

**LESSONS LEARNED**  
**FROM THE**  
**TELECOMMUNICATIONS**  
**AND**  
**INFORMATION INFRASTRUCTURE ASSISTANCE PROGRAM**  
**(TIIAP)**

**U.S. DEPARTMENT OF COMMERCE**  
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The Clinton Administration is committed to bringing the benefits of the information superhighway to all Americans. The Administration's vision is of a ubiquitous network of networks that will help America to prepare its children for the workplace of the twenty-first century, allow all Americans to continue their educations and upgrade their skills throughout their lifetimes, extend lifesaving medical care to remote rural areas and promote healthy communities, and make America's businesses the most competitive in the world. The President has challenged the nation to connect all of its schools, libraries, and hospitals to the information superhighway by the year 2000. In addition to these vital connections, we must continue to develop telecommunications policies that foster innovation, we must develop the technological skills of all of our people, young and old, and, most importantly, we must learn how to use our national information infrastructure -- to tap its full potential

As Secretary of Commerce, I am pleased to release *Lessons Learned from the Telecommunications and Information Infrastructure Assistance Program*. The **Telecommunications and Information Infrastructure Assistance Program (TIIAP)** plays a vital role in the development of the information superhighway by providing grants to schools, libraries, police departments, hospitals, universities, and community-based organizations. These grants demonstrate to the nation how the information superhighway can be used to educate our children, provide better health care, and deliver needed services to America's local communities.

Through its support for creative, community-driven projects, TIIAP highlights the best of the information superhighway. It spurs economic development in isolated rural areas, revitalizes inner city neighborhoods, and makes many citizens more active participants in their government. By focusing on the needs of underserved communities, both rural and urban, it helps to bridge the gap between the information "haves" and "have-nots." TIIAP also creates important public-private partnerships that stimulate private sector investment in local communities. Each dollar that TIIAP awards yields nearly two dollars in local matching funds. The Federal seed money that TIIAP plants is the catalyst that enables community organizations to get their projects started, then work with the private sector to expand them. By demonstrating effective, efficient uses of advanced information and telecommunications technologies, TIIAP helps to create new market opportunities for America's high-technology companies.

The development of the information superhighway represents a tremendous opportunity for America. We must make the most of this opportunity by working together to understand its benefits and extend those benefits to all Americans. By sharing the lessons learned from TIIAP, this report contributes a valuable step toward this important goal.



Michael Kantor

## Preface

The Telecommunications and Information Infrastructure Assistance Program (TIIAP) is a Clinton Administration initiative created to promote the widespread and efficient use of advanced telecommunications services in the public and non-profit sectors. Since its inception in 1994, the program has awarded 210 grants to projects in 48 states, the District of Columbia and the U.S. Virgin Islands. TIIAP has awarded \$60 million in Federal funds and generated \$100 million in local matching funds.

TIIAP grant recipients have, in effect, set up small laboratories all over the country, figuring out what is the best way to connect schools, libraries, clinics, and not-for-profit hospitals to the information superhighway. They are learning how to overcome geographic and financial obstacles. As a result, TIIAP is improving our children's education, boosting local economies, and mending deficiencies in the delivery of medical care. Already, important lessons have been learned. This report seeks to pass those lessons on to those embarking upon their own information infrastructure projects.

The public response to TIIAP has been overwhelming. For every organization that received a grant, 13 others applied for funds, and another 65 requested application materials. This report, which looks at the lessons learned from TIIAP, is aimed at these latter groups — the thousands of schools, hospitals, clinics, police departments, libraries, community colleges, state, tribal and local governments, and community-based organizations that seek to put the information superhighway to work in their communities. Many of the lessons learned are of use whether you are a teacher wishing to integrate the Internet into an eighth-grade curriculum, an administrator of a rural hospital seeking to provide patients with greater access to medical specialists, or an employment counselor trying to expand training opportunities for adult learners.

The tremendous innovations in telecommunications coupled with the historic passage of the Telecommunications Act of 1996 provide us with almost boundless opportunity. As a nation, we have the opportunity to harness the potential of the information superhighway and use it to educate citizens of all ages, care for our sick and prevent disease, and grow our economy. This opportunity must be extended to all communities, to all Americans, if we are to realize it fully. TIIAP **has** made a special effort to encourage and to award **projects** that help to reduce the considerable gap between the information "haves" and "have-nets."

The TIIAP program, however, has a limited budget, and can only provide grants to a small fraction of the many deserving organizations who come to the program energized and brimming with exciting ideas. We must do our best to leverage the small number of grants we do make by sharing their experiences and helping other communities to benefit from the lessons that the TIIAP pioneers are learning.

