

Missing Links: Lessons on the Digital Divide from Texas' Telecommunications Infrastructure Fund

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Gary Chapman

LBJ School of Public Affairs

University of Texas at Austin

gary.chapman@mail.utexas.edu

Abstract: The Texas Telecommunications Infrastructure Fund, or TIF, was created by the State of Texas in 1995 to provide grants to schools, universities and colleges, nonprofit medical facilities and public libraries, in support of investment in new telecommunications networking capabilities. The Fund, which ended in August 2003, collected and distributed approximately \$1.3 billion throughout the State of Texas, at a rate of roughly \$150 million per year. In 2000, the TIF Board authorized and implemented a program for "community networking" in the state, which eventually produced three rounds of funding and supported community networking projects in 188 communities in Texas. This represented an investment of approximately \$80 million, making this the largest program on community networking in the United States and most likely the entire world. The purpose of the TIF community networking program was to help close the "digital divide," or the disparity between communities with high access to the Internet and related skills, and those without such access. The focus of the funding was on rural and low-income urban communities.

While some communities produced successful community networking projects, many others were disappointments. The focus of this paper will be on the lessons learned from the TIF program about investing in community networks in order to address the "digital divide." The "missing links," or deficits, in the TIF story include strong technical support, a "vision" about the role of computers and the Internet in community development, innovation, useful software applications, and the development of a learning community among community leaders.

Introduction and Background

In the latter half of the 1990s and into the early years beyond the new millennium, there was a sustained public debate about the "digital divide," an alliterative phrase that is now embedded in public policy discussions around the world. The phrase refers to disparities in access and effective use of computers, software, information and the Internet, disparities found within countries and between countries and regions. The "digital divide" was a signature policy focus of the Clinton administration during the 1990s, after the phrase was included in a report released in 1995 by the National Telecommunications and Information Administration, the first of a series of reports titled "Falling Through the Net" (U.S. Department of Commerce, 1995). President Bill Clinton launched two national "digital divide" tours across the nation and organized and hosted a "digital divide summit" at the White House in December 1999.

In 1995, the Texas State Legislature passed a law, known as House Bill 2128 or HB 2128—later named the Public Utility Regulatory Act—which represented a significant turn in state telecommunications policy. HB 2128 was a complex and massive effort at deregulating

telecommunications in the State of Texas, a bill that turned out to be a precursor, or a preview, of the sea-change in telecommunications at the federal level wrought by the Federal Telecommunications Act of 1996, signed into law just a year after HB 2128.

HB 2128 restructured telecommunications in Texas by introducing competition to the telephone market, although the bill was highly favorable to the incumbent Regional Bell Operating Company, Southwestern Bell (now known as SBC and headquartered in San Antonio, Texas). The Texas bill set the new conditions for competition in local telephone service, and provided billions of dollars in revenue for telecommunications companies. As a *quid pro quo*, these companies agreed to improve the state's telecommunications infrastructure by upgrading the telephone network to digital equipment and by agreeing to the creation of a new funding mechanism for grants to schools, libraries, nonprofit medical facilities and institutions of higher education. This latter initiative became the Telecommunications Infrastructure Fund, or TIF, a new state agency created to administer approximately \$1.5 billion in grants, over ten years. The pool of grant money was funded by a 1.25% assessment on the revenue subject to sales tax of telecommunications providers operating in the state. Nearly all providers passed on this charge to their customers.

The Telecommunications Infrastructure Fund was governed by an appointed board of directors of nine people—three appointed by the governor, three by the lieutenant governor, and three by the Speaker of the House of the state legislature, with the chairman of the TIF

board appointed by the governor. These members had staggered terms and were replaced or retained as their five-year terms expired.

The vision of the TIF Board, according to its strategic plan, was to "stimulate, throughout Texas, the development of an advanced and sustainable telecommunications infrastructure that is relevant and provides equitable access to all communities in the state" (Telecommunications Infrastructure Fund Board, 2003).

In November of 1996 the TIF awarded its first grants. The agency was shut down by an executive order of the governor in August 2003. Between fiscal year 1997 and fiscal year 2002, TIF awarded \$1,017,040,576 in grant awards, and spent additional money on administrative costs. The agency was scheduled to operate until 2005, its ten-year benchmark, but the agency lost its support in the state legislature's session in 2003, and was put out of business early by the governor.

Opinions about the effectiveness of the TIF program were highly variable. The program enjoyed wide support among educators, educational administrators, librarians and public health officials, the principal beneficiaries of the grants. There was a widespread consensus that most schools in Texas would have remained disconnected from the Internet but for TIF's financial intervention. As many as 97% of Texas school districts received TIF funding.

