in Web-based information spaces without understanding the consequences from a long-term use perspective.

One of the most commonly expressed concerns regarding increasing reliance on digital information was about trust, authority, credibility, and authentication due to the fluidity of the Web information landscape and the lack of reliable quality control measures on the Web. Several of the Fellows mentioned that scholarly authority was being affected by the features that have been dubbed collectively as Web 2.0.[64] Such technologies are based on the principles of collective intelligence, open access, collaboration, and interoperability. The informants questioned how their keystone scholarly values can be protected in such online environments. Expressions of such concerns were woven through our conversations.

The Challenges of Teaching and Learning with Technologies

Several of the informants shared their concerns regarding their students' increasing interactions with Web-based information environments. Pablo said that, as a teacher, he feels that it is his responsibility to "relay to students how to use online resources responsibly." He continued:

[64] In 2005, Tim O' Reilly coined the phrase 'Web 2.0' to denote an "architecture of participation" characterized by technologies such as content-sharing sites, wikis, blogs, and folksonomies. It represents collective intelligence, open access, collaboration, and interoperability (http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html).

> We cannot discourage our students from using digital media. This is how they learn. We can teach them how to harness these resources. You need to understand how they are using the Internet to assess their writing. The Internet is a key environment for their brainstorming process.

Echoing the informants' responses to other ICT interaction domains, the comments often blended feelings of anxiety and enthusiasm. "I don't agree that using games or online simulations will distract our students from reading," Mariel commented. "I would rather engage them in an active exploration and discussion than holding on to pure textuality." In contrast with this perspective, Mia expressed her concerns about an increasing "obsession with connectivity" and how multitasking is a natural behavioral pattern for her students. She commented, "What we can offer is an opportunity to sit still with a book." Another common concern was aimed at the use of laptops during lectures, which some felt distracted students from active engagement in physical learning environments. Although they appear to be cautious about predicting the consequences of these trends, several of the informants noted that learning spaces were changing and that their students were increasingly functioning in a digital information landscape without prior knowledge of what it was like to be in a world of print and other physical artifacts.

Anxiety and Suspicion about Technologies

The ubiquity of various types of technology and their assimilation into our daily lives appear to cause some anxiety for some of the informants. "It is increasingly impossible to escape from various forms of ever-present technologies," stated Lilly. There were several comments about how technology appears to be everywhere, pervading every aspect of their lives. Several of the informants had iPhones or Blackberries and the invasive nature of interactions with these devices made them question whether e-mail was a burden as much as a tool of convenience.

One of the sources of apprehension appeared to involve the risks associated with tangential interactions with ICTs. In this regard, Sam said, "We need to get out of our disciplinary protocols into networked learning environments. Otherwise, the world of thinking, interpreting, conveying may transform without our participation." Although they were questioning the ever-increasing presence of ICTs in their environments, they were also wondering about the consequences of not being engaged with new media.

A few of the informants questioned the increasing emphasis on integrating information technologies into learning, teaching, and research. The following quote by Serdar expresses this minority opinion but also highlights the fact that some of the scholars' assessment of technologies is aligned with their social values:

> In a way I see the humanities as a refuge from technology. Especially since I am interested in environmental humanities, my inclinations and assumptions are counter to the [technology] optimism you see in the field of scholarship. That's not to say I do not see the potential in technology and it can be useful in many ways. It [technology] is not the driving force in advancing scholarship—it is the driving force that created the environmental problems. Part of my interest in humanities is dealing with the world in such a way that it does not reduce the world into data points.

Some of the informants expressed their apprehension about the increasing association of new media use with innovation and cutting-edge scholarship. Kenz said, "The reason we have started questioning the relevance of the humanities is our obsession with techno-science and increasing cultural influence of digital media over our lives." The following quote from him illustrates how several of my informants felt about the privileging of digital media:

> Digital in its essence is quantitative. In my conversations with my colleagues, we contemplate how the sciences or other positivist disciplines are now more than ever magnets for money and prestige.

The Wednesday seminar discussions occasionally revolved around the dark features of technology such as the violation of individuals' privacy. As I was talking with Tahira about her opinions on technologies, she said, "When you meet someone who works on computer design, you sometimes only remember things like surveillance." She continued to explain that she was uncomfortable about her bias and wanted to make an effort to "talk with them and try to connect to their disciplinary values." One of the liveliest Wednesday discussions occurred when the Fellows reflected on an article entitled "Operational Media." In this article, Crandall (2005) argues that the twentieth century was driven by a race to eliminate time delays of all sorts—between actions and displayed results; in travel connecting distant points; between sent messages and received responses; between observation and engagement. His key thesis is that both military development and industrial production have been driven by the need for advance detection and action time. The assumption has been that only sophisticated technological systems are capable of dealing accurately and consistently with the highly complex demands of warfare scenarios. Technologies are perceived as reliable, accurate, and fast—free of errors that can be introduced by human intervention. I would not argue that this article reflects the mindsets of my informants but it illustrates how technologies can be perceived negatively due to their association with robotic efficiencies that are considered to be superior to the capabilities of human beings.

Political Connotations of Interdisciplinarity in the Digital Age

As I noted earlier, almost fifty years after C.P. Snow's (1959) famous depiction of the worlds of science and the humanities as polar opposites, similar sentiments continued to surface in my conversations. Several of the Fellows commented about how, under the rubric of digital humanities, they felt an increasing

pressure to be more interdisciplinary and modify their research methodologies accordingly. Eric, an assistant professor of English, stated that "Computerized text analysis tries to mimic science, kind of positivist work." He continued, "Why can't we come up with applications that are computer-based but are trying to get something out that is useful for qualitative interpretivists?" The following quotes further illustrate the prevailing feeling among the Fellows in regard to interdisciplinary exchanges in the domain of digital humanities:

> I once went to a joint meeting with computer scientists. The whole conversation was them asking us, "What can we do for you? Can you use any of these tools?" No one asked what they can learn from us. (Sara, Anthropology)

> Literature ontologies are being created without the engagement of the humanists. Pushing a vision of digital humanities is favoring scale at the expense of depth and aura. I am puzzled with those who privilege technologies as though it is going to rescue our scholarship from the dark ages. (Rich, Comparative Literature)

Some of the Fellows expressed their interest in engaging in a dialogue with scientists and technologists with an open mind without underlying prejudices. "There is a lot of suspicion in humanities for IT," Ivy said. "They [humanists] underscore the ideas and concepts that IT cannot capture." She added that this was exactly why humanists need to be involved in technology developments that aim to support the work of humanities scholars. Sara expressed a similar sentiment when she said, "We need to find a way to get in an intellectual discussion [with technologists] without being defensive." She wondered if the new generation of humanists and the increasing emphasis on digital media will change this pattern.

As Kirschenbaum (2007) observes based on his experience as a humanist, there is a deep tradition of skepticism towards quantitative and empirical methods, as they represent a positivist epistemology. This is a complex attitude to explain,

representing the biases of humanists against quantitative research methodologies as well as hard scientists' tendency to undervalue qualitative inquiries. Pierre said, "Both scientists and biologists tell us that they are also interested in human interpretation." He explained that they shared a common attitude that we need to work together to make it happen; however, they [scientists] were not flexible in their ways. In his words, "they still fall back on counting and measuring." When he talked about *Labyrinthe*,[65] an online forum for exchanges and open access publishing, Sam said:

> We invited physicists and biology people to come and write with us in L'abrent but it did not work. We could not find common ground. They were trying to avoid an alternative interpretation but we want to open new ways of understanding.

My conversations and observations revealed that the informants perceive ICTs not only as productivity and knowledge management tools but also as the frontier of a potential dividing line reinforced by the status of power associated with quantitative research traditions.

Summary

The humanities academy is composed of historically constituted structures that may support or inhibit unfolding technological innovations. Although the informants are autonomous researchers with independent academic pursuits, our conversations were infused with their references to the norms and expectations of the academy in general and the administrative cultures and technical service frameworks of their home institutions and departments. As they commented on the role of structural elements in

[65] Founded in 1998, *Labyrinthe* is a Web-based review providing a place for research and experimentation in the fields of literary, philosophical, historical, and social knowledge. It is open to all researchers regardless of theoretical orientation and characterizes itself as "undisciplined" as the review is interdisciplinary. "Because it is necessary to defend complexity, incompletion and the fragmentary thought, *Labyrinthe* intends to encourage the examination of cross approaches and the circulation of knowledge." More information is available at *http://labyrinthe.revues.org/*

forming their perceptions, viewpoints, and practices regarding ICTs, the themes included the evolving nature of publishing as an enterprise, the open access movement, the role of institutional technical support systems, and the sustainability of projects with digital components.

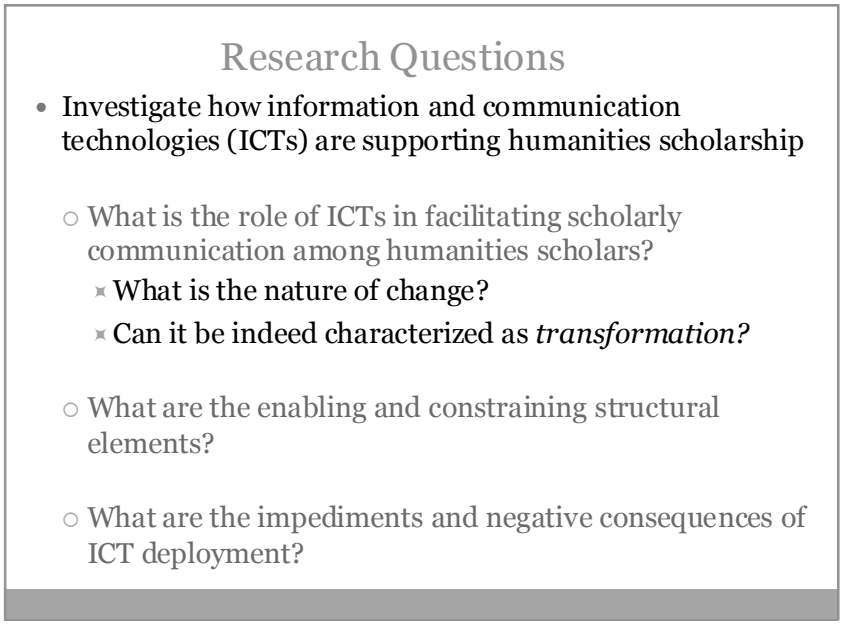
The second part of the chapter comprised a discussion of some unintended consequences of technology use and negative perceptions of ICTs. The informants' testimonies illustrated the tension between the efficiency and effectiveness of information technologies and the challenges associated with reviewing and making use of large and diverse corpuses of digital information. Although online search and reading environments are firmly embraced, some expressed concern about spending too much time searching at the expense of time devoted to reading and writing, and an inclination for online browsing rather than thorough reading. Also revealed were concerns about digital information being privileged due to the ease associated with finding and reading such information. Some voiced mistrust and suspicion about how technologies facilitate processes such as surveillance and the infringement of privacy. Also observed were occasional associations of IT with hard sciences and skepticism towards quantitative and empirical methods and the tension and competition felt between two research cultures.

The next chapter will merge the analytical approaches I have used in Chapters 5 through 7 to reflect on my core research questions. The synopsis will lead to a discussion of what digital humanities infrastructure entails for humanities scholars.

CHAPTER 8: DISCUSSION - ADDRESSING THE RESEARCH QUESTIONS

In the preceding three chapters, I presented and analyzed insights gained through my conversations with a group of humanities scholars in which I inquired into the role of ICTs in their academic work. This chapter will synthesize the three research lenses used to reflect on the research questions posed in the introductory chapter (see Table 8.1 for research questions). The goal is to consider the role of ICTs in facilitating scholarly communication, enabling and constraining structural elements that may influence use patterns, and the consequences of technology applications. Following the discussion of the research questions, I will describe how perceptions

Table 8.1. Research Questions



and interactions are influenced by the distinctive frames assumed by scholars. The analysis will lead to a consideration of what digital humanities infrastructure entails

for humanities scholars, which has been a theme at the center of my dissertation research.

Discussion of the Research Questions

The Role of ICTs in Facilitating Scholarly Communication among Humanities Scholars

- *What is the nature of change?*

The goal behind this research question was to explore how new ICTs are interacting with the techniques and structures of humanities scholarship and what such interaction entails. The accounts in Chapter 6 illustrate how the scholars' searching, discovering, reading, and collaborating patterns have been evolving as a result of the affordances offered by ICTs. As scholars become accustomed to finding vast amounts of heterogeneous information on the Web, convenient access has become an expectation, a commonplace of scholarly life, no longer an innovative novelty. This observation dovetails with Norman's (1998) notion that technologies are considered *information appliances* when the focus switches from learning a technology to discovering how to use it to accomplish tasks. ICTs such as digital content, search engines, and communication media that include e-mail and mailing lists have gone from being considered as specialists' tools to being used commonly as *information appliances* and have been integrated into the inconspicuous flow of information discovery and use.

Information appliances are easy to use. They enhance productivity and therefore blend easily into a scholar's daily work environment. This is what Ihde (1990) refers to as *background relations*, in which technologies form the context of experience in a way that is seldom consciously perceived. This is precisely how *information infrastructures* are formed, as transparent and invisible—and therefore

taken-for-granted—task facilitators (Star & Ruhleder, 1996). As described in the "Configuration" chapter, these *background relations* are fluid and change as scholars adapt them to their work flows. Technology use in this rapidly changing information ecology is a moving target. As ICTs become more ubiquitous and entrenched in daily practices, the Fellows become accustomed to using certain features of information technologies or discovering new applications to try. They also change their use patterns, for example by unsubscribing from a mailing list that may have become too large, diluting the value of exchanges.

