

# A Trajectory for Community Networks

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**We argue that the World Wide Web, network communities, and computer-supported cooperative work have transformed the context for community networks, occasioning a reconstruction of the concept. We analyze features of proximate communities and use these as a basis for examining the design rationale for current implementations of community networks. In particular, we highlight multiple roles and relationships, social and material reciprocity, personal and institutional visibility and accountability, personal and collective efficacy, community-based institutions, and place. We use the analysis to identify directions for further study and development of community networking.**

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## RECONSTRUCTING COMMUNITY NETWORKS

Community networks support interaction among neighbors. They facilitate information dissemination, discussion, and joint activity pertaining to municipal government, public schools, civic groups, local events, community issues and concerns, commerce and economic development, and social services.

Community networking is not a new idea. In the United States, its roots are in 1970s community activism—jobs, housing, and veterans’ issues in the Berkeley Community

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Memory (Farrington & Pine, 1996), community health in the Cleveland Free Net (Beamish, 1995), and problems of the homeless in the Santa Monica Public Electronic Network (Rogers et al., 1994). Public education has also been a major focus. For example, Big Sky Telegraph supported teachers in rural Montana, linking one- and two-room schools with regional libraries, and providing computer support for the literary and artistic projects of Native Americans (Uncapher, 1999). Social activism remains a strong theme in community computing (Schuler, 1996).

The concept of community network is in need of analysis and reconstruction. The context for community networks has been transformed by the development of the World Wide Web, network communities, and computer-supported cooperative work.

## World Wide Web Digital Cities

Through the 1980s, community networks incorporated Internet services like telnet and e-mail, but remained somewhat remote and isolated as regions in the global network. In the mid-1990s, the World Wide Web was widely adopted. This improved the presentation and accessibility of community network resources, but it also transformed community networks into a kind of web site, rather than a special-purpose network. Today, community networks are densely interlinked with information resources throughout the world.

This has encouraged a new paradigm for community networks, sometimes called “digital cities.” For example, America Online’s Digital City, Inc., service (<http://digitalcity.com>) provides a standardized listings of attractions, hotels, restaurants, amusement parks, day trips and itineraries, airport information, shopping, and so forth, using generic subsystems like AOL YellowPages, MapQuest, domainia.com, Match.com, ClassifiedPlus, and coolsavings.com. This makes it easy to compare communities or to quickly find information while visiting a community. But it also makes all communities look pretty much the same.

The Digital City service also incorporates interpersonal information, including personal ads, e-mail penpal listings, chat rooms, and dating services. But interestingly, these listings do not focus on proximate communities with a preexisting identity. Instead they stretch the boundary of communities, probably in part to inflate the volume of listings. For example, our hometown of Blacksburg, VA, is bundled into something called the Central Virginia community. This is a huge geophysical region to call a “community” at all. For example, in the “local brew” discussion forum (which emphasizes meeting people in bars, and says next to nothing about beer and ale) the posting for December 10, 2002, recommends a bar in Winston-Salem, North Carolina—more than a  $2\frac{1}{2}$ -hour drive from Blacksburg.

Commercial digital cities services could undermine the original communitarian goals and values of community networks. The America Online service already demonstrates that the set of services that maximize revenue and minimize costs (and other risks) leaves out many of the touchstones of earlier community networks, such as public policy debates and political organizing. There are no links to “Citizens Against Interstate 73” from the America Online service. After two decades of complaining that there is no support for community networking, the movement faces the challenge that there is perhaps a profitable portion—and it may be harvested right out of the networks.

### Network Communities

A second motivation for analysis and reconstruction of the concept of community network is the parallel emergence of “network communities.” Network communities are communities whose interactions are mediated *primarily* by the Internet. The earliest examples are multiuser domain (MUD) gaming communities and USENET newsgroup communities of interest. As was the case for community networks, the World Wide Web occasioned an explosion of interest-based communities, but also a linguistic explosion in the use of the term “community.” Even rather meager and ephemeral social interactions on the web are sometimes referred to as community interactions.

Network communities are valuable and interesting in their own right. Indeed the exaggerated contemporary use of the term “community” is an interesting sociolinguistic phenomenon. But conflating network communities with community networks has become common, and is problematic.<sup>1</sup> Participation in these two kinds of network-mediated communities entrains quite different social protocols and consequences. A network community provides experience in trusting and cooperating with strangers. But community networks have the inverse challenge: no one is a stranger. Network communities allow people to compartmentalize and customize their interactions; they can roam

a virtual world as the Terminator, and be a cardiac nurse the next morning. But in a community network, identities and roles in the network and in the grocery store are necessarily fused.

The crisis of community, as described comprehensively and visibly by Putnam (2000), is a crisis in proximate communities. All of Putnam’s indicators pertain to local community interactions (participation in Parent–Teacher Associations, membership in bowling leagues). These local community interactions clearly have consequences for the larger society, and this is indeed Putnam’s point. But all the primary causal relationships manifest in local interactions. It is difficult to imagine how participation in network communities does or could mitigate the factors described by Putnam. Thus, if one is interested in the challenges of the crisis of community, and possibilities for technological melioration, one needs to differentiate between community networks and network communities, and indeed to focus one’s attention on the former.

