CNA[2] – Communications and Community; Neighborhoods and Networks; Action and Analysis: Concepts and Methods for Community Technology Research

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1 Introduction

The purpose of this paper is to examine the challenges and opportunities of employing ICT in a community building/development context through a critical reflection of the experiences of the Community Network Analysis (CNA) and ICT research project[1] in the Poets Corner community of Brighton and Hove, UK. Grounded in community networking, community development and community learning theories, the CNA project aimed to: investigate impacts of ICT on the network ties and social cohesion of community groups; whilst exploring the uses of network technologies in stimulating social capital and promoting community development in Poets Corner.

In order to address these aims we developed a participatory action research (PAR) methodology [36], and utilised ICT in ways similar to the UNESCO approach of ethnographic action research (EAR). That is to say that we provided "a flexible and adaptable approach to researching and developing ICT projects…..within a broad and embedded understanding of local contexts and needs" [34, p103]. The rationale of this approach was to generate knowledge of community ICT applications that could be used to support and sustain community development processes. This meant that CNA possessed a dual purpose. One was to investigate the potential influence of ICT on social capital and social cohesion in community networks. The second was to design, implement and develop a community communication space (CCS) in partnership with representatives from the community infrastructure. The next section situates CNA within its theoretical and conceptual environment by locating it in community development and community informatics knowledgebases.

2 Situating the Research Through Blended Literature

In 1955, the UN defined community development as, "a process designed to create conditions of economic and social progress for the whole community with its active participation and the fullest possible reliance on the community's initiative" [35, p6].

For many community developers, this has meant formulating strategies and planning activities—with communities—that met the needs of the community at a specific point in time [1, 19]. Smith puts this into context by contending that community development should concentrate on improving local democracy; promoting mutual aid; encouraging local networks; and supporting communal coherence [32].

Around the millennium, community informatics (CI) emerged as an academic construct that concerned itself with investigating community-based ICT applications [15, 20]. However, CI is not the sole preserve of academic researchers. It has an inherent practice-based component, which focuses on the application of ICT in support of community processes and to achieve community objectives [16]. What CI currently lacks is a distinctive research agenda that lays down a clear direction or development path. It has been suggested, and this is a viewpoint with which the CNA team concurs, that CI "emphasizes a grassroots perspective whereby community members are centrally involved in the application of ICTs for community development" [20, p.4]. Because community development takes place in the everyday environment of people's lives and is built on processes of empowerment and participation that enable communities to question their realities and affect action for change [23], a question emerges as to whether the use of ICT by communities can make a significant contribution to community development. Answering this question through research requires the development of community engagement strategies built on trust and mutual respect. Such relationships do not appear over night. They take time and effort to build and more time and effort to nurture and to sustain.

In building such relationships, community informatics researchers must acknowledge the potential danger of power imbalances, even in the most well intentioned community research projects. Put simply, power is "the ability to get someone to do something he or she would not ordinarily do" [2, p10]. From a community research perspective, the question of validity—"whether you are measuring what you think you think you are measuring" [33, p32]—becomes a factor. If the processes, outcomes and results of community research can not be 1) understood, and 2) used by the community, then it is not valid as community development research. Such a situation can only be developed through mutual power sharing and open, honest and respectful dialogue in the community research partnership.

2.1 Community Networking and ICT

> *Community-type organisation is a feature of all human societies, and studies of humans and other higher primates suggest that we share an inherent sociability, a willingness to connect and to cooperate.* [13, p.1]

Pointing to relationships between social networks and their role in structuring modern community life, Gilchrist illustrates an interesting sociological constant. Regardless of changes in the structure and organization of society, humanity has, down the ages, adapted to social change and continued—sometimes in the face of extreme adversity—to socialize, develop relationships, plan events and organize activities in the name of community. The desire for community, whatever form it takes, is a feature of human behavior. The communicative behavior of networking referred to by Gilchrist is the glue, or social cohesion, that forms and sustains community.