Beyond this report, you can find a wealth of information about the program and the specific projects it has supported by contacting the TIIAP office or visiting the TIIAP site on the World Wide Web at: <http://www.ntia.doc.gov/tiiap>. As this is our first in what we hope will be many publications that report on the findings from the TIIAP projects, we would like to hear your comments — please write, fax, or e-mail them to us at: [lessons@ntia.doc.gov](mailto:lessons@ntia.doc.gov).

Larry Irving  
*Assistant Secretary of Commerce for  
Communications and Information*

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## Executive Summary

This report presents the initial lessons learned from the Telecommunications and Information Infrastructure Assistance Program (TIIAP) projects that were funded in 1994 and 1995. The report offers a snapshot look at the community impacts of TIIAP projects, and presents examples of how specific projects are using advanced telecommunications and information technologies to provide better services, to strengthen community ties, and to provide increased access to information for thousands of Americans. Lessons learned to date from these TIIAP projects include insights into project planning, the task of selecting the appropriate technologies in a time of rapid change, the importance of developing and maintaining productive community partnerships, and the challenge of securing long-term financial support for the projects.

Material for the report was gathered from a workshop and focus group sessions conducted with TIIAP project directors in June, 1996, and from a review of TIIAP project reports and documents. The report is intended for community-based organizations and government agencies that wish to incorporate new information technologies into the services that they provide to the community, as well as for those who seek to better understand the TIIAP program.

### The TIIAP Program

The TIIAP program is administered by the U.S. Department of Commerce's National Telecommunications and Information Administration (NTIA). TIIAP is a competitive, merit-based grant program that provides seed money for innovative, practical information infrastructure projects by state and local governments, schools and school districts, non-profit health care organizations, libraries, colleges, public safety providers, and other non-profit community organizations. During the 1994 and 1995 grant rounds, TIIAP awarded 210 grants in 48 states, the District of Columbia and the U.S. Virgin Islands. Approximately \$60 million in Federal grant funds were matched by \$100 million in non-federal funds. A significant portion of the funding went to rural areas that are generally underserved by information technologies; disadvantaged urban Americans also benefited from a number of TIIAP projects.

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*"We are moving from an Industrial Age built on gears and sweat to an Information Age demanding skills and learning and flexibility."*

*President Bill Clinton  
State of the Union Address  
January, 1995*

*"As we work to support the President's goal of connecting all schools, libraries, hospitals to the information superhighway, we must also look beyond the connections and learn how to use the new technologies to our greatest advantage."*

*Michael Kantor  
Secretary of Commerce  
August, 1996*

## The Impact of TIIAP Projects

Two-thirds of the TIIAP projects are still underway, but in discussions with project directors and a review of project reports, a number of significant impacts are beginning to emerge.

*Innovations in Education.* Schools are using the Internet to provide teachers with new teaching tools and students with new educational opportunities. Many students in rural areas are using distance learning networks to take advanced placement courses from teachers located hundreds of miles away.

*Increased Access to Lifelong Learning Opportunities.* Small rural public libraries are expanding their services, schools are using networks to open their doors to their communities, and adult learners are improving their job skills by taking courses through distance learning networks.

*More Responsive Public Institutions.* A number of government agencies, schools, libraries, and other community organizations that previously had limited means of reaching their constituencies are now providing information to these groups over the Internet.

*Enhanced Economic Development in Rural and Disadvantaged Areas.* TIIAP grants demonstrate that non-profit and public service organizations no longer need to be bound by geography and time. For example, several small rural businesses, many with limited resources and technical skills, have now begun to market their products over the Internet.

*Increased Access to Health Care.* Many groups that previously had limited access to health care services, particularly those in rural communities, have now begun to gain greater access through telemedicine networks.

*Increased Sense of Community.* Workers in government agencies, students, health care providers and others are using e-mail and other forms of electronic messaging to expand the network of people they reach, improve service delivery, and increase their communication with others.

*Replicable Models and Strategies for Introducing Information Infrastructure into the Public and Non-Profit Sectors.* TIIAP projects receive frequent inquiries from all over the United States and other nations from people interested in learning how to implement similar projects in their communities.

Some case studies illustrate these impacts.

*Plugged In* of East Palo Alto, California has demonstrated that young people from urban, low-income neighborhoods can become providers of information technology, not just consumers. *Plugged In* operates a community access center that lets youths and com-

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### TIIAP AT WORK:

#### North Carolina Southern Rural Development Initiative (SRDI)

In rural North Carolina, a cooperative of six small wood products manufacturers are successfully marketing their products on the Internet through a project of the Southern Rural Development Initiative.

