# Sustaining Civic Networks:
# A Blueprint for Community Use of Technology

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## Why a community-owned network?

Over a long period of time, we have come to understand that there are certain resources that must be managed for the public good, like water and sanitary sewer systems, roads, libraries, and parks. Can anyone imagine a situation where all the roads in a community are owned by a single corporation? When we talk about the information highway, this is indeed the situation we have today--in most communities, one or two companies (typically the telephone company and the cable television company) have monopoly control over the digital roads in the community.

If a single company owned all the roads, it could erect toll gates wherever it liked, leading to a situation where citizens might have to pay fees simply to gain the right to drive from one side of town to the other. This situation exists today; telecommunications companies, despite the fact that they are regulated, have great flexibility in adjusting prices and access to suit their corporate needs rather than local community needs.

If communities are to prosper in the Information Economy, they must control at least some of the information roads in their region. This means that communities must invest in publicly-owned telecommunications infrastructure (ideally, dark fiber) that can be leased on a first-come, first-serve basis by both the public and private sector, just as towns today build roads and then allow equal access and use of those roads by public and private users.

On a more practical level, it makes no sense at all to have five different telecommunications build five separate, privately owned and privately controlled roads to each home in a community. Yet this is the situation we have today. For a long time, through the monopoly granted to phone companies, we had just one company providing telecommunications services to homes. About twenty years ago, as cable television (CATV) became more popular, property owners had a second company building an information road to homes and apartments.

But thanks to deregulation, communities now face the prospect of multiple phone companies, multiple CATV companies, and potentially other telecommunications providers all building and installing private networks. Communities will have no choice but to allow these companies to tear up city streets, rip up lawns, and wreak general havoc on the infrastructure of the community. In Blacksburg recently, two poorly trained operators hired to install a new telecomm cable used a very expensive and complex boring machine to (accidentally) sever electric power to several hundred homes for a nearly a whole day. After severing the cable, the two operators disappeared, delaying repairs until late into the night.

Unintended costs like accidental cable breaks, coupled with the direct costs of providing several networks for consumers only able or interested in using one or two at a time, will create higher costs of everyone using telecommunications services. Additionally, communities need to have public spaces in cyberspace free of advertising for community groups and meetings, for local government use, and general citizen use.

# What is a community network?

Wagner and Kubicek [1] offer this set of criteria for a community network:

> *Community networks....are run by and for the local community, are to serve a clearly defined geographic region, are to address the needs of day-to-day life, are to represent local culture and strengthen the cohesion of the local community, are provided at no or little cost.*

The Association For Community Networks (AFCN) [2] offers another definition:

> *Community networking occurs when people get together to solve a problem or respond to an opportunity. A community network is a community owned and operated information and communication service that can amplify and support community networking.*

A community network is owned by the community. It is not owned by a single company or a single individual. For profit commercial ventures that rely on advertising revenue, ticket sales, or click-thru fees are not community networks, despite claims to the contrary.

# Components of a network

A source of great confusion is just what comprises a network. When asked, most people assume that technology and computers are the primary pieces of a network. Note that in the AFCN definition above, technology is not referenced at all. The technology used to create community networks changes over time. For thousands of years, human have used community networks that relied solely on word of mouth.

Today, community networks have four components.

- **People** are the key component of any network. If people are not actively using a network to accomplish tasks (civic, business, personal), there is little point in having a network. Networks connect people to one another, and this is the only reason to have a network.

- **Content** consists of data and information created by the people using the network and accessed by other people on the network. Content takes all shapes and forms. Information sent by an email is an example of one of the most common kinds of content; the information found in a Web page is another example.
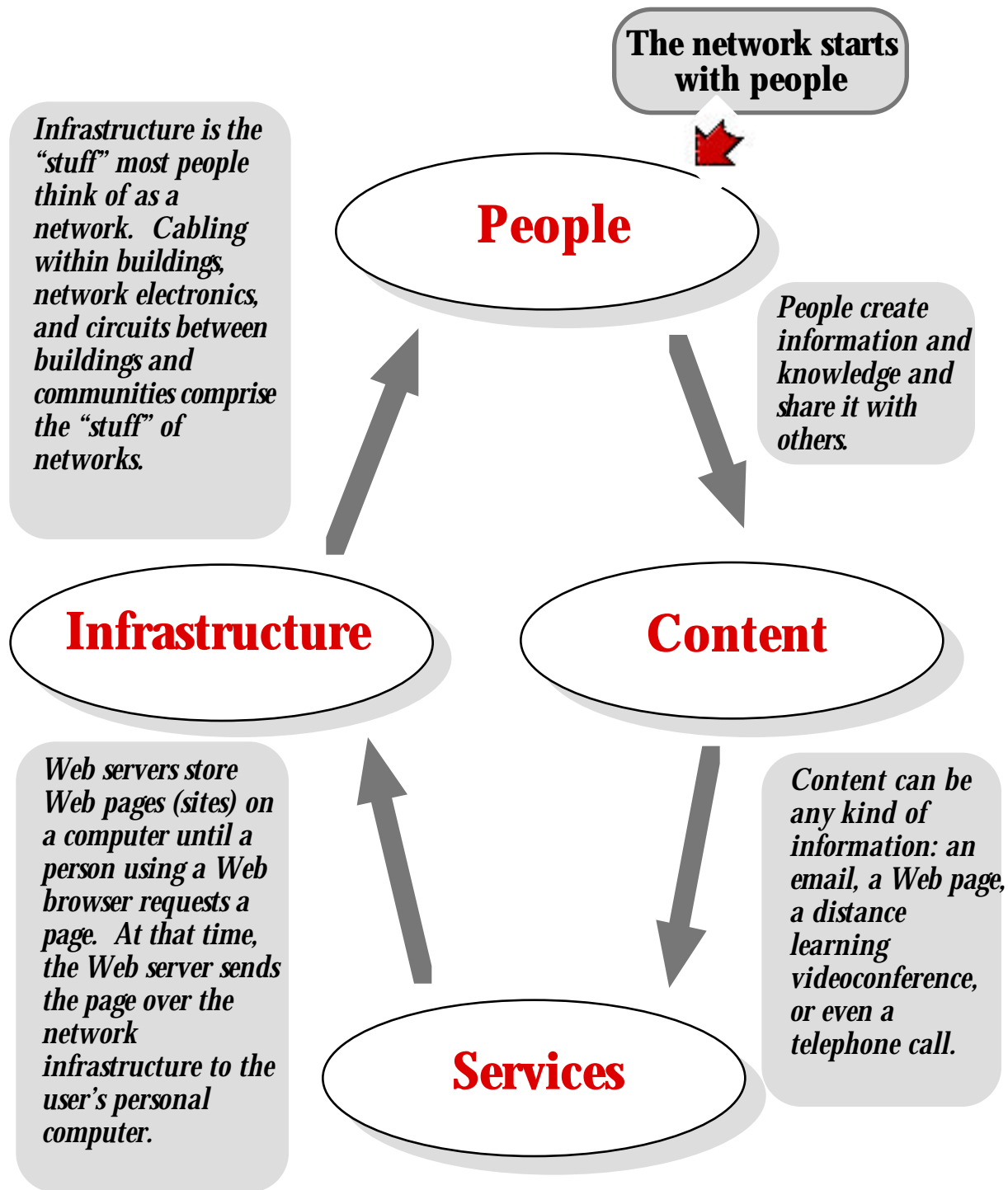
**The network starts with people**