In a seminal text on the emergence of 'new', i.e. ICT based community networks, Schuler explains that community networks existed as a sociological concept—i.e. community communication patterns and relationships—long before the web-based community networks we know today emerged [29]. From this perspective community networks are important factors in the community development environment. Interestingly however community networks are increasingly referred to as technological artifacts and appear to be understood in terms of the connectivity they give to ICT (e.g. [17]) rather than the community building links to social capital they afford within communities.

Establishing what lies at the heart of community networking, i.e. the purpose and nature of the social relationships within communities and their attendant processes of communication, is central to understanding community [7]. It provides a starting point for addressing the challenges that accompany the design, development and sustainability of technology mediated community networks. Put simply, knowledge of what shapes and energizes community life is pivotal to developing effective community networks. Connected through dialogue, community activists give purpose to social capital. They influence community norms; develop trust and sustain community networks. If community technology activists and researchers engage with communities in ways appropriate to community needs then ICT can impact significantly on building and sustaining social capital in community networks [10].

2.2   Social Capital – Communicative Networks of Trust and Purpose

Of course, making and sustaining social network relationships can be problematic. Communities are contested spaces comprising difference and diversity [23]. Conflicts can and do arise. Celebrating and respecting diversity through the promotion of a culture of shared communication, shared values and shared knowledge, or social cohesion [14], is a big step toward building healthy communities. However, establishing and maintaining social connectivity can be challenging. Social cohesion requires "stocks of social trust, norms, and networks that people can draw upon to solve common problems" [31] known as social capital. Putnam suggests that, "social capital calls attention to the fact that civic virtue is most powerful when embedded in a sense network of reciprocal social relations" [26, p.19]. However, as with any other forms of capital, its value is found in the purpose to which it is put. The capacity of people connected in community networks to communicate with one another and use their knowledge to identify problems, plan agenda, agree and execute actions, and evaluate outcomes is what Schuler calls 'civic intelligence' [30]. A theory that "describes the capacity that organizations and society use to "make sense" of information and events and craft responses to environmental and other challenges collectively" [9, p.34].

A growing body of literature relating to ICT, social capital and community capacity is emerging. However, much of the studies from which it draws are still in their infancy. Hypothesizing that ICT will affect both bonding and bridging social capital, Gaved and Anderson warn that the analyses that currently exist, based as they often are on surveys conducted only 6 – 12 months into an initiative's lifecycle, are "often too shallow and too soon" [11, p.8]. If, as Resnick suggests, "social capital is a residual or side effect of social interactions and an enabler of future interactions" [27]

then those communities with existing stocks of social capital are likely to benefit more from initiatives that enrich social capital [10]. One of the distinct challenges facing the CNA project was to identify whether ICT might contribute to building stocks of social capital in a community such as Poets Corner, where social capital stocks had been in atrophy for a number of years.

3   Insights into a Community Informatics Methodology for Community Development

Before reflecting on the project methodology and community development activities, we pause to clarify CNA's interpretation of the term 'ICT'. Focusing on the information and communication assets of Poets Corner, it became clear that we had to adjust our understanding of ICT and adapt it to that of the community. Of course, interpretations or understanding vary in the community. We have met people with very advanced ICT literacy skills and others with basic or no skills at all. Even in a small, resource poor community like Poets Corner, information is required, acquired, stored, distributed and exploited in numbers of ways and communications takes place at various levels using different media. As we learnt more about the communications of Poets Corner we decided to interpret ICT in a broader sense than initially intended. We determined to include all modes of community communication that the community used or were interested in using. A community newsletter entitled the West Hove News (WHN) illustrates the necessity. We soon learnt that WHN was a pivotal community communication medium serving as an important source of community information and knowledge exchange. In Poets Corner, WHN is an important community ICT. In order to understand ICT in the community it is necessary to understand the media that the community uses as well as the processes of communication.

