“Like a Real Friendship”: Translation, Coherence, and Convergence of Information Values in LibraryThing and Goodreads

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Abstract
This paper presents findings on the roles that two digital libraries and virtual book club communities, LibraryThing and Goodreads, play in the existing and emergent communities of their users. Informed by social informatics and sociotechnical theory and research, it improves our understanding of the phenomenon of information value and how shared information values are translated, cohered, and converged as users interact. LibraryThing and Goodreads play significant roles, but perfect coherence and convergence is not necessary in most cases; understanding differences and being willing to negotiate and translate around them allowed for continued use of the sites and for continued community existence and emergence. Translation was a significant factor in allowing common ground and social ties to be established, leading to greater information and knowledge sharing. Similar to maintaining “a real friendship,” these processes are often invisible work, but serve as significant factors in the sociotechnical infrastructure of LibraryThing and Goodreads.
Keywords: digital libraries; online communities; sociotechnical; information value; invisible work

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1 Introduction

The information science field has examined information’s social and sociotechnical contexts as far back as Bush’s (1945) memex. Early conceptions of digital libraries—seen as modern-day parallels to the memex—focused on the collection, organization, and retrieval of digital content, but a broader approach conceiving of digital libraries as organizations offering services within “social, behavioral and economic” contexts (Borgman, 1999, p. 240) has given them many characteristics of online (or virtual) communities. Under the social paradigm of information science, incorporating social informatics and sociotechnical approaches to the study of infrastructures and systems (Edwards, Bowker, Jackson, & Williams, 2009; Kling, 1999; Sawyer & Eschenfelder, 2002), researchers have examined the social and sociotechnical contexts of digital libraries, with many experimental and promising models, frameworks, and methods of study contributing to knowledge of how digital libraries may support and facilitate these contexts. There remains a continuing need to improve our understanding of the organizational, cultural, institutional, collaborative, and social contexts of digital libraries—contexts with important effects on users and communities—and of the roles they play in these contexts as both digital libraries and online communities. We should learn further about the social phenomena that take place in and around digital libraries, including users’ behaviors, norms, and values within and across the boundaries of existing communities and new, emergent communities that may form through their activities.

This paper presents findings from a completed research study of the roles that two digital libraries and virtual book club communities, LibraryThing (librarything.com) and Goodreads (goodreads.com), play as boundary objects in the existing and emergent communities of their users. Informed by social informatics and sociotechnical systems theory and research, it focuses on the phenomenon of *information value*—one of many the study examined in depth—to improve our understanding of how users translate and negotiate shared information values, how such values cohere in existing communities, and how values may help new communities converge as users interact on the two sites. Conclusions for theories of communities, information value, and invisible work have significance for future research in social informatics, sociotechnical systems, digital libraries, and online communities.

2 Background and Literature Review

2.1 Social Digital Libraries

Despite the expressed need—as far back as Bush (1945)—for a social paradigm of information science, many early information systems focused on technological components (see e.g. Raber, 2003). The paradigmatic unrest present in information science as a whole (Ellis, 1992) was echoed in the digital

library field (Borgman, 1999). Many have made calls for considering digital libraries as sociotechnical systems (Ackerman, 1994; Gazan, 2008; Levy & Marshall, 1995; Lynch, 2005; Marshall & Bly, 2004; Van House, 2003), a view paralleling the roles of physical libraries as not just physical collections or technical services, but physical and conceptual spaces "link[ing] people to ideas and to each other" (Pomerantz & Marchionini, 2007, p. 506). Digital libraries should facilitate, support, and build the differing kinds of "knowledge communities" using their content and services (Bearman, 2007, p. 245), lest social opportunities to seek, use, and share information and knowledge become diminished or lost in digital and hybrid libraries.

Drawing from Borgman (1999) and other related literature, a social digital library can be defined as (a) having one or more collections of digital content collected on behalf of a user community; and (b) offering services, relating to the content, by or through the digital library to the user community. It is, or is part of, one or more formal or informal organizations that manage these content and services, focusing on facilitating information and knowledge creation and sharing (after Lankes, 2009, 2011) and excluding different primary motivations (e.g. selling products). These characteristics should be considered in light of the various contexts they inhabit, most of all the social contexts. A social digital library will share many of the characteristics of online communities (Ellis, Oldridge, & Vasconcelos, 2004; Preece & Maloney-Krichmar, 2003; Rheingold, 2000) as "computer-mediated social groups" (p. xv) of people carrying on "public discussions" and "form[ing] webs of personal relationships" online (p. xx).

