The Information Society, 25: 255–264, 2009

ISSN: 0197-2243 print / 1087-6537 online
DOI: 10.1080/01972240903028706

Routledge
Taylor & Francis Group

PERSPECTIVE

Community Informatics and Information Systems: Can They Be Better Connected?

Larry Stillman and Henry Linger

Faculty of Information Technology, Monash University, Caulfield East, Victoria, Australia

There is an ongoing debate in community informatics about the need for a stronger conceptual and theoretical base in order to give the field disciplinary cohesion and direction. By investigating the body of reflective thinking in information systems, researchers in community informatics can develop a more rigorous theoretical context for their work. Information systems can be considered as a fragmented adhocracy that allows many intellectual communities to coexist under its umbrella. A sympathetic reading of information systems offers an opportunity to community informatics, in spite of its different orientation, to address both social and technological issues in its theoretical framework. This framework would be based on a common language that expresses a shared ontology and epistemology with information systems. Such a framework then allows community informatics to fully address its information systems problem-solving agenda as well as its community problem-solving activities. Strengthening this dual agenda will allow community informatics to work effectively with both the technical and social design and implementation problems. But it also provides community informatics with an opportunity to contribute to a discourse within information systems in order to broaden the traditional information systems concept of organization and social action.

Keywords community informatics, dual agenda, information systems

Community informatics (CI) is an emergent discipline with a dual focus: first, the conduct of research about the relationship between the design of information and communications technologies (ICTs) and local communities, and second, the implementation of ICT projects in local communities. By local communities, CI includes both geographic locations, such as a neighborhood or a district, as well as the networks of local structures and organizations that constitute the human fabric of such communities including its information infrastructure. Additionally, we assume it is axiomatic among researchers and practitioners that CI uses ICTs for positive social change in civil society and that ICT projects are conducted in conjunction with the stakeholders in the local community.

The concern of CI is the relationship between people and technology. It is expressed in its focus on solving community problems articulated in community activism at the political, social, and cultural levels. This orientation is strongly influenced by antagonism to techno-utopianism and techno-determinism. As an example, social and community issues, and their interaction with ICTs in civil society, were the overwhelming majority of the 90 or so research issues and questions that were identified at the 2006 Prato, Italy, CI Conference. Very few questions emerged about the design of ICTs.[1]

This community orientation isolates CI from many potential useful technological perspectives that derive from the theoretical frameworks of information systems (IS) and information systems design (ISD). This has consequently led to the CI agenda having a "thin" conception of its technological agenda. What is lacking is, for want of a better term, a conceptual taxonomy to help elucidate the many components that would contribute to defining CI as a discipline whose agenda is *information systems problem solving*, in addition to the *community problem-solving* orientation of CI. This requires an exploration of how critical thinking in IS could be exploited by CI.

We contend that the rich theoretical infrastructure that IS has established can be deployed to understand the social and technical needs of CI. Many of the problems that CI deals with, whether on a social or methodological level, have already been dealt with by IS, but IS discourse does

Received 11 January 2008; accepted 2 February 2009.

Address correspondence to Larry Stillman, Faculty of Information Technology, Monash University, Caulfield East, Vic 3145, Australia. E-mail: larry.stillman@infotech.monash.edu.au

not easily describe circumstances that are familiar to CI. This highlights that, while IS lacks appropriate examples relevant for a community focus, there is an absence in CI of a coherent effort to adapt the paradigmatic descriptors of IS and its methods of analyzing and describing processes and procedures. However, this gap between the disciplines does not represent a core ontological problem in IS theorization. IS has developed high-level abstractions and frameworks for problem solving within the context of different situations or structures in society, whether they are in a business or a community. But IS does neglect community-based theorization as is evidenced in its emphasis on the dominant "industrial" or business paradigm in its research agendas and theoretical literature. This dominant paradigm of IS research means that its concerns are business processes, functionalities, and controls (De Moor & De Cindio, 2007) rather than social, political, or cultural impact. Thus, there is also a "thin" conception of the social in IS thinking, including Soft Systems Methodology (Checkland, 1993), as observed by Walsham et al. (1995a; Lamb & Kling, 2003).

Our contention is that there are reciprocal benefits for both disciplines through more substantive mutual engagements. Our concern is that the current perception of tension between CI and IS has led to an unnecessary gap between the two fields. The perceived contradictions between the social orientation and technical orientation of the two disciplines is misplaced. What is needed is a way of adapting and communicating the theory frame of IS to strengthen the conceptual, theoretical, and practical activity of CI while also evolving the IS theoretical framework to accommodate the social, and in particular the community, agenda.