We adopted what the Community Development Foundation (CDF) describes as an 'involvement ready' model [4] to determine research partnership involvement. Preliminary interviews suggested that the community infrastructure, i.e. the groups, clubs, associations and organizations, would provide partners most capable of participating. This approach provided an interesting focus for the project. Chee contends that most studies of this nature are focused at the individual level [5]. This presents community from individualistic rather than collective perspectives. Concentrating on networks in the community infrastructure enables a broader understanding of the structure and organization of community life to emerge, which in turn will provide opportunities for situated or contextualized research into the individual and familial components of community networks to be conducted later.

CNA methodology comprised 4 components of investigation into community network development: 1) community profiling; 2) social network analysis (SNA); 3) participatory learning workshops (PLWs); and 4) community communication space (CCS). Although presented as separate entities, the interaction and overlap between the elements is significant.

3.1   The CNA Community Profile

Community profiles are community development tools used to describe a process or processes of community knowledge generation about a specific area or community, in which particular emphasis is placed on community perceptions in order to identify and address problems in the community [18]. Conducting a community profile had a duality of purpose for the CNA team. One was to map the community infrastructure and create a database of the community assets which could be used by the community[2] [21]. The other was to identify the information and communication needs of the community infrastructure. Both purposes were achieved using a number of techniques: exploiting existing information sources, e.g. census and neighborhood renewal surveys; in-depth interviews using story-telling techniques [37]; reflective and scenario workshops; transect walks with local historians and community activists; observation of community meetings—formal and informal—and engagement in diverse community activities. Encouraging community participation in these profiling techniques provided access to insights into the social fabric of community life that would otherwise have been hidden from exogenous researchers. Enabling people to tell their stories, precipitated a process of 'critical consciousness' [23] within the community infrastructure that enabled reflection on existing community practices and highlighted the need for improved social networking.

Poets Corner, forms a large part of the Portland Road and Clarendon Neighborhood Renewal Area, and comprises just over 100 community organizations, groups, clubs and associations. Despite the best efforts of community development agencies, the grass-roots community and voluntary sector has witnessed a weakening of social relationships between organizations and an apparent growth in territorial tensions. Communications within the community infrastructure are relatively poor and shrinking resources have meant that dialogue with the community is at times almost non-existent. Organizations and networks that should be collaborating with one another often regard themselves as competitors for resources and there is some evidence of a culture of distrust emerging between some groups.

However, there are also positives in this local story. The old community forum (West Hove Forum) which had stagnated and became moribund due to political infighting and factionalism was re-established as the Portland Road and Clarendon Forum under the auspices of a community development agency—the Trust for Developing Communities. Evidence from the first few meetings points to a desire to bridge division within the community infrastructure and collaborate for the collective good. A recent community workshop organized by CNA acknowledged the problem of local distrust and tribalism and expressed a desire to find ways of working together and improving community communications.

Of the 104 groups, clubs, associations, etc. in Poets Corner 3 main clusters and 6 smaller clusters were identified through the mapping exercise. These clusters, or affiliation networks, appear to be built around parent organizations, e.g. community associations and faith based organizations. Affiliation is based on organizational support mechanisms and the availability of physical space to support activities. A

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[2] The database was used by a local community development to inform the community infrastructure of the relaunch of a community forum, which had been moribund for some time. The forum is currently flourishing.

number of isolated nodes and dyadic networks, such as the infant and junior schools, were also identified. The network interactions of the schools tend to be with parents, children and the public sector. Connectivity with the community infrastructure has been limited in the past but both schools now have representatives on the newly launched forum.

'Informal' network structures in the community tend to be more open and dynamic than their 'formal' counterparts but are also more transient. Networking often occurs in public spaces, e.g. Stoneham Park, local pubs and coffee shops, or serendipitous street meetings. This agora 'effect' provides opportunity for knowledge exchange, and comfort and support contacts to be made. Communication transactions tend to be both self-organizing and mutually reinforcing, especially where familial and/or friendship ties predominate. The centrality of Stoneham Park makes it an ideal informal communal meeting and activity space, where networks of informal associations gradually evolve. Repeated recognition, shared or parallel activities, nodding acknowledgement of presence, anonymous conversations en passant, name exchanges and gossip often lead to friendship networks developing. Informal, or weak, neighborhood network ties [12] are formed through an accumulation of social interaction; initiated for no specific social purpose other than the human need to communicate and interact. In other words, through communication rooted in the fabric and practice of neighborhood life.