But the TIF program was a disappointment to many legislators and to the governor's office, which was occupied first by George W. Bush and

then by Rick Perry during the years TIF operated. In his first presidential campaign in 2000, Governor Bush didn't mention the TIF program. The TIF Board was stung by two highly critical reports on the agency's management by the State Auditor's Office. The State Auditor said in February 2000, "The Telecommunications Infrastructure Fund Board (Agency) may spend \$1.5 billion without developing 'a world-class telecommunications infrastructure that benefits all Texas' as charged by the 76th Legislature." (Texas State Auditor's Office, 2000) Assessments such as this one contributed to a negative image for TIF among legislators and policymakers at the state level. Moreover, the telecommunications companies paying into the fund were eager for this obligation to end. A combination of poor image, little or no citizen support, and antipathy from the telecom industry led to TIF's early termination.

TIF's Community Networking Initiative

One of the criticisms directed at TIF in its early years was that the grants awarded to schools and libraries tended to create so-called "stovepipe networking" configurations—meaning that the investment in networking infrastructure was typically aimed at a single institution, often in a community without access to broadband telecommunications at all. While a school or a library might enjoy the benefits of the investment, the rest of the community could be bereft of any access to the new broadband network the TIF grant purchased. In some small communities this was a suboptimal use of networking resources. And this was especially true as wireless broadband became a viable solution for some rural communities in Texas. Under the original grant

restrictions that came from the TIF Board, only the four legislatively mandated institutions could be either grantees or users of TIF-supported networks and equipment.

By the end of the 1990s, it was apparent that broadband access was an important component of economic development, civic participation, government, access to information and education, including "lifelong learning" aimed at adults who had long left traditional school. Yet in the late 1990s broadband access was highly limited in Texas, constrained mainly to the four large urban zones: the Dallas Metroplex region, Austin, Houston and San Antonio. In smaller Texas cities and in nearly all the state's rural communities, high-speed Internet access was unavailable to consumers and extremely expensive for small businesses, local government and nonprofit organizations.

Informal discussions among the TIF Board members and several community networking advocates in Texas led the TIF Board to organize and launch a community networking initiative in 2000. The community networking grant program began with 54 community collaboratives receiving planning grants of \$25,000 each. Out of this group, 36 communities were awarded two-year grants of \$500,000. A second round of funding in 2001 provided \$28.3 million to 63 community consortia, engaging 547 participating organizations. A third round of funding in 2002 provided \$250,000 grants on a non-competitive basis to another 89 communities, for a three-year total of 188 community grantees and about \$70 million in grants. This sum made the Texas community networking grant program the largest of its kind in the world.

The TIF Board got around the constraints of its authorizing legislation by requiring community networking grantees to use an authorized institution—such as a school, a library or a nonprofit medical provider—as the "fiscal agent" of the grant. Thus the grants were still going to the institutions specified in the 1995 law. However, the community networking grants also required that these fiscal agents be the administrative hub of a broad community-based coalition, with partners such as local government, nonprofit organizations, senior and youth centers, community centers, etc. The intent of the community networking grant program was to distribute network access and relevant equipment into places where people without access might commonly be found, and there was an emphasis on networking low-income and underserved areas of a community. Thus, through its community networking program, the TIF Board sought a wider impact for its grants.

The first two rounds of TIF community networking grants required public access initiatives—such as public access computers, or other ways for the public to get online, such as kiosks; training classes; a Web portal for community-based information such as news, local government, bulletin boards, calendars, etc.; and a plan for sustainability, meaning a roadmap for how the community network might support itself after the grant money had been spent. The third round of noncompetitive grants was considerably more structured and emphasized connectivity to the state government's own Web portal, www.texas.gov.

The community networking grantees in Texas were a diverse group, including both tiny rural communities such as Roby (population 659) and low-income zones of San Antonio and Houston, with a mix of everything in between. In the first two rounds of competitive grants, the recipient communities tended to be those with a poverty rate above the state's average, which in 2001 was 14.9 per cent. In the first round of community networking grants, the grantees ranged from a low of 7.3 per cent poverty (Arlington) to 50.9 per cent (Starr, near Edinburg). The median household income for the first round grantees ranged from a low of \$16,504 (Starr) to a high of \$47,622 (Arlington). In 2002, the median household income in Texas was \$40,149.

In June 2002, a team of researchers at the University of Texas at Austin (including the author) were engaged by TIF to conduct an evaluation study of the first-round community networking grantees (known as CN1 grantees). Graduate students at the University of Texas collected data from, and visited, 12 of the 36 communities in the academic year 2002-2003. The rest of the communities were visited by members of the research team. The graduate students and the research team conducted personal interviews with as many people as possible connected with each community networking project, using a standardized interview template. The students and team also collected data from each of the sites.

