foreground activity to be supported. In ECO we started to investigate diverse aspects of introducing engineering to a digital city, with very promising initial results. Public sector engineering decisions, directly supported by the wider public, increase the citizen-participative style of the community and improve the community decisions. The support of selected types of industrial engineering, apart from other benefits, is expected to improve the operation of the community in terms of long term criteria such as employment or creation of new companies

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Reconfiguring Community Networks: The Case of PrairieKNOW[1]

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Abstract. The advent of the Web has renewed interest in the use of information and communication technologies to support not only virtual communities but also traditional communities. This paper observes that the majority of successful applications to date tend to use technologies to substitute for and/or enlarge existing community interactions and transactions. We argue that this trend, unformnately, deepens the digital divide between those who have social and knowledge capital and those who don't. In order to improve the conditions of low-income residents, there is a need to deploy tools that help to reconfigure rather than simply substitute or enlarge existing community interactions. This paper describes the methodology of asset mapping and the development and deployment of a tool called PrairieKNOW (Prairie Knowledge Networks *On* the Web) in Champaign-Urban4 Illinois' Prairienet community network. While Champaign-Urbana was ranked by *Newsweek* magazine as one of the ten most wired cities in the world, it also has a substantial low-income population that has traditionally been under-represented in their use of Prairienet.

[1] The conceptual development of IKNOW (Inquiring Knowledge Networks On the Web), of which PrairieKNOW is a derivative, was conducted as part of a research project funded hy the National Science Foundation (ECS-9422730). PrairieKNOW's development and integration with Prairienet is also supported through the Community Networking Initiative (CNI), funded by the Telecommunications and Information Infrastructure Assistance Program (TIIAP) in the U.S. Department of Commerce and by the W.K. Kellogg Foundation. CNI is a joint effort of Prairienet, the Graduate School of Library and Information Science at the University of Illinois, and the Urban *League* of Champaign County. Karen Fletcher and Pamela Salela were especially valuable in developing the asset mapping concept for Prairienet. Prairienet's pilot asset mapping database was implemented by Andrea Ingram, with assistance from Denise DeBrock The database was implemented in PrairieKNOW by Dan Zink, Dana Serb, and Peter Taylor.

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Introduction

Communities are social systems that enable actors (individuals, groups, and organizations) to communicate, to share resources, and to participate in efforts to address their needs collectively. Moreover Cohen and Axelrod (1998) note, membership in a logical category is not a sufficient condition to describe a community. Actors must also share common commitments. These commitments may be based on shared interests (e.g., those interested in economic revitalization), diverse but complementary interests (e.g., health care, childcare, education), or constructively antagonistic interests (providers and consumers of goods and services). When such communities share a common environment (where they work or live) they are also referred to as communities of practice or local communities (Koch, Rancati, Grasso, & Snowdon, 1999).

There has been considerable discussion about the implications of terms used to describe these communities of practice and interest especially when they are mediated by computing and communications technologies. In their description of the De Digitale Stad (DDS) project in Amsterdam, Van den Besselaar and Beckers (1998) describe their network as a Digital City, which is simultaneously similar to and different from a local or topical community network. "The DDS does not see itself as a local community network, because the scope of the Digital City is much larger – the content is not restricted to the Amsterdam region, and the services available for everybody who wants to register. .. The DDS is also not a topical community network, as it covers a large number of different topics" (Besselaar & Beckers, 1998, p. 113). Using the metaphor of a "city" carries with it connotations from traditional cities. "As in a real city, the Digital City supports highly diverse activities and attracts people from many places outside" (Besselaar & Beckers, 1998, p. 113). However, the metaphor also carries the negative connotations associated with the economic plight of the "inner city" neighborhoods and the flight to the suburbs (Wolpert, 1999). Indeed, Shaw and Shaw (1999, p. 317) reinforce some of these concerns when they yearn for a more pastoral characterization of the community as a "village": "Of the place where everybody knows each other's name, and where people are often working with their neighbors on projects to improve their community. Many people are yearning for that kind of world to return. ... This is the notion of a village or at least is the ideal of the village." Of course, the village metaphor also has its dark side "where many neighbors have only time, information or small amounts of food to offer others – the informal flow of resources decreases when it comes to items such as skilled work, material resources, or cash" (Espinoza, 1999, p. 156).