- *Can it be indeed characterized as transformation?*

When considering the research questions that would inform this study, I was interested in exploring whether ICTs play a *transformative* role in enhancing scholarship, changing the nature of scholarship rather than simply introducing efficiencies such as easy access to digital content and collaboration tools. Transformation is a multifaceted concept and can be interpreted variously depending on the constructs of interest and it is complicated to assess without an explicit baseline. My preliminary literature search revealed how the term is interpreted in context, based on the diverse research perspectives of literature, computing, genetics, or linguistics. I was not able to find an established definition for the term that specifically applies to scholarly practices; however, transformation is consistently associated with disruptive, radical, and profound change in structure or composition. For instance, the National Science Foundation (NSF) describes transformational change within the context of health organizations as the introduction of managerial, cultural, or information system innovations that lead to fundamental changes at the individual, organizational, or system levels. It specifically identifies the role of information technologies in this process in terms of "the ability and effectiveness of

innovative information technologies to radically change performance and strategies."[66] For the purposes of this discussion, I created the following operational definition to define transformation as the process relates to academic environments:

> 'Transformational' within the context of scholarship denotes *disruptive and profound* changes in practices and culture that *modify the composition and structure* of research and scholarly communication. The fundamental alterations take place at *multiple levels* including individual scholar's practices, scholarly conventions, and academic institutions.

From an information technology perspective, one can argue that the scholarly communication process is changing in *composition and structure* through the ubiquitous availability of digital content, communication and social networking tools, and online content-sharing forums. If we consider that the fundamental stages of humanities research are searching, discovering, reading, and writing, the accounts offered by my informants indicate that ICTs are indeed influencing and altering their research methods. ICTs purport to introduce conveniences and efficiencies such as making knowledge discovery and access easier, and acknowledgment of these benefits is widespread among humanities scholars. Online search and retrieval tools have changed the landscape of information and there is a vast amount of primary and secondary scholarly materials available on the Web at researchers' fingertips. Communication technologies such as e-mail and mailing lists are also well established in daily scholarly interactions and exchanges. As interactions with information technologies become *background relations*, technologies form the context of the collective research experience.

It is difficult, however, to assess the extent to which the new information-seeking and communication methods are improving scholarship beyond simply

[66] The quoted NSF definition is taken from the Center for Health Organization and Transformation (CHOT) site and is available at http://www.nsf.gov/eng/iip/iucrc/directory/chot.jsp.

enabling new and enhanced ways of producing the same outcomes. What is complicated to analyze is if and how the new media are reconfiguring existing practices by enabling, for example, novel research methods. For instance, techniques such as text mining stand out as quantitative methods that facilitate new ways of analysis and contemplation.[67] Yet my informants rarely use such tools because they are perceived to require technical proficiency and an IT support system. Instead, some mundane research processes, such as comparing how a certain phrase is used by an author through a simple Google keyword search, appear to be emerging as transformative affordances. The informants' accounts demonstrated how these ordinary technical features are supporting new ways of filtering vast bodies of scholarship.

From a work practice perspective, I find it particularly complicated to assess whether scholarly procedures and routines are indeed being transformed as a result of the new information landscape. As information technologies become more common and easier to use, scholars appear to be expanding the ways in which they utilize ICTs. However, such changes in the humanities information landscape come across as incremental and cumulative rather than being *disruptive and profound*. ICTs appear to be enabling a range of research practices without changing the fundamentals of scholarship at *multiple levels*. Both scholars and academic institutions are adopting new media in a steady and deliberate pattern that cannot be characterized as disruptive of prevailing academic work flows.

Although there was broad agreement on the conveniences and new functionalities introduced by ICTs, my informants were quite thoughtful about whether they agreed that associated improvements in their scholarship were indeed

[67] Text mining refers to the process of extracting patterns from text documents such as the frequency or proximity of specific words. Content analysis applications often involve sophisticated algorithms and require access to servers and technical assistance.

transformative. Several of the Fellows stressed that exposure to more information accessed via sophisticated tools does not necessarily lead to higher-quality scholarship. They often commented on the importance of separating the effects of ease of access and discovery from its impact on the information consumption and application process. As one of the informants noted, "The mental effort that goes into deep reading and intellectual processing has not changed." The sources of digital scholarly resources appear to be infinite; however, there is limited cognitive potential for understanding, interpreting, and contemplating such a wealth of discovered information.

One outstanding question that remains to be answered is how the mediating technologies are altering epistemic cultures by introducing new research methodologies and theoretical perspectives. Are interactions with information technologies influencing how humanists make sense of the world and how they create knowledge? Are ICTs contributing to the emergence of a new style of reasoning in the humanities? Having access to a heterogeneous and multimodal corpus of knowledge with new tools of discovery has not seemed to alter my informants' interpretive and critical epistemologies. From an ontological perspective, they continue to maintain nominalist or social constructionist perspectives, perceiving social reality as an interpretive construct that is created through communicative interactions. The basis of knowledge-building is primarily individual experiences of things through communication, as there is not "one reality"—instead, there are multiple realities based on how individuals are creating an understanding of social life.

It is evident that the affordances of ICTs influence the epistemic and social nature of scholarly communication by introducing new research, analysis, communication, and dissemination tools. However, one of the most remarkable features of scholarly communication patterns has been their stability under varying

conditions. Vickery (2000) notes that "communication mechanisms, once established, rarely disappear." The first form of communication, personal contact (now enabled by e-mail), remains of inestimable value, as do meetings and conferences. As Meadows (1974) observes, perhaps in this case "the message is the medium," and the process of scholarly communication cannot be altered fundamentally unless humanities itself as a subject area undergoes a significant change.

Enabling and Constraining Structural Elements of the Social and Technical Context of Scholarship

As described in Chapter 7, such structural elements as publishing practices, tenure requirements, and institutional IT support systems were often referenced as influential factors in assessing and adopting IT-based practices. The informants' accounts revealed that recent changes in the information landscape are intertwined with various dependencies and the inherent tensions of the academy. They also observed ways in which this dynamic is changing, suggesting that structures are both influential and amendable.

The principal structure-related theme that emerged from my analysis was that of the evolving nature of publishing as an enterprise facing the ideology of open access. The informants commented on these matters from the viewpoint of their careers and institutional expectations for tenure and recognition. Although they recognized the potential of open access to broaden the readership for their work and attract new audiences, they were concerned that open access principles might undermine the credibility and sustainability of the scholarly publishing enterprise with unintended consequences for their work. For many of the informants, the subtext of open access was "deep sharing." They expressed varying feelings about providing primary information (such as field notes, images, and other unprocessed evidence that

supports their work) with their publications for broader use and expressed their concerns about misused data and the inability to control their intellectual rights.

As Becher and Trawler (2001) point out, one of the striking features of academic life is how institutions, journals, and individuals are ranked and graded. The goal of scholarly communication is not only to promote knowledge but also to establish reputations. Accordingly, the informants acknowledged the need to introduce new modes of publishing but uniformly noted that doing so will require alternative academic configurations that will recognize such undertakings as a form of academic achievement in support of their career aspirations, such as the tenure process. Openness challenges the boundaries between 'professionals and amateurs' and 'scholars and knowledge enthusiasts' as it raises questions about authority and credibility. Based on their comparison of seven academic fields (including history and music), Harley et al. (2010) found no evidence to suggest that graduate students are challenging traditional publishing practices. Supporting their conclusion, this study did not find any significant differences of opinion due to generational differences.

The second structure-related theme reported in this study was the association drawn between digital scholarship and institutional services that encourage and support assessing and integrating ICTs. The informants questioned the long-term viability of digital initiatives due to the administrative and technical challenges associated with upkeep and ongoing development. Humanities projects with digital components appeared to be strongly associated with funding issues and the information technology services offered by their home institutions. The level of engagement with new media was determined not only by scholarly needs and intents but also by the availability of academic technology support systems in their home institutions or other associated organizations. The informants observed that such

programs often depend on scarce resources and are easy targets for cuts during financial downturns.

One of the core concepts of structuration theory is that of the *dialectic of control*, according to which agents are not merely passive entities but rather have the power to change the structures that guide their behavior (Miller, 2002).[68] For instance, a number of the Fellows questioned how current tenure policies regard participation in digital initiatives and mentioned that they have been involved in conversations at their scholarly society meetings about challenging and adjusting customary conventions of performance evaluation through the potential collective influence of such academic associations. They were, however, quick to note that progress is slow and does not always move steadily forward.

Impediments and Negative Consequences of ICT Deployment in Support of Scholarly Processes

This research question was motivated by a desire to explore ICT use as a continuum of practices and attitudes, rather than in terms of sharp dichotomies such "use vs. non-use" or "pro-use vs. anti-use." As illustrated throughout this study, a range of factors determines an academic's engagement with technologies, including perceived need, ease of use, affordability, and technical skills. Also, ICT deployment is a fluid process and therefore changes continually. My study supports Selwyn's (2003) observation that individuals as agents make *choices* in considering and using technologies and there are often structural and organizational enablers and constraints in determining which choices are made.

[68] The notion of the dialectic of control is analogous to that of social constructivists' stance on the mutual shaping of technology—in the ongoing interaction between humans and technological artifacts the shaping that occurs is a reciprocal process. Interactions between individuals (or groups) and structural characteristics are also reciprocal and evolve in response to changing landscapes.

The informants interviewed for this study often equated ICTs with expediency and productivity. Ease of use and convenience were important criteria they use in assessing and using ICTs and shaping their *choices*. Also, many of them characterized themselves as technology laggers, indicating that they either are not sufficiently interested in or do not make the time to explore new ICTs. I posit that one of the reasons behind this behavior is scholars' satisfaction with current tools that support their work. They perceive few significant benefits for their scholarship associated with a broader adaptation of emerging ICTs, selecting only technologies that offer compelling value. They are also concerned with the time commitment required to explore new technologies, as time is a limited resource and they need to focus on their core goals and scholarly activities.

Chapter 7 provided several examples demonstrating ways in which ICTs not only open up new possibilities but also restrict existing ones. The informants observed that ICTs might also involve undesired outcomes such as shifting the balance between identifying information and processing information or creating tension between seamless integration of knowledge environments and the need to maintain boundaries. Such perceived restrictions or shortcomings are likely to present reverse salients,[69] impeding scholars' use of ICTs.

Although there is deep appreciation for having access to broader bodies of online literature, the Fellows' comments reflected a shift in the challenge from identifying information to filtering, sorting, correlating, and contextualizing information. Attention and time continue to be precious resources whose value remains constant regardless of the expansion of the information landscape.

[69] A *reverse salient* is a weak link in any system that impedes progress (Edwards et al., 2007). The technology historian Thomas P. Hughes introduced the phrase to refer to components in a system that have fallen behind or are out of phase with others.

One of the tensions that came through in this study was that of the prevailing association of technologies with hard sciences and skepticism towards quantitative and empirical methods, which are seen as representing a positivist epistemology. I did not perceive this attitude to be a direct factor in defining interactions with common information technologies such as digital content and search applications. It is likely, however, that such underlying perceptions may play a role in how scholars are considering new techniques such as quantitative text analysis.

Research Questions in Retrospect: Framing Information and Communication Technologies

I began my study with three broad research questions and decided to follow a grounded theory methodology in order to allow themes to emerge rather than limiting my observations and data-gathering to a set of specific questions. Although I followed an inductive approach, I worked within a specific research context—understanding interactions with ICTs that relate to scholarly work. I had characterized ICTs predominantly as tools that facilitate scholarly communication and academic practices. However, as I proceeded with my conversations and observations, it became apparent to me that the role of new media in humanities scholarship can be studied from multiple angles based on the myriad ways in which scholars relate to these technologies.

As became evident in the accounts given during my interactions with informants, they represent a wide range of opinions and assumptions about ICTs and assume diverse positions on the role of new media in facilitating their work. I will use Bijker's (1995) notion of a *technological frame* to synthesize the diversity of these viewpoints. A technological frame denotes a commonality of perception and approach within a particular group when considering a given technology. It is composed of such

elements as tacit knowledge, assumptions, challenges faced, norms, technical skills, institutional policies, and practices. Such a frame provides the context in which technologies are interpreted. The various meanings attributed to technology are generated by user-specific cultural positioning within this wider context. Within the scope of digital humanities, I will describe three general frames.

1. Digital Media as a Facilitator of Scholarly Communication

This frame positions ICTs as an enabler of scholarly communication to support a range of processes depicted in Figure 8.1 in order to create, represent, organize, analyze, and communicate scholarly content. ICTs provide broad, convenient, and easy access to scholarly information and facilitate communication through synchronous and asynchronous online interactions. This frame represents my initial conceptualization of ICTs as knowledge containers and conduits for enhancing teaching, learning, and research.

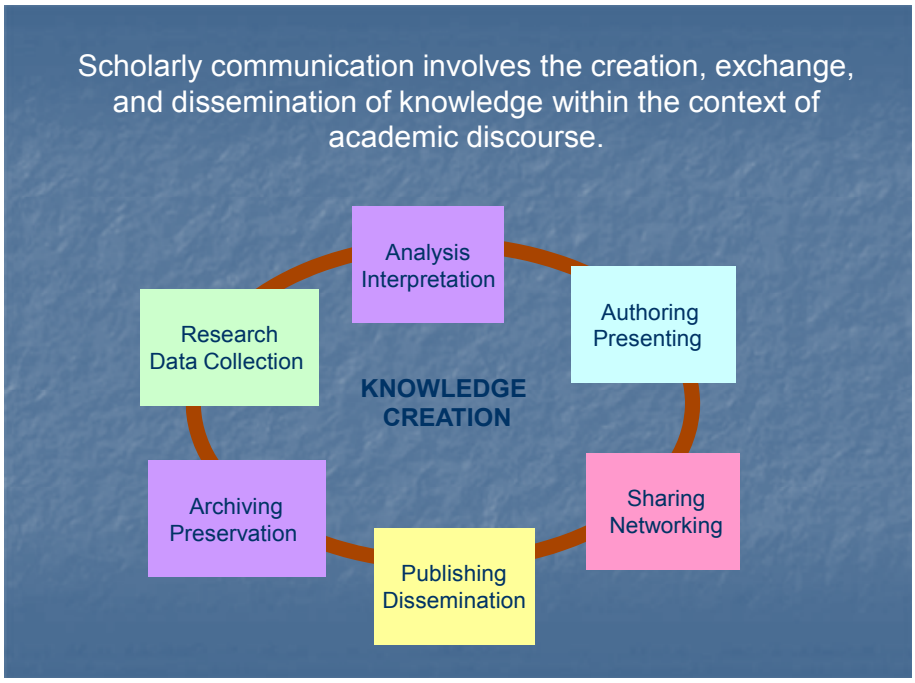


Figure 8.1. Scholarly Communication Processes.