### TIIAP AT WORK:

#### Ohio NetWellness

In southern Ohio, northern Kentucky and southeastern Indiana, residents can now consult with health experts, browse directories of health professionals and services, and view thousands of health pamphlets through the NetWellness network. A project of the University of Cincinnati, NetWellness is available online from homes or through forty publicly accessible computers and several community networks in the region.

Visit NetWellness at:  
<http://www.netwellness.org>

munity members connect to the world of information technology. Working in a state-of-the-art multi-media lab, young people create multi-media slide shows about their community, conduct video-conferences with others around the nation and world, and even operate their own computer services businesses that create and sell Internet home pages for local businesses and clients around the country.

*Technical Learning Centers and Schools.* The Foundation for Educational Innovation (FEI) created a Technical Learning Center in a Washington, D.C. middle school and took students on “virtual visits” to distant museums. Over the course of the project, the project team revised its original concept for virtual visits to enable students to participate more interactively. FEI developed a three-stage model for integration of virtual visits into a science curriculum.

*The Tri-State Network Project* of Jackson, Mississippi, has shown that a community-based advanced telecommunications infrastructure can help a community further its educational and economic goals. *The Tri-State Project* is assisting educational and economic development initiatives in rural regions of Alabama, Mississippi and Tennessee.

*Charlotte's Web*, a regional computer network spearheaded by the Public Library of Charlotte and Mecklenburg County of North Carolina, has demonstrated that diverse groups such as schools, libraries, police and fire departments, and community groups can work together to create a community-wide electronic information system that residents will rely on and use. Through this network, schoolchildren and their teachers use the educational resources of the Internet and residents search through job listings, find building permit information, access a comprehensive weather service, and discuss regional issues on-line.

*The Inland Northwest Community Access Network (TINCAN)*, based in Cheney, Washington, has shown that residents in rural, isolated areas can get access to local information and to national computer networks without high costs. *TINCAN*, a community computer network, is providing six counties in rural eastern Washington state and one rural county in western Idaho with a local free-net and access to the Internet.

*The United Neighborhood Houses* has demonstrated that a small social service organization with a tight budget can use the same advanced technology information tools as large corporations to improve the delivery of services and the efficiency of its workers. Through a local and wide-area network, this settlement house organization allows workers to efficiently store and share data.

*Telecommunications Uniting Native Americans to Develop Rural Alaska (TUNDRA)*, in Bethel, Alaska, has demonstrated that rural groups can overcome a core obstacle to the full implementation of the NII: the cost of the “last mile” in delivering services. Working with a

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## TRIMS AT WORK:

*Tennessee*  
Tennessee Reporting and  
Improvement Management System  
(TRIMS)

The University of Tennessee in Knoxville has created a database system that provides “one-stop shops” for adult education and employment training in a four-county area of Tennessee. A successful model, TRIMS is now being adopted by the state’s Department of Human Services as the basis for its statewide welfare reform monitoring and performance accountability system. Visit TRIMS at: <http://www.coe.utk.edu/literacy/trims.html>

large consortium of public and private organizations, *TUNDRA* has reduced the cost of reaching a telecommunications network access point in western Alaska, allowing the people of the Delta region of Alaska to access the Internet and to communicate with other native Alaskan villages.

*SmartCities*, a project of the Kansas City Area Development Council, has demonstrated that a regional development group can accelerate the deployment of advanced telecommunications technologies to attract businesses and create jobs. Working with a broad coalition of public and private sector organizations, the group developed a blueprint for modernizing the information infrastructure in the greater Kansas City area, thus contributing to the region's reputation as a leading-edge area for doing business electronically.

*Coordinated Care for Tuberculosis Patients.* In New York City, a project led by Columbia University has demonstrated that the information infrastructure can be used effectively to fight serious health problems, such as tuberculosis. This consortium of health care providers and private agencies has established an electronic sharing of TB case reports, automated protocols to detect new cases of TB, wireless links between visiting nurses in patient homes to health records stored at the hospital and a touch-screen kiosk at clinics that provides health information for TB patients. As a result, patients receive better care and health agencies have greater control over the spread of infectious disease.

*Making Healthy MUSIC.* In New Jersey, a coalition led by the Newark Public Schools has created an electronic community network that is helping to revitalize an inner-city community by facilitating better communication among its residents. The project is also redefining the relationship between the local school and the community in order to foster higher levels of student literacy.