In this article we highlight some key issues that underpin new points of theory and research activity directed toward strengthening the theoretical basis of CI. Examining the theoretical frame, language, and taxonomy of IS will provide the language tools to assist CI researchers to critically examine what IS can or does not offer. This would be the first step toward building a theoretically coherent picture of the tasks and issues that form the CI agenda and identify what areas within CI need development on a theoretical level. But this process will also identify the contributions that CI can make to IS theory. The point is to articulate an overarching theoretical framework that accommodates the CI agenda.

THE AGENDA OF CI

One of the most influential definitions of CI has been that developed by Gurstein, stating:

> Community Informatics pays attention to physical communities and the design and implementation of technologies and applications, which enhance and promote their objectives. CI begins with ICT, as providing resources and tools that communities and their members can use for local economic, cultural and civic development, and community health and environmental initiatives among others. (Gurstein, 2000, p. 2)

Such a definition requires, as Bradley suggests, a "new kind of engineer," one trained with a broader and deeper understanding of sociotechnical issues, rather than one with technical training focused on a narrow, instrumental approach to technology (Bradley, 2006). This is consistent with Gurstein's more recent and broader understanding of the multiple and intersecting dimensions of CI that include social activism, community development, policy studies and public administration, ICTs for development, and service design, as well as the more classical link to management information systems (Gurstein, 2008). This leads to an understanding of CI as engaged in a specific form of social practice at a micro-level of society, rather than an engagement at a macro-social or institutional level, that addresses lived-in and often needy or disadvantaged communities. This orientation is often predicated on theories of social change (Kubisch, 1997), and is associated with community development practice in both developed or developing countries (Rothman & Tropman, 1970; Heeks, 2002). In recognition of the many other fields of research and action that influence CI practice, Gurstein has suggested a broader conception of the CI agenda, which becomes:

> a commitment to universality of technology-enabled opportunity including to the disadvantaged; a recognition that the "lived physical community" is at the very center of individual and family well-being—economic, political, and cultural; a belief that this can be enhanced through the judicious use of ICT; a sophisticated user-focused understanding of Information Technology; and applied social leadership, entrepreneurship and creativity. (Gurstein, 2008, p. 12)

Much of the research in CI is thus devoted to enabling "effective use" in a "lived" communities setting for the purpose of innovative social–technical activity. Such activities include capturing community memory for community empowerment (Stillman & Johanson, 2007), and in developing countries, poverty amelioration, literacy development, or AIDS information (Heeks, 2008). Consequently, CI sees lived-in and situated communities not as passive recipients of technological opportunities, but as actors engaged in the comprehension and "doing" of community problem solving directed to social progress.

THE TECHNOLOGICAL DIMENSION OF CI

This emphasis within the CI literature on community problem solving means the "technological" angle is downplayed with a "black box" approach to ICTs. This

approach views ICTs as a technological given rather than as a malleable set of arrangements. Moreover, ICTs are seen as tools for social justice for communities rather than as tools for the community itself (Stoecker, 2005). The practical emphasis on community problem solving within the literature means that the theoretical agenda of CI, if there is one, appears to be predominantly bound up with the world of practical sociology. The reasons for this may in fact be educational and political in origin. The CI research community tends to reflect an oppositional stance to instrumental rationality and associated technologies (Habermas, 1972; Rose, 1999). Though there has been no survey done of CI researchers, it appears that many come from a humanities background or social activism. These backgrounds foster resistance to technological determinism, or at least resistance to what is perceived as the negatively material and controlling aspect of ICT artifacts. This attitude ignores current thinking in the world of human–technology interaction and interpretation.

Thus, adapting what Day and colleagues (2007), have suggested, CI can be seen as an emergent normative framework. It seeks to use ICTs in a particular way, focusing on participative community change, somewhat in opposition to assumptions about a natural alignment between governance, rationality, and technology. Such change is poised at a nexus of practice, policy, and research about and for "lived," bedrock communities. CI has strongly emphasized the centrality of "people and place" in community development, together with the importance of what Chester Barnard identified seven decades ago as "the informal organization," the things that provide meaning and solidarity within formal organizations. In this sense, communities and informal community structures and alliances can be considered as organizations. At the center of the "design, uses and consequences of information technologies" (Kling, 2000, p. 218) in CI is a very particular sort of organization that is not a business, government, commercial, industrial, or academic community but more often than not a community structure that interacts with social, cultural, or economic deprivation.