### Computer-Supported Cooperative Work

Possibilities for computer-supported collaborative work (CSCW) have developed rapidly through the past two decades. E-mail and chat are still the major CSCW tools, but they are increasingly combined with voice and video conferencing, shared editing of documents, and persistent virtual environments. CSCW has raised myriad research questions about the subjective costs and benefits of collaborative interactions, about the establishment and maintenance of common ground among collaborators, and about what collaborators need to be aware of in such interactions and how to support various sorts of awareness. Many people regularly conduct some portion of their work activity using CSCW infrastructures. This has changed expectations about what is possible to achieve with networked interaction.

Twenty years ago it was a creative leap to see Vietnam War debates coexisting online with a veterans’ memorial in the Berkeley Community Memory, or to see public health information updated daily in the Cleveland Free Net. Such services could never be experienced as lively interactions again; indeed, today we refer to such data displays as publishing or posting. Many contemporary users of the Internet check e-mail several times a day, and use chat to stay in touch with colleagues throughout the day. Even when they look at a web page, they assume that they will be able to express their opinions and get feedback. In this context, community networks must become more interactive to serve as effective forums for community learning. They must support the kinds of interactions that people today find conducive to collaborative activity.

In this article, we examine defining properties of proximal communities as a touchstone for analyzing and

refining the concept of community network. We then examine community networks with respect to whether and how they support and modulate the activities of proximal communities. We summarize our findings as a set of design trade-offs. Finally, we use these trade-offs to discuss future design trajectories for community networks, with an emphasis on trajectories that might preserve and strengthen the defining properties. We illustrate how these design trajectories could be pursued through examples from two of our own current community networking projects: MOOburg, a collaborative virtual environment, and Community Sims, a design education environment.

We do not presume, or even intend, to be articulating a consensus view. Our purpose is to articulate a position that can evoke further discussion and debate.

### PROXIMATE COMMUNITIES

Traditional proximate communities are not utopias. People who live in small, relatively isolated groups really cannot afford to initiate avoidable conflicts. Their conduct is highly visible; they are highly accountable. They must deal regularly with one another, and over an extended period of time. They are mutual competitors for local resources, and yet need to rely on one another in times of crisis. Their children will associate with, and perhaps marry into, other families in the community. Their survival and posterity depend on tempering competition and conflict with cooperation.

These underlying tensions are managed through morals and behavioral norms. In a **moral community**, members share a common ethical system entailing mutual obligation; such a community is bound by commitment to a common purpose. In a **normative community**, members share rules for behavior and interpretation of behavior; such a community is bound by shared meanings. Neither of these social rubrics requires proximate location of members: Komito (1998) discusses the Mafia as an example

of a moral community, and the medical profession as an example of a normative community.

The social construction of a proximate community involves conflating the practical dependencies of living in proximity with commitments to shared purposes and meanings. This construction ennobles proximate communities in a useful way. It allows members see their own cooperative behavior as altruistic and generous, or at least moral, and not as merely defensive. Through time the model of small groups living in harmony has been pervasively romanticized, but also generalized into significant concepts like democracy (see Bellah et al., 1986; Komito, 1998; and Putnam, 2000, for further discussion).

The modern proximate community adapts this model (Table 1). Quality of life, and not survival and posterity, is the driving motivation. Members play a variety of roles in relationship to one another; for example, a given member is simultaneously a homeowner, a parent, a choir member, a policeman, a regular customer, a patient, a high school football fan, a good driver, and so forth. Each of these relationships connect the person to others through giving and receiving various kinds of social and material support. And many of these relationships are themselves nexuses of additional roles and relationships. For example, members who are parents may take an interest in school policies and administration, staff, curriculum, enrichment programs, and facilities. They may participate in a Parent–Teacher Association, attend school board meetings, run for the school board, or become an advisor of school club, an assistant coach, a science project mentor, and so forth.

A **key property** of proximate communities is that they are **small**. The mere size of proximate communities predicts many of the other properties: Members are immersed in a group and constantly encounter other members; they do not have to choose to participate, to be visible, to give and receive support, and to share cultural artifacts, rather, they would have to explicitly choose *not* to. We argue that the model of proximate communities does not

**TABLE 1**  
Defining properties of proximal communities

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- Members typically play multiple roles (home-owner, parent, choir member, policeman) and have multiple relationships to other members, making proximate communities relatively densely connected networks.
  - Members give one another social and material support in a great variety of ways.
  - Members' conduct is highly visible; they are highly accountable.
  - Members feel they can, and in fact are able to have an impact on community initiatives (they have high perceived self-efficacy within the community).
  - Members share values, episodes and traditions, mores, folkways, and experiences of current community and world events.
  - Members participate in community-based institutions that manage infrastructures and resources, play roles and carry out responsibilities, and establish and maintain relationships with other local institutions.
  - Over time, members increasingly idealize and overidentify with the place they live (via place-based memories, and cognitive consistency in interpreting past actions); there is often a community-wide shared concept of "sacred places."
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scale up, and that the **intimacy and social coherence** challenge of proximate communities is the main resource and challenge for effectively supporting them with community networks.

The relatively dense interconnection of social roles and relationships, combined with the relatively small size of communities, allows members to feel individually responsible and empowered. Members either know or know someone who knows various community leaders. When a neighborhood group organizes and takes a position to the town zoning board, the homeowners see that they have more impact by coordinating their efforts. At the same time individuals feel their participation has an impact on the management of community infrastructures and resources. This promotes perceptions of self-efficacy (Bandura, 1997) with respect to community activities and high community collective efficacy (Carroll & Reese, 2003)—residents believe that they are able to contribute to the management and improvement of their own community.