## Getting Started

Successful TIIAP projects are usually the result of careful planning. Planning helps to create a disciplined, business-like approach to the project and fosters communication with other groups, often leading to partnerships. TIIAP projects demonstrate how to plan the successful introduction of information technology into a public service setting.

In general, steps in the planning process include:

*Gathering Information.* A first step in the planning process is gathering information about community needs, available assets and resources, existing information infrastructure, end-user training requirements, and related issues.

*Developing a Business Plan.* It is important to have a plan that defines project goals, describes the specific problems or needs to be

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*"The TIIAP program gave us a reason to sit down and talk to people and accomplish objectives, whereas we otherwise would have never done it."*

*Dell Kinlaw*  
South Carolina State Budget and  
Control Board,  
Columbia, South Carolina

*"Without solid evidence of programmatic and productivity gains from networking, executive directors and funders take a leap of faith when they commit to the large initial investment and high annual maintenance and training costs required to wire-up their organizations."*

*Maxine Rockoff*  
The United Neighborhood Houses of  
New York  
New York, New York

addressed, lists potential project partners and their roles, identifies staffing requirements, outlines a marketing strategy, proposes a detailed budget and timeline, and includes a transition plan that addresses how the project will be financially sustained over time.

*Developing an Evaluation Plan.* It is important to have an evaluation plan that identifies project goals and desired outcomes, and provides a means of measuring the extent to which such outcomes and goals are met. Such a plan provides important feedback on key issues at periodic points in the development of the project.

*Identifying Potential Sources of Funding.* TIIAP requires that projects receive financial support from multiple sources, which may include corporate and foundation funding, third party in-kind donations of goods or services, fees for services rendered, other Federal grants, or state, tribal, local and/or non-Federal grants. Financial support brings legitimacy and status to a project, often making the organization a more serious contender for additional funding.

*Soliciting Potential Project Partners.* Project partners can play critical roles in providing advice, leveraging financial support, and serving as powerful community advocates for a project. The best partners are often drawn from local organizations, particularly those that complement the talents and resources of the project group. Potential partners include end-user organizations, equipment vendors, technical consulting firms, and government entities.

*Planning for Sustainability.* Planning for sustainability is an ongoing pursuit that must begin at an early stage in project development. Ideally, funding to sustain a project should come from many sources, and should be in return for a variety of services.

*Determining Which Technologies to Use.* Although technology choices must be tailored to the specific needs of each project, the current pace of technological change greatly complicates the task of selecting appropriate technologies for a project. In general, project directors should carefully follow technology trends, remain flexible, and be prepared to shift or adapt to unplanned contingencies.

*Replicating Model Projects.* A principal feature of the TIIAP program is to support the development of projects that can serve as models that can be adopted in other locales. A new group seeking to develop a service like the model service should learn what happened in the model project, extract the core elements that span specific social, economic, and technological contexts, and adapt the model to the new context, taking into account the unique social, economic, and technological context of the community where the application must take root and grow.

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*"The technology doesn't have to be leading edge, but it should have a long enough life cycle to meet your project needs."*

**Wayne Little**  
Kansas City Area Development  
Council  
Kansas City, Missouri

## Moving Forward

TIIAP projects offer valuable and practical lessons about implementing new information infrastructure projects in a variety of settings and about transforming a plan into a working project. Among the steps identified as necessary to set a plan in motion are the following:

*Hiring and Managing Staff.* Before recruiting and hiring staff, project leaders should have a clearly defined organizational structure in mind, define staff roles clearly, and know what qualities are desirable in new employees. Staff should understand and support the project mission, and be able to interact with both technical and non-technical people. TIIAP project directors recommended the hiring of local people, noting that college students and volunteers can often be valuable sources of labor.

*Working With Partners.* Although developing and maintaining strong relationships with project partners requires significant time and effort, such partnerships can be mutually beneficial when expectations and responsibilities are clearly understood by each group. Working with private sector partners requires an understanding of company goals, organizational structure, and procedures. Working with non-profit partners often requires making the project's service so valuable to that organization that it is willing to adopt it and pay for it from their operational budget once initial funding has come to an end.

*Marketing the Project.* It is important for non-profit organizations to think like businesses. Such thinking involves researching potential markets, targeting services and products to clearly defined groups, and following-up with strong customer service.

*Working With Equipment Vendors and Technical Consultants.* Selecting equipment vendors and technical consultants requires careful research, knowledge of the equipment and services that are needed, a realistic budget, and clearly stated expectations regarding timelines and delivery schedules.