**People**

*Infrastructure is the "stuff" most people think of as a network. Cabling within buildings, network electronics, and circuits between buildings and communities comprise the "stuff" of networks.*

*People create information and knowledge and share it with others.*

**Infrastructure**

**Content**

*Web servers store Web pages (sites) on a computer until a person using a Web browser requests a page. At that time, the Web server sends the page over the network infrastructure to the user's personal computer.*

*Content can be any kind of information: an email, a Web page, a distance learning videoconference, or even a telephone call.*

**Services**

**Figure 1: Components of a network**

- **Services** enable the flow of content. An email server and a Web server are examples of information services. Servers require both hardware and software to work.

- **Infrastructure** is the cables and network electronics required by services to transfer content among people. The cable and electronics is what most people think of when one mentions the word "network."

All four components are necessary to have a useful network, but note that infrastructure, the "stuff" of networks, is one part of a larger system.

# Key roles of community networks

There are five key roles played by community networks, as illustrated in Figure 2.

- Create and maintain public spaces in cyberspace.

- Provide training and skills development needed in the Knowledge Democracy.

- Provide the community with economic development initiatives focused on the Information Economy.

- Develop a community-owned telecommunications infrastructure to support the Information Economy.

- Community-based information technology consulting and information resource.

Communities need public spaces in cyberspace; community networks create those spaces. These public spaces in cyberspace support local government, local civic groups (e.g. arts groups, church groups, volunteer organizations, children's groups like the Girl Scouts, and many other civic and citizen-led groups). In many communities, there is great reluctance from local political leaders to get involved in supporting the need for these new public spaces. Our political leaders are frequently the least likely people to make full use of these new technologies, and they are projecting their own discomfort with the network onto the community at large.

# Public spaces in cyberspace

Communities can be large or small, public or private, civic or commercial. All of them need the same kind of services if all members are going to communicate and collaborate effectively. Network services create the public spaces in cyberspace that communities need to support collaboration, opportunity, and transformation.
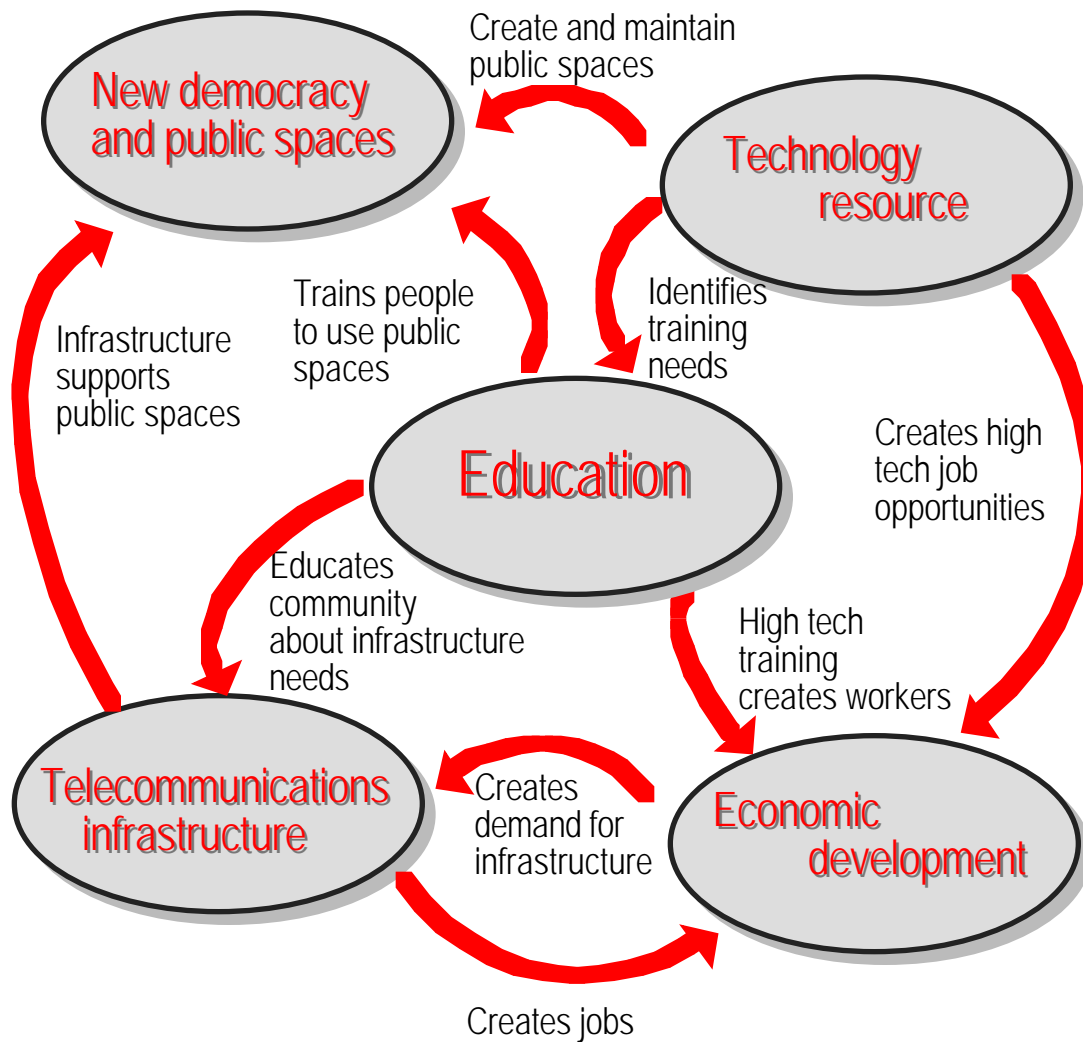
**Figure 2: Community network roles**