Communities maintain themselves through the establishment of institutions. These institutions are more than aggregations of current members; they are collective actors in their own right, and define the persistent social structure of the community (Laumann et al., 1978; Porpora, 1989). Examples of community institutions include schools, hospitals, municipal government, businesses, churches, and clubs. Community institutions articulate the range of the community's functions and interests, which both "institutionalizes" diversity, and broadens the foundation for community cohesion from mere similarity to mutual interdependence within a framework of shared purposes and meanings (Durkheim, 1893; Selznick, 1996).

Over time, **proximate communities develop local cultures, consisting of shared values, episodes and traditions, mores and folkways, and experiences of current community and world events.** Many of these components are associated with common activities and places in the community. Objectively, many such places are pretty ordinary: a coffee shop, a parking lot, a storefront. But members tend to idealize and overidentify with these shared places. A coffee shop where local politics is regularly discussed maintains the echoes of those discussions; the parking lot is crisscrossed by downtown shoppers and is a place for ad hoc encounters. These are experienced as "sacred places" in a modern proximal community (Hester, 1993). The places evoke memories, help members reinterpret their memories, and come to signify the values, achievements, and social richness of the community.

The ties that bind a community together—individual perceptions of contribution and self-efficacy, ability and willingness to take on multiple roles, shared values and emotional attachments—coalesce over time. They may not be articulated explicitly but rather contribute tacitly to the

social fabric of community life. Local events draw a community together, perhaps a shift in political power or a threat to the environment. These events motivate individual and group action, which in turn enhances perceptions of effectiveness and strengthens social bonds.

## COMMUNITY NETWORKS

Community networks are created to facilitate the development and management of information and activity in a proximate community. The network and the community are coextensive. Members publish web pages for, send e-mail to, and chat with essentially the same people they encounter as they shop, work, and move about in everyday activities. The motivations for and the consequences of participation in the network range from the purely pragmatic (finding current show times for movies, printing online pizza coupons) to the more communitarian (helping others learn about technology, organizing grassroots community action). In supporting these various interactions, the network becomes more than a medium. It becomes an institutional actor with relationships to other community institutions, as well as to individuals and their groups. The network becomes part of the persistent social structure of the community (see Kling & Iacono, 1989).

The features of community networks—including software and hardware, use policies, and applications—entail design trade-offs in the sense that a given feature causes both desirable and undesirable consequences for members, groups of members, and other community institutions. As an example, consider the very idea of managing community information and activity through a networking infrastructure. This feature benefits the community by providing a new channel for social interaction, thereby strengthening existing social ties throughout the community and creating opportunities for establishing new ties. By relaxing temporal constraints, that is, by allowing members to contribute to community discussions even if they cannot attend a particular meeting, it eases participation in community life and enhances critical mass.

When the Blacksburg Electronic Village (BEV) was first organized, the town of Blacksburg, VA, rallied to the shared endeavor of learning about the Internet (Carroll, 2003; Carroll & Rosson, 1996; Cohill & Kavanaugh, 1997). New social structures formed such as the BEV-news listserv, a group that included technical support staff, early adopters, and new users with varying levels of computing experience and sophistication. During the early years of the BEV, this was a very active group. Its e-mail traffic and resulting archives became an important resource for community members, not only in their efforts to become users of the community network (the original intent of the listserv), but also as an additional channel for general

social support and interaction (e.g., sharing successes or problems with community organizations).

A specific example is the online seniors group, which helped to solidify and energize a community of older adults who were beginning to associate through the town recreation programs. The BEV enabled these older adults to interact with each other and with other community members frequently and conveniently; they developed a rich set of online information and support services and quickly became role models for other organizations in the BEV. Proximate communities welcome and support diverse groups whose members continually develop and take on new roles. In the same sense, BEV extended the community with new structures, activities, and roles.

However, the very idea of managing community information and activity through a networking infrastructure also has associated downsides. For example, as the community comes to rely on a networking infrastructure to carry out its ordinary business, those who do not participate in the network become increasingly excluded from participation in their own community. This creates a digital underclass, invisible in the network because they are not a part of it. Not everyone joined the BEV; it required the purchase of a computer and networking services and new skills. One local merchant heard from friends that his services were being criticized online; he was frustrated that he was unable to even see firsthand what was being alleged or respond to it.

Other downsides are possible. In the BEV, some merchants were concerned that the network would devalue the face-to-face service they cultivated, were proud of, and enjoyed. People wonder now how the BEV has altered downtown life (Carroll & Rosson, 2001). The town of Blacksburg supported a variety of online governmental services, including a town chat, but later became overwhelmed maintaining online services and concerned that overall quality of service has been compromised. An analysis of trade-offs entailed by features in a design is sometimes called a design rationale (Moran & Carroll, 1996). Table 2 presents a (partial) design rationale for community networks, focusing on the features of managing community activity with a network, implementing web-based networks, connectivity to the Internet, and creating and maintaining community identity in the Internet.

Most community networks have embraced the World Wide Web as a framework. This leverages members' experience with other web interactions, and provides a simple and efficient model for information presentation. For example, the Blacksburg Seniors pages provide much useful information about events, classes, and other activities relevant to older citizens. However, the web-presentation paradigm also subtracts potentially beneficial aspects of information seeking. Reading the seniors' page is very different from encountering this information at the Seniors

Center in the community building. It does not reinforce or extend residents' place-based experiences and attachments. The community building is across from the high school and next to the aquatic center and a town park; these locations are also sites for community events, each of which leaves its own memories. The community building itself is used for a variety of activities and groups, some involving older adults, some their children or grandchildren. These collateral experiences are not evoked by reading a web page, yet evoking such experiences is highly desirable for the community.