*Managing Costs.* Although some project costs can be anticipated and built into a project budget, other costs are sometimes hidden or can quickly escalate well beyond the initial project budget. This latter category includes costs of training end-users, retro-fitting old equipment, internal wiring, ongoing equipment maintenance, and network connections. This report identifies strategies for dealing with and satisfactorily resolving each of these cost issues.

*Working With End-Users.* A project's ultimate value to the community is based on how well it meets the needs and wants of the end-users — the individuals that must interact directly with the new technology — and the people that they serve. Achieving this goal can be challenging because end-users often have had limited experience with new technologies. Overcoming this obstacle requires training and time. End-users also want a service that is

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### TIIAP AT WORK:

#### *Nevada* More Than Geometry

"One of our geometry classes had **keypals** in Oregon. They would share geometry problems that were representative of the uniqueness of the region. While corresponding, they were able to dispute unsavory stereotypes about each state, especially Las Vegas. So there is a lot more learning and sharing going on than just geometry when students connect with students via the Information Superhighway."

**Cynthia Montoya**  
Green Valley High School  
Henderson, Nevada

*"We are embarking on a long journey toward what we believe is a shared goal — bringing the benefits of the Information Age to all our citizens."*

**Ronald H. Brown**  
June, 1995

easy to use and **that** quickly displays content that is useful, timely, and well-organized.

## Next Steps

Lessons learned to date from TIIAP projects suggest that TIIAP is serving important needs in the community. First, the projects are helping cities, schools, libraries, economic development groups, police and other public safety departments, and social service organizations to become anchor tenants on the National Information Infrastructure (NII) and thereby attract others to use the NII. Second, **the** role of many government agencies, libraries, schools, and other information agencies is changing from information repositories to customer-driven service providers. Third, it is raising **the** level of information technology skills in the community as TIIAP projects train people in their local communities **who** in turn become trainers of others.

By seeding these projects across the country, TIIAP is:

Helping to build a critical mass of users for the NII;

Adding discipline to the process of planning local NII applications;

Showing the private sector the feasibility of some telecommunication applications that they might otherwise have passed over; and

Helping to close the gap between the information “**haves**” and “**have-nets**” by extending access to the information superhighway to remote rural communities and inner-city neighborhoods.

In creating **new** telecommunications applications, the TIIAP projects are building and strengthening local communities and helping people to work more productively, to improve literacy and education, and to receive better medical care. In this way, TIIAP is a catalyst for economic, educational, and social development in communities through information infrastructure.

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To learn more about the *Telecommunications and Information Infrastructure Assistance Program (TIIAP)*, call 202/482-2048, or visit the TIIAP Home Page on the World Wide Web at <http://www.ntia.doc.gov/tiiap>

## Introduction: The Telecommunications and Information Infrastructure Assistance Program (TIIAP)

*In rural Hays, Kansas, home health aides are checking up on their elderly home-bound patients using two-way video links. These video house calls are saving driving time for the home health aides, enabling them to serve more patients and allowing more elderly citizens to stay at home instead of a nursing home.*

*Public safety officials in the tri-cities area of El Paso, Texas, Las Cruces, New Mexico, and Ciudad Juarez, Mexico are using a video conferencing network to create a virtual consolidation of the region's law enforcement agencies. Suspects are being arraigned remotely, avoiding security and transport costs, and police officers hold case conferences with prosecutors, speeding up investigations.*

*A team of thirteen year-olds from inner-city neighborhoods have become so proficient in computer and Internet technology that they are selling their Web page design services to local businesses. The youths are developing their skills at an after-school education center, in East Palo Alto, California.*

These examples offer snapshots of the potential of emerging telecommunications and information technologies to improve delivery of vital public services. The increasing deployment of high-speed fiber optic communication links, the development of new wireless communication technologies, the explosion of new services and information available on **the** Internet and the World Wide Web, and the innovation that will result from the recent passage of the Telecommunications Act of 1996 collectively represent a tremendous opportunity. Information technology presents us with **new** tools **that** communities can use creatively to provide improved education for their children and lifelong learning for adults, better health care to all its residents, and increased communication and civic participation among its citizens. The Telecommunications and Information Infrastructure Assistance Program (TIIAP) was created to help us, as a nation, make the most of this opportunity.

The TIIAP is a competitive, merit-based matching grant program that provides assistance to public and non-profit sector organizations with creative approaches to applying these new tools to solve community problems and **meet** community needs. The program does not support the development of new technologies, nor does it aim to build new telecommunications infrastructure through the construction of new facilities. The focus of the program is on the use of information infrastructure in providing services to communities.