Many approaches, perspectives, models, and theories have been applied to studying and supporting the communities in and around digital libraries. These have included experimental models and perspectives that showed great promise at first, but have not been as successful in practice over time, including the CKESS model and project proposed by Bieber et al. (2002), the CYCLADES prototype (Renda & Straccia, 2005), the Alexander project (Kolbitsch, Safran, & Maurer, 2007), Fox's 5S model (Fox, 1999; Gonçalves, Fox, Watson, & Kipp, 2004), and Marchionini's sharium model (Marchionini, 1999; Marchionini, Plaisant, & Komlodi, 2003; Marchionini, Wildemuth, & Geisler, 2006).

More successful or promising approaches exist, including in contexts beyond the traditional scope of digital libraries. Social annotations (Neuhold, Niederée, & Stewart, 2003) have been used with reasonable success in the Digital Library for Earth Science Education (DLESE; dlese.org) and the Multimedia Educational Resource for Learning and Online Teaching (MERLOT; merlot.org) (see also Arko, Ginger, Kastens, & Weatherley, 2006; You, 2010); they have found success in social questioning-and-answering service AnswerBag (answerbag.com; Gazan, 2008), pinning site Pinterest (pinterest.com; see e.g. Zarro & Hall, 2012), and the Steve project (steve.museum; see Bearman & Trant, 2005; Trant, 2006). Social constructionism is a promising approach applied to a prototype, ScholOnto (Tuominen, Talja, & Savolainen, 2003), and an integral part of many studies of digital libraries from a sociotechnical perspective (including this one). Social network approaches have been suggested (Farooq, Ganoe, Carroll, & Giles, 2009; Neuhold et al., 2003; Star, Bowker, & Neumann, 2003), but few applications exist; there is also little known literature applying wikis to the design and development of digital libraries (Krowne, 2003, is a notable exception). Theories of sociotechnical infrastructure, including situated context (Bishop, 1999; Bishop et al., 2000) and boundary objects (Star et al., 2003; Van House, 2003), have been used in studies of the social contexts of digital library design and use. Nevertheless, no one approach can be considered *the* way to facilitate and support digital library communities and their social contexts. Those studies and methods that apply well-grounded, context-sensitive, and flexible theories and conceptions of digital libraries and communities should provide the most insightful findings and the highest chances of success.

2.2 Communities

The concept of community is important in many fields, and does not have a universal definition across or within them (Fischer, 1975). Many community conceptions and theories have seen use in information science or fields cognate to it (see Ellis et al., 2004), including communities of practice (Lave & Wenger, 1991), virtual communities (Ellis et al., 2004), social networks (Haythornthwaite, 2007; Wellman, 1999), social worlds (Clarke & Star, 2008; Strauss, 1978), and information worlds (Burnett & Jaeger, 2008; Jaeger & Burnett, 2010). Careful review of the strengths and weaknesses of these and the existing literature on digital libraries (see above) and virtual book club communities (Elsayed, 2010; Fister, 2005; Foasberg, 2012; Greene, 2012; Rehberg Sedo, 2003, 2011b) led these last two lenses to be selected as most appropriate for the current study.

Strauss's (1978) *social world perspective* built on the work of Shibutani (1955), who argued a great "variety of social worlds" exists, each with an "organized outlook" based on the norms, beliefs,

communication, and interactions of a group of people (p. 566). Each of Strauss's (1978) *social worlds* includes

- "at least one primary *activity* ... strikingly evident";
- "*sites* where activities occur";
- "*technology* ... [for] carrying out the social world's activities"; and
- in established social worlds, "*organizations* ... to further one aspect or another of the world's activities" (p. 122; emphasis added).

Strauss's social worlds can and will "intersect ... under [various] conditions," and segment into smaller subworlds given sufficient analysis (p. 122).