Detailed descriptions of this evaluation study can be found in other published reports (Strover, Chapman and Waters, 2004). While the success or failure of these funded community networking projects was, as usual, highly variable and to some extent subjective, depending on

who was asked to assess the project, some patterns and lessons did emerge.

For example, one strong lesson was that public access computers that were simply "dropped into" locations where the public might not expect to find a public access computer typically saw little or no use. A lone computer in a Chamber of Commerce building, or a single computer in a public agency, was a common initiative for these community networking projects and almost always a failure. Computers placed where the public expected to find them, particularly in schools, libraries and senior citizen centers, were in high demand.

There was only a weak and ineffective effort to engage the communities most adversely affected by the "digital divide," the poorest communities or the most disadvantaged neighborhoods of a specific community. With a few exceptions, most community networking grantees were disappointed in their ability to reach the lowest income groups and ethnic minorities. While there were some projects that located public access computers in low-income and minority neighborhoods, the overall assessment of project managers was that poor and minority citizens were not engaged in the process of planning or securing the grants and thus felt little or no ownership of the project's goals.

The most successful deployments of public access computers were in schools, libraries and senior citizen centers, where computer classes were very popular. In other words, the community networking grants tended to reinforce the digital infrastructure of the institutions that

were already eligible for TIF grants, without the community networking program, although the emphasis on public access undoubtedly improved that aspect of these communities' infrastructure and programs. Hundreds of new public access sites were funded by TIF, and the grants made possible classes in basic computer literacy and, in some cases, specialized skills such as creating Web pages. The impact on the "digital divide" was probably minimal, in terms of moving people to a level of competence with computers and the Internet that would make a difference in their lives. Nevertheless, many communities saw some impact from the TIF program, particularly in the expansion of public access computers and networking.

The mixed results of the TIF community networking grant program were largely the product of very vague goals, poor support on the part of an agency with a small staff, and a lack of preparation among the communities that received funding. Among the 36 CN1 grantees, 34 used the services of the same planning consultant, whose company wrote the grant applications that committed these communities to a certain course of action and a specific set of technologies. This meant that there was a very shallow understanding of the concept of "community networking" among many community planners. A typical pattern was that someone in the community heard about the availability of money, hired a consultant to write a successful grant proposal, then turned over the money and the management of the project to an official of the fiscal agent, which in most cases was the local school district. It was not surprising that most of the equipment was eventually controlled by the school district and the community participation gradually faded away.

As the University of Texas research team wrote, "A critical implication is that state policymakers need to establish the indicators or evidence that can help them determine which communities are in fact well equipped to use scarce resources to their maximum potential, and which are simply angling for additional resources that do not contribute to the broader agenda of improved community circumstances, greater social capital and superior opportunities for economic development" (Strover, 483).

The limitations of the TIF agency contributed to the problems encountered in the community networking grant program. The staff of the agency was not prepared to offer detailed technical support or even ongoing training for community leaders. Only in the last few months of the agency's existence did its staff set up an online bulletin board for the grantees to discuss issues and "lessons learned" among themselves. From the stories told by many grantees, TIF was excessively concerned with accountability and imposed a significant hardship of paperwork and fiscal accounting, which fostered an antagonistic relationship with some grantees. On the other hand, TIF did not provide any help for improving the projects, such as offering an assessment tool, a template for the Web portal each grant required, or even basic signage that would have identified the public access computers as enabled by TIF funding. (Quite a few of the public access computers purchased with grant funding had no signs on or around them indicating that they were for the public to use, or that they were purchased with a grant won by the community. A computer

that is not identified as a public access machine is not likely to be used by the public, and most of these computers sat idle.)

Another shortcoming of the agency was that its grant funding structure was, in effect, binary—either the community group had full funding from a TIF grant or it didn't, which meant that once the grant ran out, the group's financial resources went to zero, overnight. During the grant period, grantees in CN1 and CN2 (the first two rounds of grants) were prohibited from launching money-making activities that might have prepared them for fiscal sustainability after the grant period. There were some groups that charged for training, but once they did, attendance dropped dramatically. Thus, during the grant period, the community networking coalition had few opportunities to develop or test alternative funding strategies. In the third round of grants, TIF officials recognized this problem and allowed for "ramped" or "graduated" income near the end of the grant. This allowed the projects to get some income from a source other than the grant, and helped prepare the group for the end of state funding. But this could have been planned better than it was, and state officials should have been more helpful and insightful about how to transition these projects to other sources of support.