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*The landmark **Telecommunications Act Of 1996** will open up competition among local telephone companies, long distance service providers, cable companies, cellular providers, and others. Competition will result in lower prices, greater choice, and increased innovation.*

TIIAP projects focus on practical applications, demonstrating not only the delivery of improved services, but also that services can be provided more effectively and efficiently. The technologies employed may not be “cutting-edge” in and of themselves, as this is an applications program, not a technology program. Often, however, the knitting together of the technologies into a practical system for improving services is highly innovative.

In its first two years, TIIAP funded 210 projects, representing a diverse collection of ideas, serving communities in 48 states, the District of Columbia, and the U.S. Virgin Islands. These projects have ranged from providing emergency medical consultations to remote rural areas, to redefining the role of a metropolitan public library, to taking school children on “virtual visits” to distant museums. City governments are making their services more accessible to their citizens. American Indian tribes in the Pacific Northwest are using electronic networks to coordinate management of jointly-operated fisheries. Human service providers are offering their clients one-stop shopping access to multiple public and private assistance programs. Children are learning about the environment by examining real-time data provided by buoys floating in the Chesapeake Bay. The portfolio of projects is so diverse because the program has responded to the needs and ideas that communities have expressed through their grant applications. Each application represents a community’s vision of how they can begin to realize the potential of the emerging information infrastructure.

### TIIAP Tenets

The grant proposals that survive the rigorous competition for award reflect the principles laid out in the Clinton Administration’s *Agenda for Action*. These tenets are reflected in the criteria used to select TIIAP grant recipients. Four of these criteria bear special mention.

**Partnerships.** As budgets for state and local governments and for non-profit institutions are shrinking, it becomes vital that these organizations fully tap the resources in their communities and seek synergies through resource sharing and collaboration. Furthermore, many community services, such as health and public safety, are greatly enhanced by teamwork among multiple agencies or providers. The TIIAP projects show how such collaboration can be enhanced through electronic communication. The program has also emphasized the importance of public-private partnerships, encouraging applicants to establish relationships with the private sector. The matching funds requirement of the program has led to many productive partnerships between non-profit organizations and telecommunications companies, computer companies, and other businesses. While some partners are corporate giants, applicants often join with local small businesses, such as computer suppliers and Internet service providers, or with local chambers of commerce.

**Support for End-users.** TIIAP defines an “end-user” as one who must interact directly with the information service that is being

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### TIIAP AT WORK:

#### *Louisiana* Greater New Orleans Free-Net

A unique collaboration of public, private, and non-profit partnerships in a nine-parish region surrounding New Orleans have created a regional community network to communicate, exchange, and access information, both local and global in nature. These dynamic partnerships, from K-12 schools to the Chamber of Commerce, have created a sense of working together to introduce a wide spectrum of organizations to the new information technologies and their myriad uses.

created. The end-users may be teachers, students, nurses, physicians, patients, police officers, librarians, social workers, and members of the general public. TIIAP encourages applicants to focus carefully on the needs, the skills, and the working environments of a project's targeted end-users.

*Providing Access to the Underserved.* Studies, including NTIA's *Falling Through the Net: A Survey of the "Have Nots" in Rural and Urban America*, have documented significant disparities in access to computers and on-line networks such as the Internet. TIIAP has focused from the start on the need to reduce these disparities through projects that extend access to the information infrastructure and its benefits to communities that are in danger of being left behind. In particular, the program has targeted rural areas, which are often the last to receive new services and which can use telecommunications to overcome the barriers of distance and isolation, as well as the inner cities, where the persistence of poverty often limits access to emerging technologies.

*Evaluation.* Each organization funded by TIIAP must evaluate its implementation of the project. The program encourages examination of the implementation process and how the technology is used. Most importantly, each organization should look at outcomes, asking questions such as, "Has the project helped students perform better?" "Have more children been immunized?" "Has the average response time to a fire alarm decreased?" In addition, the TIIAP program asks similar questions of itself. As a new program, it continually re-examines its own policies, and works with other Department of Commerce offices, including the Office of Inspector General, and the Office of Executive Assistance Management, to ensure the maximum return on the Federal investment. The program has undertaken a broad set of assessment activities in accordance with the Government Performance and Results Act. These activities will provide a comprehensive program of performance measurement and evaluation consistent with the program's intent to share what it learns.

## Beyond Connections

The program highlights partnerships, end-users, and evaluation because of a belief that the technology alone is not the answer. The challenge for the nation is to shape the technology into productive tools that benefit society. Americans must also be trained to use these tools.