- Every person in the community should have an electronic mailbox (email address) regardless of their ability to pay.

- Every community should support a common electronic mail address space for every person in the community, without regard to how each person accesses the network. This can be accomplished with a community mail forwarding service.

- Every person in the community should have affordable access to the network through private and/or non-profit access providers.

- Local libraries should be supported as a partner in any community network to provide network access for those who do not have network access at home, and as a source of and access point for network-based information.

- Every community should support a common authentication mechanism (validating a person's identity) that can be used equally by both public agencies and private businesses to facilitate electronic voting and referendums, electronic commerce, and to simplify access to services.

- Every community should support a public, online directory of email and Web site addresses of all personal, non-profit, community, and businesses entities.

- Every community should support wide use of mailing lists to facilitate discussions on any and all topics of interest to the community, especially local government issues, public education, and to facilitate the work of civic groups.

- Every community should support a World Wide Web server as a community information publishing resource in cyberspace for local civic, non-profit, and government activities.

- Every community should support local Usenet server and news groups to facilitate a "town commons" where people can meet to discuss issues of interest asynchronously and to facilitate discussion and local commerce.

- Every community should support online conference facilities to support moderated asynchronous meetings and civic discussions.

- Every community should support a community historybase [4] to help document and preserve an online, archival record of important community activities and events.

- Every community should have a public access multimedia broadcasting system based on the Internet.

There is also great pressure on political leaders from the private sector to "leave everything to us." This is no more appropriate than it would be to leave fire protection or community recreation programs to the private sector.

# Training and skills development for the knowledge democracy

Ray Connor, a Member of Parliament in Queensland, Australia, has identified [5] the knowledge democracy as a key issue to be addressed by community networks. Connor notes that once communities, regions, and countries have addressed basic human rights issues as identified by the United Nations, the key issues that must be addressed are:

- Increasing knowledge
- Dissemination of knowledge must be democratic

The Digital divide is NOT about who owns computers and who does not. Owning a computer and having Internet access in the home does not automatically enable a person to find a better job, become more involved in the community, or to take a more active role in civic affairs. Connor notes that as the cost of computers continues to fall and more homes have computers, the real issues will begin to emerge:

- Knowledge Have/ Have nots
- Skill Have/ Have nots

In Connor's vision of the knowledge democracy, communities that are serious about solving the digital divide will focus less on acquiring "stuff" (i.e. buying computers) and focus more on comprehensive training programs at all levels, including K12 schools, higher education, and adult education. In the knowledge democracy, one's level of participation will based heavily on one's ability to acquire information, turn that information into knowledge, and use that knowledge to improve one's own socioeconomic situation or that of the community.

It is important to remember that humans create and use knowledge, not computers or networks. Digital information systems store and manipulate data and information, but these systems cannot create knowledge--that is a uniquely human ability.

Community networks can play a key role in solving the digital divide problem by identifying new skills needed, developing training and learning programs, and delivering training to the community.

At a higher level, community networks can also play a key role in educating our political leaders, our business people, and our traditional educators (e.g. K12 teachers) about how to adapt and extend existing community systems in this time of change. Connor lists a series of questions that communities must be prepared to discuss openly:

- The changing rights to information (who owns information and who can distribute it?)

- The right to communication as basic principle of citizenship

- Privacy issues, especially as they relate to personal information and the needs of the community for open communication

- Who should own telecommunications infrastructure, and how communities can ensure a sustainable future by prudent investment

- Knowledge vs. Information and the ability of citizens to transform information to knowledge

# Economic development for the Information Economy

In the manufacturing economy that has dominated the 20th century, the focus was on creating a certain profile or set of services that communities could offer to businesses interested in relocation or expansion. The services that Information Economy businesses want and expect has changed, and the community

network can play an important role in the community as a catalyst for new and enhanced economic development.

Information Economy businesses need different kinds of buildings, need different kinds of infrastructure systems, and need different kinds of workers. Community networks can work with economic developers to design new "Internet ready" office buildings, redesign existing buildings, develop and manage new public telecommunications infrastructure needed to support ecommerce, and train the information workers.

# Infrastructure development for the Information Economy

For much of the 20th century, communities invested heavily in public infrastructure improvements like highways, water, and sewer systems. It was considered essential to do so to attract businesses and to create a community conducive to business.

The roads of the 21st century are made of fiber, and communities that wish to prosper must maintain some control over those roads by investing in a community-owned telecommunications infrastructure. Just as communities build roads for the common good today but allow everyone in the community to use them, including businesses, in the future, communities will build fiber systems throughout the community and lease that (dark) fiber to anyone individual or business that wishes to deliver services to the community.

It would make little sense to have five different road companies building special purpose roads to each citizen's home in the community (one road to deliver groceries, one road to deliver heating oil, another road to deliver clothing, etc). It makes even less sense to have multiple companies building multiple information roads to homes and businesses, duplicating virtually identical infrastructures several times over, raising the costs of access to information, and creating negative long term impacts on the community (homes, yards, and streets damaged by constant cable plant construction projects).