Overall, perhaps the most constraining feature of the TIF program was the nature and purpose of the agency and its authorizing legislation. First, for many years the leadership of the agency took the name of the agency literally, meaning that it administered a fund only for equipment and connectivity charges. The grants could not be used for training or even for compensating personnel. As the State Auditor's

report noted, "While it is essential, equipment alone does not create an effective telecommunications system." Only in the last year of the TIF program did the agency take steps to address teacher training by collaborating with other state agencies and with nonprofits that offer professional development to teachers.

Second, the institutions designated as authorized grantees, which became the fiscal agents for community networking collaborations, are inherently conservative, with missions only tangentially related to closing the "digital divide." Schools and libraries have "core" missions that overlap public access to computers, but with ambivalence on the part of administrators. For some librarians, a TIF grant was simply a way to expand the library's computer equipment and pay for its Internet access. Many school administrators viewed their grants in a similar fashion. The other requirements of the grant, such as the community Web portal or the public training classes, were handled in a more or less perfunctory manner in most cases. The training classes, in general, were offered at an extremely low level of skill and rarely went beyond the basics of using Microsoft software. Such classes were unlikely to make a big difference in a student's employability or economic value.

The goal of "public access" to the Internet was not sufficiently clear to either the grantees nor the funding agency, in hindsight. And how public access to the Internet might close the "digital divide" was even less clear. While there were a few success stories about people using the Internet on TIF-funded computers in ways that improved their economic prospects, the overwhelming impact of the community

networking grant program was to increase the inventories of computers under the control of the fiscal agent institutions, primarily schools and libraries.

The Missing Links: What Might Have Been

Once again, in hindsight, there were three major elements missing from the TIF community networking program that might have made it more effective. These were a *coherent vision* of what can be done with Internet-connected computers, an understanding of the importance of the concept of *effective use*, and a *learning community* of people involved with these projects.

A Coherent Vision

TIF officials developed very broad and general goals for the funding program, but these were never translated into practical guidelines for community leaders. As a result, most of the community network projects aimed at fulfilling the technical requirements of the grant contract, which included public access, a Web portal and training classes. Few of the projects managed to craft a vision of development beyond these three required features. There were some individuals who had larger ambitions, but their ambitions were not shaped into an exemplary plan or "roadmap" for other community networking efforts.

As one example, nearly all the community networking projects limited their training classes to the most basic features of "computer literacy," which usually meant how to use Microsoft software such as Internet

Explorer, Outlook and Office. Several networking projects that held classes for senior citizens included sessions on how to use eBay or how to manage digital photos via e-mail, two popular subjects. A handful of the projects offered classes on how to make Web pages. A couple of networking projects in the CN1 group tied classes to other educational goals such as General Education Degree (GED) preparation, basic literacy or English-as-a-Second-Language.

But these classes were all offered as what might be called "general education" training, or workforce development at the most basic level. The classes were generic, organized around a common set of skills necessary to "drive" a certain software package. What was missing was the organization of skills around some specific goal of individual or community development, such as the task of strengthening the community networking project itself. The students of the classes were treated as, and regarded as, isolated individuals seeking individual exposure to the topic of the class session. But none of the community networks organized projects specifically designed to improve the community's overall effectiveness in using computer technology. For example, there were no obvious examples of the TIF-related investments in equipment and networking being used to improve the effectiveness of a community-based nonprofit organization or local government agency. In nearly all cases, "public access" meant serving whoever came in the door, so to speak, instead of generating or serving a more specific public interest.

One result of this limited vision about what to do with the equipment funded by TIF was that there was little evidence of "thinking bigger,"

such as linking classes to community needs or identifying goals other than those required by the grant. If people stopped coming to the classes offered, the training usually shut down. If the Web portal went unused by community members because the information was out of date or insufficient, there was usually no follow-up effort to fix this, except in a couple of exceptional cases.

In sum, in part because of the way TIF structured their grant program, and in part because of a lack of resources and knowledge in the grantee communities, the typical project was aimed at fulfilling the requirements of the grant contract and did little else. There were some cases of imagination and initiative, but these were haphazard and isolated, rather than encouraged and supported by some shared vision communicated by TIF and other community networking leaders.

This problem might have been addressed by offering the community grantees examples of things to do, such as good case studies, and sharing the positive and innovative experiences of other grantees or even other community projects unrelated to TIF. Unfortunately, most of the contact the grantees had with TIF officials after being awarded a grant was about accountability and compliance instead of inspiration and innovation. The tenor of this relationship at best tended to reinforce the constraints of the grant's requirements, and at worst created an antagonistic and in some cases even hostile connection between the state officials and the local leaders.