TIIAP is a catalyst; its mission is to promote the widespread and efficient use of advanced telecommunications services in the public and non-profit sectors. The program helps to speed the development of the national information infrastructure by supporting model projects that will identify obstacles and demonstrate solutions. While private industry is rising to meet the challenge of connecting schools, libraries, and hospitals to the information superhighway, TIIAP is looking beyond the connections to examine how the technology is used and how it can bring most benefit.

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## TIIAP AT WORK:

Texas

### NETmobile

The University of Texas-Pan American has developed "NETmobile," a mobile Internet computer classroom that helps business owners, farmers, students, teachers and government officials in 19 rural counties of southern Texas get access to the Information Superhighway. Visit the NETmobile website at <http://coserve1.panam.edu>.

## TIIAP AT WORK:

Washington, DC

### Virtual Visits

The Foundation for Educational Innovation, in Washington, D.C., found that a virtual visit to a museum that only featured a guided tour would not hold the attention of K-12 students — students were most engaged when they could interact directly with other students on collaborative projects.

Each of the TIIAP projects benefits its local community directly by offering new or improved services, but **each** also plays a greater role. From the start, TIIAP has emphasized the selection of projects that can serve as national models. These projects are selected for their potential to be trailblazers, to show what works and what does not. As communities struggle with the challenges **that** innovators face and as they succeed in offering new and exciting services, valuable lessons emerge.

## Lessons Learned

This report documents the initial lessons learned from the TIIAP projects that were funded in 1994 and 1995. Material for the report was gathered from a workshop and focus group sessions conducted with TIIAP project directors in June, 1996. The report is also based on information taken from quarterly and final project reports submitted to NTIA, as well as from project literature and selected interviews. The report is not intended to be a definitive evaluation of the TIIAP program, as two-thirds of these projects are still underway. Rather, it is intended to serve as a practical planning and implementation guide for government agencies, school districts, libraries, community groups, and other organizations that are planning their own information infrastructure projects, and as a general progress report for those with an interest in TIIAP.

The report emphasizes issues associated with the application of information infrastructure technologies in public and non-profit sector organizations. It also describes some of the economic, social, and organizational impacts of TIIAP projects and examines the evolution of projects from their start-up phases through the delivery of reliable and financially sustainable services. A number of general findings are then summarized, along with a few implications for the TIIAP program as it moves forward.

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### **TIIAP AT WORK:**

#### *North Carolina* **NC TeleMed**

The State of North Carolina has implemented a pilot emergency telemedicine network that provides small rural hospitals with access to the expertise of the State's four academic medical centers. Local physicians use high-quality video teleconferencing to consult with remote specialists, who can also view high resolution X-rays and CAT scans of the patients. The project uses state-of-the-art ATM technology.

## The Impact of TIIAP Projects

TIIAP was created to promote **the** widespread availability of advanced information applications in the non-profit and public service sectors. Although in existence for only two years, the program's results are increasingly apparent. TIIAP access grants have helped students, displaced workers, at-risk youths, and citizens in remote and economically disadvantaged areas to seize the opportunities of the information age. TIIAP demonstration grants are providing replicable models to teach public service organizations how to use the information infrastructure.

### Significant Impacts

Two-thirds of the TIIAP projects are still underway, but in discussions with project directors and a review of project reports, a number of significant impacts are beginning to emerge.

*Innovations in Education.* Schools are using the Internet to provide teachers with new teaching tools and students with new educational opportunities. Many students in rural areas are using distance learning networks to take advanced placement courses from teachers located hundreds of miles away. In many instances, these advanced math, science, foreign language, and other courses were previously unavailable in rural schools.

*Increased Access to Lifelong Learning Opportunities.* Small rural public libraries are expanding their services, bringing the resources of large university libraries to their patrons. Schools are using networks to open their doors to their communities, often serving as the hubs for broad-based community networks. Adult learners are improving their job skills by taking courses through distance learning networks.

*More Responsive Public Institutions.* A number of government agencies, schools, libraries, and other community organizations that previously had limited means of reaching their constituencies are now providing information services to these groups over the Internet. Such information includes garbage collection schedules, school lunch menus, library events, tax information, and safety notices from the police. Government workers, librarians, teachers, health care professionals, police officers, social workers and others are changing the way they deliver services and re-training their

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### TIIAP AT WORK:

#### *Nebraska* **InterLinc**

In Lincoln, Nebraska and surrounding Lancaster County, over two dozen public sites with Internet access are helping urban and rural residents discover what services are available to help them. Residents can register to vote on-line, and soon will be able to apply for and purchase various permits on-line. Learn more about InterLinc at:

<http://interlinc.ci.lincoln.ne.us>

work forces to function more effectively and efficiently using information technologies. For example, access to a community immunization database allows a pediatrician to determine instantly if the toddler she's examining is due for a shot. A caseworker can check if the young mother he is counseling is eligible for assistance from any of dozens of different community programs with a few simple database queries.