The specific emphasis of CI on participatory community change presents a strong case for moving from the abstract prototypical, "atomic, individualistic user," devoid of location in complex and multidimensional real-world environments, to the "social actor" (Lamb & Kling, 2003). The notion of the "atomic" individual theorizes and models a "person" in a way that attempt to strip the individual of any agency except that of "rational" choice. In contrast, the social actor is an agent: a real person, with multiple allegiances, roles, and reactions. This concept of the social actor is well established in social psychology (Goffman, 1983), but Lamb and Kling also draw on research in computer-supported cooperative work (CSCW), Scandinavian social technology studies (Bradley, 2006), and structuration theory (Giddens, 1984) to situate this concept in a sociotechnical context. This allows the ICT designers to wean themselves away from a stripped down atomic "person" as the prototypical "user" that can be easily matched to system design criteria for instrumental artifacts. In the context of a work organization, Lamb and Kling suggest that people

> are simultaneously enabled and constrained by the sociotechnical affiliations and environments of the firm, its members, and its industry. . . They often have conflicting and ambiguous requirements about the activities they perform, and the socially legitimate ways in which to perform their work. (Lamb & Kling, 2003, p. 218)

Such an approach avoids an idealized and deterministic fit between people and technology. It considers a situated, systematic, and longitudinal investigation of people and technology (De Moor, 2007) within the context of a community with all its inherent complexity. It also allows human agency to result in restlessly reconfigurable and unpredictable interactivity with technology (Orlikowski, 1992; Suchman, 1996; Orlikowski, 2000). This many-sided conceptualization of the changing relationship between people and technology is very different from that of the black-box design common to the technologically normative orientation, and leads to epistemological difficulties in understanding complexities of artifacts as material objects (Leonardi & Barley, 2008), in preference for social analysis and particularly social action.

For CI, the complex interactions between people and technology can thus be considered as a sociotechnical network that

> includes people (including organizations), equipment, data, diverse resources (money, skill, status), documents and messages, legal arrangements and enforcement mechanisms, and resource flows. The elements of a [sociotechnical network] are heterogeneous. The network relationships between these elements include: social, economic, and political interactions. (Kling et al., 2003, p. 48)

Viewing such a network through the lens of actor network theory (ANT) (Callon, 2001), CI can also be prompted to disregard design idealization and practical determinism by considering a social–technical network as emergent from negotiation that occurs between all elements in the network. Negotiations are subject to all the vagaries of asymmetric power relationships and degrees of agency of the different elements, resulting in a sociotechnical artifact that is an ensemble of social and technical interests (Orlikowski & Iacono, 2001). For CI in particular, different community relationships and technologies produce an assemblage of reproduced and socially embedded practices and resources to support, in particular, social solidarity and human agency (Bhattacharyya, 1995), as distinct from corporate solidarity and agency, geared

around the profit motive or different forms of government operations.

The community as a social–technical network thus instantiates dimensions of community power, race, class, gender, and politics, while ICTs are but one technology in the ensemble of tools and processes that serve community ends. Thus, within communities, Foucault's concept of "technologies of power, which determine the conduct of individuals and submit them to certain ends or domination" (Foucault, 1988, p. 18), is applied to the design of social–technical systems such as community networks through "mechanisms, techniques and procedures at work in the production and distribution (management if you will) of knowledge in particular settings"(Ekbia & Kling, 2003, online). This results in CI adopting particular ways of approaching technologies at hand for what can be called community-oriented governance of technology artifacts for social ends.

With its focus on community problem solving and its specific orientation to technology, the open question is whether CI is in fact part of the "fragmented adhocracy" that is IS (Banville & Landry, 1989), and if so, how does CI define itself as an "intellectual community" within this adhocracy? Taking this further, the issue for CI is how the ontology of IS, its structure and vocabulary, can be used to set the CI research agenda and how CI can engage in a productive discourse with IS. In the next section we explore a framework for IS for its potential to provide such an ontology that is inclusive of CI and provides the vocabulary for a discourse between CI and IS.

A CRITICAL APPROACH TO INFORMATION SYSTEMS

To someone with a social or community rather than a technological background, such as researchers or practitioners in CI, understanding just what IS is and does is not easy. This is due in part to the technological imperative of IS, and its particular discourse epistemology, coupled with its strong organizational and, in particular, business and commercial focus. A starting point for understanding IS is to accept that information system development (ISD) is the central activity of IS and this involves the purposeful construction of a technological artifact. Other issues (users, interfaces, contexts, uses, techniques, technology) are meaningless without an artifact as the object of inquiry (Hirschheim et al., 1996; Leonardi & Barley, 2008). This highlights a significant divergence between IS and the community problem-solving agenda of CI discussed earlier. But it also highlights the theoretical weakness of CI that lacks ontology for its technical endeavours.