The fact that the BEV is integrated with the Internet makes it easy to include pointers to a wealth of worldwide resources. For instance the local League of Women Voters chapter has a link to the web resources and publications of its national organization. This enriches the local group. But integration with the Internet also undermines the identity of the BEV. For example, some of the local business listings in the BEV are actually pointers to the holding companies who maintain franchises or branches in Blacksburg. Their connection to the Blacksburg community—at least as conveyed by the links—is marginal. It is hard to determine what is the BEV, to know whether and when one leaves or returns (Carroll & Rosson, 2001). Although BEV users now have access to a broad base of information and resources, they are less likely to encounter material that is distinctive or identifiable with the community.

The BEV's connection to the Internet has also raised new concerns about community values. Parents wondered about the consequences of children spending their after-school time in chat rooms rather than playing with friends. The community worried that children would access inappropriate content on the Internet, so BEV staff searched for services and software that could ensure a "safe" Internet experience. Teachers began to monitor student Internet use, and to instruct them in how to react to different categories of Web sites. Lurking in the background is evidence that some people who use the Internet become strongly attracted—even obsessed—with the information-rich but relatively anonymous activities that it enables (Kraut et al., 1996; Rosson, 1999). It is difficult to benefit from greater connectivity with the world, without also addressing the problems stemming from information and services posted by untrusted (perhaps even unscrupulous) individuals from outside the community.

The early days of the BEV were an exciting time. Throughout the community, time and attention were directed to creating the concepts and models, the information and services of a vibrant and forward-looking community on the Internet. The extensive mass media attention directed to the BEV in the mid-1990s intensified the sense that this was a moment in history. Considerable effort was spent to involve the whole community. For example, the town of Blacksburg initiated a grant program to help local

**TABLE 2**  
Key trade-offs in the design of community networks systems

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- Managing community information and activity through a community network provides an additional channel for social interaction (strengthening existing social ties in the community, and creating opportunities for establishing new ties); it especially supports participation by members who might otherwise be too busy to attend evening meetings (enhancing critical mass)
    - but* as the community comes to rely more on network infrastructures, those who do not participate in the network are more pervasively excluded from participating in the community at all (creating a local digital divide that impairs social ties; creating an underclass that has reduced awareness of and impact on local issues, and that receives less social support than other members)
    - but* redirecting community discourse to a web forum could undermine critical mass for synchronous/face-to-face meetings
    - but* local government, businesses, and civic organizations may not be capable of assuming the responsibility for managing such communications infrastructures
  - Web-based community networks provide flexible and convenient posting of and access to community information
    - but* reading web pages is a relatively asocial activity, invisible to other members of the community, and promotes a passive relationship between members and the community's information and activity
    - but* web-site directories of local shops, services, and organizations do not leverage or strengthen members' place-based cognition and affect
    - but* authoring and browsing web-based information are not currently universal literacy skills
  - Internet connectivity increases the value of the community network by providing access to a greater range of information resources and activities
    - but* reduces the relative proportion of local information and communication, both within the community network and in members' daily lives
    - but* may expose members to health risks associated with use of the Internet (e.g., obsessiveness and mild depression)
  - Creating a community identity in the Internet is a collaborative activity that contributes to social capital; it reinforces community self-perceptions and values by externalizing them; it may attract attention and participation from beyond the proximal community; it may even attract new residents
    - but* challenges the community to live up to its image
    - but* local government, businesses, and civic organizations may not be capable of assuming the responsibility for managing such communications infrastructures
    - but* requires design and message maintenance, potentially on a worldwide scale
    - but* significant changes in patterns of communication and cooperation in the community can entail changes in individual and institutional roles and relationships, and the emergence of new conflicts
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businesses develop their own information and services within the "Village Mall"; the public library acquired resources to guide and host the Internet sites for nonprofit organizations; the library and BEV staff combined their resources to provide Internet training to citizens on a walk-in basis.

Today, the maintenance of the town's presence on the web is a routine task, as it probably is in many communities. The university and town must continually mobilize the resources and activities that constitute the BEV, without any media coverage, and in a far poorer economic climate. This has led to a rather different development paradigm. Except for a few top-level web pages maintained by the part-time effort of a group in Virginia Tech, individuals, groups, and institutions throughout the community maintain their own information and services (Carroll & Rosson, 1996). Now, the most up-to-date sites on the BEV belong to

businesses that have their own webmasters (or that benefit from national web-site maintenance). A few community organizations have volunteers who have taken on maintenance responsibilities, but a huge number of pages are out of date. Accordingly, the top-level view of the BEV is pretty much controlled by a group of Virginia Tech employees, and much of the usable network content is developed and maintained by a small number of relatively resource-rich institutions.

Creating a community doppelganger in the Internet can entrain new challenges and opportunities for individual and institutional relationships. For example, when the BEV was initially established, any town resident who wanted to participate was invited to use the university's low-cost ISP service; a few years later, in accordance with its published BEV development plan, the university discontinued ISP support for residents not affiliated with the university.