Burnett and Jaeger's (2008; Jaeger & Burnett, 2010) *theory of information worlds* built on Chatman's theory of normative behavior (Burnett, Besant, & Chatman, 2001; Pendleton & Chatman, 1998), but moved beyond its limitation in small worlds. Chatman had used the term *information world* as early as the 1980s (see Chatman, 1983, 1987, 1992), but left it ill-defined and requiring interpretation. Burnett and Jaeger saw to be more explicit, and combined her work with that of Habermas on lifeworlds and the public sphere. Besides information worlds themselves, five additional concepts are part of their theory:

- *social norms*, or the "standards of 'rightness' and 'wrongness' in social appearances";
- *social types*, "the [social] classification of a person" (Burnett et al., 2001, p. 537);
- *information behavior*, "the full spectrum of normative [information] behavior ... that are available to members of a ... world" (Burnett & Jaeger, 2008, "Small worlds" section, para. 8);
- *information value,* relating to the value judgments of information within and across worlds; and
- *boundaries*, "the places at which information worlds come into contact with each other," where "communication and information exchange can—but may or may not—take place" (Jaeger & Burnett, 2010, p. 8).

As with the social worlds perspective, the theory of information worlds allows for analysis of communities of multiple sizes, settings, and shapes which may or may not be contiguous or overlap. Such a view is compatible with the subcultural view of communities proposed by Fischer (1975) and with the "ecosystem of subcultures" Rheingold (2000, p. xviii) found in early Internet communities.

2.3 Boundary Objects

Where and when communities overlap and interact, objects of interest often play significant roles. Star's (1989; Star & Griesemer, 1989) *boundary object theory* conceives of *boundary objects* as crossing the boundaries between multiple communities, being used within and adapted to many of them "simultaneously" (p. 408). Such boundary objects may be abstract or concrete. They have weak structure when used across communities, but strong structure when used in individual communities (p. 393). The "different" and overlapping meanings they have across communities may cause "mismatches," which require negotiation and translation processes (p. 412). Successful negotiation requires careful management of the boundary objects, their representations, and the interfaces they provide between communities. A critical role of boundary objects is maintaining "*coherence*" between communities (p. 393; emphasis added).

Conceiving of social digital libraries as boundary objects means they are socially constructed (Van House, 2003) and should adapt as best as possible to the "local needs" (Star, 1989, p. 46) of the multiple communities that use them. They interface and translate between communities, which can be viewed as social and information worlds (see above), to reconcile and cohere users' meanings and understandings within and across these communities and allow them to "work together," collaborate, and interact (Star & Griesemer, 1989, pp. 388–389). Drawing on the social worlds perspective and the theory of information worlds, social digital libraries should support emergent, localized, and shared social norms, social types, information behavior, and information values; act as common sites and technologies for shared information-based activities; and facilitate the potential *convergence* over time of one or more emergent communities around their use. This framework provides an appropriate, well-grounded, and flexible approach for study of the sociotechnical contexts of digital libraries.

2.4 Values

These sociotechnical contexts include the *values* users hold as individuals and collectives. Much literature has considered this concept, including a significant corpus on values in the context of the design, development, and use of information technology, a research area reviewed by Shilton, Koepfler, and Fleischmann (2013) with a focus on the two traditions of "value sensitive design" and "values in design" (p. 260). The former is most interested in moral and human values and is grounded in methods

and theories for incorporating such values into the design process (Friedman, Kahn, & Borning, 2008). The latter does not mandate specific methods or theories and uses a broader definition of values, focusing on the careful description and evaluation of the implications of values for the design of emerging technologies while considering values a "critical component" of sociotechnical systems design (Knobel & Bowker, 2011, p. 27). Each draws on research on computer ethics, participatory design, and social informatics (Shilton et al., 2013), with further influences from computer-supported cooperative work (CSCW; Friedman et al., 2008), the sociology of science, and technology and sociotechnical systems design (Knobel & Bowker, 2011, p. 27). Shilton et al. (2013) focused their article on exploring the roles played by values in the design of technologies and sociotechnical systems, drawing on value sensitive design, values in design, and social informatics. Fleischmann (2014) has reviewed the connections between the latter and values and design in further detail.