There is widespread acknowledgment within IS that it lacks coherence and a shared understanding of the IS discipline from within its own ranks: a familiar situation in many ad hoc and emerging disciplines (Kuhn, 1970, p. 148; O'Donovan & Roode, 2002). As an emerging discipline, IS does not have an adequate and accumulated research tradition; instead it is best considered as a fragmented adhocracy (Banville & Landry, 1989), which allows different research communities to fall under the IS umbrella. Hirschheim et al. (1996) believe that the imposition of a conceptual unity over this diversity is intellectually dangerous. They propose a "federated" IS framework that provides the theoretical basis for a fragmented adhocracy that they believe should characterize IS into the future. Within the many fields that fall under this putative federation are areas that are of specific interest to CI researchers, but CI's conceptual and theoretical linkages with these areas are weak.

The framework proposed by Hirschheim et al. (1996) provides a challenging but comprehensive overview of IS. It is not the only framework that has been proposed within IS, but we believe it is a good starting point for thinking about IS, and particularly ISD, in relation to CI (Walsham, 1995b; Fisher & Karlheinz, 2007). The framework is proposed to "provide categories for interpreting . . . research literature and for understanding the co-evolution . . . of diverse research concerns" rather than as a paradigm that "refers to a core set of consistent assumptions . . . that guide [a] research agenda" (Hirschheim et al., 1996, p. 5). The theoretical basis for the framework draws on social action theories that combine Habermas's concept of orientation, that express human intentions in respect to change, and Etzioni's concept of malleability, which focuses on the subject of the action that result in change (Etzioni, 1968; Habermas, 1984). Thus the framework is expressed as a matrix with orientation and domains as its two dimensions. This is a space that defines action and change in respect to ISD.

Adopting social action theory as the analytical lens for the framework is significant from the perspective of CI. This orientation considers ISD as a socio-materialist design activity that must also deal "with the changing conditions and forms of social behaviour brought about by the design outcome" and take account of the "historical context and social influences" (Hirschheim & Klien, 1987, quoted in Hirschheim et al., 1996, p. 7). The significant aspect of this approach to IS, and one that distinguishes it from social science, is that it seeks to integrate instrumental rationality, the technological artifact and its construction, with the social activity that contextualizes the artifact. Moreover, drawing on the critical social theory of both Habermas and Etzioni, Heirschheim et al. focus on both social action and change while adopting a finer granularity that allows the subject of inquiry to be an organization or community, rather than just the broad social context.

TABLE 1
Object system classes (adapted from Hirschheim, Klein, and Lyytinen, 1996, passim)

	Orientations			
	1 Control		II Sense-Making	III Argumentation
Domains	IA Instrumental	IB Strategic	Communicative	Discursive
Technology	Information Technology Systems **Systems Engineering**			
Language	Formalized Symbol Manipulation Systems **Comm. Eng'g**	Manipulative Communication Systems **Manipulative Communication Design** Access rights	Symbolic Interaction Systems: speech acts, intentions, meanings, metaphors **Consensual Communication Development**	Systems for Rational Argumentation **Rational Argumentation Design**
Organisation	Mechanistic Social Systems ('ritualized' tasks) **Org. Design**	Political Systems: systems to replicate decision making hierarchies, non-hierarchies surveillance, control, security **Political Organisation Design**	Cultural Social Systems; values, beliefs, myths, rituals, negotiated meanings and practices Social and work arrangements; participatory & community design exercises **Organisational Sense-making**	Systems for Institutional Checks and Balances **Institutional Democracy Design**

The two axes of the framework are domains of change, the objects that are changed by ISD, and orientations that signify the purpose of the change brought about by ISD. There are three fundamental orientations: control, sense-making (communicative), and argumentation (discursive); a distinction is made between control over objects (instrumental) and humans (strategic). This distinction is important, as instrumental control treats people as physical objects while the latter treats them as intelligent agents. The domains are technology (the artifacts), language (all forms of communication), and organization. This typology is reminiscent of the modification of Giddens's original model of structuration theory, developed by Orlikowski (1992) and others, in which technology-in-practice is both the medium and the outcome of human agency in mediation with facilities (such as technical artifacts), norms (organizations, communities, and their variable cultures), and interpretive schemes (such as language/communications and all that is mediated by it).