The nature of informal networks in Poets Corner appears to fall into two categories – spontaneous and planned. Spontaneous informal networks tend to be unstructured and spur-of-the-moment. During the collection of personal narratives we learnt that a local cat had gone missing. Neighbors immediately organized a search of the area. In another street, learning of the arrival of a new family, neighbors collectively left bags of clothes and toys on their doorstep as a welcoming gesture. People visiting each other's homes for a chat and coffee: reinforcing and developing social bonds, illustrates the spontaneous nature of informal community networks. Planned informal networks are more structured and preconceived but have no formal membership. A curry club—where participants get together to try new curry recipes and socialize—is organized at irregular intervals by email, and a book club—run along much the same lines as the curry club—is organized by mobile phone. Circles of baby-sitters and parents requiring 'sitters' that evolved through the local grapevine are maintained by landline telephone, SMS text messaging and face to face contacts. Key holder groups, formed by neighbors in the same street, where spare keys are cut and distributed in case of need or emergency (especially among the elderly) are another example of organized but informal networks in the community. Networking activities such as these illustrate that people are increasingly comfortable using communication technologies such as email and mobile telephony to support their network structures and facilitate communicative exchanges.

3.2 Social Network Analysis (SNA)

The project's use of a SNA approach was intended to encourage community partners to think about the effectiveness of their network relationships by getting them to reflect on: 1) the nature of their ties within the infrastructure, and 2) the significance of communications to community activities and practices. Data collection involved

surveys of two significant areas of community communication activity – firstly, the organization of the family fun day and summer festival, and secondly a more comprehensive investigation of communication patterns within the community infrastructure.

The first survey focused on communication within the family fun day organizing committee and who they spoke to in the broader community infrastructure. The survey also questioned why and how they communicated, together with their preferred communication media. Our main objective was to use network data to illustrate the communication patterns occurring during the organization of the community's biggest event of the year. Because social network analysis uses graphical images to represent social realities we were able to use these visualizations as aids to stimulate critical reflection of the communication processes. Providing the opportunity for community groups to reflect on and discuss their community communication behavior proved to be an essential element in the community network learning process. For example, we were able to show how the organizing committee had developed excellent connectivity within the committee itself but that communications with the community infrastructure were fairly ineffective. In fact, the organizing committee was a clique which emanated mainly from the Poets Corner Residents Society (PCRS) and was at the time of the survey, dependent on individuals for communicating with non PCRS groups in Poets Corner. Since this survey was conducted, the organizing committee, whist not an ideal model of inclusivity has become a more openly participative body in the community.

The second survey collected data on formal network relationships within the community infrastructure. The intention here was to build a representation of the community network structure and organization by plotting transactional exchanges, i.e. communication, in a way that illustrates in graphical form the connecting elements and nodes [6] in the community network. Frequency, purpose and mode of communications were also identified in order to stimulate critical reflection of existing communication and relationship patterns within the infrastructure at large.

A separate paper is required in order to provide a detailed discussion of the community infrastructure network survey. However, 2 points of interest arise that contribute to the point here. The first is that the survey confirmed the findings of the mapping exercise regarding the structure of the community infrastructure, i.e. it comprises 3 large clusters or affiliate networks; 6 smaller clusters; a dyadic network and a number of individual community entities. The majority of communication takes place within clusters, providing some evidence of bonding social capital, although a detailed analysis reveals a more complex picture. Evidence of bridging social capital exists but much of this occurs during formal monthly or bi-monthly community meetings such as the Portland Road and Clarendon community forum or community safety meetings and is undertaken by one or two key stakeholders, or hubs, from each cluster. Whilst these hubs, i.e. highly connected elements of a network [6], provide the shortest routes between clusters and are effective community communicators, they are also what Csermely describes as keystone species [6]. Their removal from the communication ecology of a community could result in the fragmentation of the community network.   Bridging social capital is more widespread during the planning and organization of the Fun Day and summer festival.