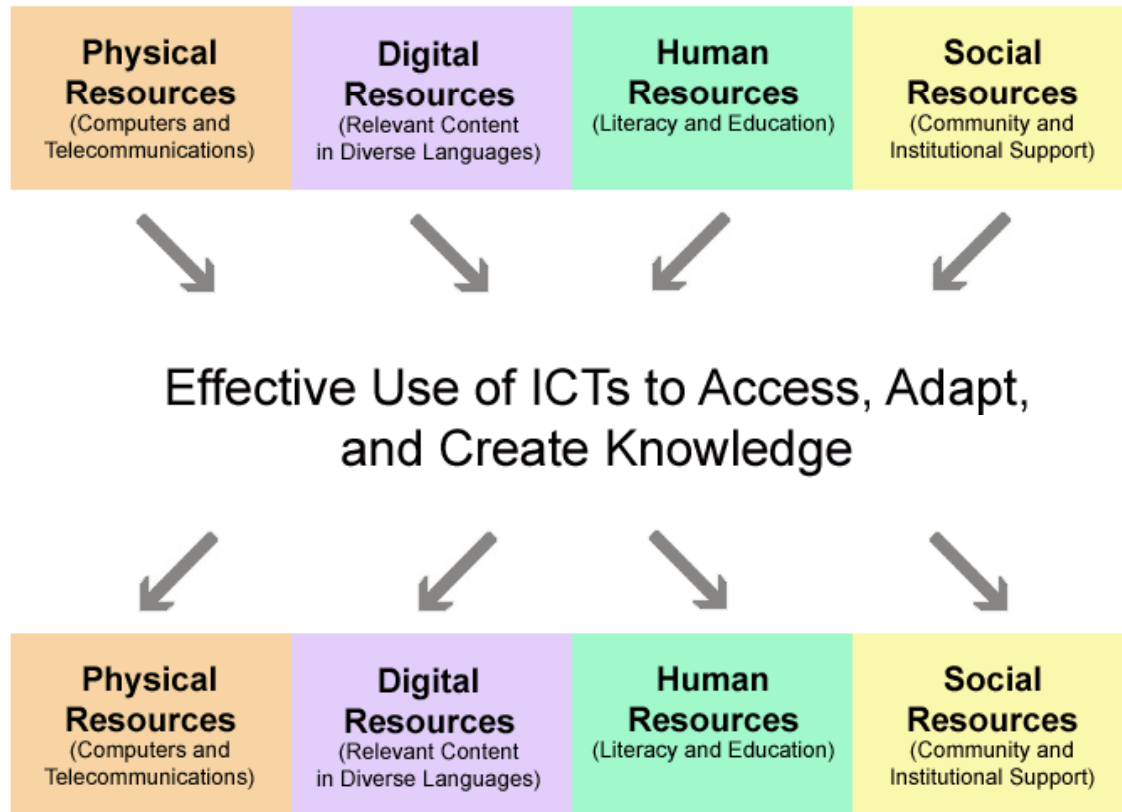
Effective Use

Over the past five years or so, the discourse on the "digital divide" has changed from an emphasis on access to an emphasis on effective use of networked computers and software. Access is still important because, obviously, effective use cannot happen without access. But not only is public access increasingly available in many communities around the world, but "digital divide" activists have come to understand that the demand side of computer use is critical for sustainability and widespread adoption of the Internet. Affluent users have long established patterns of use that are connected to specific purposes, and high on the list of users' priorities is being more effective.

Michael Gurstein of the New Jersey Institute of Technology has defined effective use as "[t]he capacity and opportunity to successfully integrate ICTs into the accomplishment of self or collaboratively identified goals" (Gurstein 2003). He goes on to say:

the challenge with ICTs is not simply to provide passive "access" to the technology but rather to provide the means by which individuals in their communities can find ways of making "effective use" of these technologies for productive, wealth creating, and transactional as well as other processes. In this, "access" in all its various components is a pre-condition and an enabler of "effective use" but is not a substitute for it.

Mark Warschauer of the University of California at Irvine has also adopted the term "effective use" and described a wide array of components for what constitutes effective use of information technologies, represented in this table:



(Warschauer 2002)

In general, the concept of effective use, when connected to the idea of a "digital divide," incorporates the challenge of access into a social and developmental context that seeks to describe the full range of requirements for meaningful participation in the information society. These requirements are constantly changing. The argument of proponents of the concept of effective use is that without sufficient

attention to the elements "beyond access," so to speak, public investments in information technologies, in order to address the digital divide, are in jeopardy of being wasted or, at best, underutilized.