In addition to these multiple connotations, terms such as cities and villages suggest a geographical area comprised of neighborhoods. Wellman (1999, p. xii) cautions that communities must not be equated with neighborhoods: "Communities are about social relationships, while neighborhoods are about boundaries." Hence, Wellman (1999) argues, communities are more usefully defined not in terms of space or neighborhoods, but in terms of social networks (see also Chaskin, 1997).

Castells (1996) extends the argument in his vision of a network society. The actors in these networks may be individuals, groups, associations, and/or organizations. The relationships among these actors include the flow of symbolic resources (such as communication, advice, social support, expertise), material resources (products and goods), or monetary resources (Monge & Contractor, in press). The network metaphor also dovetails well with the underlying technological infrastructure of community computing networks, though Agre (1999) points to the inherent tension between the concepts of "community" and "network" in this context.

Technologies and Community Networks

Historically, the advent of new communication technologies – the telephone, radio, television, and the Internet being recent examples - have been accompanied by considerable prognostications about their social impacts as "the ultimate transformer" for better or for worse. Utopians have waxed eloquent about the technology serving as an unalloyed blessing for the enhancement of community, while dystopians have characterized the technology as an unmitigated curse that will destroy community (Rochlin, 1997). However, the benefits of hindsight have given us an opportunity to examine historically the transient and long-term impacts of communication technologies on the fabric of communities. Scholars (e.g., Fischer, 1992; Malone & Rockart, 1991; Sproull & Kiesler, 1991) have gleaned a consistent pattern from these historical analyses. Our use of communication technologies *goes* through three stages: ***substitution, enlargement,*** and *reconfiguration*. In the first stage, ***substitution,*** the communication technology is adopted to accomplish the very same communication tasks we had done previously – albeit faster, cheaper, and perhaps more accurately. The reasons for an initial substitution effect can be found in studies that have shown that there are five factors which determine our likelihood to adopt an innovation (Rogers, 1983): (i) relative advantage of the innovation over an older product (or service), (ii) compatibility of the innovation with previous products (or services), (iii) observability of the benefits of the innovation, (iv) trialibility of the new innovation, and (v) adaptability of the new innovation. All of these factors are closely tied to the relationship the innovation has with previous ways of accomplishing a certain task. Hence it follows that for a new technology to be successfully adopted, it is at first considered as substitute for existing tasks. However, the benefits of substitution are often not sufficient to offset the investments in the technology, the training, and other Sunk costs. Hence the ability of the technology to serve as an effective substitute and the need to recover the initial investment, leads to an increase in use of the technology, thereby ushering in the second phase – ***enlargement.*** Enlargement typically manifests itself in an increased use of the technology to sustain ongoing interactions, rather than to create new links. For instance, Fischer's (1992) social history of the telephone until 1940 illustrates how Northern California communities adopted and adapted the telephone to enhance, rather than broaden, their existing Social networks. Thus enlargement serves to deepen rather than broaden existing communication network patterns. While substitution and enlargement are important milestones in the adoption of a communication technology, their impacts on society are only transient. The more enduring impacts of the technology are evidenced when the technology is used to *reconfigure* social practices. The use of new computing and communication technologies to support communities appears to be tracking this three-stage evolution pattern.

The first landmark event in the wide-scale deployment of community computing networks in the US was the creation of FreeNets. Free-Nets are "loosely organized community-based, volunteer-managed electronic network servers." (Victoria Free-Net Association 1994). They provide free dial-up access to the Internet and information about the local community (Beamish, 1999). The major impetus of FreeNets was the recognition that in order to harness the benefits of community computing networks, as a first step, the public needed low-cost (or no-cost) access to the network. Free-Nets belong to the National Public Telecomputing Network (NPTN), a nonprofit corporation established in 1989 to disseminate software and methodology for establishing community networks. It filed for bankruptcy in the fall of 1996.

The access framework continues to be an influential design imperative for community networks (Mitchell, 1999). The early notion of access (in terms of free dial-up to the servers) has now been broadened to include public access centers where hardware, software, and technical support are offered to neighborhood residents (Beamish, 1999). Further, there has also been an attempt to provide content that would motivate the use of the technology, especially by low-income groups. In particular, computer-based community networks (CNs) are not-for-profit institutions that typically provide online community information, Internet services, and user support to local residents and organizations (Beamish, 1995; Schuler, 1996). At their most vibrant, community networks develop and distribute tools such as software and computers; identify and encourage participation from community groups; provide training about use of tools and provision of information; foster a rich information space that includes email, listservs, and newsgroups; link real and virtual communities through social and information-sharing gatherings; and establish public access terminals in comfortable, neutral settings (Martin, 1997).