Cross-relating domains and orientations generates a "matrix of change frames . . . [as] a taxonomy of object systems which embodies, in an abstract way, the variance in the content and target of ISD" (Hirschheim et al., 1996, p. 7). Table 1 conflates six complex tables presented by Hirschheim et al. (1996), showing only the most relevant components to indicate a future CI conceptual, theoretical, and practical agenda. It is interesting to note that the Control orientation, concerned with the development of technical systems (the Instrumental and Strategic columns), represents the object systems that are most familiar and most visible aspects of IS. Unfortunately, they are also what are often considered as the dominant aspect of IS. It is this limited and one-dimensional perception of IS that has led to the perceived contradictions

between the social and technical orientation of CI and IS.

READING CI THROUGH THE LENS OF THE IS FRAMEWORK

Critical social theory makes behavior and social, political and historical contingencies visible in the construction process of the technical artifact. This visibility provides space to express both the CI agenda and its technological orientation. When this space is examined critically, IS provides the opportunity to question the methodological approaches to investigating social phenomena, the purpose of that enquiry, and the relationship between theory and practice. Also important is how the domains of change are understood. Thus, even though organization is considered simply as "socially organized behavior," technology covers both the physical paraphernalia as well as the technical know-how that can exploit those physical objects. Furthermore, language is any form of symbolic representation that covers everything from natural language to the precisely defined systems for information processing through to the semiotics of organizational symbols. Significantly, ISD needs to address each domain in some way in order to construct a functioning IS. Such broad understanding of domains allows the CI agenda to be adequately expressed within this ontology of IS.

In Table 1 the object systems in bold represents particular object systems, the design discipline strategies and bodies of literature relevant to CI. Column 4, representing the Communicative Domain, represents the current focus of CI and emphasises the communicative sense-making orientation inherent in the community problem-solving agenda of CI. What this view highlights is the neglect by CI of both the control and argumentation orientation. The implications for CI are that it needs to adopt a dual agenda that addresses equally both its community problem-solving agenda and its information systems problem-solving agenda. To address this dual agenda, CI needs to develop a theoretical position that recognizes the inherent dialectical relationship between these agendas.

In order to move toward a dual agenda, CI needs to critically analyze its current stance toward technology and its uses within the community context. The framework proposed by Hirschheim et al. provides an adequate vocabulary for this analysis. In the Control orientation, if we examine the black-box view of technology dominant in CI thinking, as discussed earlier, a number of contradictions emerge. The black-box view allows CI to focus strongly on the community problem-solving agenda as a reaction to the technological–rational ideologies that emphasize "efficiencies." And yet the black-box position is itself an expression of instrumental rationality in that it does not acknowledge the impact that the black box has on the community and its actions; nor does it offer a voice for the community in its construction (and of course, the more interpretive approaches to human–machine interaction in IS offer further opportunities for CI). This suggests that CI needs to acquire the technical knowledge and know-how that would enable CI researchers and practitioners to conduct the discourse necessary to engage meaningfully in the design and construction of artifacts. Such engagement means having the vocabulary and knowledge to interact with the engineers who are responsible for the design and construction or perhaps also to take on such engineering roles. Such an agenda is emerging in CI—for example, the work done by Kırlıdoğ in getting people from community organizations and technical specialists to understand each other in articulating requirements for disaster management in rural Anatolia through a participatory methodology (Kırlıdoğ, 2006). But even such progressive work falls short of addressing the dual agenda advocated here.

Thus, the role of CI is to make visible in the design and construction process the impacts of the artifact in the language and organization domains as well as to adequately address the strategic control, communicative sense-making, and discursive argumentation orientation from its community perspective. The implication of CI acquiring the necessary technical knowledge and know-how is that it will facilitate more innovative ICT projects that span CI and IS, but will remain explicitly community focused, and will express the dual agenda. Significantly, such know-how allows CI researchers to adapt the action research methodologies already used in CI to address the dual agenda in order to implement innovative and relevant ICT projects. This will allow CI to be more proactive in the social action agendas of communities through innovative ICTs that are part of the information systems problem solving agenda.

Currently, the sociotechnical network approach of CI, particularly as seen through the ANT lens, allows CI to deal with technology as an actor in the network with equal status to other actors. But this is largely rhetorical, as the lack of an adequate conceptualization of technology as a interpretable material agent (Leonardi & Barley, 2008) in CI negates a significant role for technology in the emergence of the network and undermines the dual agenda inherent in the network approach. In the Argumentation orientation, the role of technology in networks is critical to understanding social action by the community and the development of the community itself. There are numerous examples of technology playing a central role is community activities (for example, the organization of G8 protests or dissemination of AIDS information) by effectively creating the target community and network. What is interesting about this is that it is community problem solving, not the information systems problem solving,

that still dominates these discussions even if the role of technology is acknowledged. But this network approach also applies recursively to the interactions between a community and its broader social and political context. This raises questions about how the community voice is heard in that broader context and how technology facilitates interactions within this broader network while also engaging community members in those processes. Examples of the possibilities include work on defining rights in communities (de Moor & Weigand, 2006) and the development of politically responsive systems dealing with potentially highly sensitive personal and private information as raised by Iacovino in her discussion of access rules for community memory archives (Iacovino, 2007).