The networks that will tie communities together will not be created entirely by the private sector, and should not be created entirely by the public sector. Partnerships between public and private sector will be the most efficient and effective way of addressing the need for better infrastructure and high speed local bandwidth.

These public/private partnerships will be most important in rural areas of the world, where large telecommunications conglomerates will have little or no incentive to upgrade local facilities to provide high bandwidth.

Private industry is good at managing resources with a short life like network electronics, and local governments are good at managing stable infrastructure with a long life, like fiber. If local governments invest in the development and deployment of community fiber and conduit and lease it out to local entrepreneurial firms on a first come, first serve basis, we will leverage the strengths of both. Jobs will be created in the private sector to implement services on these local, leased fibers. More taxes will be collected from these new businesses, and part of those tax dollars can be re-invested in buying and deploying more fiber until there is fiber in every home in the community.

Local governments undertake public infrastructure projects in many areas--recreation, public safety, roads, water, and sewer, as examples. We need to begin the dialogue that will lead communities to support community networks as a public resources that is managed jointly by public and private partners, for the public good. If we can finance, build, and support swimming pools with public dollars (which are used by a small part of the community), we can certainly support these new communications tools which will be used by every member of the community.

# Community IT resource

An additional need for community networks has arisen because of the worldwide demand for information technology (IT) workers. High wages and high demand in the private sector has made it extremely difficult for public sector and non-profit organizations to hire and retain qualified IT staff that can provide these organizations with the information tools they need to reduce costs and offer services. By aggregating demand among non-profits and local government, the community network can offer high quality IT consulting services at lower costs and with better results than any single organization could afford on its own.

Community networks can provide assistance in the following areas:

- Provision of Internet services -- email, Web services, database publishing, conference systems, etc

- System configuration administration -- Specify and/or administer computer systems (e.g. it is much cheaper to manage one large mail server than several small ones)

- Information systems design -- Provide technical professional staff on a consulting basis to analyze organizational information needs, develop high level IT strategic plans; design, develop, and implement information systems.

- Network design and administration -- design, specify, and manage local and wide area networks

- Personnel management -- assist with writing job specifications; provide expertise during the hiring process (writing job advertisements, review applications, participate in interviews)

# Community goals in the 21st century

What communities will want and need in the 21st century, is, I think, quite simple, and involve values and goals that we have understood as important for a very long time.

**Communities need freedom.**
Individual members of a community must be free to pursue economic, political, and personal freedom.

**Communities need collaboration.**
If communities are to solve the ever more complex social, political, and global economic problems we all

face, communities must learn to communicate effectively to solve local problems. If we can do this, I believe we will also be able to solve many difficult national and international problems. Meaningful collaboration among communities groups with differing opinions can ultimately lead to real consensus on how to solve problems in ways that really involve the entire community.

**Communities need prosperity**
We see the effects of unsustainable growth worldwide. We must develop, by consensus, ways of supporting the economic and financial freedom of individuals and corporations while respecting our natural resources and using them in ways that ensure generational sustainability. The end goal should not be growth--growth is simply not sustainable over the long term, and calling growth "smart" or "sustainable" uses sophistry to conceal the damaging effects of growth. I think what we really want for our communities is prosperity--the idea that all in the community enjoy the fruits of sensible economic development.

**Communities need history**
Communities must respect their individual and collective pasts, remember the work of their parents and elders, and preserve their memories and their work for our children. A community without history is a community without heart.

# Community transformation using the Napa Tetrahedron
The Napa Tetrahedron, developed by Framework For The Future working group in 1997 [6], offers a three dimensional model in which to discuss the goals and activities a community must undertake to meet the telecommunications challenges of the 21st century. The Napa Tetrahedron is illustrated in Figures 3 and 4.

**Generational sustainability**
The goals (or cornerstones) support the tetrahedron. If even one cornerstone is missing, the tetrahedron collapses. In the community, the long term goal is Generational sustainability--that is, the ability of the community to create a healthy, prosperous living environment that can be passed on to the next generation (our children).

When considering community networks, the bridge between Generational sustainability and the Common good is Investment. Communities must invest in telecommunications infrastructure on behalf of the Common good to achieve long sustainability of the community in the new Information Economy. Communities that fail to invest will not prosper in the long term. Infrastructure investment in telecommunications is a new idea for communities that will require Transformation in community thinking. Learning and Collaboration between the public and the private sector will be required. As sustainability becomes a common goal, Wisdom about how to adapt, change, and maintain new community structures will accrue.