Shilton's (2010) study of how values are built into mobile sensing systems through participatory design found design practices encouraged the incorporation of social values as integral parts of the design. These values are articulated by design teams through the process of system development, becoming personal and an important factor through iterative and responsive design and testing of prototypes, wireframes, and system versions. Designs were more successful due to the influence of values; external values, such as feedback from users, did not play as successful a role.

Under this same broad umbrella, Fleischmann (2007) has suggested digital libraries should include embedded social values as part of their design, and applied a framework of "boundary objects with agency" to digital libraries. His framework drew on social worlds, boundary objects, and the concept of nonhuman agency (as used in actor-network theory). Fleischmann argued his framework could be useful "for understanding the connection between values and other forms of IT, including digital libraries" (p. 420). While Fleischmann's work focused on information and social values, not translation or coherence, he identified Van House's (2003) complementary findings on trust and credibility as values that affected coherence and convergence in another digital library.

Shilton et al. (2013) introduced another framework for studying value negotiation and enactment in the context of sociotechnical systems, organizations, and people. Their work drew from the value-sensitive design and values in design research streams, allowing for the classification of the source and attributes of values identified through research and analysis. Three case studies—one from each author—applied the framework; Koepfler's case (Koepfler & Fleischmann, 2011, 2012) of information sharing in an online social media community—Twitter users who had or were experiencing homelessness—is most akin to the research presented in this paper.

Turning to online community research, a thorough review of all such studies that examined values is impossible here, but—in addition to Koepfler's work mentioned above—Seraj (2012) provides an example with a high degree of comparability with the present study in the types of communities studied and the research approach taken. She employed qualitative analysis of messages and interviews with users to understand how value is created in the Airliners.net online community. Seraj found intellectual, social, and cultural values to be created in the community, and related these to social roles she identified (such as "educator" or "innovator"; p. 219). Sharing of values across a community is termed *common ground* in knowledge management literature (Davenport & Prusak, 2000); such shared values are common motivators for knowledge sharing (Ardichvili, 2008). Users will share more of what they know with others, and help create and share distributed knowledge (Haythornthwaite, 2006), if they have a shared sense of what information is important and of value.

Burnett and Jaeger's (2008; Jaeger & Burnett, 2010) theory of information worlds includes *information value* as one of its five core concepts. Drawing on Chatman's earlier theory of normative behavior (Burnett et al., 2001; Pendleton & Chatman, 1998) and its concept of worldview, Jaeger and Burnett (2010) define information value as "a shared sense of a relative scale of the importance of information" within a world (p. 35), i.e. the value judgments people hold of information within and across their communities. Information value can be emotional, spiritual, cultural, political, economic, or a combination of these. Of the other approaches reviewed above, the work of Koepfler and Fleischmann (2011, 2012; Fleischmann, 2007) shares the most similarities with Burnett and Jaeger's view of information value, given its grounding in the sociotechnical and social informatics research literature. Some values identified by Koepfler and Fleischmann fell beyond the scope of information value. While greater synthesis of research on values in sociotechnical contexts would be useful, the focus here is kept on the conceptualization of information value presented in Jaeger and Burnett's (2010) theory.

3 Method

Informed by social informatics and sociotechnical systems approaches, this study examined LibraryThing (librarything.com) and Goodreads (goodreads.com), two case studies of large-scale, public, multi-faceted social digital libraries and online communities for lovers of books and related media. Both sites (a) feature collections of digital content collected for user communities, including book data and metadata and user-contributed content such as reviews, tags, lists, and discussions; (b) offer services relating to the content including cataloging and social tagging, discussion venues, and search; (c) are managed by formal organizations and companies; and (d) include information and knowledge creation and sharing among their primary motivations. As large social digital libraries (under the definition in section 2.1) and online communities, open to the public and with multiple facets, LibraryThing and Goodreads are well-suited as cases for this study's purpose.