Within this framework of technologies, scholars are both consumers and producers. For instance, a historian may use a blog to post her opinions on a specific topic while also using the same site to learn about other colleagues' opinions on a particular issue. Scholars use ICTs to build and share new digital collections for further study and analysis.

This frame is also evident in the interpretation of ICTs that is presented in Chapter 5 based on the accounts of the informants. The examples provided throughout Chapter 6 illustrate how technologies such as digital content, Web search engines, e-mail, and mailing lists were supporting the scholars' academic practices in creating, representing, and communicating their work as well as discovering and accessing information sources.

2. Digital Media as Venues for Creative Expression and Artistic Endeavors

This frame approaches ICTs as media of artistic expression. During the Wednesday seminars, there were several presentations in which new media were positioned as platforms and artistic tools for creative manifestation of the Fellows' theses. For instance, one of the Fellows used film and digital editing tools as an artistic medium within which to explore how we see and perceive water. The forums and seminars hosted by the Society often included demonstrations of artistic projects in digital music and digitally generated sound. Reacting to the art performances, participants considered issues such as sound's importance in an era of visual studies, the cultural and ethnic specificity of sound fields and rhythms, the gender attributes of voice and spoken narrative, and the history and politics of electronic experimentations in sound.

The discussion of multimodal scholarship in Chapter 6 illustrates the potential role of new media in exploring new forms of literacy through the use of digital authoring and visualization tools. Such applications provide new visual, aural, dynamic, and interactive experiences and form channels for creative expression. As one of the Fellows pointed out, new media help to create experiences that involve a range of senses and lead to novel forms of interpretation.

The Fellows also discussed ways in which digital technologies sometimes enable new aural and visual experiences at the expense of disabling some other feelings and encounters. Also considered was how using digital media may involve reinterpretation and appropriation of a digital work each time it is re-created. Reinterpretation often requires following site-specific installation instructions, rewriting the code for an alternative platform, or recasting a work in a contemporary medium trying to conserve some of the attributes of the original medium of digital art.

3. Critical Studies of Digital Culture

A critical studies frame approaches technology as a context for interactions and examines the philosophical implications and impact of the use of new media on individuals or the larger society. It addresses digital culture and the potential role of humanists in exploring the evolving norms of knowledge and values to both appreciate and critique the influence of new media on our society.

This frame represents the viewpoint that technology is not inherently damaging but must be carefully examined when being utilized. For instance, alternative worldviews such as posthumanism and transhumanism are controversial, as they introduce a slew of ethical questions regarding the associations and boundaries that characterize relations between human beings and technologies.[70] For instance, what would be the implication of there being no demarcations between bodily existence and computer simulations such as robotic technologies? What are the ramifications of re-engineering the human body through technological enhancements? What are the consequences of creating robotic machines with intellectual capabilities that far outstrip those of humans? Such controversial assertions form one of the theoretical grounds for critical approaches to technologies.

This frame was implicit in some of my conversations with the Fellows and observations at the Society. This research took place as social network and collaboration sites such as MySpace, Facebook, and thousands of academic and amateur blogs were being introduced and becoming integrated into daily conversations

[70] Over the course of my project, there were occasional referrals to the philosophies of posthumanism and transhumanism at the forums and meetings sponsored by the Society. Although a discussion of these complex worldviews is beyond the scope of this dissertation, I will briefly describe these philosophies, as they are useful in illuminating this specific frame. Posthumanist philosophy rejects the humanist divisions of self and other, mind and body, society and nature, human and animal, organic and technological (Wolfe, 2009). The goal of this philosophy is to reveal a new theoretical and ethical understanding of humanism without such demarcations. Transhumanism is a philosophical perspective that explores how technologies may alter biological constraints to enhance intellectual, physical, and psychological capacities (Bostrom, 2001).

and practices. Although none of my informants were involved in a study that explored the practices, implications, or meaning of such sites, they often referred to them and speculated about the implications of such new media for their scholarly engagements or their students' learning and communication patters. Several of them acknowledged, however, the importance of engaging in projects that investigate how new media are influencing culture in general with a specific emphasis on communication and socialization patterns.

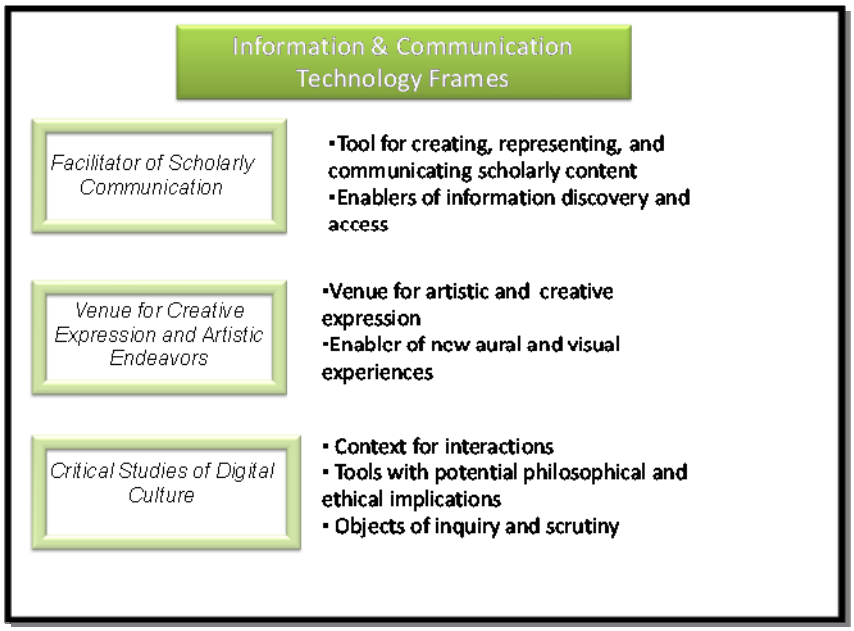


Figure 8.2. Frames for Information and Communication Technologies.

The frames summarized in Figure 8.2 have blurry boundaries with overlaps and intersections. They may co-exist, as individuals often consider technologies within multiple frames. These frames are examples of perspectives—they are not inclusive of all potential approaches to ICTs. They are illustrative, however, insofar as we postulate that in order to explore interactions with ICTs we must consider the multiple mindsets of individuals. The purpose behind my categorization is not demarcation but

the accentuation of diverse perspectives. My informants worked within multiple and sometimes overlapping frames; however, this study approached ICTs primarily using the first frame. Although alternative frames were revealed through the grounded theory approach, my theoretical framework and research questions privileged a deeper understanding of ICTs as scholarly communication tools.

Humanities Infrastructure

One of the impetuses behind this study was my desire to achieve insights that would expand my understanding of the dynamics of *humanities cyberinfrastructure.* Humanities cyberinfrastructure is characterized as an enabling technical and social configuration that facilitates *digital humanities* initiatives. The term is associated with the conceptualization, design, and development of a digital infrastructure over which to advance knowledge creation and sharing.

Framing the Cyberinfrastructure Vision

Thus far, the cyberinfrastructure agenda has been primarily framed by funding agencies such as the National Science Foundation or by researchers mainly within the information science and informatics communities. Although there are a growing number of subject domain scholars and practitioners engaged in the conceptualization of cyberinfrastructure, their involvement is relatively limited. Most of the current initiatives are informed by the requirements of data-driven and quantitative disciplines such as science and engineering (Wouters et al., 2008; Edwards et al., 2007). Cyberinfrastructure is envisioned as a network of hardware, software, expertise, best practices, content, and policies that support the following goals (ACLS, 2006; Atkins, 2003):

- Creating ubiquitous and comprehensive knowledge environments to enable a decentralized research environment
- Providing unprecedented technical capacity for computation, storage, and communication
- Ensuring the interoperability of systems and content to allow seamless access to information across repositories
- Providing discipline-specific software applications to introduce innovation and novel scholarly processes
- Allowing and fostering distributed collaborations among researchers
- Encouraging and enabling interdisciplinary collaborations
- Leveraging IT expertise and relying on common technologies for the management and sustainability of digital tools and content

The underlying requirements for information environments are comprehensiveness, high capacity, seamlessness, speed, and interoperability. The key guiding principle is to foster sharing and interdisciplinary collaborations that lead to significant scientific advancements.

Positioning Cyberinfrastructure from the Informant Perspective

As illustrated throughout this study, the term "digital humanities" is a catchphrase and is emerging as a set of practices, methods, beliefs, and theories for creating, applying, and interpreting digital information and new media. Most importantly, the response to this phrase is full of tensions and varying opinions about the role of ICTs in supporting, extending, or transforming humanities scholarship. The informants in this study construed "digital humanities" as jargon without an applied meaning for the Fellows' scholarship. It is evident both in the literature and in this study that a burgeoning number of humanists are engaged in practices that fall under

the rubric of digital humanities. However, Hayles (2008) estimates that only 10 percent of humanists seriously participate in projects that involve Web authoring or constructing research projects using digital tools. My study revealed a similar pattern.

Although the informants in this study were appreciatively assessing and integrating ICTs that were deemed pertinent to and convenient for their work, I felt that the business of humanities departments has not undergone any significant alterations. Many tools and techniques that are being associated with sophisticated digital practices, such as data mining or visualization, remain accessible and relevant to only a handful of scholars. Although some attribute this trend to the conservative nature of the humanities disciplines, I postulate that it is also related to the scholars' satisfaction with existing tools and methodologies. In this study, most of the informants came across as open-minded and interested in exploring and assessing how technologies can support their research and teaching. However, they were often buried in their daily work flows and were not motivated to make a special effort to understand or incorporate ICTs in support of their work—unless they perceived a discernable benefit.

Conceptualizing Infrastructures in the Context of Everyday Practices

One of the goals of this study was to consider the emerging infrastructure within the context of the everyday work practices and research values of academics. Fundamentally, infrastructure is a relational concept as it emerges in practice and is rooted in activities and structures (Jewett & Kling, 1991). It therefore needs to be examined and defined in relation to specific organizational practices. I chose the Society as a research site intentionally, recognizing the co-existence of traditional and digital scholarly practices, depending on the purposes and styles of scholars. As opposed to digital humanities centers that aim to foster technological implementations,

the Society brings scholars of common interests together for scholarly exchanges and explorations and provides a more realistic assessment of perceptions and practices.

When one views the information environment from the perspective of these scholars, one is struck by the ways in which their core scholarly practices prevail and persist regardless of the changing information landscape. Discussions regarding innovative features, such as institutional repositories or e-print servers, appear to be taking place predominantly within circles of researchers who are interested in the management, preservation, and dissemination of information. Many tools and techniques that are being associated with sophisticated digital practices, such as data mining or visualization, remain accessible and relevant to only a handful of scholars.[71] In this study, informant testimony shows that scholars value an information landscape that facilitates their work; however, they did not appear to be engaged in the ongoing deliberations, preferring to remain focused on their proven work practices and tools. Although they appreciate the potential of collaborations and interdisciplinary exchanges, they continue to choose collaboration strategies that dovetail with their scholarly aspirations and institutional opportunities.

As King et al. (2006) caution, technical approaches designed to move scholars from their deeply embedded value systems are destined to fail. Positioning cyberinfrastructure as a technical system is likely to privilege the consideration of technical design challenges at the expense of neglecting the importance of a host of non-technical requirements. For instance, the informants in this study prefer

[71] It is important to note that some recent studies that have explored the evolving scholarly communication patterns in hard or applied science disciplines such as life sciences, chemistry, and biology also report that the views and practices of researchers diverge sharply from strategies promoted by information providers and policy makers (Harley et al., 2010; Research Information Network & the British Library, 2009; Velden & Lagoze, 2009). They identify a gap between the visions of open access, data sharing, preprint servers, and scholarly blogs in transforming scholarly communication and the actual practices and perceptions of researchers. Harley et al. (2010) caution that enthusiasm for the development and adoption of information technologies should not be conflated with the hard reality of highly competitive and complex professional environments.

networking with trusted colleagues in small gatherings rather than participating in large and anonymous online conversations. They continue to find value in interacting with physical information artifacts as much as they appreciate the ubiquity of digital sources. They question the virtues of sharing work-in-progress or "evidence" broadly as such practices may conflict with their professional aspirations. They hesitate to support open access principles without understanding if these norms conflict with their performance measures. It would be an oversimplification to attribute these tensions entirely to resistance by conformist humanists. The conflict is partially introduced by neglect of the social and cultural aspects of scholarship as we envision a digital information infrastructure. The slow uptake may also be related to scholars' not having opportunities to comprehend the potential benefits of ICTs, as articulated in the next section.

Conceptualization of Use and Local Support Systems

Infrastructures are not stand-alone or top-down systems. They are composed of local implementations and grounded in institutional practices (Edwards et al., 2007). In addition to material aspects of technologies, the structures surrounding scholars are also instrumental in supporting or impeding technology adoption. This is what Rogers (1962) refers to as *awareness-knowledge*—information about not only the availability of an innovation but also about how it functions. It is important to help scholars conceptualize how a specific technology can be applied in support of their goals. Efforts to encourage faculty experimentation with ICTs need to be accompanied by local or community-based support systems to provide technical guidance that will make it easier for scholars to *conceptualize use* (Zimmerman & Finholt, 2007). Potential users must understand the capabilities of ICTs and learn how these features may assist them in accomplishing their tasks.