**Transformation**
Transformation of the way a community communicates, using new technologies like the Internet, will create Individual opportunity (allowing individuals in the community to prosper), but Governance will balance those opportunities with the Common Good. Leaving all telecommunications infrastructure development to the private sector may enrich some businesses and business owners in the community (or
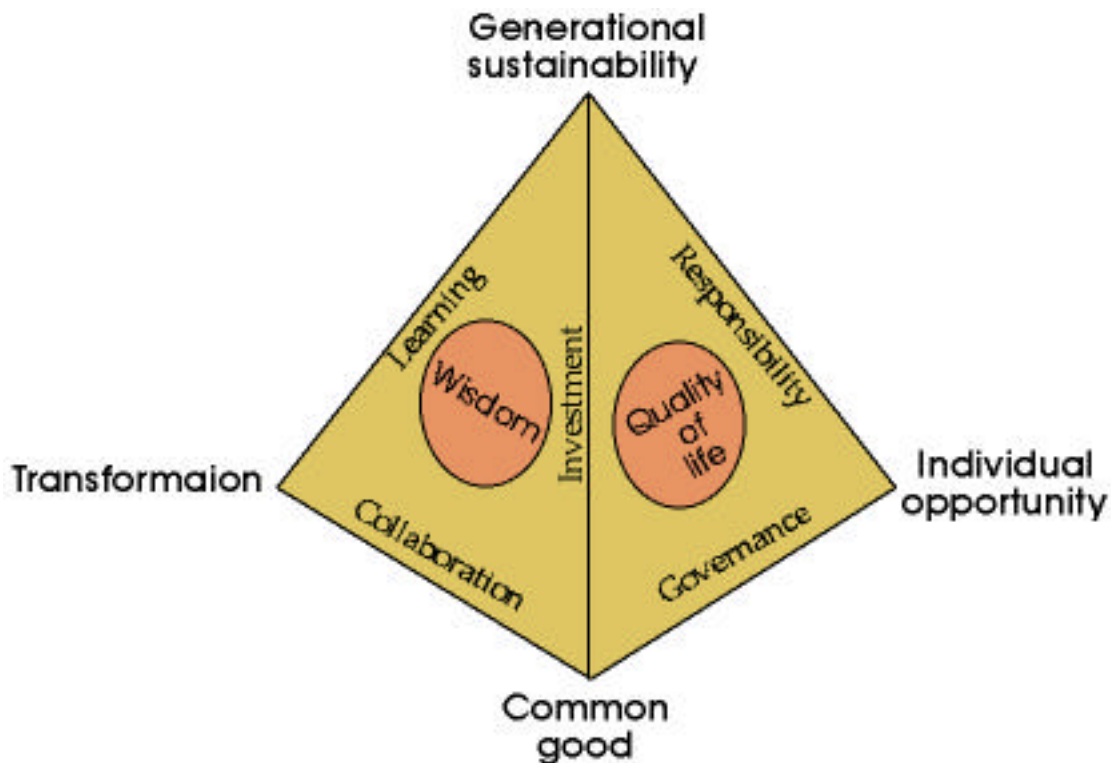
**Figure 3: The Napa Tetrahedron (two of the four sides)**

elsewhere, in the case of transnational telecomm companies) but it may not be the right thing to do for the Common Good.

Towns and cities routinely invest in many kinds of community systems, including shared water, sewer, and road systems. In the future, communities will come to understand that some investment may also be required to develop a shared "data road" system. If this Transformation is to take place, individuals, businesses, and local governments must act with integrity to create the new systems needed. In the long term, an outcome will be more Freedom for members of the community (businesses and individuals) to pursue their personal, civic, and financial dreams.

**Common good**
By prudent Investment in the community, balancing sustainability with individual opportunity, communities can achieve a higher quality of life. Community networks have demonstrated that diffusing technology widely across the community can enhance quality of life while potentially reducing pollution, enhancing personal and organizational communications, and by bringing people closer together [3].

**Individual opportunity**
It is essential that all individuals, businesses, and civic groups in the community have the opportunity to pursue their dreams. This means identifying and embracing a Path with heart. Responsibility and Learning provide a balance that helps transform individuals and groups in the community, with generational sustainability of all public and private organizations and enterprises.
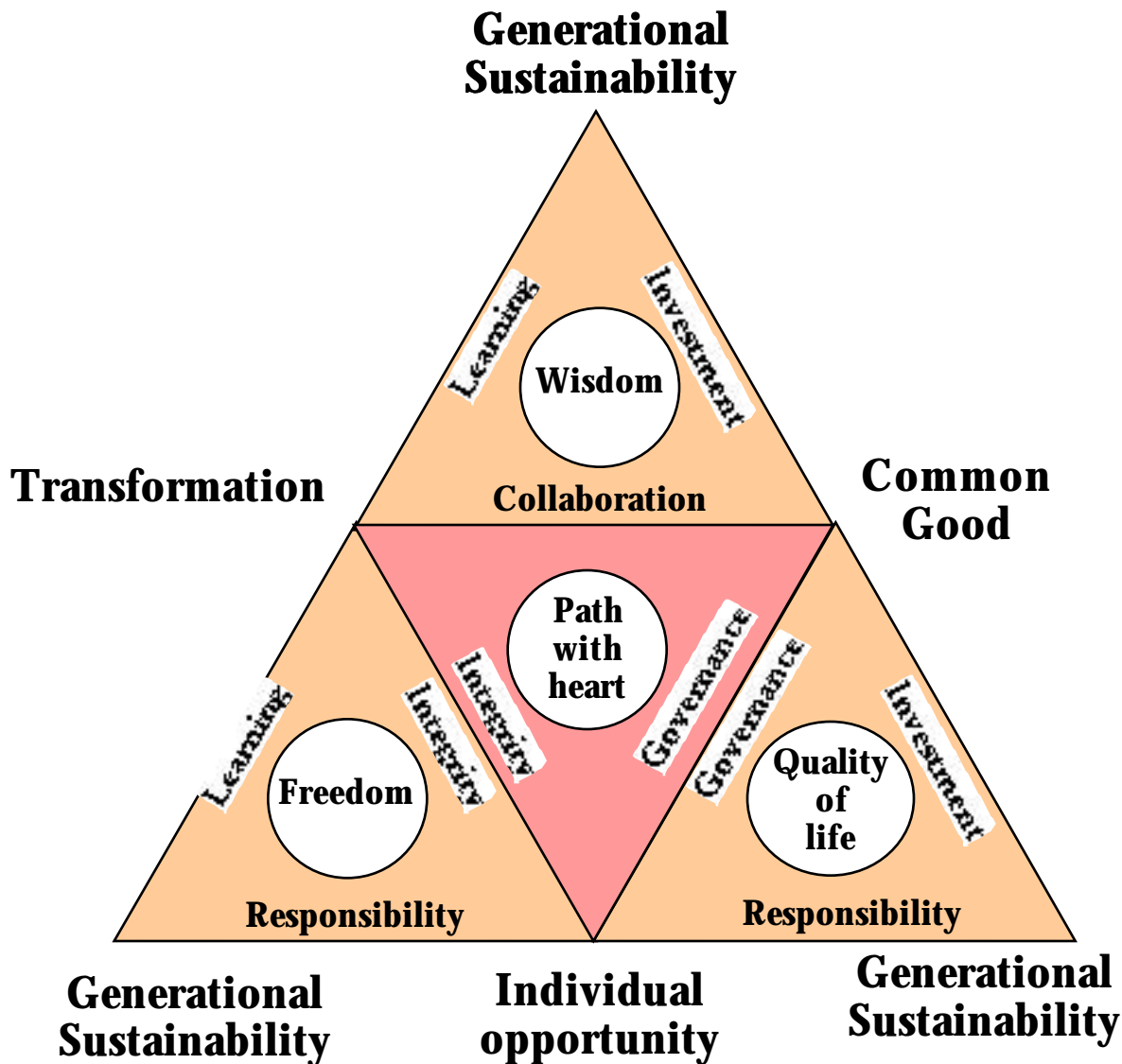
**Figure 4: The Napa Tetrahedron (unfolded)**

In summary, if communities wish to participate in the Information Economy, and wish to have citizens and organizations in the community participate and contribute to the prosperity of all, several activities must take place.