However, Beamish (1999, p. 363) conclndes that "in spite of their rhetoric, far too many projects have been unable to go beyond the broadcast model and still see their target group as consumers rather than as producers of information. Too many ignore the capacity of the technology to support communication. And even sites that emphasize information over communication are unable to maintain a high standard of updated information." Beamish's observations underscore the notion that the early use of community networks appears to be based on (i) a failed broadcast "publishing" model, as a ***substitute*** for traditional media like radio, TV or the newspapers and (ii) an untapped communication model as a *substitute* for the telephone, letters, or face to face conversations.

Notwithstanding the limited success of community networks to serve low-income residents, the advent of the Web has triggered several community applications in other segments of society. There have been several successful demonstrations using the Web to support community activities such as the following: (i) online interaction starting with the well-documented success of the WELL (Rheingold, 1993); (ii) access to public information repositories; (iii) access to real time information (such as highway traffic); (iv) public information kiosks (for instance, Geokiosks in a Paris suburb that citizens can use to find the local dentist); and (v) public participation and discussion in political events, such as the Internet Voices Project *to* support deliberative discussion for the 1999 mayoral elections in Philadelphia (see http://internetvoices.asc.upenn.edu/). In parallel, and often in competition with grassroots community initiatives, the past year has seen a dramatic increase in the number of city-oriented commercial web services such as City Search, Yahoo,

Microsoft's Sidewalk, and AOL's Digital Cities (Shapiro, 1999). Beamish (1999, p. 352) notes that "a fundamental difference exists between grassroots community computing initiatives that see their users as residents and neighbors and the commercial ventures that view their users as consumers and customers." The exponential use of grassroots community and commercial Web services as a substitute for traditional broadcast and communication media in these applications has demonstrated their viability in offering cheaper, faster and more accurate communication and information transfer. Further, some of these applications suggest that we are moving from the substitution to enlargement phases of community computing.

Studies ***of this*** advancing "enlargement" phase have two implications for low-income community networks. *First,* investments in these efforts have put low-income communities into an even greater disadvantage. As pointed out by James Katz in the Benton Foundation (1998, p. 5) report on low-income communities in the information age, "The information poor will become more impoverished because government bodies, community organizations, and corporations are displacing resources *from* their ordinary channels of communication on *to* the Internet." As such they have exacerbated the Digital Divide (Wolpert, 1999).

Second, studies of this enlargement of electronic communication in society indicate that these communications increasingly are used to augment rather than substitute for face to face communication. Consistent with the evolution of a technology's *use* from the substitution phase to the enlargement phase many online interactions continue to be with people who are seen in-person at work or at leisure. In fact, despite the dramatic press coverage portraying virtual worlds whose "netizens" only meet online, the overwhelming evidence From systematic studies demonstrate that most ties combine in-person with computer-mediated contact (Castells, 1996; Rheingold, 1993; Wellman & Gulia, 1999). Castells (1996, p. 363) notes that computer-mediated communication "does not substitute for other means of communicating, nor does it create new networks; it reinforces the preexisting social patterns." These fmdings imply that computer mediated communication "may he a powerful medium to reinforce the social cohesion of the cosmopolitan elite" (Castells, 1996, p. 364). In deed, elsewhere in this book, de Bruine (2000) notes that 87% of the people using public access kiosks in the city of Bristol were those who already had access to computer in their homes. Hence, these developments do not augur well for low-income communities, where the challenge is to also help individuals reconfigure (mobilize new network links) rather than to simply augment existing network ties. Thus the technology bonanza further isolates precisely those people and organizations who *are* at the heart of local development efforts: those without the resources, expertise, motivation and experience to access and make effective use of local information infrastructure (Novak & Hoffman, 1998; Schon, Sanyal, & Mitchell, 1999; U.S. Department of Commerce. 1999).