TABLE 3

Reasoning from the positive and negative consequences of a community network design feature to generate new design directions

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Web-based community information . . .	
+ Flexible, convenient posting and access	
– Web-site directories do not leverage or strengthen a shared sense of place	→ Incorporate models of place
– Reading is asocial, invisible, and passive	→ Integrate communication channels and interactions
– Web browsing and authoring not universally accessible	→ Incorporate lifelong learning

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This led to initial dismay on the part of the newly disenfranchised residents, and a certain amount of town–gown tensions (Carroll & Rosson, 1996). However one community group, the BEV Seniors, assumed a new leadership role in the community, investigating and posting an analysis of local ISP options, and eventually assumed a permanent mission for outreach and training of senior citizens.

A current example involves the town, the public high school, and the senior center. The high school is located directly across the street from the town community center, which offers various after-school activities. When the high school wanted to add Internet access to these activities, the town offered new resources to the senior center (located in the community center building): The center would get money and technology support for a small network of computers if it allowed students to use the computer lab after school. The senior center readily agreed, but as the program was put into action, problems developed regarding the Internet sites being accessed (e.g., adult materials and chat rooms). The school complained to the town, which subsequently threatened to reduce support for the lab unless Internet-filtering software was installed (which had pervasive side effects) and unless student use of the lab was closely supervised. The new restrictions were accepted, but there is a residue of bad feeling in the seniors group.

## DESIGN DIRECTIONS

An irony of the contemporary burst of interest in community networking is that in many ways community networks are *less* interactive and *less* community oriented than they were 15 years ago. In the early 1990s, community networks were implemented as bulletin boards and newsgroups, supplemented by listservs and email. They were all about communication, albeit asynchronous communication. They were locally hosted and managed, and their content reflected local topics. Today, they are part of the global World Wide Web, sometimes managed by a web development company, and containing, via hyperlinks, a spectrum of local and external content and topics.

As we argued in our discussion of the BEV, accepting the web as a framework for community networking has

positive consequences. Yet at the same time, it brings along a number of less desirable consequences. In this section we illustrate how the developers of community network systems might work with such trade-offs. Briefly, we suggest that community networks be analyzed in terms of design features that can produce both positive and negative consequences (as in Table 2). Design rationale can be used to guide redesign, by exploring design changes that might mitigate the problematic consequences while maintaining or even enhancing the positive effects.

As an example, Table 3 summarizes the consequences discussed earlier of posting community information on the web: Although the web makes distribution and access to information very convenient, it does so at the cost of weakening the context and attachment provided by places in the community, and thereby reducing the sociality of the exchange. It also raises technology acquisition and usage barriers to participation. We suggest that such downsides can be mitigated by reconceptualizing the interaction framework and activities that constitute the network. Specifically, the sociality of community behavior might be enhanced by providing channels for communication that go beyond the exchange of information; a sense of place can be conveyed by building models of place into community network infrastructure; the potential barriers to participation might be lowered by embodying a culture of lifelong learning into the activities of the community network.

We are currently exploring a community network system that illustrates some of these new directions. MOOsburg is a Java-based collaborative virtual environment that incorporates a model of Blacksburg as a framework for all information and social interaction (Carroll et al., 2001). Although users can access arbitrary web pages through MOOsburg, all individual and group interaction takes place in an activity context that includes a map of Blacksburg, a view of a “virtual place” in the town, and a chat channel that supports conversation among people copresent in the virtual place (Figure 1).

Communities are bound together by the physical structure in which members live, do their work, and congregate for civic or social activities. The places chosen for meaningful activities are not random; they have often been



**FIG. 1.** MOOsburg community network. In the lower right is an interactive map that can be panned or zoomed to locate and navigate to virtual places. In the upper left is a view of one such space (the Natural History Museum), along with avatars representing three users currently at that place. The lower left is the chat tool for the place, and the upper right lists a number of other tools that can be used for collaboration.

designed specifically to support activities such as debate, learning, or play. Places are enriched over time with personal memories and physical artifacts related to people's activities; what is otherwise simply a physical space makes the transition to a "place" when it provides a social context for a group's activities (Harrison & Dourish, 1996). MOOsburg seeks to capitalize on these feelings of place, shifting users' attention away from the Internet and its emphasis on the world at large, back toward the proximate community.

The emphasis on depicting geophysical place in MOOsburg and its use of relatively advanced web software technologies is similar to recent digital city<sup>2</sup> projects in Europe and Japan (see Ishida, 2003, and Ishida & Isbister, 2000, for review). These projects often direct virtual environment and ubiquitous computing technologies to produce high-fidelity, Internet-based simulacra of cities, updated continuously via cameras and other sensor data—an impressive example is Digital City Kyoto (Ishida, 2002;

<http://www.digitalcity.gr.jp/>). Like many technology projects, these efforts address a wide range of goals, spanning technology development, new information services and applications, and support for community life. However, such a broad agenda entails trade-offs; as Aurigi (2000) observes, these projects often do not support broad participation and collaboration.