During my conversations with the Fellows, they often asked what was happening at Cornell and what services and opportunities were provided to researchers in the realm of academic technologies. Based on the insights gained, I feel that researchers who want to explore what is possible need service frameworks not only to assist them with experimentation but also to enable them to network with likeminded scholars and to open up horizons by sharing what is possible. For humanities scholars who are interested in engaging with ICTs, an infrastructure should include customized applications and services so that scholars can continue to spend more time on research or teaching than on trying to understand, manage, or sustain technologies. In this way adoption patterns are not only based on personal choices but are also linked to opportunities provided to the scholars through which they can familiarize themselves with potential tools and services.

Aligning Technical Tools with Scholars' Norms and Values

According to Borgman (2007), at the heart of the cyberinfrastructure initiative is the "information as public good" concept and the notion of making the outcomes of research interoperable, extensible, and scalable. Humanities cyberinfrastructure is often framed as a technology and policy framework for distributed digital humanities initiatives within which to encourage re-usable and extensible collections (CLIR, 2009; ACLS, 2006). My conclusions from the case study confirm Borgman's observation that "information as public good" is a new concept for many humanists as it relates to their scholarly outputs.

The proponents of the open access movement characterize digital culture as a liberating environment marked by broad sharing, innovation, and reliance on collective intelligence. This stance did not, however, appear to dovetail with the established scholarly communication patterns and social organizations of the

humanists who were the subjects of this study. The informants were not necessarily against open access values; however, they stressed the importance of preserving cherished academic values (such as selective small-group interactions) that may not be equally appreciated by open access supporters who foster broad and open scholarly communication patterns. Cyberinfrastructure discourse tends to be utopian and to view scholarship as a privileged institution. As Latour and Woolgar (1979) demonstrated in the *Laboratory Life*, "scientific activity is just one social arena in which knowledge is constructed" (p. 31). Likewise, humanities scholarship is a social activity guided by the individual and cultural interpretations of sharing and collaborating as well as by professional recognition. The individualistic and interpretive techniques used by humanities academics need to be taken into consideration as we are envisioning an infrastructure for digital humanities.

Blending Established and Emerging Information Infrastructures

The current infrastructure for humanities scholarship was built over centuries and is composed of collections, bibliographies and searching aids, standards for organizing and classifying information, accreditation and certification policies, presses and publishers, and libraries and archives for facilitating access and archiving. This infrastructure is embedded within other structures and social arrangements such as universities, university presses, archives, and scholarly societies. In Star & Ruhleder's (1996) terms, it is transparent in use and invisibly supports tasks without needing to be created anew at each time of need.

As we contemplate what the humanities infrastructure will entail, the new ecology for digital scholarship is evolving within a complex sociotechnical network of search engines, digital content, information repositories, open access principles, multimedia and hypertext learning environments, interoperability standards, and so on.

Contrary to its characterization as a sophisticated technical environment, cyberinfrastructure involves not only novel tools but also ordinary practices. As Star and Ruhleder articulate it, "infrastructure occurs when local practices are afforded" and associated technologies can be used in a "natural and ready-to-hand fashion" (1996, p. 114).[72] ICTs such as digital content and search engines appear to be *ready-at-hand* in the sense that their use is organic and supports scholars in their efforts to concentrate on specific tasks at hand without thinking about the tool they are using. However, a search engine has the potential to be "present-at-hand" when one encounters too many citations and wishes for ways to limit and filter such information.

To be considered an established infrastructure, the emerging humanities infrastructure needs to facilitate scholars' work and enable the effective and innovative use of new media in support of intellectual pursuits, similarly to the entrenched framework that has traditionally supported scholarship. As was evident in the remarks of the informants, scholars consider and use ICTs based on their needs, goals, skills, practices, experiences, and institutional constraints and enablers. From the scholars' perspective, ICTs are often equated with expediency and productivity. They prefer tools that are easy to use and convenient to access and maintain. Infrastructure is being perceived as a long-term vision whereas scholars' natural inclination is to think about their immediate projects and short-term goals. ICTs are not used for the sake of being innovative and cutting-edge but to facilitate daily routines and get the work done.

[72] Star's statement is rooted in Heidegger's notion of 'ready-to-hand.' Heidegger uses 'present-at-hand' and 'ready-to-hand' to describe various stances toward things in the world (Stepanich, 1991; Heidegger, 1962). Ready-to-hand entities are revealed through our involvement with them and thus are characterized by the specific use that we make of them. This involvement with ready-to-hand entities is constitutive of an ontological structure as being-in-the-world, whereas a present-at-hand stance views things as discrete entities or facts that can be objectively distinguished. This approach breaks up the unitary whole of being-in-the-world into the discrete elements of the human subject and external objects.

There is no demarcation between traditional and digital information infrastructures. The informants in this study continue to make use of tools from each domain based on their specific needs. One of the challenges for teams that are conceptualizing and developing tools in support of a digital information infrastructure is to build seamless and natural bridges between the two sets of tools rather than positioning them as discrete information ecologies.

Holistic Assessment of the Consequences and Perceptions of ICTs

Information appliances are easy to use and enhance productivity. Therefore, they readily assume the status of background relations, in which technologies form the context of experience in a way that is seldom consciously perceived. As the informants' experiences demonstrate, ICTs do not simply open up new possibilities for research and communication but also have the potential to alter existing models, causing a *loss* of previously available affordances. This is precisely why it is critical to understand how scholarly practices and ICTs are co-evolving in order to identify positive and negative consequences as well as changes in the broader information ecology.

Among the unforeseen aspects of my research was that of variances in the technological frames of the informants. ICTs not only are perceived as productivity tools but also provoke unease and distrust due to their association with the Cold War, surveillance, environmental destruction, and entrepreneurial science. Also, it is common to draw a close association between ICTs and positivist disciplines. My interviews revealed that the distinctions and tensions between Snow's two cultures persist. Several of the informants contrasted science's progressive impression with the retrospective inclination of the humanities. The informants in this study often associated technical terms such as "digital" and "infrastructure" with quantitative

epistemologies. This tension may be a reverse salient, impeding humanists' openness to considering new technologies as tools of productivity as well as objects of their studies. As we envision a humanities cyberinfrastructure, it is critical that we acknowledge these variations in perception. We also need to seek opportunities for identifying productive and constructive points of intersection between the two disciplinary cultures.

Summary

This chapter has considered the research questions that framed the study to reflect on the role of ICTs in facilitating scholarly communication, enabling and constraining structural elements that may influence use patterns, and the consequences of technology applications. From a technological perspective, one can argue that the scholarly communication process is being altered through the widespread availability of digital content, communication and social networking tools, and online content-sharing forums. It is difficult, however, to assess the extent to which these changes are leading to a transformative process for the humanities beyond that of simply enabling new and improved ways of producing the same outcomes.

The informants' accounts revealed how changes in the information landscape are intertwined with the dependencies and tensions of the academy, such as tenure requirements and publication and collaboration cultures. Although there are structural changes responding to evolving scholarly practices, the progress is slow and requires periodic interventions and encouragement. This case study also revealed ways in which technologies enable new practices as well as possibly constraining existing ones. Perceptions and interactions are also influenced by the distinctive frames assumed by scholars.

This chapter has also offered insights gained through the case study regarding the notion of humanities cyberinfrastructure, which is characterized as an enabling technical and social configuration that facilitates digital humanities initiatives. Although there is an appreciation of the importance of the sociocultural aspects of digital infrastructures, the current framing tends to underscore its technological architecture and novel applications. Factoring in the behaviors, norms, and values of scholars is important to our ability to align technical tools and services with actual practices. Also, it is critical to envision the traditional and new information infrastructures as related and blended ecologies rather than privileging a novel cyberinfrastructure.

CHAPTER 9: CONCLUSION AND IMPLICATIONS

This chapter concludes my dissertation by summarizing the focal findings and discussing their implications for future studies. Building on the discussion of my research questions in Chapter 8, here I begin by drawing together the themes and tensions that have been raised in the previous chapters. I present the key insights gained to position this study in light of the research questions posed, prior research surveyed, and the theoretical framework used. There are several limitations that should be considered in interpreting my findings. I will point them out before discussing the potential contributions of this study to theory, policy, and design. I will conclude by suggesting potential directions for future research.

Implications of Information and Communication Technologies for Humanities Scholarship: Themes, Insights, and Tensions

Theoretical Framework and Research Questions

Through a qualitative case study at the Society for the Humanities (Cornell University), this project investigated how ICTs are being used in supporting research and scholarly discourse by humanities scholars. I used a grounded theory approach and was guided by the principles of social informatics in gathering and analyzing data about the scholars' perceptions and accounts of technology use and the consequences for their academic work. The study not only examined the practices of scholars who employ technologies but also attempted to understand the perspectives of those who choose not to integrate them into their daily work flows. The 22-month research phase of the project involved approximately 160 hours of participant observations and 45

interviews with a group of humanities scholars from the Society of Humanities and other institutions. I framed the study by reference to the following three overarching research questions:

- *RQ1- What is the role of ICTs in facilitating scholarly communication among humanities scholars?*
- *RQ2 - What are the enabling and constraining structural elements of the social and technical context of scholarship for ICT appropriation?*
- *RQ3 -What are the impediments and negative consequences of ICT deployment in support of scholarly processes?*

This study was motivated in part by my objective of achieving insights through which to expand my understanding of the dynamics of *humanities cyberinfrastructure.* I wanted to view the envisioned service framework from the informants' perspectives to explore the meaning (or meanings) they associate with the concept. The premise of this study was that infrastructures are rooted in local activities and become transparent and invisible—and therefore taken-for-granted—task facilitators (Bowker & Star, 2000; Star & Ruhleder, 1996; Jewett & Kling, 1991). The case study enabled me to view information infrastructure as a relational concept that emerges in practice based on the daily workflows and routines of scholars.

One of the questions underlying my research was about the extent to which technological determinism assigns excessive autonomy to technologies when it informs analysis of the role of ICTs. The innovative and constructive consequences of technology use in humanities scholarship are evident. My goal has been to seek an impartial assessment in order to reveal unintended and negative consequences as well as scholarly processes to which new media have no immediate applicability.

My study investigated an evolving domain so I kept my research lens focused broadly during my fieldwork to allow new themes to emerge through the use of a grounded theory methodology. However, I used social informatics in order to factor in the social and structural context of technological innovation and the mediation process. The fundamental tenet of social informatics is that technologies are mutually constituted by interactions of the properties of technological artifacts and their broader context (Tyworth & Sawyer, 2008; Kling, Rosenbaum, & Sawyer, 2005; Lamb & Kling, 2002). The theoretical framework provided a basis for exploring how scholars use ICTs and it informed grounded theory building based on the three key social informatics principles illustrated in Figure 9.1.

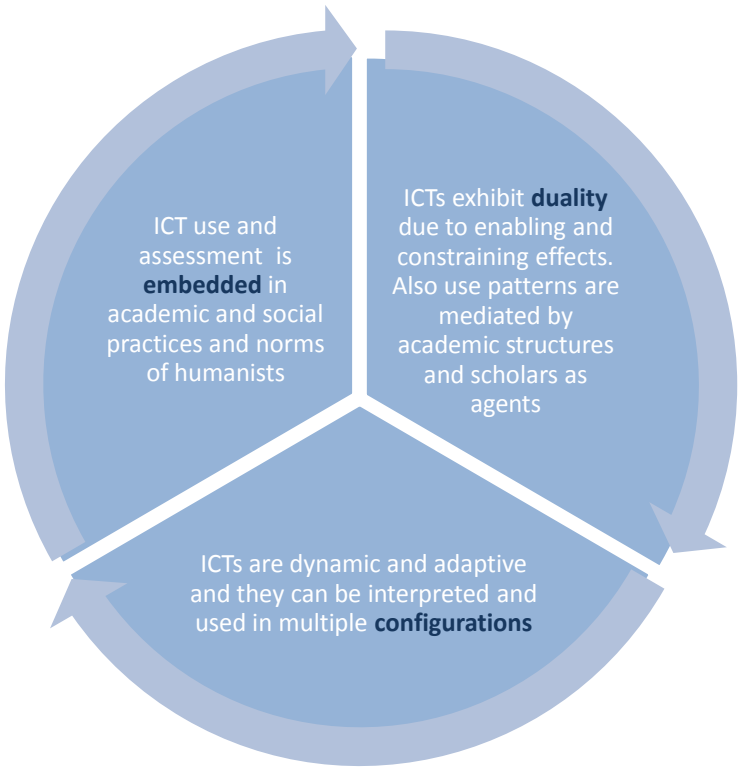


Figure 9.1. Seamless web: Key principles of social Informatics

As shown in Figure 9.1, the concepts of embeddedness, duality, and configuration represent the key principles of social informatics, which is built on the notion of a seamless web denoting how people, artifacts, practices, norms, and power relationships are bound together in situated, mutually constitutive activity. The key theoretical underpinning of both grounded theory and social informatics is symbolic interactionism, with the focal premise that individuals construct the social world on the basis of the meaning they associate with it and these meanings are derived from social interactions (Denzin & Lincoln, 2000). The utility of adopting social informatics as an interpretative stance is due to its facilitating an understanding of the *context* of information technologies and the *process* of appropriation.

As described in the literature review chapter, there are several studies that investigate how humanities scholars use technologies in research, teaching, and creative expression. Some of these studies intend to correlate disciplinary characteristics with adoption patterns. These are informative efforts; however, they are often not descriptive enough to shed light on underlying use and non-use issues beyond indicating usage patterns. To complement such research approaches, my fieldwork focused on the daily practices of humanities scholars without limiting my investigation to a specific domain of interactions with ICTs. My goal was to assess ICT use holistically as a component of the rich and diverse social and academic life of scholars. Rather than seeking to demonstrate causal relationships among variables, I was interested in looking at configurations, understanding contingencies, and exploring the mutual shaping process as scholars integrate ICTs into their practices and work flows.