In summary, while community networks have made important strides in providing access to computer-based tools and resources for a larger proportion of low-income community members, the infrastructure has attempted with limited success to substitute for traditional means of publishing and communicating. Further, even as these networks evolve into an "enlargement" phase and experience an increase in use, the networks tend to reinforce the existing community structures rather than help low-

income residents reconfigure their networks by creating new ties that will help them mobilize their resources more effectively.

Special Challenges for Low-Income Community Networks

The critical needs of low-income residents—who in the United States typically include African-Americans, single parents, and seniors—include affordable health care and housing, crime prevention, family support and youth development. As social systems, low-income communities face distinct problems. Problem-solving is hampered because information regarding beneficial social services is fragmented, and community organizations find it difficult to share resources and coordinate their work (Dewdney and Harris, 1992; Venkatesh, 1997). In addition, a sense of isolation burdens many of our disadvantaged neighborhoods. Indeed, Rheingold (1993, p. 13) notes that the social glue that helps bind communities together are social network capital ("Who knows who?" and "Who knows who knows who?"), and knowledge capital ("Who knows what?" and "Who knows who knows what?"). Low-income communities are in dire need of tools that help provide members with this social glue. Computing and communications technologies offer the potential to support community-wide social systems by facilitating more extensive communication and coordination related to problem-solving efforts and the delivery of social services.

Hence, the unique challenge for low-income community networks is to provide an infrastructure that helps the residents realize and mobilize both their social capital and their knowledge capital (Amsden & Clarke, 1999). In what is arguably a hyperbolic observation, Resnick and King (1990) note that "There is no such thing as a poor community, Even neighborhoods without much money have substantial human resources. Often however the human resources are not appreciated or utilized, partly because people do not have information aboul one another and about what their neighborhood has to offer. For example, a family whose oil heater is broken may go cold for lack of knowledge that someone just down the block knows how to fix it." Although discussion of mobilizing human resources in low-income neighborhoods must recognize that the resources community members bring to the table are circumscribed by the opportunities they have had to develop their education levels and skills training, it points to a way that, *ceteris paribus*, communication technologies can be implemented to leverage and foster relationships among community members.

In an attempt to address this issue, Kretzmann and McKnight (1993) report the use of asset mapping to help with community renewal projects. Asset mapping is a way to identify and involve all the capabilities or capacities of a community to create community transformation, or to build community self-reliance. Asset mapping begins with a survey of capabilities in a community at three levels: (i) individual assets, which include the skills, resources, and expertise of individuals in the community, (ii) association assets, which include a list of citizen associations and non-profits and what they can accomplish, and (iii) institutional assets, which include information provided by institutions including businesses, government agencies, and city services, In addition, at all three levels, the assets mapped include not just the knowledge capital possessed by actors (i.e., the individual, associations and

institutions) within the community, but also their social capital -- that is, the relationships and partnerships among these actors.

Several projects demonstrate that the process of convening citizens for the purpose of identifymg and mapping these assets have been extremely productive. Practitioners of asset mapping chronicle several "Eureka" moments where members of a community can discover assets that they did not realize existed within the community. An example posted on the web (http://www.assetmap.com/About/about.html) illustrates this sentiment: "One of our most memorable sessions was in Virginia. Fourteen community teams were working on some preliminary asset maps, when we heard this cheer from one comer of the hall. The cheer was followed by this ecstatic yell "Wow! Yes!! We've got everything we need right here!!!" The surprise and joy was absolutely wondrous. That community will succeed because they found the treasures they need to solve their problems -- right in their community!"

But sustaining and scaling up the asset mapping process for a community entails very high coordination costs – in terms of the time and effort required by the various actors on an ongoing basis. Further, the coordination costs continue to escalate as the community begins to harvest the information gathered in the asset mapping process into the asset matching process (linking "who has what" to "who needs what" or "who knows what?" to "Who needs to know what?). Coordination theory (Malone & Crowston, 1990) suggests that there is a real and, as yet, largely untapped opportunity for information technologies to reduce coordination costs, In this case, technologies offer the opportunity to reduce the coordination costs for a community to dynamically map, update, and access its asset maps, thereby exploring and cultivating its social and knowledge capital more effectively. The remainder of this paper describes our experiences in developing and deploying such tools within Prairienet – a community network serving the Champaign-Urbana community in the midwestem USA.