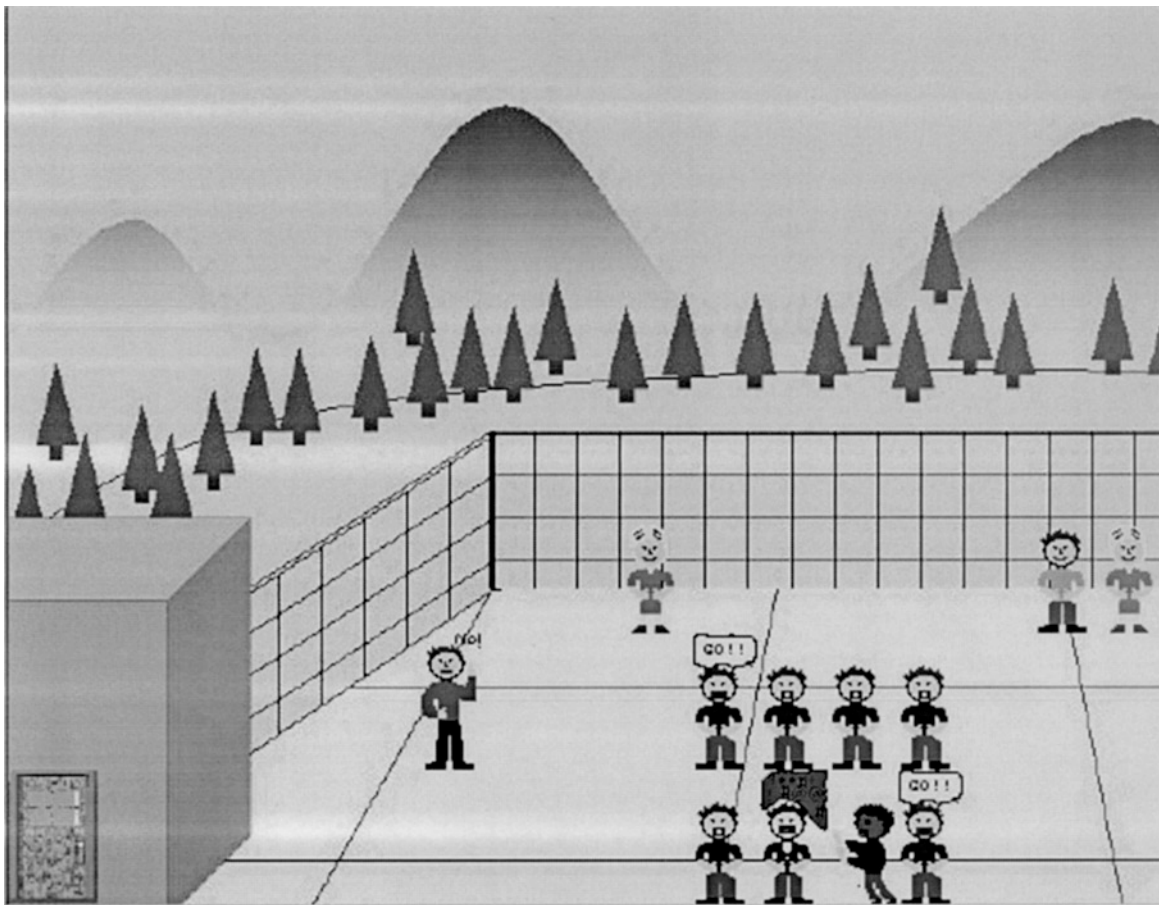
MOOsburg emphasizes communication and collaboration, rather than mere information dissemination. When people browse information on the Web, they do it alone; a separate set of tools such as chat rooms and newsgroups is used to support communication. But in a proximate community, information exchange is often a social activity itself, for example, when people attend a lecture, or ask their neighbors for an update on the zoning debate. These informal and opportunistic encounters help to build the knowledge and social context that guides more specific, goal-oriented activities (e.g., writing a letter to the newspaper). MOOsburg seeks to support a similar style of

ad hoc interaction by displaying an avatar of everyone “at” a place, by identifying visitors by name, and by providing a constantly open chat channel, as well as a variety of other synchronous communication tools (e.g., shared whiteboards and editors). Problems of critical mass are addressed with tools for asynchronous information and message exchange.

One way that proximate communities sustain their energy and social capital is by providing opportunities for personal growth and development. Thus, anyone can show up at a PTA meeting and develop their leadership talents. Community organizations develop their members’ skills by engaging them in active, construction-oriented efforts: people work together to agree on a position, create a zoning plan, rehearse and perform a choral selection. The BEV-news listserv in the early days of the BEV was an example of this. Community networks can provide continuing opportunities for training, learning, and development through active exploration and negotiation of different technology and policy possibilities. MOOsburg allows users to

design different network behavior in different online spaces. For example, senior citizens could establish one space for after-school student use (i.e., with appropriate web filtering), but maintain more open access policies in other spaces. MOOsburg opens possibilities of more interactive community collaborations to members of the Blacksburg community.

The CommunitySims project is exploring the role of construction-oriented activities in a community network context. Residents use the Stagecast Creator tool (Smith, Cypher, & Tesler, 2000) as a medium for community design and programming of visual simulations that depict local issues or episodes (e.g., a schoolyard fight, Figure 2). The simulations evoke meaningful community discussion among students and adults, while at the same time providing a motivating activity for community members to learn visual programming and design. As simulations are produced, the community network is extended with town-specific content, reinforcing the sense of place and shared concerns. The people who work on or discuss the



**FIG. 2.** Stagecast Creator simulation of a schoolyard fight at the middle school. The two boys in the bottom center become progressively more angry and aggressive, as they are heckled by the onlookers. At some point, a teacher may arrive (the figure in the middle left) and stop the fight.

simulations contribute to the community's social capital. At the same time they enhance their computer literacy, making them more able to participate in other community network initiatives.