A common "solution" to the contextual basis for effective use is training, which was a requirement of TIF community networking grants. But generic training—which in effect means decontextualized training—is rarely a means to effective use. Of course, people who use computers and the Internet effectively must know how to use a computer, obviously. But this basic level of skill (commonly observed in young children) is still a long distance from effective use, when the computer and the Internet are integrated into a stream of tasks that, when fulfilled, achieve a significant practical goal for the user. Usually, as experience has shown, effective use of a computer is learned by trial and error, by using the computer in the course of trying to achieve some specific goal, and often in the midst of other users doing the same thing.

Gurstein thus notes that "there is the need for active participation on the part of the local community to 'animate' the process of technology acquisition and implementation" (Gurstein). He calls this participation a form of "technology pull," which should work in conjunction with "technology push" strategies, such as state intervention and funding of infrastructure and training.

Several of the communities that received TIF community networking grants achieved an exemplary level of community participation, but in most cases this faded over the term of the grant. In Haskell, for

example, a small rural community north of Abilene, community leaders organized a "technology fair" for the entire town prior to applying for a grant, and the committee that prepared the grant application was a diverse representation of institutions in Haskell. But within a year after the computers were installed, the Haskell community networking project had settled into routine maintenance by a school district technician, there were no more community meetings, and there was no plan for the equipment except as public access terminals. Haskell had a brief episode of innovation, when someone thought of using digital cameras and the high-speed connectivity provided by the TIF grant to communicate photos of local horses afflicted with an unusual equine disease to veterinary medicine experts at Texas Tech University in Lubbock. But the exceptional nature of this story of local innovation mostly demonstrated how rare such episodes were among the TIF grantees.

In the TIF community networking program, some things could have been done to help communities progress to more effective uses of their information technology investments.

"Blogging" was a phenomenon just starting to appear on the Internet when the first community networking grants were awarded. Since then blogging has exploded, although it took a few years for blogs to become mainstream. A blog-tracking Web site, Technorati (www.technorati.com), is currently tracking over 11 million Web blogs, and the Technorati site reports that this number is doubling every five months. Blogging is a form of self-publishing and extremely popular. It provides an easy way for people to express themselves online, without

needing to know HTML or having to cope with other complicated and technical barriers to publishing on the Internet. Most Weblogs are simple text typed into an online form and then submitted to the server by hitting a button on the form. Blogger.com, the new Microsoft blog service, and Yahoo's coming Yahoo 360 are all examples of free blogging sites.

Other free, easy-to-use services have appeared online to support Internet users who don't want to be bothered to learn HTML coding or other typical ways of getting material on the Web. Flickr, for example, is a simple interface for loading, sharing and sorting digital photos (<http://www.flickr.com/>), and it's free. EZBoard is an inexpensive (\$5 per month) community bulletin board service (<http://www.ezboard.com/>) that is simple to set up and maintain. Meetup.com is an online service that lets users organize real meetings by voting on meeting places, sending out invitations, and posting photos and mailing lists. BaseCamp (<http://www.basecamp.com>) is an elegant online project management system that is free or low-cost, depending on how many projects are managed.

Many of the free or low-cost services that have appeared online are designed to foster and support online communities, which may be virtual representations of real communities. Software for maintaining Web sites, often called content management systems, is now widespread and either free or low-cost, and includes systems that match the features of commercial software that costs hundreds of thousands of dollars. Mambo (www.mamboserver.com), Drupal (<http://www.drupal.org>) and Plone (<http://plone.org/>) are all free,

Open Source content management systems designed to support a community of content creators. Bricolage (<http://www.bricolage.cc/>) is a free content management system that is as sophisticated as those used by large commercial enterprises.

The appearance of these kinds of systems is an indication of developers serving the needs of users, in general by providing free or low-cost and easy-to-use interfaces to online services that help people use the Internet more effectively. This is part of a growing trend in the use of computers on the Internet that is replacing desktop software on individual client machines with centralized services on the Web, accessed through a Web browser. These centralized services are easier to maintain, cheaper, and they can be accessed with any Internet-connected computer. The technical support costs for a community network can be focused on server-based services that reach both public access and home users. The diversity of the services available online now can meet the needs of most organizations and individuals.