The goal of the individual interviews was to gather information about the informants' scholarly practices and use of information technologies. Through an ordinary conversation, my objective was to understand the points of view of Fellows

in the Society for the Humanities at Cornell University pertaining to what ICT entails in the humanities, how the Fellows are using information technologies in support of their research, and the changes they are observing in their practices. My participant observations at the Society formed an important implicit explanatory framework in my analysis and allowed me to gather observation-based data that are grounded and confirmed by findings from the interviews.

Embeddesness: Context Matters

In this study, I viewed the humanities as a cluster of disciplines in order to differentiate it as a community of scholars bound within the same subject area, procedures, and theories, using similar research methodologies. Chapter 5 provided a general characterization of the humanities subject area to illustrate the knowledge domain's research methods, knowledge production structures, and communication and collaboration patterns. My goal behind this characterization was providing a social context within which to interpret the role of information and communication technologies (ICTs) in academic work.

ICTs within the context of humanities scholarship comprise a range of technologies and associated practices that support creating, accessing, processing, sharing, and archiving information as well as facilitating communication. This study began with a broad characterization of ICTs as a constellation of applications rather than as a specific technology and did not focus on a specific configuration. Adhering to the *embeddedness* principle of social informatics and the grounded theory methodology, the ICT definition within the scope of the study emerged during the interviews. The informants consistently interpreted the terminology as denoting *digital content*, involving such media as digital collections and databases; *search engines* for searching, discovering, retrieving, and verifying information; and *communication*

applications such as e-mail, mailing lists, blogs, and wikis that enable communication and collaboration among scholars.

Overall, I observed a uniform level of enthusiasm and openness about the role of information technologies such as digital content and search engines in enhancing scholarship. Consistent with existing studies (Toms & O'Brien, 2008; Kirschenbaum, 2007; Segal et al., 2007; Katz, 2005; Palmer & Neumann 2002), my interviews and observations indicated that these ICTs were indispensable and that their use was organic, characterized as integral to the scholars' daily work flow. I did not perceive any variances of opinion or ICT-use pattern differences among scholars of different generations. Adoption patterns appeared to be well-distributed regardless of specific discipline, gender, or tenure status.

Themes: Configuration and Interpretive Flexibility

The scholars I have studied came across as discerning and astute consumers of technology. The themes presented in Chapter 6 have illustrated how the informants are considering, trying, and putting into use information technologies based on their specific needs and circumstances. Using the notion of *configuration* as a research angle brought out the fluid and emergent nature of technology development, assessment, and adaptation and revealed the following themes:

1. Evolving Notions of Distance and Place

In online research environments, perceptions of distance and place are evolving due to the availability of vast amounts of digital information on the Web as well as the availability of digitization technologies that enable scholars to contribute content to this growing corpus of multimedia materials. From an access perspective, scholarly knowledge that was once captured and organized in archives, libraries, or

bookshelves and file drawers in analog format now exists virtually, distributed among various repositories, databases, and Websites.

The informants articulated the virtues of having convenient and easy access to vast amounts of scholarly archival and published materials available on the Web, literally at their fingertips. They also pointed out the implications of the online information domain for some of their academic norms. Libraries and archives as *places* set boundaries for scholars in defining the parameters of the research environment. The *place* also signifies authority and credibility. The evolving notion of distance and space necessitates the reinterpretation of some well-established scholarly standards and principles. For instance, several of the informants remarked on the fluidity of versions and what is considered the authoritative final copy of a scholarly work.

2. The Materiality of Books and the Importance of Physical Context and Place

While the informants were praising the burgeoning availability of online scholarly information in support of their academic work, their accounts also demonstrated the role of the affordances of physical knowledge spaces in academic work. It is common for humanists to work in physical settings—archives with boxes of information artifacts such as photos, manuscripts, diaries, letters, and finding aids. The common sentiment among the informants of this study was that interactions with physical information artifacts (such as books) are important in the learning process through the practices of marking up, highlighting, and so on. The physicality of information objects assists scholars in their conceptual linking and the material context of research forms an important cognitive element in the course of research, guiding the mental processes of perception, memory, judgment, and reasoning.

Although I encountered what appeared to be undisputed support for the virtues of discovering and accessing information online, the informants emphasized the role of physical archives and libraries as *places* that bring individuals with similar academic pursuits together for both social and academic exchanges. Their accounts helped me better understand the difficulty of separating the epistemic aspects of scholarship from its social dimensions. The boundaries between information spaces in the forms of archives and collections differentiate knowledge domains and signify the credibility and authority of scholarly resources. The designers of digital library environments take pride in seamlessly incorporating a large corpus of information from a wide range of sources. Although such a feature may benefit certain types of information discovery, it may also cause difficulty in assessing and understanding knowledge domains due to disappearing boundaries.

3. The Use of Search Engines

Almost all of the scholars who contributed to this study remarked that search engines, especially Google, have changed how they identify information that is relevant to their research and teaching. Digital content on the Web enables a rich set of practices, from discovering books of interest through keyword searches to confirming a fact in a given chapter or looking at the works cited in the references section. The accessibility of a large corpus of digital text and commonly available search features make it possible to explore linguistic patterns such as the frequency and distribution of words to discover new associations among scholarly works.

In the related literature (CLIR, 2009; Rydberg-Cox, 2006; Schreibman et al., 2004), techniques such as text mining stand out as quantitative methods that facilitate new ways of analysis and contemplation. Yet my informants rarely expressed interest

in such sophisticated tools and preferred applications such as search engines that enable a range of tasks and blend naturally in scholarly workflows.

The ability to locate smaller units of information such as specific pages, paragraphs, images, sentences, and even words influences how information is found, compiled, used, and interpreted. The Fellows found value in accessing smaller units of information, but also identified a potential downside of such an affordance as these units can be cited or interpreted outside of their original contexts. They also commented on the importance of separating the effects of ease of discovery and access from its impact on the information consumption and application process. Such comments indicate the importance of not conflating the increasing ease with which relevant information can be retrieved with expanding cognitive capacity for processing information.

4. Multimodal Scholarship

My findings confirmed the conclusions of related studies that digital representation of information constitutes a new medium of expression and compels and enables new ways of thinking (CLIR, 2009; Cohen et. al., 2008; Davidson, 2008; ACLS, 2007). The informants pointed out the affordances of physical context and information objects and described the virtues of the new digital media for their scholarship. Therefore, new media is not replacing or remediating traditional media but complements it with its complexity and richness. As Hayles (2008; 2003) argues, digital technologies are not simply tools that we use, but tools that we think through, as they provide a range of overt and subtle effects.

Another characteristic of the new multimedia knowledge production system is the availability of technologies and standards that allow one to present and share underlying data and evidence (such as audio recordings or visual images) that form the

basis of analysis and interpretation. Although digital media have streamlined the sharing process through the availability of digital content creation, dissemination, and archiving mechanisms (such as digital repositories), such affordances do not always dovetail with the Fellows' professional aspirations, habits, and norms. Several informants questioned the consequences of making previously private background scholarship visible for sharing and further analysis.

5. Changes in Reading

My informants uniformly reported that they had observed changes in their reading and writing habits due to their increasing interactions with digital content and search engines. Although online search and reading environments are firmly embraced, some expressed concern about spending too much time searching at the expense of time devoted to reading and writing. They also exhibited an increasing inclination for online browsing rather than thorough reading. For instance, confirming Liu's (2005) study, several of the scholars indicated that, when they read online, they tend to skim and not read closely. They also observed that they find themselves reading less broadly because in online search environments one may find exactly what she needs through a keyword search.

Digital content on the Web enables multiple affordances, from discovering books of interest through keyword searches to confirming a fact in a given chapter or looking at the works cited in the references section. Although the Fellows often compared various affordances provided by online and print reading environments, they found value in both sets of features depending on their purposes. For instance, the tendency to skim was useful when they were trying to identify sections of interest such as a bibliography in reviewing supplementary resources for their research. The accounts of the informants revealed how the opinions and perceptions of screen-based

reading cannot be generalized, as the quality of the reading process can be assessed differentially depending on users' specific goals and experience.

6. Interactions with Social Collaboration Media

Social network sites represent a rapidly expanding ICT domain and offer a diverse range of online forums for content sharing or networking, such as Flickr and Facebook. The opinions I gathered pertaining to social network sites were diverse and represented several levels of experience and interest. For instance, although most of the informants were familiar with the use of blogs to facilitate scholarly exchange and collaboration, they tended to be skeptical about the enduring value of blogging and perceived them as opinionated forums that can distract them from their core activities. On the other hand, demonstrating interpretive flexibility, some viewed social network sites as virtual research environments for "evidence-"gathering, such as conducting online ethnographies.

Informants were not merely dismissing a new communication medium but making deliberate decisions based on their assessments of the value of the mode in supporting their communication patterns. For instance, the opinions expressed on blogs were based on trying out and assessing the utility of such forums for the scholar's own work environments. Some of the informants indicated that they only follow the sites that are authored by close colleagues. Such remarks indicated that invisible colleges continue to manifest themselves on digital communication forums. The reliability, authority, credibility, and track record of the communication mode and participants mattered.

7. The Impact of Information Technologies on Collaboration and Interdisciplinarity Patterns

The informants' interpretations of what collaboration and interdisciplinarity entail indicated that they associated these practices with various meanings. Collaborations ranged from participating in book projects with other authors to putting together conference panels to circulating drafts of papers or talks to co-presenting papers in panels at conferences to sharing citations and ideas. The interpretations of interdisciplinarity varied from learning a foreign language to "writing for a broad range of audiences that cannot be predicted." Given the broad interpretive flexibility associated with collaboration and interdisciplinarity, this study has not identified any significant patterns regarding the role played by ICTs in changing collaboration or interdisciplinarity patterns.

The Fellows observed some positive associations, however, and described the role of ICTs in fostering collaboration and interdisciplinarity. Several of them referred to the burgeoning role of collaborations on transnational initiatives, which involve creating online archives of multimedia and interdisciplinary content contributed by partnering scholars to overcome the physical partition of local sources of knowledge. Convenient online access to a wide range of information is allowing humanities scholars to be more interdisciplinary by reading scholarship from other disciplines. Some pointed to the public outreach potential of new media in extending humanities scholarship to broader new audiences outside common academic circles. Although they observed that digital media make new forms of online sharing possible, they were quick to note that not only the characteristics of technologies but also the content itself determine the accessibility of content to the public.

This study confirms the findings of collaboration studies that successful joint initiatives require motivation, commitment, effort, and trust (Harley et al., 2010;

Haythornthwaite et al., 2006; Sonnenwald, 2006). My conversations with informants indicated that invisible colleges continue to be influential as scholars form peer groups based on their special domains of interest. Such comments on the social aspects of collaboration indicate that technologies in and of themselves are not sufficient to encourage partnerships although they offer tools with which it is possible to facilitate and enrich interactions.

8. Revisiting Appropriation

The Fellows' accounts reflected the situated nature of their perceptions as they described their ICT use in a contextualized manner by relating use patterns and consequences to their specific goals and practices. Opinions and use behavior transform as technologies cycle through successive versions and forms with changing functionality. Several of the Fellows reported that their practices were evolving and that they often adjusted them based on the characteristics of current projects to reflect the difference between writing a book, for example, and developing a syllabus for a new course. Their accounts underscored the contingent nature of the scholars' ICT-use patterns, indicating that they may have multiple and contextual opinions on a specific information technology. I will further expand on this theme below in the *Tensions* section.

9. Assessing Transformation

One of the goals of this study was to explore the nature of change in scholarly practices due to deployment of ICTs and to ask whether such change can indeed be characterized as transformational. Although there was broad agreement on the conveniences and new functionalities introduced by ICTs, some of my informants were quite reflective on whether there were indeed associated improvements in their

scholarship. Several of the fellows stressed that exposure to more information and sophisticated information management tools do not necessarily lead to higher-quality scholarship.

It is evident that the affordances of ICTs influence the epistemic and social nature of scholarly communication by introducing new research, analysis, communication, and dissemination tools. However, observing the information environment from the perspective of these scholars, one is struck by the extent to which their core scholarly practices prevail and persist regardless of the changing information landscape. In the literature, changes in research patterns and outputs introduced by ICTs are widely characterized as transformational. However, the examples offered throughout this dissertation illustrate the subjective nature of assessing what transformation entails for scholarship. Based on the operational definition of "transformation" that I presented in Chapter 8, I concluded that transformation is a multifaceted concept and that it is complicated to assess without an explicit baseline and assumptions that will guide an evaluation process.

Table 9.1. Interpretive Flexibility

Value Proposition and Potential Limitations of Digital Content and Search Engines.

DIGITAL CONTENT AND SEARCH ENGINES	
Value Proposition	*Duality of ICTs: Tensions and Concerns*
Convenient and easy access to vast amounts of scholarly archival and published materials available on the Web, literally at their fingertips Virtual unification of content that was once dispersed across many geographic locations and confined to physical spaces Ability to quickly search, discover, and retrieve relevant materials through online searching and browsing Support for multiple affordances, from discovering books of interest through keyword searches to confirming a fact in a given chapter or looking at the works cited in the reference section. Ability to find smaller units of information such as specific pages, paragraphs, images, sentences, even words Possibility of new intellectual experiences as multimedia formats involve a range of senses, leading to richer and novel forms of interpretation Ability to conduct more historically oriented research due to the abundance of available documentation	Information management challenges associated with having access to large and diverse corpuses of digital information Unease about spending too much time searching and browsing at the expense of time devoted to thorough reading and writing Worries about digital information being privileged over physical sources of knowledge due to the ease associated with discovering and accessing information in online environments Tension between seamless integration of knowledge environments and the need to maintain knowledge boundaries Concerns about increasing misuse of snippets taken from online materials as they are decontextualized Concerns about losing physical context of research, which constitutes an important cognitive element in the research process Questions about the lack of reliable quality control measures on the Web and concerns about trust, authority, credibility, and authentication due to the fluidity of the Web information landscape

Table 9.2. Interpretive Flexibility.