- **Collaboration**--Freedom and responsibility will lead us to collaboration. Partnerships in the community based on honesty and respect help achieve common goals and solve community and individual problems.

- **Learning**--We must make a commitment to support education and learning in the community. We must learn about ourselves, each other, our history, and we must teach our children to be

better than ourselves.

- **Investment**--Public and private investment is needed in shared partnerships, in public and private systems, and in individual enterprise.

- **Integrity**--The new communications tools come with the ability to speak out whenever and however we wish. But in a community, the ability to speak out comes with responsibility to be honest about our intentions and to always act with integrity. We will never be able to trust without mutual respect and a commitment to integrity.

- **Responsibility**--Freedom must be tempered by individual and collective responsibility. Community members must have self-control, and must respect the rights of others. There must be recognition that if freedom is a right, membership in a community is a privilege based on mutual respect.

- **Governance**--all members of the community have a voice, and consensus cannot be achieved without the legal and moral force of shared governance.

# 21st century challenges

The network also brings us new challenges and problems to solve. More than ever, we must understand how dangerous it is to confuse information with knowledge. The transformation of information into knowledge is a uniquely human ability. I cannot overemphasize the danger in believing we can delegate the responsibility of understanding to machines, however anthropomorphic they may be in design. Our wealth and well-being evolves from our human capabilities of creativity and empathy, not from an unconscious stream of bits on a slender thread of silicon.

The wealth of all organizations and the wealth of all communities will be based on the sum of our organizational knowledge, which in turn resides in individual human beings. Our wealth in the future will be based on how well we can communicate with each other. And I am sorry to say, we still are not very good at this. We currently have many small and large international conflicts that are due most often to an inability to communicate effectively with each other. It is troubling that we are successful in creating and maintaining global markets for things like sneakers while we simultaneously threaten each other, sometimes with nuclear weapons.

The appropriate use for technology is to facilitate the development of community by providing new and innovative ways to communicate more effectively. In the end, it is people, always, that create community, not technology.

# Tell a story

I will close with one final thought--each of you should tell your own story. And I know that we all have stories to tell. We can tell stories of the work that we do, we can tell stories about our lives, our problems, and our successes. We can tell stories about our hobbies, our passions, and our loves. We can tell stories

about our hates and fears in the hope that we reach a new understanding of ourselves and of each other.

The great power of the 'net is that it allows us to return to this most fundamental and important human activity of storytelling. Computers and networks will never tell stories, but humans can and will. Television and the movies are storytelling of a kind, but there we must listen to the stories of others. The 'net lets us tell our own stories, it gives us an audience, and it allows us to talk directly to our listeners in our own words.

This is why the 'net is important--it gives back to us the power that we lost during the Industrial Revolution when we began changing from rural economies based on small, tightly knit communities to what has evolved into the faceless global suburb. We must take our communities back, and we must do it by telling our stories, one at a time, to whomever will listen, and we will learn as we do.

The rest of this chapter is a collection of recommendations (actions) that a community can undertake to begin the transformational process needed to achieve prosperity for all, leading to generational sustainability. There is no "wrong" way to begin; each community is unique, and each community must adapt and extend these ideas in ways that are appropriate and respectful of the communities' needs and resources.

# A blueprint for action

## Recommendation 1 -- Community Network Steering Committee

Form a Community Network Steering Committee comprised of twelve to twenty-four major users and purchasers of network services in the region. In any given region, there are already hundreds of thousands of dollars are being spent yearly on telecommunications services. Bring all the major purchasers together in this Committee. Two major aims will be to aggregate demand and lower costs for network users, and to manage and better coordinate common network and interconnection problems.

Develop a sliding fee scale for members, based on the number of people in each organization and whether it is a public or for-profit organization. Goal will be to collect approximately $4000 to $5000 per seat (on average) per year (or whatever makes sense for your community. Funds collected will be used primarily to fund a full time position of Technology/Network Coordinator to help members manage network resources and to work on related tasks, as directed by the Committee. Each member of the Steering Committee will also receive one seat on the Technology Management Group.

Strategy to get the Committee started should be to have at least three to four major players agree to each contribute start-up funds and make a public announcement about the formation of the Committee. Each starting member should contact 4-5 additional potential partners to solicit additional memberships.

Some potential projects for the Committee:

- Business-education partnership--engage local schools and businesses in a dialogue to identify what skills businesses feel they need from high school graduates. Schools may adjust technical and technology literacy programs to better meet business needs, and businesses may provide

additional financial and/or technology support for the schools.

- Internet ready commerce parks--ensure that all business and industrial parks in the area are technology and Internet ready. Educate existing businesses on how to better use technology through the use of case studies and business staff and executive training seminars.

- Promotion of the region as "Internet Ready" -- Ensure that all marketing materials for businesses considering a move into the region present a coherent and cohesive picture of a "Internet ready" region.

- Management of network/technology infrastructure--Encourage all public and private entities in the region to share network resources, reduce costs, and improve access to bandwidth, especially a locally owned and managed fiber infrastructure.

- Support for community networks for localities and the region--support community network efforts in the region as part of a comprehensive strategy of work force training and job creation.

### Recommendation 2 -- Technology Management Group

The Technology Management Group will be comprised of network engineers and network managers from the member organizations of the Community Network Steering Committee. This will be a true working group that would meet monthly or on a scheduled determined by members. The primary purpose of this group will be to share technical information, provide mutual support for problem solving, to create opportunities for pooling purchases of equipment and services, and to develop and extend networking in the region.