On the other hand, CI offers a novel perspective, for mainstream IS, of the organization domain. CI represents a particular "non-corporate" organization: communities with a philosophy and culture of working to eliminate social disadvantage. This is a real and legitimate dimension that has particular agency on the work that they do in conjunction with ICTs. Such nonprofit cultures are not well known in ICT research, which has been much more oriented to address for-profit business, the military, or government (Stillman, 2006). While all organizations exhibit some similarities (such as resource problems, training, skills, etc.), it would be erroneous to engage in a reductionist exercise to view all organizations as being the same. This would ultimately depoliticize the unique character of the community and the social justice concerns that can make CI such a powerful adjunct to social change. Moreover, communities addressed by CI are frequently inchoate, emergent, and ever-changing, making it hard for typical IS processes to develop replicable models and templates for implementation (De Moor, 2007). It is the social justice concerns, coupled with the dynamic and emergent nature of communities, that need to be expressed in all orientations in the framework. The development of social software (Web 2.0) could be an opportunity for CI, with its grass-roots orientation, to react in new ways with different (social) technology platforms. In this space CI can lead and influence the development of practical and theoretically based approaches to such technology and form the basis of a dialogue between CI and IS.

Social informatics (SI) is an existing "intellectual community" within the adhocracy of IS. It has many similarities to CI in that it deals with the development of a coherent approach to user-technology issues that are familiar to CI. Table 2 represents the relationship of SI and IS developed by Kling and Lamb (2000) but is adapted to include a CI perspective to the issues. The first column represents a historical view of IS dominated by an engineering approach, grounded in the instrumental control orientation. Current IS thinking is now much closer to the SI stream. The third column (in italics) represents a short-hand CI "response" as an "ideal type." The table overall is intended as a provocation to thinking, modification, and documentation for the CI community. It should be recognized, however, that as a "target" this table is always moving, as the tasks and interpretations of change. Moreover, these three disciplines will appear differently if interpreted more precisely through the lens of Hirschheim et al. framework.

CONCLUDING REMARKS

The challenge for CI is how it can "work" better with the particular technical disciplines in IS. Our aim in this article has been to try to match sympathetic elements of each complex discipline in order to demonstrate what IS can offer to CI and conversely to identify what CI can contribute to a discourse with IS. The article argues that an exploration of IS through a social action theoretical lens allows CI to identify and understand core theoretical issues concerning technology, especially artifact design and its organizational context, including its impact on the people affected by its development and the implementation of the artifact. On the other hand, the theoretical framework used to explorer the various dimensions of IS also highlights that CI has much to offer with respect to its understanding of IS's undertheorized conception of organizations that focus on real-world community structures and engagements. We argue that this reading of IS provides an appropriate basis to theoretically ground CI in its technical agenda and to establish a dialectical relationship with its social action agenda. Moreover, we argue that this dual agenda is necessary to strengthen the conceptual, theoretical, and practical activity of CI.

The arguments presented in the article, while focusing on theoretical aspects, also suggest more practical impacts. The development of a dual agenda for CI would provide a shared conceptual taxonomy with IS that would both enable a productive dialogue between the two disciplines and establish CI as a recognised intellectual community within the adhocracy of IS. The development of the dual agenda is the responsibility of CI researchers, but their efforts would be facilitated by bringing together critical and interpretive thinkers in IS with those in CI in forums such as joint conferences, interdisciplinary workshops, and special inerest groups. Such activity would be greatly helped if CI researchers read the key IS research literature. Additionally, CI needs to seriously consider the implications of the dual agenda in terms of educational strategies. Klein and Hirschheim (2008) have recently suggested "boundary spanning" within the territory of IS through different PhD training options, directly reaching out to industry engagement. CI can engage with IS in order for the community sector to be considered an appropriate venue for "industry

TABLE 2
Conceptions of ICT in organizations, society, and communities (adapted from Kling, 2000, and Kling & Lamb, 2000)