Value Proposition and Potential Limitations of Social Collaboration Media

SOCIAL COLLABORATION MEDIA	
Value Proposition	*Tension and Concerns*
Facilitating virtual scholarly exchanges and collaboration by overcoming physical barriers Enabling online ethnographic studies and providing access to abundant data (evidence) in a cost-efficient manner	Skepticism about the enduring value of blogging and perception of it as an "experimental technology" Characterization of blogs as a potential source of distraction Unease about the consequences of online ethnography for in-person and onsite interactions that define the essence of certain humanities specialties

Tensions: Contextual and Fluid Nature of ICT Assessment Process

The informants' accounts not only confirmed well-established patterns of ICT use but also demonstrated how interactions with information technologies might lead to multiple, unexpected, and often paradoxical effects. There has been an inherent tension in my findings as I describe how certain ICTs such as electronic journals begin to function as background relations and assimilate into the information infrastructure but at the same time point out the informants' reservations about certain attributes of these technologies and articulate their concerns about their implications for their academic practices. I speculate that this conflict predominantly stems from several factors that influence the ICT-use behavior and opinions of the informants—which are described in the following discussion:

1. *As individuals' needs, goals, perceptions, and abilities shift, ICTs are interpreted in a diversity of ways.*

Tables 9.1 and 9.2 highlight selected findings of this study pertaining to the informants' perceptions of how ICTs facilitate their academic work as well as their potential limitations. This information should, however, be regarded as a snapshot. The Fellows' accounts reflected the extent to which their perceptions were situated, as they described their ICT use in a contextualized manner by relating use patterns and consequences to their specific goals and practices. Often, the informants equated ICTs with expediency and productivity. Ease of use and convenience emerged as important criteria for selecting and using ICTs. The informants clearly regard time as a precious resource as they select technologies that fit their workflows and support their immediate goals.

As described in the literature review chapter, most of the accounts in the literature that characterize humanists' use of information technologies either report and emphasize positive consequences or cite the conservative nature of humanists in explanation of non-use or under-utilization. Unlike such characterizations, ICT-use patterns and opinions form part of a fluid continuum and are complex, defying dichotomization based on opposing categories such as users and anti-users.

The informants' accounts not only confirmed well-established patterns of ICT use but also demonstrated how interactions with information technologies might lead to multiple, unexpected, and often paradoxical effects. For instance, although the literature tends to emphasize such virtues of interdisciplinarity as novel ways of studying phenomena of interest, several of the Fellows pointed out possible pitfalls, which often are underrepresented in the related literature. The informants observed that they have to balance creativity and innovation in their projects with the need to secure a position and there was a perception that interdisciplinarity might also limit

their career options. Another paradoxical finding was that convenient and easy access to vast amounts of scholarly information facilitates research but also introduces information management challenges associated with having access to (and needing to interpret and organize) large and diverse corpuses of digital information.

2. *ICT-use patterns evolve based on the changing forms and affordances of ICTs.*

The *configuration* principle also indicates that technologies are fluid and their forms and affordances change over time. Opinions and use patterns transform as technologies cycle through successive versions and permutations with changing functionality. As ICTs become more ubiquitous and entrenched in daily practices, the Fellows become accustomed to using certain features of information technologies or discover new applications to try. Several of the informants praised search engines for continuing to improve and offer them new affordances. For instance, some of the informants mentioned that they were now able to limit a search to only monographs through the use of Google Book. This feature helped them eliminate the need to sift through a large number of findings.

This two-year case study was implemented during an active application development-and-release stage. I observed changes in opinions even during such a short time span. For instance, increasing reliance on mobile phones with wireless Web connectivity has introduced the need for online service providers to offer hand-held device interfaces for commonly used information portals such as online catalogs or journal databases. On the other hand, the informants also expressed concern about an increasing "obsession with connectivity" and worried that multitasking is now a given behavioral pattern among their students. Although they appeared to be cautious about predicting the consequences, several of the informants noted that learning spaces were rapidly changing and that their students were increasingly functioning in a digital

information landscape with little understanding of what working in an environment oriented entirely to print and other physical artifacts is like.

3. *ICT assessment and use patterns are also contingent on structural elements and their shifting characteristics.*

Another source of tension in my findings is the symbiotic relationship between the informants as agents and structural elements such as academic norms, institutional support systems, and rapidly evolving information policies. As illustrated in Chapter 7, the humanities academy is composed of historically constituted structures that may support or inhibit unfolding technological innovations. Although the informants are autonomous researchers with independent academic pursuits, our conversations were infused with their references to the customs and expectations of the academy in general and the administrative cultures and technical service frameworks of their home institutions and departments.

As they commented on the role of structural elements in forming their perceptions, viewpoints, and practices regarding ICTs, the themes included the evolving nature of publishing as an enterprise, the open access movement, the role of institutional technical support systems, and the sustainability of projects with digital components. For instance, scholarly journals in all disciplines increasingly are being published only in digital format (Tenopir et al, 2009). Therefore scholars may feel pressured to adjust to online search and reading environments if a particular publication that they consider essential for their work exists with no print counterpart, that is, only in digital versions.

The affordances of technologies are often not sufficient by themselves, however, to shape well-established academic principles and sociocultural norms. An example of this tension is demonstrated by the Fellows' reluctance to deposit their scholarly work in institutional repositories where they would be open to broad and

unlimited access. Although the informants felt that they were not knowledgeable enough to grasp or critique the open access model, several of them remarked about its possible impact on the stability of the current publishing system. They indicated that, based on their limited knowledge of the issues, they were concerned that open access principles may have the potential to undermine the credibility and sustainability of the scholarly publishing enterprise with unintended consequences for scholarship.

Structures are both influential and amendable. One of the core concepts of structuration theory is that of the *dialectic of control*, according to which agents are not merely passive entities but rather have the power to change the structures that guide their behavior (Miller, 2002). An excellent example of the dialectic of control in humanities scholarship is demonstrated by a task force report for the Modern Language Association (MLA) that examined current standards and emerging trends in publication requirements for tenure and promotion.[73] The task force recommended that departments and institutions recognize the legitimacy of scholarship produced in new media and venues such as institutional repositories (MLA, 2006). Although some structural changes have occurred in response to evolving scholarly practices, the progress is slow and requires periodic interventions and encouragement.[74]

[73] Another example of structural change is reflected in the conversion in 2008 of the National Endowment for the Humanities (NEH) Digital Humanities Initiative to the more permanent Office of Digital Humanities (http://www.neh.gov/odh/). Along with other leadership organizations, such as the Mellon Foundation and the American Council of Learned Societies, the NEH actively promotes new digitally enabled forms of research, publication, and pedagogy. There are also examples in the open access domain. For instance, Harvard's faculty in Arts and Sciences unanimously adopted a resolution that requires all faculty publications to be placed in an open repository. Further indicating such structural changes, there are a number of positions listed on the MLA job list that mention digital humanities and require digital skills (at http://www.mla.org/jil).

[74] For instance, the MLA and the Humanities, Arts, Science, and Technology Advanced Collaboratory (HASTAC) recently announced that they are preparing guidelines to offer tenure committees help in properly evaluating digital scholarship (Jaschik, 2010). The goal is to move the 2006 recommendations from a "position statement" to "actual practice" in hiring and review decisions.

4. *As digital and traditional sources of information co-exist, there is a natural tension due to differences in respective information infrastructures.*

Print culture is not merely a medium but an infrastructure that determines how scholars find information, read, think, and write. With the addition of ICTs the information ecology grows richer and more complex, requiring complementary co-existing infrastructures to support interactions with a broadening range of knowledge sources. Digital and traditional sources of information co-exist and each involves its own distinctive configurations. As Nardi and O'Day point out, distinct components of the information ecology nevertheless depend on one another and need to co-evolve in order to create an enabling knowledge-creation environment.[75] For instance, the printed book is an outcome of a complex set of social and technical processes (Johns, 1998). Because it is a taken-for-granted and seamless part of the current information ecology, it is easy to forget about the great complexity of the historical processes through which the printed book became a common object of knowledge. It is a material embodiment of authors, readers, printers, publishers, libraries, writing and reading conventions, archival conventions, and information policies.

Although the information ecology is composed of distinct elements such as physical knowledge places and online information resources, ideally it should be presented as a seamless web of complementary resources taking into consideration scholars' attributes and structural elements. If not aligned and coherent, some of the elements of the information infrastructure may emerge as reverse salients, impeding scholars' use of ICTs. For instance, the unease about the lack of reliable quality control measures on the Web and concerns about trust, authority, credibility, and

[75] Nardi & O'Day (1999) define *information ecology* as a system of people, practices, values, and technologies in a particular local environment. They use the phrase to describe information environments as sociotechnical systems, so that the spotlight is not on technology, but on human activities that are served by technology.

authentication due to the fluidly of the Web-based information landscape may form a weak link, hindering the formation of a *seamless web* of online information.

5. *Perceptions and opinions of ICT also depend on technological frames that provide a context for interpreting technologies.*

Another reason that helps explain contradictory findings of this study lies in the variations in the informants' opinions pertaining to ICT. My original research approach positioned ICTs primarily as knowledge containers and conduits for enhancing teaching, learning, and research. The informants, however, attributed disparate meanings to technologies based on their cultural positioning as individuals. In Chapter 8, I provided four technological frames to illustrate how varying approaches to ICTs provide a context for interpreting technologies. The informants not only perceived ICTs as enablers of information discovery and access but also viewed new media as a suite of tools for artistic expression and creative manifestations of knowledge and ideas. Also, some of them approached technology as a context for interactions and contemplated the philosophical implications and impact of the use of new media on individuals or the larger society.

The tension created by multiple technical frames is illustrated by the informants' observations about using content from social network sites for their research. Viewing ICTs as a conduit for information, they unanimously praised how social collaboration media enable online ethnographic studies and provide cost-effective access to data (evidence). Viewing new media as providing a context for interaction, however, the informants' wondered about the possible consequences for

in-person and onsite interactions that define the essence of certain humanities specialties.[76]

My observations and interviews revealed that ICTs sometimes provoked unease and distrust due to their association with Cold War, surveillance, environmental destruction, positivist epistemologies, and entrepreneurial science. Some of the informants perceived ICTs as marking a potential dividing line on the other side of which lies the power associated with quantitative research traditions. It was common to draw a close association between some information technologies and positivist epistemologies. Some worried about the prominence of techno-science and what they perceived as the increasing cultural influence of digital media over our lives. Although they were questioning the ever-increasing presence of ICTs in their environments, they were also wondering about the consequences of *not* being engaged with new media.

The following section will build on the themes and tensions summarized in this section to expand on my conclusions in the form of implications for theory, policy, and design.

Implications of the Study

The goal of the following section is to review the potential implications of this research in terms of theory, policy, and design. First, I will assess how the blended theoretical framework that incorporated grounded theory and social informatics guided this study. Then, I will discuss the potential policy implications of the themes, tensions, and issues discussed in the study. Lastly, I will present some design

[76] The *Internet inquiry: Conversations about methodology* (Markham & Baym, 2009) offers a comprehensive discussion of how the Web has changed qualitative inquiry. The authors conclude that although the Web has made more data available to researchers and has raised seemingly infinite research opportunities, the process of conducting qualitative online research is more complex due to a range of ethical, practical, and logistical questions.

principles that are suggested by the findings of the study to illustrate how to incorporate insights gained from work practice studies into the information system development process.

Theoretical Implications

This research was based on a qualitative methodology, as I believe that the phenomena I am interested in are best analyzed through systematic observation and discourse. As shown in Figure 9.3, Hesse-Biber and Leavy (2006) describe such a methodology as a bridge that brings research epistemology, theory, and research method together and serve "as a strategic but malleable guide throughout the research experience" (p. 37). I investigated an evolving realm, so I used a grounded theory approach in order to keep my research lens wide and to allow new themes to emerge. However, I relied on social informatics as a heuristic model to enable a nuanced exploration of the scholarship landscape by bringing into the discussion the social and structural context of technological innovation and the mediation process. From a theoretical perspective, I believe that my research method represents a framework that merits consideration for related studies in the future. The approach provided me with a broad interpretative perspective; however, in the meantime, it also facilitated the use of an inductive approach to discover new patterns and constructs of interest in an emergent research domain.

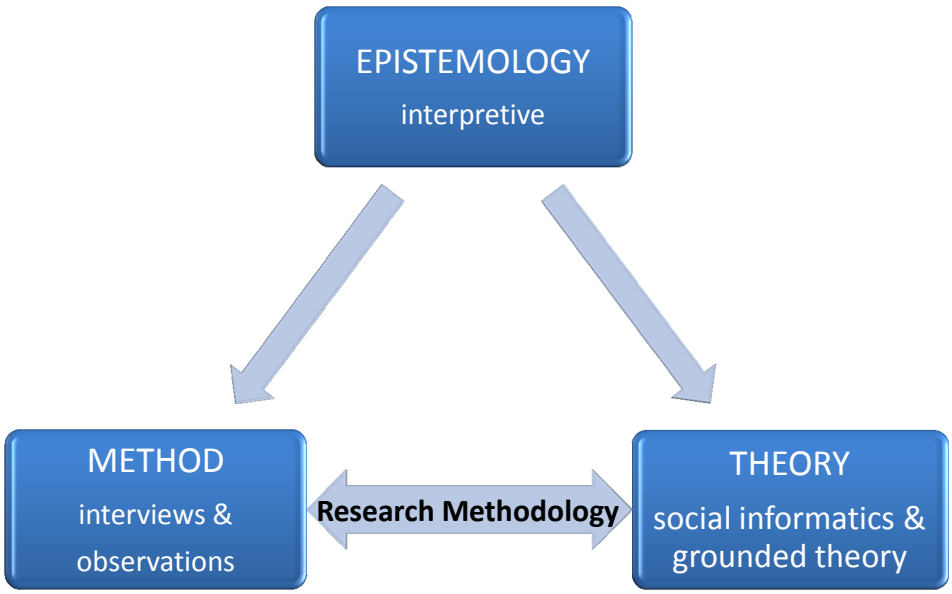


Figure 9.3. Research methodology as a bridge between research perspective, theory, and method.