The survey provides interesting evidence about the significance of linking social capital. Even groups with limited community relationships indicated the importance of their connections to exogenous community development and neighborhood renewal resources and funds and government agencies and offices. The CNA team subsequently developed working relationships with the Neighborhood Renewal team, the Trust for Developing Communities and Brighton & Hove Community Initiatives and has established themselves as members of the Portland Road & Clarendon Forum with a view to ensuring that all CNA actions and activities are transparent and contribute to community attempts to build social cohesion in the community.

3.3   Participatory Learning Workshops (PLWs)

PLWs afford interactive ICT learning spaces which provide and share knowledge of, and skills in, the use of network technologies. Traditional community ICT training courses often lack social or community contextualization and are typically driven by performance indicators and targets. Training is often task based and aimed at individual users rather than members or participants in a community network. The PLW rationale acknowledges 2 main considerations. Firstly, learning is contextual and affected by the environment in which it occurs [22, 3]. Secondly, social interaction is a crucial component of learning. PLWs provide spaces for diverse community stakeholders to situate their engagement with ICT in a community context. They actively encourage open participation and knowledge sharing through social networking and dialogue [24].

The type of technologies introduced during PLWs, together with other community learning needs, are determined by community participants prior to the workshops—underlining the importance of dialogue between researchers and community. Workshops are designed to stimulate critical reflection of the social appropriation of technologies and encourage community networking. This is achieved by workshops: 1) employing participatory and interactive learning techniques, 2) working at the community's pace, 3) working with technologies and applications that the community wants to learn, and 4) wherever possible, using content generated by workshop participants.

As the project developed so hybrid PLWs evolved to meet community needs, which were extending beyond the static environment of the Talkshop[3] ICT suite. Mobile PLWs emerged because people were not always able to attend the Talkshop workshops. In order not to exclude these people we utilized wifi networked laptops to take the workshops to the community at time and locations appropriate to their needs. The second factor was technology related. A significant proportion of participants expressed an interest in learning to use digital cameras and digital camcorders. Some wanted to learn how to use their mobile (cell) phones and portable media players to generate content. Mobile PLWs enabled us to facilitate situating community learning in community contexts, and enabled community groups to generate their own digital content.

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[3] Talkshop is a small community centre – converted by local people from a disused council storage building in a rundown 'park' inhabited at the time by drug dealers and disillusioned youth. Stoneham Park has since been reclaimed by the community and is a thriving community space.

A third type of PLW evolved during the project—the scenario PLW. These workshops are built on the philosophy of open participation, knowledge sharing, social networking and dialogue found in the other PLWs in order to find a collective solution to community problems. An issue or question facing the community is presented as a scenario to participants who, drawing on their own knowledgebase, collaborate to find solutions. Due to the diversity of participants this usually requires some effort in establishing common ground before solutions can be identified. Scenario PLWs are an excellent way of highlighting the significance and potential impact of social networking in both theory and practice.

During the first round of PLWs we worked with a range of community groups to develop their skills in recording and archiving the activities that have taken place during the summer festival as well as other community events e.g. local history walks, holistic health days, tai chi in the park, poetry, art and music. Digital video, photography and podcasting have proved popular activities in the community and we are planning to work with interested parties to create digital community story maps for the community as part of the CCS.