Standard (tool) perspectives for IS	Social informatics perspectives	*Community informatics perspectives*
IT is primarily an individual tool.	IT is a sociotechnical network.	*Community networks are social technical relationships and structures for local communities; both people and ICTs have degrees of agency.*
Business model is sufficient.	Ecological view is needed.	*A community model is needed that incorporates depth understanding of the concept of community and community organizations as supporting group social solidarity and human agency.*
One shot implementation.	Implementation is an ongoing social process.	*Same as preceding description, and is ideally a community-oriented participatory process.*
Technological effects are direct and immediate.	Technological effects are indirect and involve different time scales.	*As above.*
Politics are bad or irrelevant.	Politics are central and even enabling.	*Community politics are as complex as any other politics. Social justice is critical.*
Incentives to change are unproblematic.	Incentives may require restructuring (and may be in conflict with other organizational actions).	*Incentives are complex in the community setting.*
Relationships are easily reformed.	Relationships are complex, negotiated, and multivalent.	*As above, and language, power, gender, class, disability, ethnicity need to be accounted for.*
Social relationships of ICT are big but isolated and benign.	Potentially enormous social repercussions of ICT.	*As above, and potentially enormous social and community repercussions of ICT*
Contexts are simple (a few key terms or demographics).	Contexts are complex.	*As above. In particular, the vocabulary and agency of community and community organizations need to be well understood. Gender, class, disability, ethnicity need to be accounted for*
Knowledge and expertise are easily made explicit.	Knowledge and expertise are inherently tacit/implicit.	*As above. ICTs are not at the core of many community/community agencies actions. Social/people technology is just as important and knowledge and expertise are not just tacit or implicit, but may be expressed in unfamiliar ways.*
ICT infrastructures are fully supportive.	Additional skill and work are needed to make ICT work.	*ICTs are an additional layer to human–technology networks and may encounter resistances. Design decisions are all too often made from above.*

engagement." But this needs to be extended to include a joint IS–CI educational strategy that also involves the master's-level courses, both research based and with coursework for practitioners. Such a joint approach would also provide IS with appropriate examples of relevant community-focused contexts within a shared vocabulary. In this endeavor the wealth of rich research in SI already offers a vocabulary and framework that can be quickly adapted to CI in its effort to engage productively with IS.

NOTE

1. http://www.ccnr.net/prato2006/archive/index.html (6–11 October 2006, Monash Centre, Prato, Italy).

REFERENCES

Banville, C., and M. Landry. 1989. Can the field of MIS be disciplined? *Communications of the ACM* 32(1):48–60.

Bhattacharyya, J. 1995. Solidarity and agency: Rethinking community development. *Human Organization* 54(1):60–68.

Bradley, G. 2006. *Social and community informatics: Humans on the Net.* London and New York: Routledge.

Callon, M. 2001. Actor network theory. In *International encyclopedia of the social & behavioral sciences*, eds. N. J. Smelser and P. Baltes, pp. 62–66. Oxford, UK: Elsevier Science Ltd.

Checkland, P. 1993. *Systems thinking, systems practice*. Chichester: J. Wiley.

Day, P., C. Farenden, and H. Gross. 2007. Participative community profiling: A method for community informatics research: Maps, networks, and stories. In *Constructing and sharing memory community informatics, identity and empowerment*, eds. L. Stillman and G. Johanson, pp. 24–36. Newcastle, UK: Cambridge Scholars Publishing.

De Moor, A. 2007. Using System dynamics to construct design theory for community information systems. *Journal of Community Informatics* 3(1): online. http://www.ci-journal.net

De Moor, A., and F. De Cindio 2007. Beyond users to communities—Designing systems as though communities matter. *Journal of Community Informatics* 3(1): online. http://www.ci-journal.net

de Moor, A., and H. Weigand. 2006. Effective communication in virtual adversarial collaborative communities. *Journal of Community Informatics* 2(2):116–134.

Ekbia, H., and R. Kling. 2003. *Power issues in knowledge management*. WP-03–02, http://hdl.handle.net/2022/164 (accessed April 18, 2009).

Etzioni, A. 1968. *The active society: A theory of societal and political processes*. London: Collier-Macmillan.

Fisher, J., and K. Karlheinz. 2007. Initiating a north–south dialog: A reflection on Information Systems Research in Australia. *Scandinavian Journal of Information Systems* 19(1):3–10.

Foucault, M. 1988. Technologies of the self. In *Technologies of the self: A seminar with Michel Foucault*, eds. L. H. Martin, H. Gutman, and P. H. Hutton, pp. 16–49. Amherst: University of Massachusetts Press.

Giddens, A. 1984. *The constitution of society: Outline of the theory of structuration.* Berkeley: University of California Press.

Goffman, E. 1983. The interaction order. *American Sociological Review* 48(1):1–17.