The study as a whole examined the roles LibraryThing and Goodreads play, as boundary objects, in (a) translation and coherence between existing social and information worlds, and (b) coherence and convergence of new worlds around their use. This paper narrows the focus to the following research question:

> RQ: What roles do LibraryThing and Goodreads play, as boundary objects, in the translation, coherence, and convergence of *information values* between the pre-existing and newly emergent social and information worlds of their users?

Three sequential methods of data collection took place, following a mixed methods, multi-phase research design. First, *content analysis* was conducted of 519 messages from the discussion forums of five LibraryThing and four Goodreads groups, with groups sampled at random from lists of those most recently active provided by the two digital libraries. Second, LibraryThing and Goodreads users from these nine groups were invited to participate in a structured *survey*, with 142 users completing Likert scaled questions on concepts from the theoretical framework and demographic and background questions. Third, semi-structured qualitative *interviews* were conducted with a purposive sample of 11 LibraryThing and Goodreads users who completed the survey, focusing on critical incidents (Fisher & Oulton, 1999; Flanagan, 1954) of interactions with other people while using the two sites.

Survey data were analyzed using nonparametric statistics (as appropriate given sampling methods) using SPSS. Messages and interview transcripts were coded and analyzed using concepts from the theoretical framework, facilitated by NVivo qualitative analysis software; initial analysis focused on sentences or short passages, with higher level units considered as the analysis proceeded. Validity, reliability, and trustworthiness of data were ensured through multiple means, including reliability analysis of the Likert scales in the survey and intracoder reliability testing of a 20% subsample of the qualitative data. Further details of the data collection and analysis process are available (Worrall, 2014). This paper reports findings related to information value from across all three methods; all names used are psuedonyms.

4 Findings

4.1 Content Analysis and Interviews

4.1.1 Convergence

Through the content analysis and interviews, information values were found to cohere and converge around expressions of personal and collective opinions and thoughts. Convergence of shared group interests and understandings often took place, but this sharing was not always explicitly acknowledged in messages. It did occur in some cases, such as in LibraryThing Group B where members spent much time establishing common values of which audiobook narrators were best and the qualities they valued in narrators. In Goodreads Group F, the welfare of a member's cat became a common value for building community, with other users expressing shared concern in an affable and caring way over time, often with humor and sincere emotion injected (e.g. "keep my paws crossed" and "sending purry thoughts his way :)").

Convergence of common values was made explicit or implied by interviewees. For example, once Goodreads user Rachelle started using the groups features of the site, she realized what she had discovered:

> "…first of all I went in, you know, because of recommendations, and then we started talking about books and I'm like, oh! Here are people who read the same books that I read, and I can talk to them about it. 'Cause I know *no*body in real life who reads the same books that I do."

Rachelle had found a group of people, as an emergent information world, whose information value judgments about genres and book interests aligned with hers in historical fiction. She continued to give further details about these common experiences, such as the group tending "to read a lot of [historical] battle books" and users who wanted to read historical romances—not valued by this group—being sent to a different group that valued that subgenre.

Sometimes convergence happened on smaller scales. This was true for Ann, who participated in a LibraryThing thread where "about four or five readers who are quite curious about fantasy" shared and compared their information values and interpretations of fantasy fiction, despite not all of their interests aligning. Another example comes from a private LibraryThing group Sam was part of, where at one point

> "…everybody was listing the 100 best books written. So, I'm checking to see what people are writing, I came up with a list myself, and, one of the people in there is writing a lot about each choice …. I especially look for [that] one person …. [His reviews are] more personal, and you know, we've all read his reviews of some of the books he's read, but he's also, now he's given anecdotes. And so it's that much more interesting."

Sam valued seeing everyone's contributions, with emphasis on this one person's posts. The two of them had strong convergence of information values within a small, but emergent information world, while convergence for the thread as a whole was weaker, but still present.

4.1.2 Coherence

Coherence existed between individuals and the communities they were part of (or wished to be part of). Individual expressions of information value were common, as users shared their opinions of books, authors, genres, products, and so on. In some cases these aligned with other group members, while in other cases they diverged. Consider an exchange in LibraryThing Group A. It began with a post by Will, an author, which was later removed; the thread implies Will was promoting his latest book. Brian responded to Will's post, asking him to

> "please read [LibraryThing's author policy]. And when your message is flagged so as to hide it from view to prevent its use as advertising, do not take it too personally."