One of the theoretical implications of this study is that scholars would benefit from incorporating both constructivist and constructionist approaches in new media studies rather than positioning them as conflicting viewpoints. Constructivism as a theoretical stance proposes that each individual, depending on her specific needs and local contingencies, makes various uses of technologies. From a constructivist perspective, I can argue that the humanists' specific needs and statuses determine their interpretation and use of ICTs. The informants' testimonies illustrated an inherent interpretive flexibility as well as variances in practices and opinions. As illustrated in Chapter 6, such a constructivist analysis highlights variances in use patterns and perceptions based on goals, values, and previous experiences.

On the other hand, according to the constructionist approach to research, people eventually construct and share similar perceptions and practices regardless of their differences (Leonardi & Barley, 2008). I have accordingly observed, from a

constructionist perspective, the normalization of some interactions with information technologies due to a common culture of increasing reliance on digital content, search engines, and e-mail. As Orlikowski (2000) suggests, asking questions from the constructionist perspective uncovers the extent to which new media such as search engines are taken for granted and embedded in scholarly practice as they blend into our daily workflows. One of the conclusions of this study was that search engines are uniformly shaping how knowledge is discovered and accessed.

An underlying objective behind my research was exploring new ways of theorizing new media. Exposed to the emergent, fluid, relational, and sociotechnical aspects of ICTs, everyday lives are increasingly bound up with technologies. Orlikowski (2007) posits this process as *constitutive entanglement* and advocates alternative ways of theorizing technologies by positioning the social and material as inextricably bound rather than privileging one of them. I believe that applying the grounded theory and social informatics approaches allowed me to take an integrated approach as I explored the interactions and perceptions of humanists with information technologies in situ.

Another theoretical implication of this study is its positioning of humanists as social actors—individual professionals as well as members of their academic institutions, disciplinary groups, and circles of specialties. Humanities scholarship is a social activity guided by the individual and cultural interpretations of sharing and collaborating as well as professional recognition. Kling, as the key theorist behind social informatics, views organizational life as a negotiated social order of both conflict and cooperation. The social informatics framework encourages a research perspective that perceives science as an activity that brings individuals together, and which is not substantially different from what is typical of other professional activities. Such a stance inherently favors empirical research involving daily and practical

actions and interactions and recognizes that identities are both self-constituted by social actors and also articulated by their environments. Such a nuanced characterization of individuals for this project has been useful as I viewed humanists as individual professionals as well as members of their academic institutions, disciplinary groups, and circles of specialties. Also evident was the social nature of their affiliations as they often referred to their friends, relatives, partners, or family members during our dialogues.

For studies such as this one to contribute to ICT policy, service, and technology development efforts, I believe that new media theorization must take a critical stance in an effort to influence technology development and deployment in support of scholarly endeavors.[77] Winner (1993) argues that social theorists must go beyond positivists' "value neutrality" and constructivists' "interpretative flexibility." He asserts that the black box is a hollow one if there is no judgment as to what it all means. He claims that, unlike modernist theories, constructivist approaches do not question the basic assumptions of modern societies and assume that it is sufficient to provide a clear explanation of the inside story. In a recent article Bijker (2010) proposes 'technological culture' as a unit of analysis for constructivist studies to expand the choices of 'singular artifact' or 'sociotechnical ensemble.' He argues that we live in technological cultures and "technologies do not merely assist in everyday lives, they are also powerful forces acting to reshape human activities and their meanings" (2010, p. 67). Adhering to a similar philosophy, social informatics supports a problem-oriented and critical investigation. It is positioned as an approach that provides increased understanding that will result in ICTs that are "actually workable

[77] In chapter 3, I differentiated the notion of a critical stance in social informatics from 'critical epistemology' that involves conceptual and discursive analysis of historic and cultural concerns. The critical stance in social informatics brings into question established social assumptions and values surrounding ICT use and implies the empirical and problem-driven nature of the theoretical framework (Day 2007).

for people and can fulfill their intended functions" (Kling, 2000, p. 228). From a theoretical stance, I endorse the social informatics approach. If there is a desire to influence design by presenting insights gained from research and recommending alternatives for professionals who design and implement ICT technologies and policies, new media studies will benefit from adopting a critical and normative dimension.

I also want to note the importance of considering the convergent nature of ICTs in theorization efforts. Due to the ever-increasing integration of various functionalities under one information appliance, commonly used tools such as hand-held applications are serving multiple purposes and representing an amalgamation of digital content, databases, content creation tools, search algorithms, and communication features. This trend has theoretical implications for future studies as it will be increasingly challenging to investigate specific instances of ICTs in isolation.

Policy Implications

Over the two most recent decades we have witnessed an increasing reliance on communication and information technologies in knowledge creation and communication processes. In light of such technological immersion, my goal was to understand how humanities scholars work and communicate with each other in order to assess the role of technologies in a broader social and cultural landscape. From a basic research standpoint, investigating the work practices and traditions of scholars helps us form an exploratory basis for observing how the humanities as a subject area is evolving due to social, technical, and political factors.

Statements describing the humanities as undergoing a complete transformation and the "inevitable shift to a digital realm" prevail in the literature (Jankowski, 2009; Toms & O'Brien, 2008; Baruchson-Arbib & Bronstein, 2007; ACLS, 2006; Katz,

2005; McGann, 2004; Inman, Reed, & Sands, 2004). These studies often perceive the integration of ICTs into scholarship as a matter of national competitiveness and as a mission that needs to be embraced by scholarly communities for the ultimate sustainability of humanities disciplines. Also common are statements suggesting that the humanities lag behind, its practitioners being too conservative in adopting ICTs (Davidson, 2008; ACLS, 2006). As illustrated throughout this study, the innovative and constructive influence of technology use in humanities scholarship and the increasing reliance on the emerging digital information ecology are evident. I posit, however, that there is a gap between the framing of digital humanities in the literature and the perceptions of the informants of this study regarding the implications of digital humanities for their scholarship. I argue that there is a level of technological determinism behind the assumption that technology's intrinsic characteristics and functionalities will control and direct changes in humanities scholarship.

For instance, there is a prevailing opinion that ICTs are redefining the nature of collaboration among humanists and that interdisciplinary teamwork will be a hallmark of contemporary scholarship (Jakubowicz, 2007; Short, 2006; Unsworth, 2005; Inman et al., 2004). I question the assumption that technologies in and of themselves will alter intrinsic collaboration patterns without associated changes in goals and structural elements. As described in the section on infrastructure, efforts to encourage faculty experimentation with ICTs need to be accompanied by local or community-based support systems to provide technical guidance and address sustainability issues. Potential users must understand the capabilities of ICTs and learn how technical features may assist them in accomplishing their tasks through conceptualization of use (Zimmerman & Finholt, 2007). They also need to recognize the potential benefits for their scholarship and career aspirations.

The individualistic and interpretive techniques used by humanities academics need to be factored in as we envision an infrastructure for digital humanities. Cyberinfrastructure discourse tends to be idealistic and often focuses on technological affordances more than on scholars as social actors. While open access publishing has been the focus of many discussions in recent years, studies seldom address how scholars perceive and assess open access (Park, 2007). Articles are often written by proponents and exhibit a normative orientation when recommending alternatives to information scientists and practitioners who design, implement, and assess ICTs. As reported in Davis's (2009) research, open access is often framed with the notion of information as a public good that needs to be shared for advancement in science, transparency that enhances citizen access to information, and public accountability for research funded by federal grants. Although some studies have examined potential negative consequences, such as the problem of financial sustainability and the deteriorating quality of publications, the common public discourse focuses on positive and desirable outcomes.

Today's Web-based research environment represents a convergence of search engines, digital books, wikis, blogs, and online communication forums. The new form of literacy involves the ability to evaluate, manage, process, and filter information and distill meaning in this new information ecology. The New Media Consortium (2005) defines new media literacy as "the set of abilities and skills where aural, visual, and digital literacy overlap." These skills include the ability to navigate across, reconfigure, and evaluate various media forms; the ability to synthesize material and bring together diverse methodologies to solve complex problems; and the ability to critically evaluate the potentials and limitations of new technologies. At its core, digital humanities should instill the knowledge and skills needed to create and critique new media content. For instance, an essential requirement of digital scholarship is an

ability to assess the credibility of virtual information environments that are based on social intelligence such as collectively composed learning spaces (e.g., Wikipedia).

Knowledge is increasingly represented in digital media, whether it is converted from analog sources or created digitally without a print counterpart. While we are still able to read our written heritage from several thousand years ago in print media, digital information created merely a decade ago is in serious danger of being lost due to the obsolescence of storage media, file formats, and access interfaces. Humanities scholarship relies heavily on accumulated and well preserved knowledge. The print infrastructure for humanities scholarship is so well established that the preservation mandates and services of agents such as research libraries and archives are taken for granted. Although I heard a few comments regarding the long-term longevity of digital content, most of my informants focused on how they find and use digital content. The long-term archiving challenges associated with digital content did not appear to be a significant concern for them. In order to support programs and policies that address the longevity of digital scholarship, it is critical that scholars recognize the preservation requirements for digital content and are aware of the risks associated with digital obsolescence.

When we investigate the intersection of humanities scholarship with new media, ICTs should be viewed not only as tools that enhance productivity, creative expression, and communication. They should also be made into objects of study themselves. Therefore digital humanities should be engaged in humanities studies that adopt critical stances intended to reveal the ideological and contradictory nature of information and communication systems. Such a critical orientation will encourage humanities researchers to question idealized expectations and examine ICTs from multiple perspectives to reveal possible limitations, negative consequences, and potential losses. While technologies are being positioned as driving forces behind

innovation, it is more important than ever to understand the cultural, social, and political implications of new media.

The digital humanities literature often assumes a divisive tone that pits progressive humanists against traditional humanists. "Traditional" in this context not only embodies anti-technology sentiments but also reflects humanists' inclination to engage in impenetrable scholarly discourses that are difficult to comprehend and can be understood only by a limited audience. Hayles, for instance, argues that traditional humanists suffer from rapidly declining public esteem and are viewed by the public as "frivolous, obscure, unimportant, and indulging in completely opaque discourses that no one else can understand" (2009, p. 11). McGann makes the case that "ignorance about information technology and its critical relevance to humanities education is widespread" (2008, p. 81). Although these remarks may be accurate and justified from the authors' perspectives, I believe that such portrayals further widen the gap between the pioneers of digital humanities and those humanists who carry on their traditional practices. As described in this dissertation, underutilization or resistance patterns need to be interpreted and addressed by taking into consideration the social and structural characteristics of the academy.

Design Implications

As Abbott (2008a) argues, only a few empirical studies of the knowledge production process in the humanities have been conducted. He points out that most of the research has been produced in the field of information and library science, which is primarily concerned with collections of information objects and the services associated with these collections. Because information science views information as a commodity, it often lacks the theoretical grounding necessary for understanding basic principles of communication systems (Marchionini, 2008). Exploring the role of

technologies in humanities scholarship is an important undertaking and requires a cultural shift in the ways in which information professionals and researchers assess needs, design technologies, and evaluate outcomes. In the early phase of a new technology, designers anticipate and define the preferences, behaviors, and skills of potential users and "inscribe" (Akrich, 1992) these views into the technical design of the new product. The key requirement in the design of information technologies is the alignment of developers' inscriptions of end users with actual end-user behaviors so that system features represent users' needs, competencies, and actions.

I decided to focus my case study on humanities as my review of the related research indicated that hard science disciplines are often privileged in ICT-use studies. One of the purposes behind this study was to contribute to the development of effective ICT resources and support systems. From an applied research perspective, studying scholars' work and collaboration styles reveals useful design principles that can be applied in constructing e-scholarship systems and services that will align with the needs and practices of researchers. As Bowker (2010) points out, we need to develop an integrative view by moving beyond studying only technical, social, or organizational aspects. Such an integrative approach involves comprehending the emerging infrastructure within the context of the day-to-day routines and evolving work practices of academics. Based on such a stance, I will present two design principles, which I intend to be illustrative rather than exhaustive:

- *Align Inscriptions with Actual Uses and Perceptions*

My findings suggest that humanists' tendency to look at information broadly is counter-intuitive to information scientists' efforts to systematize and present information manageably. Abbott (2008a) argues that making research more efficient through Web-based resources will not necessarily improve overall quality or ability;

humanists seek rich interpretations, not an optimized truth. Although there is a rich body of literature on search engines, digitization, and digital repositories, extant studies often focus on improving search engine algorithms to enhance the precision, recall, and interoperability of findings. The current research agenda should be expanded to reach beyond looking at the efficiencies and novelties associated with ICTs to understanding how individuals are using the information discovered to support their tasks. For instance, many current digital library projects over-emphasize searching and access to digital information. This emphasis fails to recognize the potential for applying computing to intellectual activities beyond the point of discovery. Although the ability to discover and access an abundance of digital information is attractive, more is not always better. There are cognitive limitations to the human capacity to consume and process information. How can we create a digital research environment that values filtering and limiting as much as increasing the relevancy and recall volume of search findings? How can we open space for contemplation and reflection without focusing too narrowly on discovery and access? Humanists enrich knowledge by adding new dimensions or by looking into the margins to discover omitted issues. How can we achieve and support this online environment?

- *Create a Continuum from Analog to Digital – Not a Dichotomy*

Although there is increasing reliance on digital information, scholarly work continues to rely on both analog and digital content. There is no demarcation between traditional and digital information infrastructures. The informants in this study continue to use tools from each domain based on their specific needs. This is in part because research libraries often hold valuable special, rare, and archival materials that are not as easily or as expeditiously converted to digital format as more conventional

materials (and often at the cost of losing distinctive attributes). Also, physical artifacts continue to provide an important source of data for humanists (in fieldwork, for example). Moreover, at least from the humanists' perspective, there is still a role to be played by print media. Scholars want to discover information online but some still prefer holding a book to support their "deep reading" habits. Complex multimedia formats such as digital art on DVD require special physical environments to support humanistic reading practices. One of the challenges for teams that are conceptualizing and developing tools in support of a digital information infrastructure is that of building seamless and natural bridges between two sets of tools rather than positioning them as discrete information ecologies. Instead of presuming that everything will inevitably become digital, we need to design online technologies that support the seamless use of physical artifacts as well. How do we design technology to support a balanced continuum of resources ranging from digital media to physical artifacts?[78] How do we foster an environment that does not create a sharp dichotomy between print and digital resources, but allows connections and synergy between virtual and physical information spaces?