3.4 Community Communications Space (CCS) – A Prototype

The purpose of the CCS is to provide ICT mediated support for community networking activities. During the design and implementation of the prototype we sought to achieve this by embedding it as an integral part of the community infrastructure and community activities. However, such an approach is accompanied by various levels of complexity that present challenges to both researcher and community participant. Firstly, achieving consensus for a project across the community can be problematic. Building the necessary levels of trust and respect with the community to create effective partnerships takes time and effort—and these resources are usually at a premium in both academic and community sectors. Balancing the competing demands of program funders and community partners is no simple matter and there is a very real danger of researchers getting caught up in the day to day excitement of community life and losing sight of the fact that the investigation is a funded research project—we have probably been guilty of this on occasion. Impatience can add to complexity. There have been times when people have appeared to forget what the partnership agreed to do, i.e. create an online environment which would underpin and be used for community development. It is important to understand that as spaces of diversity and difference, communities, like people, learn at different speeds. They also engage in different ways and accommodating difference and diversity is not always straightforward. The choice of technical platform also added to the complexity as at times we were left with inadequate technical knowledge. Ensuring appropriate levels of technical support is essential before commencing a project such as this. When we set out, we believed we had the support we needed but circumstances change and for the remaining social scientists and community practitioners with reasonable levels of techno-savvy, the technology proved to be a big problem at times. Earlier, we clarified what we meant by the phrase 'ICT' in terms of our engagement with community groups and activities. Because CNA aimed to: investigate impacts of ICT on the network ties and social cohesion of community groups; whilst exploring the uses of network technologies in stimulating

social capital and promoting community development in Poets Corner, it is also necessary to explain how we approach ICT as an element of data analysis.

Within community informatics a considerable literature exists that focuses on the use of ICT as tools supporting community activities (see e.g. [8, 28]. Indeed, in this study we refer to ICT appropriated in support of community activities. In this sense the CCS can be understood as a tool supporting community activity. However, presenting the CCS as a tool paints a limited picture of its versatility. Intended to support community communications, as well as the social and organizational activities of community groups, the CCS is much more than a simple tool. It supports information transfer and knowledge sharing and can be used to generate community content and community contexts. The CCS supports community communication and social networking. In this way ICT is understood as space or environment [25] in which people engage in dialogue, network with one another and develop relationships in a virtual world. Although a fuller picture of the CCS is now emerging, the CCS is still more than a combination of tools and virtual environments. One of the purposes of the project was to work with the community to design, implement and develop a community prototype and although this phase of the project has just ended, it is far too early to evaluate it in terms of its direct impact on social capital [11]. This does not mean, however that the CCS can not be analyzed in terms of social capital.

In order to analyze the affects of ICT on network ties, social cohesion and social capital, it is necessary to understand how effective the processes of utilizing ICT in a community development context have been. CNA is ostensibly a project about processes—community development processes; community networking processes; community learning processes; community communication processes and community technology processes—Resnick's model of social capital forms and facilitated interactions [27] therefore provides us with a useful framework for understanding ICT as process. That is to say the process or processes that connect people through situated community ICT learning; for purposes of information sharing, communication, participation, network ties strengthening and trust building.

The components of the CNA methodology referred to previously were used to collect data and engage the community in designing a digital environment that meets the needs of those engaged in the initiative at that time. Yet it needs to be flexible enough to adapt to and accommodate the changing needs of additional participants as the initiative's diffusion throughout the community expands. For example, whichever format the PLWs took, we always sought to ensure they provided space for community discussion of CCS design considerations and needs, which informed the planning, design, implementation and ongoing development of the CCS prototype. Built on the Plone open source, content management system (CMS), the prototype has gone through a number of iterations as PLW participants have learnt to use it and numbers engaging with the project have increased. Enabling all the usual group pages, blogs, notice boards, visitor pages, local diaries and news facilities that you might expect from a community web site, the CCS also supports video and audio podcasting, digital story-telling, digital art, poetry and music activities. Discussion forums are being added to support the community development/building processes currently underway through the Portland Road and Clarendon Community Forum referred to earlier. A range of social networking applications are also being considered.

4   Conclusion

During our work in Poets Corner we encountered a strong desire to share stories and meaning in the community. More than that however, we discovered an eagerness to learn how communication technologies might assist in supporting and sustaining community activities. As the CCS moves into a community diffusion phase we are exploring innovative and creative ways of developing community voice and memory initiatives that promote community networking. If technology mediated community networks are to support the diversity found in community environments, then community informatics practitioners and researchers must focus on the design and development of safe and welcoming spaces that encourage and facilitate participation and engagement. Enabling people to interact with one another by constructing narratives and sharing meaning in convivial environments is central to effective community networking.