Will, realizing the error of his ways in violating the existing, cohered LibraryThing information values and social norms around self-promotion, responded with an apology and by removing his post. Brian had no desire to start a major conflict, responding with "Good show! We're a very forgiving group. :)" This and other examples showed understanding of the coherence of information value and associated social norms shared in LibraryThing and Goodreads, in broader society, and on the Internet as a whole.

Existing values often had impact on coherence processes, with many interviewees feeling the existing information worlds other users came from impacted on their information values of given books. For example, Goodreads user Kevin said he could often sense on the site that

> "if one of the people has religious views, [whereas] another person does not, they might have different opinions about a book that either has a religious slant or lampoons a certain religion."

4.1.3 Conflicts and disagreements

While there were many cases of strong coherence or convergence, occasional conflicts and disagreements occurred that indicated weaker or nonexistent coherence and convergence. Sometimes these caused less valuing of the community and less sharing of values. Goodreads user Taneesha was asked what common connections there were between her and the other users she was interacting with. She responded that "yes, all [valued] the young adult book group," but that she "cannot think of anything [as a common interest], apart from that." Over the course of her interview, it became clear she had little else in common in other phenomena the study examined. Her values and interests did show strong coherence with those of the group in young adult novels and in a love of reading, but strong convergence of a new information world including Taneesha as a member did not occur. She seemed happy with and accepting of that, given a narrow focus on book reviews, discussions, and recommendations.

Stronger comments came from LibraryThing users Jennifer and Betty. Jennifer felt there was not a match between her information values and the values of others she interacted with, saying that "you know you do have that one thing in common…"—a love of books and reading—"…but a lot of times that's the *only* thing you have in common." While Jennifer, like Taneesha, seemed happy enough with her use of the digital library, she was a more frequent user of another online community that allowed her to give away books to others and track them, activities of greater value for her. Betty related a disagreement over the information value of a popular author's writing that took place in LibraryThing Group A, where a

selection of people "exited en masse" as a result. This occurred despite Betty—and perhaps others—feeling that the users who left "actually were some of the people … [who] had the most interesting conversations about the books." Once the conflict occurred, Betty did not find the group as useful or valuable, and her participation dropped off.

4.1.4 Sense of community

Despite such conflicts and disagreements, many interviewees related a shared and valued sense of community and commonality, related to the partial sharing of information values they experienced. Lindsey called her discovery of LibraryThing discussion groups "a happy surprise," while Miriam found it

> "affirming, to know so many other people who like the same things, and, we know that since we like the same things, we like each other too."

Melissa, another LibraryThing user, commented that differences in values would be dealt with "like a real friendship would be dealt with." Ann provided a humorous view of this sense of differences in values being OK in a strong community: members of a specific LibraryThing group

> "would not slag you off at all; not even if you went on there and said that you loved *Twilight* and said it was the best thing ever written."

Sam compared the private group he was part of to a "tavern"; while he struggled to explain his sense of community, when member-checked with the idea of "everybody knows your name" from the sitcom *Cheers*, he seemed to agree there was a certain something, helped along by shared and common values and interests among the group, helping him to feel part of a convergent and emergent community.

4.2 Survey

The Likert scales from the survey were analyzed to determine their internal consistency and reliability of the scales, following procedures related by George and Mallery (2010). The Cronbach's alpha value for the information value scale was 0.697, falling just below the cut-off value for "acceptable" reliability of 0.7. The scale was kept in further analysis because the value was so close, but the borderline-"questionable" reliability of the survey results for information value should be kept in mind.

Demographic and background variables were analyzed as part of the survey, and an interaction was found between information value and the age of survey participants. Among users who completed the survey, younger participants felt information value played a greater role ($\chi^2(9) = 18.833$; $p = 0.027$; $n = 136$). No other interactions between information value and the demographic and background variables measured were found.