The stage we are in now is matching this new approach of centralized, community-building online services with the capabilities and needs of groups addressing the digital divide. Many community organizations that work on the digital divide are just discovering these online tools, such as blogs or bulletin boards or wikis, which are Web sites that can be edited by any authorized user. There is still work to be done on making these services easy to set up and use. A big task ahead is how to make an array of different functions that support community development work well together, instead of working as isolated and separate services. For example, all of the services noted above have

their own individual login and registration requirements, which can be aggravating to users—this means remembering a login and password pair for each service. Ideally, developers should work out ways for different services to share a "single sign-on," a goal of commercial software developers as well.

A free and Open Source code fork of Drupal called CivicSpace (<http://civicspacelabs.org/>), which was originally developed to support the local campaign organizations of U.S. presidential candidate Howard Dean, advertises itself as a "Web site in a box." This means that the software allows a site developer to quickly and easily set up a range of features that would have previously required custom programming, such as a blog, calendar, bulletin board, photo gallery, polling function, etc. CivicSpace is specifically designed to facilitate the activities of civic organizations. Once it is set up, people with few technical skills can use it to participate in online dialogs, or post photos, or list events, or do other things that help build the social capital of a community, whether a geographic community or a virtual community.

Tools like CivicSpace are big steps forward in effective use among people just beginning to encounter the Internet. They help bond community members and they help "map" the community's own interests to online content. They can help focus a community's use of the Internet on self-identified tasks, goals and issues. This is a sharp contrast to the training model, which typically assumes that an individual will find a reason to use the Internet after being taught how to use a computer. The appearance of "civic software" also helps justify public investment, because it is designed to increase the

effectiveness of entire communities, not just a few individuals. In fact, because programs like CivicSpace are free and customizable, the software can be "cloned" throughout a community, and used for different purposes or by different organizations. Setting up and using programs like CivicSpace can also build skills within a community, without a big investment in software licenses.

This approach of effective use needs more experimentation and more innovation in diverse communities around the world. The software tools described above need to be translated into many more languages than are available now. Developers need to think more strategically, in collaboration with groups with concrete needs, and transcend the all-too-common motivation for developing a free, Open Source software program, which some people call "scratching an itch" — meaning that the motivation is often idiosyncratic and self-directed, rather than a collaborative response to the circumstances of people on the wrong side of the digital divide. There is much more work to be done but a lot of progress has been made already.

Had TIF been able to understand, communicate and "evangelize" this different approach to using the equipment its grants purchased, the community networking projects might have been more effective and successful. However, even an ideal mix of tools cannot substitute for the human-centered work of building and nurturing a real community. Getting people's attention and securing their commitment to collaborate is never easy nor foreordained. The tools described above are available as computer-based assistants, or facilitation tools, but the availability of the tools alone cannot guarantee the success of a

community-based project nor a closing of the digital divide in any specific locale. Those goals are dependent on the human qualities of leadership, commitment, perseverance and collaboration.

A Learning Community

One of the biggest deficits in the TIF experience—and the most inexplicable in hindsight—was the absence of ways for grantees to share their experiences with each other, particularly in an online forum or bulletin board or even an e-mail listserv. Some mechanism of supporting a learning community of grantees would have gone a long way toward improving many projects and enhancing the understanding and competence of project leaders. It would have probably improved communication between TIF officials and the project leaders, communication which at times became quite strained and difficult.

Virtual learning communities are by now routinely found on the Internet, although they are not automatically productive nor successful. Most Internet users belong to multiple e-mail lists or listservs. Most users have some experience with an online system that is designed to promote dialog or a sharing of ideas and experiences. These were not uncommon during the years TIF was in operation. For reasons that will probably remain mysterious, the TIF board did not ask its staff to implement such tools. Some of the staff started their own bulletin board for community networking grantees shortly before the agency was phased out by the governor's office. But even this effort was largely informal and never fully integrated into the agency's mission.

Experience with online communities of interest suggests that "virtual communities" need to be nurtured in a fairly deliberate fashion, by participants with a stake in whether the online community succeeds or not. TIF was, on the face of it, in a good position to take on this role and to recruit assistance from exemplary community networking leaders throughout the state. For other digital divide efforts the stakeholders might not be so clear. This is why it may be beneficial to actually structure a project addressing the digital divide so that it produces such stakeholders, and engages them in a way that makes a learning community possible. The way the TIF community networking grants were structured, however, it was typical for the stakeholders to be primarily interested in securing more equipment for their respective institutions. An early (1995) and short-lived (ended in 1996) e-mail listserv about TIF that was started by the author was dominated by discussions about how to secure a grant—understandable in the context—rather than by discussions about how to deploy the equipment effectively. In other words, institutional bias was evident early on in the TIF program, and someone would have had a difficult job turning this bias into an open learning community. But TIF's lack of interest in nurturing a learning community (the agency's leadership refused, for example, to participate in the e-mail listserv in 1995-96 and didn't start one of their own) contributed to the difficulty.