Prairienet: Champaign-Urbana's Community Network

The city of Champaign-Urbana was ranked by *Newsweek* magazine (November 9, 1998, http://www.newsweek.com/nw-srv/19_98b/printed/us/bz/bz0419_1.htm) as one of the ten most wired communities in the world. It is served by a nationally recognized computer-based community network (CN) called Prairienet (http://www.prairienet.org), which develops and consolidates community information in digital formats, provides free or low-cost access to Internet services such as electronic mail and web browsing, and offers significant user outreach, training and support.

CNs like Prairienet have been heralded as promising partners in local efforts aimed at both community development and bridging the digital divide that splits use of Computer resources along socioeconomic lines (Chapman and Rhodes, 1997; Lillie; Virnoche, 1998). Information on Prairienet is organized (as it is in most CNs) following a city metaphor with information and organizations grouped into general categories, such as Health or Recreation. While a great deal of valuable local information is provided on Prairienet, the online information areas created by individuals and organizations do not typically include the kind of information that would provide answers to the questions about local problems and resources posed

above. This arrangement does not optimally support local problem-solving and resource-sharing across organizations.

PrairieKNOW: A Tool to Support Prairienet

As mentioned above, the pervasiveness of electronic communication media in communities makes it increasingly difficult for economically disadvantaged individuals and community organizations to discern their community's knowledge networks. Specifically, it is increasingly difficult for individuals and organizations to accurately determine: "Who knows who?" and "Who knows who knows who?" "Who has what?" and "Who knows who has what?" "Who is addressing which community problems?" and "Who knows who is addressing which problems'?" This difficulty presents a serious barrier to coordination and collaboration in community development efforts across local organizations. As part of the Community Networking Initiative (http://www.prairienet.org/cni), we are piloting an approach that uses networked information services to enhance community-wide collaboration. Our approach is derived from the concept of asset mapping (Kretzmann & McKnight, 1993) described above. Our pilot project is intended to develop more effective ways of identifying and mobilizing sharable assets that are currently hidden within organizations, and missing from Prairienet itself. We have developed PrairieKNOW, Prairie Knowledge Networks On the Web, to help enhance an organization's ability (http://iknow.spcomm.uiuc.eddpraiieknow), to access the community's knowledge network. PrairieKNOW, which represents a new generation of software, sometimes called "communityware," makes visible the community's tacit social and knowledge networks (Contractor, Zink, and Chan, 1997). For a multimedia overview of KNOW, see http://www.spcomm.uiuc.edu: 1000/contractor/iknowtour.ppt.

PrairieKNOW represents an innovative application that complements the existing tools and resources currently found on Prairienet and most other CNs. We have collected and loaded into PrairieKNOW asset records from about 30 community-based organizations in the local region. The asset records contain fields for the following categories of information: major programs and services offered; target audiences; community organizations worked with in the past; past community development projects; resources available to share; resources needed; and contact information. Within PrairieKNOW, users can examine the existing network relations among the various organizations in the community. For instance, they can identify those organizations that are directly and indirectly connected to one another through various community partnerships and projects. They can also examine the network of organizations that can offer or share a need for similar resources. More significantly, PrairieKNOW allows organizations in the community to visually map the network of local groups and institutions in terms of their matching resources. A screen shot from PrairieKNOW displaying the matching of these resources is show in Figure 1.