The survey identified a strong role played by LibraryThing and Goodreads in most of the phenomena studied, but information value was an exception: the median score for information value was not significantly different from a "neutral" response of 3 ($p = 0.709$). Correlations between information value and translation, technologies, and organizations were not significant ($\tau = -0.003$, $p = 0.958$; $\tau = 0.082$, $p = 0.201$; and $\tau = 0.046$, $p = 0.467$, respectively), implying the possibility of a weaker role for information value than first identified in the content analysis. However, further holistic analysis led to the discovering of nuances in the impact of information value on the roles of LibraryThing and Goodreads in communities, as discussed in the next section.

5 Discussion

LibraryThing and Goodreads served three major roles as boundary objects in the existing and emergent social and information worlds of users. Information values were the strongest factor found to influence these roles played by LibraryThing and Goodreads in users' communities, despite survey respondents indicating they did not perceive this importance. Analysis shows perfect coherence or convergence of information values is not required for them to be a factor—often an important one—in these roles, albeit one that may be invisible to community insiders. Despite the differences users perceive, communities form that users feel a part of and value. The infrastructure of the threads, groups, and LibraryThing and Goodreads as a whole provided sufficient rigidity to maintain a common identity for individuals and communities of multiple sizes, shapes, and scales, with users valuing specific sociotechnical features of the two digital libraries. At the same time, they allowed for the flexibility necessary for differences in information values and other phenomena across individuals and communities, thus serving as boundary objects (Star & Griesemer, 1989).

5.1 Values-Based Role

One of the three roles identified has a strong basis in values, where the digital libraries facilitate and support translation, coherence, and convergence of existing and emergent communities through users sharing information values. Users discussed or implied their individual values of objects and discussion topics of interest, cohering with those of others in some cases, but divergences were present and accepted. Such divergences and partial lack of coherence can be and were assets and themselves valued by members of a broader community, as seen in the virtual book clubs studied by Rehberg Sedo (2003).

The process of translation and its potential to lead to coherence is important in a values-based role for LibraryThing and Goodreads. In this context, the process of translation takes place when users negotiate and reconcile the meanings and understandings underlying the values and interests of individuals and those brought to the table from their existing social and information worlds. This may lead to implicit or explicit coherence of values and to better understanding of where divergences and disagreements exist, allowing maintenance of coherence over time without major conflict.

Convergence is more implicit. As users discuss or imply their individual values, they reflect on and react to what others have shared and the commonalities they have. They may not always acknowledge such convergence, as seen in information value not being significant in the survey findings. Holistic analysis indicates convergence takes place, albeit with nuances and caveats. Such convergence is not complete; differences remain and users often realize that is the case (as the survey again implies). These differences themselves are valued, and communities form, converge, and are valued by users for emotional, cultural, and informational reasons.

5.2 Translation, Communities, and Common Ground

Other views of values exist in the literature on online communities, common ground in knowledge management, and sociotechnical systems design. The prevalence of social value in the Airliners.net online community studied by Seraj (2012) is similar to the social network-based role played by LibraryThing and Goodreads in this study. All three communities are socially co-constructed, with users both shaping and being mutually shaped by the social organization (compare Giddens's structuration theory; Orlikowski & Robey, 1991); such a view of co-construction is present in Rehberg Sedo's (2011a) study of virtual book clubs.

This study found convergence of values led to greater sharing of information, as in the literature on common ground (e.g. Ardichvili, Page, & Wentling, 2003; McLure Wasko & Faraj, 2000). Differences in values indicated moderate levels of convergence, but these did not discourage such sharing. Common ground literature does not distinguish between coherence and convergence, but the levels of convergence present here are sufficient to be considered shared values for the purposes of establishing common ground. The bridging of values and norms by translating knowledge between contexts leads to greater levels of knowledge sharing (Ardichvili et al., 2003; Bechky, 2003); in this study, translation helped users explain circumstances that could reduce coherence or convergence and get to know other members of the community, bridging value-based norms and forming and maintaining valuable social ties within a community or across multiple communities. The "happy" (Lindsey) "family" (Rachelle) of "real friendship" (Melissa) and "real community" (Ann) sensed by many interviewees, resulting from this process, shares similarities to common ground. Common ground literature and the findings of this study stress the importance of sharing and translating values to cohering and converging communities around ICTs intended for the sharing of information and knowledge. These processes incorporate other phenomena, including norms and behaviors, which will be explored in further publications from this study and future research.