## Recommendation 3 -- Hire a Community Network Director

Develop a draft job description for the Community Network Director that would work under the supervision of the Technology Council. Use this position as part of the effort to attract members for the Technology Council. The Director should have superb people skills, a high comfort level with and enthusiasm for technology, and a proven track record of successful project management. This is not a technology job, this is a people job that requires a mature individual that can manage conflict and change well and is also has a very high comfort level with technology.

## Recommendation 4 -- Wire office buildings to be "Internet ready"

Of all the opportunities and ideas that may be discussed related to technology, "Internet ready" office space may be the single most important initiative. Facilities of this kind have the most potential in both the short term and the long term to become a catalyst for increased economic development in the area and the potential to create more and better jobs.

Regions and communities should pursue, by whatever means necessary (tax credits, easements, loan guarantees, etc) a partnership with one or more property owners to create business incubator facilities that are "Internet ready". Downtown areas may have historic buildings that can be converted to high quality

office space. Downtown areas are often attractive to high technology companies because of the proximity of amenities like restaurants, coffee shops, banks, legal offices, and related services. Parking may not be as much an issue as with retail stores because many of these start ups have modest parking needs (few walk in customers).

The Internet–ready theme can be combined with downtown revitalization plans to create a powerful synergy. Traditional retail shopping is not likely to return to downtown areas anytime soon, if ever, because of the "Wal–Mart" phenomenon that has pushed shopping areas out of downtown areas into regional shopping centers near highways and the edges of communities where large tracts of land are more plentiful. Downtown revitalization plans will succeed only to the extent that communities are willing to rethink how downtown areas are used (e.g. making a transition from primarily retail stores to a mix of white collar office space, specialty retail shops, and food/entertainment districts.

The combination of reasonably-priced office space and reasonably priced high speed Internet access has been a powerful motivator for business relocation in other areas of the country. In both Blacksburg and Abingdon, Virginia, commercial office space with Internet access via hard-wired Ethernet in the buildings has consistently created high occupancy rates.

Special attention should be paid to providing support for "micro-businesses" that may need relatively small amounts of office space. In Blacksburg, small entrepreneurs hungry for inexpensive office space have created high demand for small offices of 300 to 400 square feet. The key to creating demand for this office space is to retrofit existing buildings with high speed Ethernet cabling and providing Internet access as an amenity.

## Recommendation 5 -- Implement a telecommunications infrastructure development plan

Communities should identify existing telecommunications assets (public and private systems), inventory current network use with respect to both current and future bandwidth needs and current and future services use. It is important to remember that services use affects bandwidth needs; for example, existing networks may provide adequate bandwidth for current email and Web use, but are probably not adequate for broader use of video conferencing and video on demand applications.

The development plan should seek to maximize choice of services and competitive pricing from multiple providers to ensure the community pays the lowest possible costs for services and receives high levels of technical support and service.

Communities should also seek to aggregate bandwidth use across both public and private users to reduce costs for all users, and should promote the development of community network exchange points (MSAP, or Multimedia Services Access Point). For more information on MSAPs, see .

## Recommendation 6 -- Education programs for key segments of the community

A broad program of education and training is needed in the community, and many partners can assist in this activity (e.g. K12 schools, community colleges, four year colleges and universities, private business

schools, civic groups, etc.).

- Local leaders -- Included in this group are elected and appointed public officials, citizen advisory committees, and other citizens involved with policy and decision making at the local level. Often these local leaders will not attend public seminars and training sessions, so it may be useful to design "private" classes and seminars to help them learn basics like email and using the World Wide Web in a comfortable setting. Communities and governments may also want to consider providing computers (desktop and/or laptop models) for groups like supervisors, schools boards, and planning commissions that have to deal with large amounts of paper. Some Virginia groups like the Montgomery region School Board have found using email and distributing some documents via email and PDF files quite helpful to managing the workload and ensuring that all members of the group have timely information.

- Educators -- Surprisingly, despite large expenditures by public schools on technology, training has lagged behind equipment acquisitions. Many teachers are not making good use of technology in the classroom because of lack of training and lack of classroom ready content. Schools systems may need not only additional training opportunities but encouragement to reallocate funds to increase training (e.g. set a goal to reduce copier paper use by 15% a year and reallocate saved funds to Internet training--email could replace many paper memos).

- Citizens -- When a range of training opportunities exists for the citizen at large in the community, small business economic development is likely to follow as the community's capacity to support high tech businesses increases. Workers at all levels are now required to have basic Internet skills, even for tasks like assembly lines (computer aided manufacturing), the mail room (email management, Web based shipping systems), and reception (answering email, responding to Web inquires). A broad range of public and private training opportunities will be needed to increase skills in the community.

- Civic groups -- The vitality of a community can be measured in part by the activities of local civic and community groups. These organizations also need training, and civic volunteers with skills like Web site design and mailing list management not only help increase communication in the community, but make good workers as well.

- Landlords and property owners -- Landlords and property owners are not likely to invest in capital improvements and upgrades related to technology without an aggressive education program that demonstrates how both old and new properties can become more valuable. One task of the Technology/Network Coordinator would be to prepare business briefs for property owners that outlines the steps they need to take to embark on cabling and office space upgrades. Local electrical contractors and local ISPs (Internet Service Providers) may wish to form business partnerships to provide cable and network services to landlords.

## Recommendation 7 -- **Diversified strategy to attract business**
Focus on manufacturing and high tech–each has very different requirements in terms of work force needs and infrastructure needs (e.g. high quality office space for high tech instead of manufacturing–style shell

buildings). Diversification will provide a broader base of jobs with both low end and high end wages, and will provide a cushion against swings in the economy. Light manufacturing, especially computer-integrated manufacturing (CIM) will become increasingly important to manufacturers of all kinds.