Although the CommunitySims project is designed to enhance the skills and awareness of individuals within our community, these simulation projects can be used to raise and reinforce the roles and responsibilities of community groups. For example, in one workshop, middle school teachers and senior citizens collaborated on simulation designs (Rosson et al., 2002). The teachers were oriented toward the educational mission of the school system, while the senior citizens shared a range of personal concerns about the community. The result was a mixture of simulations that communicated school issues (e.g., flirting or bullying at the middle school) and town management (e.g., noise pollution, voter education and registration). The simulations and associated discussions can be posted at appropriate locations throughout the virtual town infrastructure provided by MOOsburg (e.g., the school, a student residential neighborhood).

We have discussed how community networks could address some of the undesirable consequences of web-based information by incorporating models of place, collaboration, lifelong learning, and collective and interinstitutional problem-solving. Table 4 summarizes these propos-

als as design principles (along with two further principles that follow from our analysis of proximal communities, Table 1).

One consequence of a place-based community network is that people may be better able to recognize and exhibit appropriate roles and responsibilities. In a proximate community one does this without even thinking, acting as "concerned parent" when attending a PTA meeting, "informed consumer" at a gas station, and "mom" on arrival back at home. It is the social context provided by the place that evokes and reinforces these roles. The physical boundaries of the real world act as a sort of social mode switch, so that individuals can implicitly track which role and associated responsibilities are currently in play. MOOsburg approximates these effects with its emphasis on place. This may help to reinforce community-appropriate behavior. Contrast, for example, a teenager who visits a web chat room while inside his own MOOsburg "house," with linking to it from the generic and anonymous context of a web browser.

Finally, a foundation of shared places and social exchange ensures that the community network will be unique in structure and content. Web information hierarchies are designed to be generic, decomposing and organizing town and city information along standard dimensions. In contrast, MOOsburg emphasizes the uniqueness of the community by highlighting a map of its place. The spaces

**TABLE 4**  
Six general design principles for community networks

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- *Community networks should incorporate and leverage models of place.* This might, for example, involve navigation of community information spaces by interactive maps instead of hierarchical directories. This would better exploit members' prior knowledge as well as their affect for community places. Community networks could help people articulate their feelings for places.
  - *Community networks should better integrate communication channels to enhance critical mass.* This includes synchronous and asynchronous communication channels as well as face-to-face and remote interactions. Everyone attending a meeting should count and be visible (in some sense) to everyone else attending the meeting—including those who attended before or after the event. This would help make meetings more valid, attractive, and effective.
  - *Community networks should incorporate a model of lifelong learning.* The network's architecture and services should attract its members to network-based activities as well as informal learning more generally. Community networks can become environments for continuing education, particularly for education and training in information technology (e.g., web programming). Universal access to programming skills is required for a sophisticated implementation of community networks, and benefits society more broadly by upgrading workforce skills for underemployed adults.
  - *Community networks should enhance communication and problem solving among community institutions.* The network should support evolution of the community's social structure; the network should facilitate awareness throughout the community of conflicting issues and agendas, clearly articulating its own stake. It should host multiple solutions, and should reify progress toward consensus.
  - *Community networks should support members' multiple roles and relationships to other members.* For example, members might be able to configure (or automatically configure through their activity) a map of their social relationships or shared resources to use in navigating the community network; community institutions should be able to specify their own usage policies or rules.
  - *Community networks should support the articulation of shared values and knowledge.* This may include community episodes and traditions, mores, folkways, and experiences of current events.
-

built within MOOsburg can be customized to support the needs of organizations with diverse usage expectations and policies. Many of the MOOsburg underlying services are generic, but the presentation emphasizes their unique combination. Just as Blacksburg's cafés and bookstores add color and history to our real world activities, the places of MOOsburg will organize and contextualize our online activities.

We intend the design principles in Table 4 as a partial model for community networks. We do not expect that these principles exhaust what there is to learn about community networks, even at the most general level. Rather, the principles are just an endpoint for the present investigation. We also do not expect that design principles for community networks can only be stated at this most general level. To some extent, each community network must uniquely reflect the community from which it arises, the resources, needs, interests, values, places, and institutions of *that* community (for further discussion and exemplification of the relationship between design rationales and design principles, see Carroll, 2000).

## DISCUSSION

Community networks should be reconstructed in view of major transformations in the context of community computing, namely, the development of the Internet and digital cities, network communities, and computer-supported cooperative work. We have employed design rationale to identify the underlying relations that constitute networks as supporting infrastructure for proximate communities (Table 1). We identified a set of central issues and trade-off positions in the design rationale for community networks (Table 2). From this design rationale, we projected a set of principles that could guide the developmental trajectory of community networking in the future (Table 3). Doing this helps address the issues that motivated our investigation.

The people, places, and activities of each community are unique. Nevertheless, they can be associated with categories and scripts; they can be simplified as stereotypes. This insight is a key to developing a commercial digital cities service: To some extent, at least, one size *can* fit all. From this standpoint, digital cities services are a reasonable commercial codification of the some of the simpler features of the community networks of the past two decades. Consider the analogy of (telephone) Yellow Pages: Creating a Yellow Pages for one's community might plausibly have been a community-building project at some time in the past. Members would cooperate, build something together, learn things, collectively benefit, and so forth. However, having done it once, the potential of such an activity for collective development is drastically reduced. Moreover, there are good reasons to have a standard Yellow Pages design for all communities. A

better model is to have the telephone company manage the Yellow Pages.