TIF leaders did implement a "community networking advisory group" made up of leaders from grantee projects. This was a small committee of grantees, headed by an energetic woman from Cuero, a small rural community in south central Texas. However, the principal task of this

committee was to advise the TIF board, not other community networking grantees, and the committee itself was a small subset of grantees. They did communicate by e-mail, but there was no mechanism to share their wisdom with all of the grantees, nor was there a way for most grantees to share experiences with each other. Late in the life of the agency, TIF also started a small newsletter, in print, but this was mostly a publication for public relations.

Oddly, during the CN1 and CN2 rounds of TIF grants, TIF officials were preoccupied with accountability and compliance but had little to offer the projects for their own self-assessment. Many projects didn't even keep track of how many people used their public access computers. Also, many of the projects didn't bother to move computers that were clearly sitting unused. While several project managers complained about TIF's paperwork requirements, the paperwork was focused on financial accountability, not on what lessons were being learned about public access networking. In the CN1 communities evaluated by our University of Texas team, there was almost no evidence of information-sharing between community networking grantees.

A contrast might be found in the federal government's chief program on the digital divide during the Clinton administration, the Technology Opportunities Program, or TOPs, part of the National Telecommunications and Information Administration. The TOPs program provided extensive case studies of successful community technology projects that it helped fund. The agency held an annual conference of grantees that was organized around sharing lessons learned, and the agency encouraged community networking projects

to network with each other to share expertise and innovation. Program officers from TOPs were sent to conferences and they even organized their own regional meetings throughout the United States, to tell citizens about the lessons that were emerging from funded projects.

At the heart of every digital divide program should be the development of a learning community of participants. This learning community should help spread innovation, help avoid the repetition of mistakes or dead-ends, and build skills, understanding and networks of advocates. Because an online learning community doesn't appear automatically, it should be part of the planning when an organization begins thinking about how to structure a program to address the digital divide. An online learning community can sometimes be the principal motivation for people to use networked computers, and motivation is essential to any technology diffusion project. A successful learning community will not only enhance skills and understanding but also help stimulate identity, pride, energy and grassroots, collaborative innovation.

Conclusion

The Telecommunications Infrastructure Fund in Texas, between 1995 and 2003 invested approximately \$1.3 billion in telecommunications and Internet networking equipment in the state, and clearly played a leading role in bringing Internet capabilities to many communities that would not have otherwise been able to afford such investments. TIF served nearly all Texas school districts and public libraries, and spent about \$70 million on the largest community networking program in the United States, if not the world. The overall impact of TIF was both

significant and salutary, and the story of the agency should be a source of pride for Texas citizens. There is no doubt that Texas would be worse off today if it had not made the public investments that TIF administered.

Within the community networking portion of TIF's funding program, however, there were some missed opportunities and some conceptual confusions that, had they been remedied, might have made this novel program more effective. These missing links, so to speak, provide some lessons for the future, especially for countries where state actors or nonprofits may take an active role in trying to bridge the digital divide. There were three lessons described in some detail in this paper.

First, it is important to have a conceptual vision of how the Internet can be used to improve a community and the life prospects of individuals. Lofty rhetoric is not enough; there need to be specific examples of things that can be done, in a collaborative fashion, by the communities being targeted by a program. Simply aiming for improved access is not enough, either. Computer technology and the Internet need to be embedded in a context of effective use, the second lesson. Generic training in standard software packages, with the hope that such skills may turn out to be useful, is less valuable than tasking the equipment and software to specific community-based goals. The demonstrated popularity of self-expression online, such as through the phenomenon of blogging, or the utility of task-oriented virtual communities, were offered as examples of effective use, and fortunately these activities are supported by capable, low-cost or even free software applications.

Finally, it is important for digital divide programs to incorporate a learning community of participants, in order to disseminate innovation and skills and avoid mistakes and failures. The structure of a digital divide program can and should be oriented around the support of an ongoing learning community, which requires attention and commitment. The structure of a digital divide program can also be infertile for the development of a learning community, such as when it is accompanied by disinterest among the leaders or institutional bias that makes the conversation about getting more assets.

Texas' TIF community networking program was, unfortunately, too focused on equipment and access and not enough on vision, effective use and learning. This is not to say that nothing productive or instructive came out of these investments. To repeat many commentators, access is a necessary but not sufficient element of overcoming the digital divide, and the TIF experience further reinforced this strengthened consensus.

Gary Chapman is director of The 21st Century Project and a member of the faculty of the LBJ School of Public Affairs at the University of Texas at Austin.

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