5.3 Sociotechnical Infrastructure and Invisible Work

In the literature on values in sociotechnical systems design, Shilton's (2010) examination of the design practices of mobile sensing systems identified articulation processes to be an important factor, paralleling the translation between information values that took place in this study. While LibraryThing and Goodreads users did not engage in "design" as such, in the cases where they collaborated together—often led by a moderator or boundary spanner—coherent or convergent values were present; translation of these helped activities take place without major issues, with conflicts caused by lack of agreement (e.g. Betty's example over an author's writings) or a lack of translation.

The common values identified among the Twitter users who had or were experiencing homelessness studied by Koepfler (Koepfler & Fleischmann, 2011, 2012) stress the importance of context in determining values and the frequency with which values are expressed. This was true in this

study, where users did not explicate sharing values in the survey and, as insiders, were not always aware—at least at first—of value sharing in their interview responses. Analysis by an outsider showed implicit coherence and convergence of information values. This leads to another significant nuance: translation, coherence, and convergence of information values may not be something most users are aware of. Instead, they are "invisible work" (Star & Strauss, 1999) that takes place behind the scenes. Users, perhaps without realizing it, have interests and opinions they want to and do share with others. The invisible work of value coherence and convergence becomes evident to insider users in reflection on the community (as in many of the interviews) or when conflicts occur.

Star and Ruhleder (1996) also saw the emergence of invisible work under these conditions in their study of sociotechnical infrastructure. Invisible work literature has indirectly implied the role of coherence and convergence processes, and there are well-established links between invisible work, sociotechnical infrastructure, and boundary objects (Star, 2002, 2010). Shared, coherent, and convergent boundary objects, serving as sociotechnical infrastructure, and the common characteristics—such as shared information values—that allow for such coherence and convergence, may be "vague" but simultaneously "quite useful" in such invisible work (p. 607), as seen in the current study. There is little known research that includes specific and detailed analysis of the translation, coherence, and convergence of information values as invisible processes.

5.4 Limitations

Data collection was limited to LibraryThing and Goodreads as cases, and to nine groups from across the two sites; in addition, sampling methods were not purely random. The findings thus cannot be considered fully representative at larger scales, leading to limitations in the generalizability of the survey findings in particular. My own biases and predispositions as a researcher may have affected study execution and data analysis. Deep knowledge of the research literature and potential theoretical lenses, use of mixed methods and nonparametric statistics, and incorporating an ethnographic approach informed by social informatics and sociotechnical perspectives minimizes these limitations. Potential transferability is quite strong to other populations of social digital library and online community users beyond the nine groups studied. Further research to address these limitations should examine information values in a wider variety of digital libraries and online communities and further test and refine the theoretical framework and survey instrument.

6 Conclusions

While users may not have realized, LibraryThing and Goodreads play significant roles in the translation, coherence, and convergence of information values. Perfect coherence and convergence was not necessary for a sense of community to exist; understanding differences and being willing to negotiate and translate around them allowed for continued use of the sites and for continued community existence and emergence. Translation was a significant factor in allowing common ground and social ties to be established, leading to greater sharing of information and knowledge. Those who are already insiders to an online community may not be aware of their importance, but similar to the process of maintaining "a real friendship" (as Melissa phrased it), the processes of cohering and converging information values are a significant factor in the sociotechnical context of LibraryThing and Goodreads, emerging from the background when conflict arises and stresses a lack of translation for users.

Further research should draw on frameworks used to study values in sociotechnical systems design and to study information value in communities, bringing them together to examine the often invisible value negotiation, translation, coherence, and convergence processes and how they emerge from or recede into the background. The fuzzy line existing between all values and information values needs further exploration and definition. Various degrees and levels of information, knowledge, and value sharing exist, which should be examined in depth and in the context of other characteristics of communities. Seraj (2012) calls for longitudinal studies of communities at different developmental stages, a natural progression for studies of information value. Future work will extend the current findings in these directions to further our knowledge of the nature and scope of information values in and their impact on the roles played by digital libraries, online communities, and other sociotechnical systems.

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