In order to address some of the fears about technology that exist in communities, ICT must be seen to be relevant to the needs and interests of community life. The community technology environment must be accessible to all and use language that encourages common ground thinking in determining community uses. Local communities need to feel in control of technologies rather controlled by them. When CNA engages with community groups we contextualize ICT in ways that relate to their environments and activities. Learning about the community environment, its practices and its relationships is paramount. Conducting community profiles and speaking to people, is not only a great way of breaking the ice between researcher and community, but provides knowledge crucial to the effective design of community networks.

Participants from all sections of Poets Corner have understood the need for improved communications within the community infrastructure and with the community at large. Information about what the community needs and wants from the community infrastructure has become a significant issue for many groups in the area. Although ESRC funding for CNA has now ended, we have secured funding through the Brighton and Sussex Community Knowledge Exchange (BSCKE), to conduct a community-based participatory research (CBPR) project undertaking a community needs assessment of the Portland Road and Clarendon Neighborhood Renewal Area and to present the results in the form of tag clouds on the CCS. In an additional outcome, following agreement in principle of a number of community groups, we are currently exploring the possibility of establishing CNA as a community sector organization or charity.

During our time in Poets Corner, we have, in keeping with our contractual obligations to ESRC, generated knowledge contributing to the body of academic knowledge in the field of community informatics. In addition and in keeping with our ethical responsibilities to our community partners, we have generated knowledge and processes that will support community development and community networking. The CNA methodology has:

1. Demonstrated that the use of personal narratives—story-telling—is a useful tool for facilitating critical consciousness of the community environment, which in turn is paramount for building effective community development practices and strategies.
2. Shown that communities are interested in learning how to use and apply ICT that are appropriate to their needs. Technologies such as digital camcorders and cameras,

mobile phones, PDAs and iPods are particularly useful in providing support for community voice and memory activities. It is activities such as these that often provide the contextualizing 'hooks' or act as a catalyst for communities wanting to learn about the archiving and distribution capacities of other ICT. In addition to this we have shown that by collaborating with others to appropriate ICT for community purpose, communities can build and increase their stocks of social capital.

3. Developed a suite of PLWs to support community learning that situated and contextualized in the day to day realities of the community environment. PLWs are grounded in a philosophy of information sharing, open participation, social networking and dialogue.

4. Highlighted how, through the use of social network analysis techniques, critical awareness of community communication patterns can assist in understanding the strengths and weaknesses of a community's social relationships. This in turn can lead to improved communication, common knowledge, community identity, shared values, obligations, roles and norms and trust.

5. Illustrated how, despite an inherent focus in academic circles on the significance of bridging and bonding social capital, 'linking' social capital also plays an increasingly crucial role in sustaining the community infrastructure. An important lesson that we as CI researcher take away from this project is to engage with community development and government agencies; seek to raise awareness of, and support for, community networking activities; and commence dialogue about how CI can support community development.

In closing, we reiterate the 3 key points from the literature that we hope will stimulate further discussion. The first is that to be valid, community informatics research must be of use to the community in which the researchers are engaged. In this respect, we concur with Keeble and Loader [20] who contend that the community informatics research agenda must emphasize grass-roots needs and perspectives. For the CNA team, this means locating the application of ICT, and associated learning processes, within a community development context. By community development we mean development that occurs in the everyday lives of the community environment and is based on processes of empowerment and participation [23]. Secondly, designing, implementing and developing technology mediated community networks requires a grounded understanding of the social network structures, organization and communication processes that comprise the community environment. Finally, the capacity of people in community networks to communicate with each other in order to share knowledge and collectively solve community problems is a crucial component of civic intelligence [30]. Finding ways of assisting communities to develop their capacity to shape and sustain their own community networks should be an integral part of all community research partnerships.

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