Limitations of the Study

The case study presented in this paper was based on theoretical sampling and sought to gather detailed knowledge about scholarly interactions with information technologies. My goal was to understand configurations among phenomena of interest rather than to demonstrate direct relationships among variables. Qualitative research is a situated activity and attempts to make sense of specific settings with complex and evolving social interactions. Therefore, as Maxwell notes, "the cultural analysis is

[78] This question emerged as I was collaborating on a research grant proposal with Professor William Arms and Professor Phoebe Sengers from Cornell University Library. I would like to acknowledge the convergence of opinions on the importance of this design principle.

essentially incomplete" (1996, p. 87) and my interpretations and conclusions need to be approached as components of an empirical snapshot that, when it was "taken," aimed to expand our understanding of evolving practices and perceptions as part of an ongoing process.

The case study approach taken here offers both strengths and limitations. I studied the work practices and interactions of a group of highly accomplished scholars from prestigious research institutions. Therefore, the group cannot be considered representative of humanists from all higher education institutions. On the other hand, by focusing on a specific group of scholars through a qualitative methodology, the study provided a detailed account of their descriptions, perceptions, and opinions of ICT use in support of academic work. Although my analysis represents the perceptions of 45 scholars, they often made generalizations and commented about their colleagues elsewhere to indicate common perspectives.

In this study, I use the notion of subject area to characterize the humanities as a distinctive academic community bound by its own knowledge creation methods, communication processes, and institutional structures. I decided to approach humanities as a cluster of related disciplines rather than focusing on a particular humanities discipline. As Klein (2008) argues, discipline as a unit is not a monolithic construct, as humanities disciplines exhibit considerable heterogeneity and boundary crossing has become a marked feature of contemporary research. I appreciate the perils of over-generalizing and homogenizing scholarly characteristics. Based on this case study, however, I argue that there are identifiable general patterns of knowledge creation and sharing among the informants. Therefore, using the subject area as a unit of analysis provided me with a useful framework for this study. I recognize that a comparative study involving scholars from other subject areas could have been more valuable in assessing and articulating disciplinary differences. My purpose behind this

study, however, was not revealing variations among subject areas and disciplines but producing a case study to provide a basis for making such comparisons. Rather than striving for generalizability, I focused on providing thick descriptions against which other contexts can be compared and on describing research processes in order to form the groundwork for investigating other domains.

Interviews are not neutral tools of data gathering but capture active interactions between people leading to *context*-based results (Fontana & Frey, 2000). Therefore, another potential limitation of the study is that, by virtue of their participating in the Society, the Fellows I interviewed might have been acting on dispositions that include being relatively more open and predisposed to collaborations than fellow humanists who are not inclined to participate in such institutional settings. Nevertheless, I did not sense that the interdisciplinary nature of the exchanges and collaboration opportunities at the Society was an overriding factor in joining the Society. As the Fellows talked about what motivated them to apply for a fellowship, several highlighted the opportunity to spend an extended length of time (three to nine months) on a specific research topic as one of the virtues of being a Fellow. Several said that one of their goals was to finish a book project or complete a dissertation. To further assess whether the Fellows' prior inclination for collaboration poses a threat to the study's validity, during the last stage of this research I interviewed ten scholars who have no associations with the Society and did not observe any significant differences.

My research identity also needs to be taken into consideration in interpreting the results of this study. During this research project, my position as the head of the digital library program at Cornell University Library has provided me with a stimulating and readily available applied research environment and has been a factor in shaping my identity as a researcher. I have the opportunity to observe key players in scholarly activities and often lead projects that focus on specific aspects of these

trends. Therefore during this research I was surrounded by data-gathering opportunities both as an associate librarian and as a doctoral student. My research questions and interpretations inevitably reflect my background, knowledge, and tacit beliefs. As Lofland et al. argue, however, I believe that "getting personally involved with research does not contaminate data" (Lofland et al., 2006, p. 16). Because my educational background is in social sciences, I entered this case study with an open interpretive space for understanding how humanities scholars characterize the emerging digital information infrastructure.

A final limitation of the study that I will mention is inherently a subject matter of interest to me and relates to the intrinsic challenges associated with studying new media. As a result of their emergent, fluid, relational, and sociotechnical aspects, ICTs are increasingly integrated in our daily practices. It is important to understand the role and outcomes of individual technologies such as search engines or social network sites; however, the embedded and convergent nature of new media makes it difficult to see them as discrete and standalone entities. I tried to adhere to this principle during my study; however, it is a complicated conceptual process due to blurry boundaries.

Directions for Future Research

There is a widespread trend of placing an "e-" in front of many well established scholarly processes such as research, scholarship, and data curatorship. During the past decade, large sums of federal funds have been diverted to developing and maintaining digital repositories in order to improve knowledge creation, dissemination, and archiving. It is more important than ever to understand the epistemic and social characteristics of science so that we can assess the virtues of technological improvements within the context of understanding how scholars assess and adapt new media to their purposes.

We often envision the future as perpetually just over the horizon. As we plan for its advent, however, the digital humanities infrastructure is emerging as an amalgamation of Web browsers, digital content, content-sharing platforms, communication tools, protocols, standards, skills, and information policies. As new ICTs are incorporated into scholarly workflows, the social and material aspects of technology are becoming inescapable as everyday lives are bound up with search engines, digital content, and online communication information forums. Understanding how information infrastructure is forming as disciplinary practices and technologies co-evolve requires longitudinal data on technology-in-use to observe such tendencies. This study captures only a snapshot of changing practices based on a case study. To support future comparative studies, we need to continue examining both temporal changes and disciplinary variances to gain deeper insights and build a broader knowledge base for this important but understudied research domain.

As illustrated throughout this study, the innovative and beneficial consequences of technologies in humanities scholarship are evident and my intention was not to denigrate ICTs. The goal of my case study was to seek a balanced assessment in order to uncover unintended and negative consequences as well as to understand how practices are evolving due to the convenience of technologies. Stolterman and Croon Fors (2008) argue that there is a need for research that reveals how digital media alter the preconditions for life and how it influences the way we perceive and think about our world. Because information is increasingly encountered through technologies, we need to take up a critical stance as a balance against un-reflected acceptance of digital technologies. Such technologies should not be examined as standalone affordances but viewed as integral parts of our daily lives. To this end, more and more studies, such as this one, call for balancing technological optimism with work studies that reveal tensions and potential mismatches. I believe

that this domain of research needs further examples to reveal useful design principles that might support the development of effective and efficient information systems and services.

Among the unforeseen aspects of my research was that of the variances in technological frames of the informants that I observed. ICTs were not only perceived as productivity tools but also sometimes provoked unease and distrust due to their association with Cold War and totalitarian surveillance, environmental destruction, entrepreneurial science, and quantitative epistemologies. This tension may be a reverse salient, impeding humanists' openness to consider new technologies as tools of productivity as well as objects of their empirical studies. As we envision a humanities cyberinfrastructure, it is critical that we acknowledge these variations in opinions. We also need to seek opportunities for identifying productive and constructive points of intersection between the two disciplinary cultures.

I continue to find great value in Heidegger's (1954) seminal philosophical insights on technology. I agree with his assertion that the problem is not the existence of technology but rather our orientation to technology. Everything depends on our ability to get technology "spiritually in hand" (Heidegger, 1954) and to manipulate it in a proper way as a means to human ends. Digital humanities will greatly benefit from adopting a philosophical stance that acknowledges the contributions of ICTs in introducing new research questions and methods as well as the potential role of technologies in mediating new relationships and cultural experiences. Such a critical stance will balance the celebration of ICTs' progressive and creative affordances with the vigilance of understanding new media's potential impact on our society and the ways in which we create and share knowledge.

APPENDIX 1: CONSENT FORM

Role of Information Technologies in Scholarly Communication Study
Consent Form

Research by Oya Y. Rieger
Department of Communication, Ph.D. Student
Cornell University Library, Associate University Librarian

You are invited to participate in a research study. Please read this form carefully and ask any questions you may have before agreeing to take part in the study.

What the study is about: The goal of this exploratory study is to expand my understanding of the research practices of the humanities scholars and to consider the potential and limitations of information technologies in facilitating their scholarly communication. I am a librarian at Cornell University Library and a Ph.D. student in the Department of Communication through the Employee Degree Program. My research focuses on social construction of information technologies within the context of scholarly communication. This study is being conducted as a part of an independent doctoral study supervised by Professor Jeremy Birnholtz from the Department of Communication, who is a member of my special committee.

What we will ask you to do: If you agree to be in this study, I will conduct an interview with you at a location of your choice. The interview will include questions about your scholarly communication practices and the changes you've been observing in scholarly communication patterns. The interview will take about 30-45 minutes to complete. With your permission, I may audio record the interview in order to support accuracy and completeness of my handwritten interview notes

Risks and benefits: I may include brief excerpts from our conversation in publications or presentations. There is the risk that a knowledgeable person may, however, identify the respondent from context.

There are no benefits to you behind participating in the study. However, as a scholar, you may be interested in contributing as the study examines current trends in scholarship with the goal of informing the community who provides information services to scholars.

Compensation: There will be no compensation for your participation in the study.

Taking part is voluntary: Taking part in this study is completely voluntary. You may skip any questions that you do not want to answer. If you decide not to take part or to skip some of the questions, it will not affect your current or future relationship with Cornell University. If you decide to take part, you are free to withdraw at any time.

Your answers will be confidential. The records of this study will be kept private. If I tape-record the interview, I will destroy the tape after it has been transcribed, which I anticipate will be within two months of its taping. I'll use code numbers on the interview transcripts and will confidentially maintain a sheet with names and associated code numbers. I will be the only person who will have access to the sheet with the participants' codes and names.

In any sort of public report, I will not include any information that will make it possible to identify you. I may include brief excerpts from our conversation in publication or presentations. Your name or affiiliation information will not be included in any publications or presentations that arises from this work. As I noted as a potential risk, a knowledgeable person may, however, identify the respondent from context.

If you have questions: The researcher conducting this study is Oya Rieger and guidance is provided by Professor Jeremy Birnholtz. Please ask any questions you have now. If you have questions later, you may contact Oya Rieger at oyr1@cornell.edu or at (607) 254-5160. You can reach Professor Birnholtz at jpb277@cornell.edu (607) 255-7819. If you have any questions or concerns regarding your rights as a subject in this study, you may contact the Institutional Review Board (IRB) at 607-255-5138 or access their website at http://www.irb.cornell.edu. You may also report your concerns or complaints anonymously through Ethicspoint or by calling toll free at 1-866-293-3077. Ethicspoint is an independent organization that serves as a liaison between the University and the person bringing the complaint so that anonymity can be ensured.

You will be given a copy of this form to keep for your records.

Statement of Consent: I have read the above information, and have received answers to any questions I asked. I consent to take part in the study.

Your Signature _____ Date _____

In addition to agreeing to participate, I also consent to having the interview tape-recorded.

Your Signature _____ Date _____

Signature of Person Obtaining Consent _____ Date _____

Printed Name of Person Obtaining Consent _____ Date _____

This consent form will be kept by the researcher for at least three years beyond the end of the study and was approved by the IRB on March 13, 2008.

APPENDIX 2: SAMPLE EMAIL INVITATION REQUESTING AN INTERVIEW

Dear <name of the Fellow>,

I am writing to ask if you will be willing to share your insights about your research and collaboration patterns with me in a 30-minute conversation in support of my dissertation research. I have been attending the Wednesday discussions at the Society to familiarize myself with the scholarly topics of interest to the Fellows. As a Cornell librarian and a doctoral student, my research focuses on the research practices of the humanities scholars and the potential and limitations of information technologies in facilitating their scholarly communication. My methodology was reviewed and approved by Cornell's Institutional Review Board.

I am planning to conduct the interviews during April-May, 2009, scheduled at a time and location that is convenient for you. If you are willing to talk with me, please suggest days and times that are generally convenient for you.

Thank you for considering this request. I have an online CV if you'd like to learn more about my background.

Best regards,

Oya

Oya Y. Rieger
Associate University Librarian for Information Technologies
Cornell University Library

Department of Communication- Human Computer Interaction, Ph.D. Student
Cornell University

APPENDIX 3: QUESTIONS USED TO FRAME THE INTERVIEWS

1. What kinds of activities are involved in your typical work day or week?

2. Which ICTs do you use in support of your scholarly work? How do you use them? For example, e-mail, mailing lists, online journals and books, bibliographic file management, text mining, wikis, etc.

3. How do ICTs contribute to your daily work?
    a. Communication
    b. Collaboration
    c. Research

4. Do you envision or perceive a transformative role for ICTs beyond introducing efficiencies such as easy access to digital images or articles?

5. What is the impact of ICTs on you as an author and writer?
    a. For instance, Google Scholar and reading without context.
    b. Through social networking tools the boundary between writer/author and authoritative/popular information is disappearing.
    c. Impact on reading and writing behaviors
    d. Opinions on archival digital content and perpetuity of scholarly information

6. Do you observe any changes to the scholarly communication process in the humanities? For example, what is the role of digital scholarship for tenure and recognition?

7. Any work that you'd characterize as interdisciplinary or collaborative?

8. What do you think about e-books, especially the ones digitized by Google? Do you use them? If so, how? How do you compare them to their print counterparts?

9. What comes to your mind when one refers to "digital humanities"? Have you been involved in any work that will be considered digital humanities?

10. What comes to your mind when you hear "crisis in humanities"

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