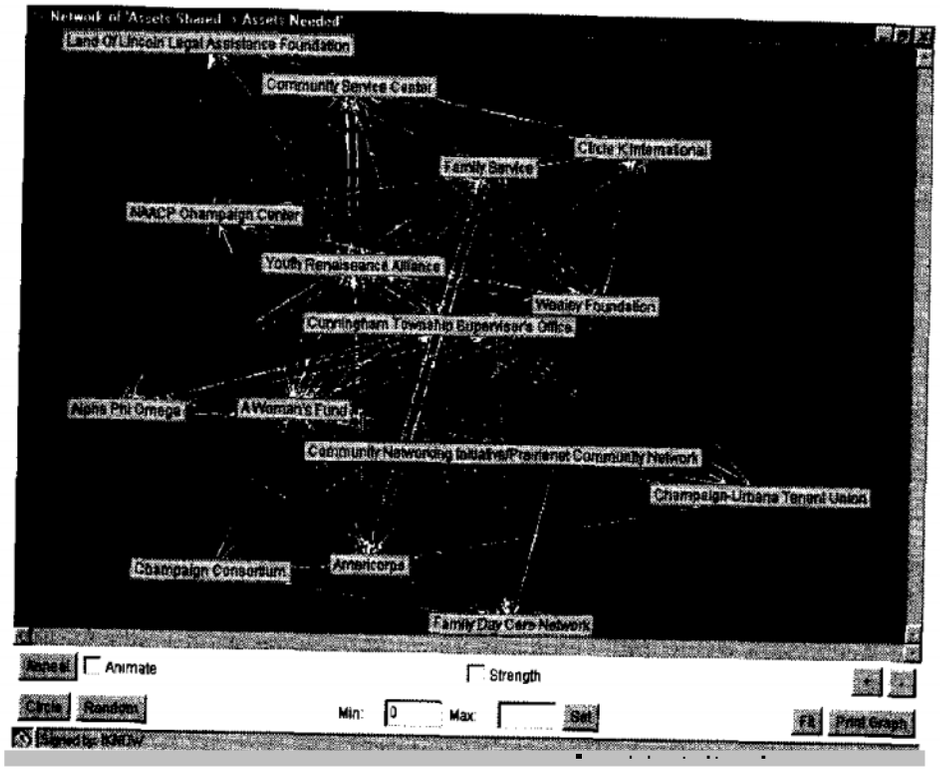

Fig. 1. Mapping and matching assets in the Prairienet community

These asset records have also been mounted directly on Prairienet in the form of simple web pages (http://www.prairienet.org/assets/). As part of our pilot project, we are exploring the strengths and weaknesses of these two technological platforms. One offers a high tech solution that allows sophisticated search, analysis, and display, but will require more advanced skills and equipment to use. The other offers a low-tech solution with minimal functionality but greater ease of use. Eventually we hope to develop an integrated solution that will make the power of PrairieKNOW readily available to all community members.

User Reactions to PrairieKNOW

In meetings attended by representatives of local community organizations, we have introduced the asset mapping concept, collected asset records, and obtained direct feedback from those who are both the creators and users of the local asset map we are developing. Organizations attending these ongoing meetings include the Urban League of Champaign County, Family Services, Senior Services, and A Woman's Place (which offers temporary shelter and social services to women and their children who are in need of emergency aid). Those attending the meetings were enthusiastic

about the potential of asset mapping to facilitate collaborations across community institutions and felt that such an application would indeed address an important information and communication need. At one meetnng, a representative from one organization noted they often have leftover food that goes to waste because they have no means to discover, quickly and easily, what other organizations might be able to use it. The representative of another organization quickly noted that they could use the leftovers, and the two people exchanged phone numbers so that, in the future, they could contact each other when food was available. This incident, with its ironic use of face to face communication to set up future contact via another traditional communication technology (the phone), demonstrates both the potential for cross-institutional resource sharing and the need for improved communication mechanisms to support it. Users also suggested enhancements that explicitly supported the asset matching process. For instance, one person suggested that the asset mapping should he augmented with an automatic alerting function to email people when a resource thev needed was posted as an available resource in the asset record of another organization.

Meeting participants also identified important issues related to the adoption of online asset mapping. Concerns were raised about 1) the inability of community organizations who lacked computers and technical skills to participate in the system; 2) the demands associated with maintaining the online asset record repository; and 3) the need to keep private that information which organizations did not want to make publicly available.

Potential of PrairieKNOW to Support the Community

There are at least four ways in which PrairieKNOW can assist creating, sustaining, and growing knowledge networks within the community. First, it provides participating organizations with a set of visual tools to inspect, identify, and critically analyze the existing and potential collaborations and partnerships among the local government and non-profit, and health organizations in the community. Second, it offers participating organizations the ability to track over time the growth characteristics of the community network (in terms of its social and knowledge capital). Third, it provides participating organizations the ability to efficiently identify other organizations represented on Prairienet who offer specific complementary or similar services. This feature is especially beneficial for organizations assembling partnerships to address specific project concerns or funding opportunities. Fourth, it provides citizens in the community the ability to identify organizations on Prairienet which offer specific services.