A deeper analysis of community networks reveals some of what cannot be generalized or franchised, and what therefore must remain in the content and services of one-off community networks. These noncommodity features include the unique personalities and particular activities of identified individuals and specific groups, details of geography and architecture, and the myriad ways the community leverages and adapts its activities and places. This is how cafés and parking lots become sacred places. Signature patterns of interaction can imbue very ordinary events with greater significance. Thus, the absence of an elderly choir member is important if she rarely misses a practice. Our conjecture is that the unique identity of a community's places, with the people and activity that inhabit those places, is part of the ungeneralizable content of a community network.

This tension is evident in the evolution of community networks. Two of the major thrusts in the early Blacksburg Electronic Village project were to help members get connected to the Internet, and to facilitate participation by local businesses and organizations people. These goals were typical and appropriate for community networks in the mid-1990s: The Internet was becoming a standard information infrastructure, and many individuals and small businesses needed help. Providing this help was a community-building project that many people were passionate about. But this period of transition is largely over. What is most striking about listings of local businesses and organizations in community networks today is that they are often woefully out of date: Routine maintenance isn't being performed well. It may make sense to have commercial Internet service providers do this job.<sup>3</sup>

Supporting the unique people, places, and activities of a community distinguishes community networking from network communities. For example, cancer patients anywhere in the world might benefit from participation in an alt.support newsgroup. But in community network, an e-mail about cancer is coupled with a visit, a phone call, or some other contact. The former is a supportive and/or informative interaction about cancer, but the latter is an interaction between people, and specifically between people who share the special intimacy of membership in a proximate community.

In one of our projects in the Blacksburg Electronic Village, we created a community history forum in which people could post stories about Blacksburg in the 1960s (Carroll et al., 1999). Our initial motivation was to capture and preserve personal recollections of the town's elders. We were surprised that several of the active participants in this project were people who were not residents of Blacksburg, but had been formerly. One of them described how the stories were very evocative for her—she no longer

had access to the physical places to which the stories referred. This is an interesting case because it emphasizes that distinction between a community network and network community is not necessarily a matter of the current distance between interlocutors as it is a matter of the place-based knowledge and experiences they share.

In our MOOsburg work we are exploring a strong position with respect to concretely representing and supporting the people, places and activities of a community. We conjecture that vivid rendering of a community can add definition to places that physically are somewhat vague. A typical case of proximate community nowadays is a vaguely bounded neighborhood in a vast surround of city or suburb. In such a case, emphasizing the community's place might help to strengthen community identity, as much as leverage it. Some network communities have a place-based foundation, for example, the text-based MediaMOO, a professional community of interest, that modeled the MIT Media Lab and the Apple Advanced Technology Group laboratory (e.g. Bruckman & Resnick, 1995; see also Cherny, 1995). It would be interesting to study a MOOsburg-like rendering of such network communities.

Future community networks will emphasize computer-supported collaborative activity, not just information dissemination and asynchronous discussion. Whether this means that community networks merely ought to incorporate "town chat" services or whether more pervasive and integrated developments like MOOsburg are appropriate remains to be seen. For example, many education initiatives are underway to address the challenge of developing an information technology workforce. Most approaches involve formal education, for example, expanding and better utilizing university programs in computer science, or providing university extension or community college programs. It is clearly important to increase the capacity and accessibility of such programs. However, formal education is frequently inaccessible to adult learners in a sense more profound than the mere availability of classroom seats. Adult learners are not engaged effectively by the "learning for learning's sake" orientation of formal education. For adults it is critically important to learn new skills in a meaningful context in which real goals are pursued and achieved in the course of the learning (Knowles, 1973; Carroll, 1990). This train challenge is a special case of the "digital divide": the chasm between those who have access to technology and the skills to use it, and those who do not.

Informal, community-based activities can complement formal approaches to the training challenge of an information technology workforce. Persons not in the workforce may still be active and engaged members of their community. Indeed, homemakers and retired people are typically *more* engaged in community development activities than the fully employed, who often work outside the community. People with existing and active commitments

to their communities may find it more meaningful to learn about web programming, for example, by helping to create a web application for a community service organization, than by attending an intensive programming class. What we know about adult learners suggests that this would indeed be the case. In this approach, community groups inspire and assist one another in learning about, utilizing, and developing skills for advanced information technology tools and resources. The learning is project-based, peer-oriented, and collaborative. It depends on and requires *local* facilitation.

We believe that sharpening the concept and trajectory of community networks will lead to new possibilities for developing and utilizing community computing. Our program is to better analyze and differentiate community networking with respect to other concepts and paradigms in order to simultaneously focus and enrich community computing and complement and leverage other concepts and paradigms.

## NOTES

1. This can be traced to Rheingold's (1993) important book. For Rheingold, any community that employs interaction mediated by networks is a virtual community. Community networks and network communities are just different types of virtual communities.

2. Terminology is highly problematic in this literature. European and Japanese researchers often call their projects "digital cities," but these are quite distinct from AOL Digital Cities. In particular, they are not "community information" franchises, which is the particular aspect of AOL Digital Cities we emphasize in this article.

3. There still is a challenge of getting everyone connected, but today it is not an issue of access for the middle class. It is an issue of access for the poor, the homeless, the disabled, and people otherwise disadvantaged. Getting these people connected is not something that digital cities are going to do. Indeed, this contrast helps to clarify the distinction between the civic sector purview of community networks, and the commercial role of digital cities services.

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