## Recommendation 8 -- **Develop a community Web site**
The region, in partnership with key public and private stakeholders, should fund the development of a gateway community site that would aggregate all public and private Web sites in the region. This gateway site would provide visitors with easy access to any other site in the region without a lot of searching, and would send a powerful message to businesses interested in locating in the region that there is a comprehensive effort in the region to be "Internet ready."

This Web site should also provide hosting services for all local government entities and for all non-profit community and civic organizations.

## Recommendation 9 -- **Develop a community economic development Web site**
It is essential that every community has a high quality, professionally managed and developed economic development Web site to convey the message that the region or region is ready for 21st century businesses.

## Recommendation 10 -- **Provide free email to all citizens**
Every community should offer free email accounts to residents of the area, including all schoolchildren. It is relatively inexpensive to do this, since not all residents would take advantage of the offer immediately. Residents would still have to buy Internet access (which would promote local economic development). The main value of this would be to send a message that the region takes the Internet seriously enough to give every single citizen an online presence.

## Recommendation 11 -- **Create a community-wide online directory**
One of the biggest problems in communities with many people online is finding the email addresses of other residents. The community should support an online directory that would allow people online to register their presence in cyberspace. This also has economic development value, since widespread use of an online directory would give the region a solid number to use about how many people in the region are online--valuable information for prospective businesses trying to evaluate whether or not an area is "Internet ready."

## Recommendation 12 -- **Develop and implement a government technology plan**
All local government entities should undertake rapid development of a comprehensive strategic plan for technology.

- Every local government should provide access to all elected officials and administrative departments via electronic mail. Local governments should provide adequate support and training

to government officials and staff to ensure citizen inquiries can be handled routinely and efficiently.

- Every local government should provide full access to all government information, including regulations and services, including property and land records via a government World Wide Web site. Local elected officials should ensure that there is adequate training and support to ensure that all paper-based government information can be routinely posted online as well.
- Every local government should ensure that there is a comprehensive and affordable Internet training and education effort for local citizens who wish to use the network to participate more fully in the life of the community.

- Comprehensive access to all forms and applications online, with options to download and print paper versions (saving a visit to the government office building) and/or electronic submission of forms and payment of fees

- Development of a 3 year strategic plan to move all billing (taxes, water, garbage, etc.) to electronic format, resulting in a dramatic reduction in costs and great potential to see dramatic improvements in cash management (electronic transactions get money to the local government more quickly and more reliably). Paper bills would always remain an option for citizens not connected.

- Development of an economic development telecommunications infrastructure plan to benefit both the public and private sector, focused on reducing the cost of telecommunications to local government, schools, and libraries while also reducing telecommunications costs to local businesses and providing incentives for new start-up businesses

- Strategic plan to assist all local government agencies (water authorities, social services, economic development groups, etc.) online.

# References

[1] Kubicek, Herbert and Rose MM Wagner (1998) *Community Networks in a Generational Perspective*. Presented at the Workshop "Designing Across Borders: The Community Design of Community Networks", Participatory Design Conference (PDC). Seattle, WA, USA, Nov. 12 - 14

[2] Association For Community Networks (1998) AFCN Web site.

[3] Cohill, A. and Kavanaugh, A. (1999) *Research results from Blacksburg*. In: BEV Community Network Briefing Book, A. Cohill, editor. Blacksburg, VA: Virginia Tech

[4] Schmidt, K. and A. Cohill (1996) *The design of a community HistoryBase*. In: Community Networks: Lessons learned from Blacksburg, Virginia, edited by A. Cohill and A. Kavanaugh. Boston: Artech

[5] Connor, Ray (1999) *The knowledge democracy and community networks*. Private memorandum to A.

Cohill.

[6] Cohill, Andrew, and Joseph Kruth, editors  (1999) *Generational Sustainability: Pathways to the future*. Ebook published on the Web. <http://ceres.ca.gov/tcsf/pathways/>  This paper appears as part of this book in an earlier version.

## For more information, visit the following Web sites

**Community networks**
<http://www.afcn.net>

**Community network design and development information**
<http://www.bev.net/project/digital_library/>
<http://www.bev.net/project/evupstart/>

**Communities of the Future**
<http://www.bev.net/cotf/>

**Communities, technology, and local governance issues**
<http://www.newdemocracy.org/>

## About the author
Dr. Andrew Michael Cohill is an information architect with an educational background in architecture, ergonomics, and computer science. He is the Director of the Blacksburg Electronic Village (BEV) at Virginia Tech and an adjunct professor in the Department of Architecture at Virginia Tech. He teaches courses on community networking and information architecture regularly.

As Director of the BEV, he is responsible for the design and development of electronic village services, supervises a research and development group, and oversees an operations group that manages the BEV office and administrative services. He also directs the long range planning effort for the group, and serves as an advocate for networking in the university and around the Commonwealth of Virginia. Cohill has served as Director of the project since July of 1993.

The Blacksburg Electronic Village, an outreach project of Virginia Tech, is designed to link Blacksburg's citizens to each other and to the world, through computers and networks. It is serving as a model community for the data "superhighways" being planned for the United States. A variety of innovative services and network access methods have been developed for the BEV. Applications include education, medical uses, government and general information, and other retail and commercial opportunities. Current BEV work includes the design and development of a community MSAP (Multimedia Services Access Point), and the development of a community fiber infrastructure.

Blacksburg has become widely known as the "most wired community in the world." In the fall of 1997, more than 83% of the town's residents were using the Internet, and over two-thirds of the town's businesses had made the Internet a regular part of their marketing.

Cohill has an international reputation for his work network design for communities; he recently gave the CAN Forum Memorial Lecture at the Institute for Global Communications in Tokyo. He is also a member of the National Advisory Board for Communities of the Future, a national coalition of thinkers and policy makers concerned with sustainability and health of communities. He is a member of the Association For Community Networks, and is currently serving (1999) on the AFCN Board of Directors. He is the President-Elect for the AFCN, starting in 2000.

He has also published numerous papers and book chapters, and is an author and co-editor of the popular book about Blacksburg (Community Networks: Lessons learned from Blacksburg, Virginia), now in its second edition, and recently translated into Japanese.

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