Potential of PrairieKNOW to Support Research

The introduction of tools such as PrairieKNOW also raises several theoretically provocative and practically relevant questions about the emergence – creation, maintenance, and dissolution – of networks in communities. Fortunately, the tools also provide us the ability to unobtrusively gather comprehensive and accurate

longitudinal data on the evolution of community knowledge networks. Specifically, it provides an opportunity to answer questions such as:

- How can tools like PrairieKNOW enhance Prairienet's ability to contribute to community-wide collaboration and problem solving? How can these old and new genres of community networking tools be most appropriately integrated, and in a manner that does not further widen the digital divide?
- What effect do tools like PrairieKNOW have on a community's power structures? Does it undermine the perceived centrality of those organizations which are currently viewed as important resources? What effect does it have on established means of cross-organizational communication and coordination?
- What configurations of community knowledge networks are more appropriate to specific types of tasks – such as planning an event versus mobilizing for a cause? To what extent are community knowledge networks reconfigurable to accommodate the community evolving needs?
- How does the use of tools such as PrairieKNOW alter the structures and growth of community knowledge networks?
- What theoretical mechanisms are most influential in "growing" a community knowledge network in terms of its size as well as the density of connections? To what extent does the initial configuration of the network influence the speed and characteristicsof its growth patterns?
- How do exchange and trust mechanisms both explain the likelihood that organizations will remain members (or drop out) of a community knowledge network, and account for which information about organizational assets members are willing to make public?
- How can tools like PrairieKNOW achieve its goals while not violating the participating organizations' privacy?
- To what extent will cultural differences in community networks *(Otani,* 1999) impact the design and utilization of communityware tools?

Theoretical and methodological advances in the field of social network analysis promise to play an important role in helping us address these questions (Monge & Contractor, 1999).

Conclusion

This paper has attempted to make the argument that, like technologies in earlier times and other contexts, the initial use of technologies to support traditional communities has followed a substitution framework. Community computing networks were used as a substitute for traditional means of broadcast and interpersonal communication. For many sectors of contemporary society, the use of the technology as a substitute has transitioned to an enlargement phase stimulated by the increase in commercial services and the increased activity among certain sectors of the community – the so-called *digerati.* However, this enlargement has further exacerbated the digital divide

between these sectors of society and the low-income community and has failed to yield direct benefits to low-income communities since it augments existing relationships rather than building new connections.

This paper has argued that in order for community computing networks to help bridge this divide, special attention must be given to tools that help to reconfigure, rather than simply substitute or enlarge the extant community networks. Reconfiguring the network serves to provide disadvantaged members of communities the opportunity to enhance and leverage their social and knowledge capital. Our initial experiences, using asset mapping as a methodology and PrairieKNOW as a tool, in the Prairienet community network indicate a high degree of demand and potential for this approach. While such tools will not compensate for other structural changes that seek to improve the condition of low-income communities, they can play a modest role in helping maximize the opportunities for the economically and socially disadvantaged within the existing structures.

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The Mutual Development of Role, Rule, and Tool Through the VCOM Project

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Abstract. Communities on the Internet have developed to the stage where they are no longer a mere "virtual existence". Though these network communities have little to do with "real society", they are nonetheless a very real existence as they have a substantial and firm effect on society. To enhance the activities of network communities, utilization of IT tools is indispensable However, design and development of community-oriented tools is not an easy task because tools should reflect the characteristics shared in the communities. which never cease to change. In this paper, we propose three aspects to characterize network communities: role, rule and tool. We will also introduce the interpenetration of these three aspects through the activities of the VCOM project, which is driven by Keio University. Finally, we discuss the indispensable characteristics of IT tools for network communities, which are regarded as having an important role to play as a real existence in the future society.

1 Network Communities: The New Method of Problem Solving

As our society is becoming more complex and more diverse, there are more business chances due to the general trend of information sharing. The trend is accompanied by the emergence of a new class of problems, which cannot be solved by the conventional approach of either government or market. Environmental problems are a typical example of this class. It seems to us that such general movements in society are making voluntarily formed "communities" more important as units of trying to tackle problems. The recent emphasis on "communities" in the Internet seems to be a reflection of this phenomenon in society. The following are some achievement of these "communities."

Many people wish to quit habitual smoking. The going success rate in Japan for a regular hospital Visit type treatment is estimated at roughly 10%. However, when a self-help group of people wishing to quit smoking was formed on the Internet, the result of the community was astonishing. More than half of the participants were reportedly successful in quitting smoking. The substance of the community is a mailing list on the Internet. This mailing list consists of hundreds of people who wish to quit smoking, some doctors, and people who hied to quit smoking in the past (and

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