Gurstein, M. 2000. Community informatics: Enabling communities with information and communications technologies. In *Community informatics: Enabling communities with information and communications technologies*, ed. M. Gurstein, pp. 1–30. Hershey, PA: Idea Group.

Gurstein, M. 2008. *What is community informatics (and why does it matter)?* Milan, Italy: Polimetrica.

Habermas, J. 1972. *Toward a rational society*. London: Heinemann.

Habermas, J. 1984. *Theory of communicative action*. Boston: Beacon Press.

Heeks, R. 2002. Information systems and developing countries: Failure, success, and local improvisations. *Information Society* 18(2):101–112.

Heeks, R. 2008. ICT4D 2.0: The next phase of applying ICT for international development. *Computer* 41(6):26–33.

Hirschheim, R., H. K. Klein, and K. Lyytinen. 1996. Exploring the intellectual structures of information systems development: A social action theoretic analysis. *Accounting, Management and Information Technologies* 6(1–2):1–64.

Iacovino, L. 2007. Community, identity and shared value systems from Aristotle to Singer. In *Constructing and sharing memory community informatics, identity and empowerment,* eds. L. Stillman and G. Johanson, pp. 62–72. Newcastle, UK: Cambridge Scholars Publishing.

Kırlıdoğ, M. 2006. Requirements determination in a community informatics project: An activity theory approach. In *OTM Workshops 2006, Lecture notes in Computer Science 4277*, eds. R. Meersman, Z. Tari, P. Herrero, et al., pp. 257–268. Berlin/Heidelberg: Springer.

Kling, R. 2000. Learning about information technologies and social change: The contribution of social informatics. *The Information Society* 16(3):217–232.

Kling, R., and R. Lamb. 2000. IT and organizational change in digital economies: A socio-technical approach. In*Understanding the digital economy—Data, tools and research*, eds. B. Kahin and E. Brynjolfsson, pp. 295–324. Cambridge, MA: MIT Press.

Kling, R., G. McKim, and A. King 2003. A bit more to it: Scholarly communication forums as socio-technical interaction networks. *Journal of the American Society for Information Science and Technology* 54(1):47–67.

Kubisch, A. C. 1997. *Voices from the field: Learning from the early work of comprehensive community initiatives*. Washington, DC: Aspen Institute.

Kuhn, T. 1970. *The structure of scientific revolutions*. Chicago: University of Chicago.

Lamb, R., and R. Kling. 2003. Reconceptualising users as social actors in information systems research. *MIS Quarterly* 27(2):197–235.

Leonardi, P. M., and S. R. Barley. 2008. Materiality and change: Challenges to building better theory about technology and organizing. *Information and Organization* 18(3):159–176.

O'Donovan, B., and D. Roode. 2002. A framework for understanding the emerging discipline of information systems. *Information Technology & People* 15(1):26.

Orlikowski, W. J. 1992. The duality of technology: Rethinking the concept of technology in organizations. *Organization Science* 3(3):398–427.

Orlikowski, W. J. 2000. Using technology and constituting structures: A practice lens for studying technology in organizations. *Organization Science* 11(4):404–428.

Orlikowski, W. J., and C. S. Iacono. 2001. Research commentary: Desperately seeking "IT" in IT research—A call to theorizing the IT artifact. *Information Systems Research* 12(2):121–134.

Rose, N. S. 1999. *Powers of freedom reframing political thought*. New York: Cambridge University Press.

Rothman, J., and J. E. Tropman. 1970. Models of community organization and macro practice perspectives: Their mixing and phasing. In *Strategies of community organization*, ed. F. M. Cox, pp. 3–26. Itasca, IL: FE Peacock.

Stillman, L. 2006. *Understandings of technology in community-based organisations: A structurational analysis*. Unpublished doctoral

dissertation, Faculty of Information Technology, Monash University, Caulfield, Australia.

Stillman, L., and G. Johanson, eds. 2007. *Constructing and sharing memory: Community informatics, identity and empowerment*. Newcastle, UK: Cambridge Scholars Publishing.

Stoecker, R. 2005. *Research methods for community change: A project-based approach.* Thousand Oaks: Sage.

Suchman, L. 1996. Constituting shared workspaces. In *Cognition and communication at work*, eds. Y. Engestrom and D. Middleton, pp. 35–60. New York: Cambridge University Press.

Walsham, G. 1995a. The emergence of interpretivism in IS research. *Information Systems Research* 6(4):376–394.

Walsham, G. 1995b. Interpretive case studies in IS research: Nature and method. *European Journal of Information Systems* 4(2):74.