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## TIIAP AT WORK:

### *New Hampshire* **SafetyNet**

The Children's Alliance of New Hampshire is helping families who need social services by finding the appropriate programs to meet their needs. In one stop, residents can determine their eligibility for services from over fifty organizations.

*Enhanced Economic Development in Rural and Disadvantaged Areas.* TIIAP grants demonstrate that non-profit and public service organizations no longer need to be bound by geography and time. Several small rural businesses, many with limited resources and technical skills, have now begun to market their products over the Internet. In other instances, individuals in rural and disadvantaged areas have gained greater access to job information and training opportunities via the Internet.

*Increased Access to Health Care.* Many groups that previously had limited access to health care services, particularly those in rural communities, are gaining greater access through telemedicine networks. Health care workers have been able to target their immunization programs more effectively because of access to an integrated immunization database. Increasingly, public health officials have instant access to information that helps them prevent the spread of disease.

*Increased Sense of Community.* Workers in government agencies, students, health care providers and others are using e-mail and other forms of electronic messaging to expand the network of people they reach, improve service delivery and increase their communication **with** others. An increasing number of senior citizens are acquiring computer literacy skills and using the Internet to gain information and to communicate with others who share common interests. Community residents are using electronic networks to discuss local issues and take steps to improve their neighborhoods.

*Replicable Models and Strategies for Introducing Information Infrastructure into the Public and Non-Profit Sectors.* TIIAP projects receive frequent inquiries from all over the United States and other nations from people interested in learning how to implement similar projects in their communities. Before people and communities make large investments in telecommunications and information infrastructure, it is vital that they find out what works and what does not. In addition, projects that have started out as small-scale demonstrations have become blueprints for regional or statewide implementations. Moreover, many of the projects are developing tools, such as software and network configurations, that can be used by other organizations.

TIIAP projects also have encountered a number of unanticipated effects and indirect benefits. For example, students have turned their training in Web page creation into an economic opportunity: they are earning

money by creating Web pages for local organizations. In addition, racial tensions in one community were reduced as different ethnic groups began to communicate on-line through their respective community information centers. In another instance, a student who was a poor performer with weak grades became a local star by taking an interest in a TIIAP project and acquiring information design skills. As other students began to seek him out for help, his confidence grew and better grades followed.

The most significant indirect benefit identified by many of the TIIAP project directors has been an increased level of collaboration across agencies, particularly at the middle management level. Such increased communication has led to many new collaborative activities.

In even a short time, TIIAP has accelerated the non-profit and public service potential of the information infrastructure. As seen in the case studies that follow, TIIAP projects are accumulating experience that others can use to reduce the uncertainties associated with investing in new technologies and, ultimately, lower their costs.

## Case Studies

### *Plugged In*

East Palo Alto, California

Can young people from an urban, low-income neighborhood realize that they can become providers of information technology, not just consumers?

Yes, they can, and Plugged In Enterprises, Inc. demonstrates innovative ways they can operate their own computer services business. Plugged In operates a community access center that lets youths and community members connect to the world of information available through the Internet. Every day, youths drop by Plugged In to work in a state-of-the-art multi-media lab, creating home pages, and videoconferencing with others around the nation and the world. Their imaginations have been captured by the excitement of information technology, where it can take them and what it can do. For example, teens involved in *Plugged In* create and market World Wide Web home pages for local businesses and clients around the country.

Children in low-income areas like East Palo Alto have fewer resources than children in neighboring affluent communities. Access to the Internet for information searches open new vistas not only for homework assignments but also for job possibilities. Teens in the community suffer from a lack of challenging and engaging after-school activities. Electronic teen discussion groups, like those offered at *Plugged In*, help them develop job skills, leadership potential, and self-esteem. They learn about teamwork.

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*“The TIIAP project started out as a demonstration project and quickly transformed into the first phase of a statewide implementation.”*

**Jeffrey Wehl**

Michigan Association for Local Public Health

Lansing, Michigan

*Plugged In* offers free access and training to the community at large because most residents of this low income community cannot afford computers or Internet connections. Community adults face a highly competitive and technically sophisticated marketplace in which computer literacy is increasingly required. Low cost training in a supportive environment has helped to address the problems of technophobia and educational disadvantage.

*Plugged In* is working with the community, and in the community, to make sure that residents of the community have the computer skills necessary for success in today's economy. Partnerships make it work. *Plugged In's* success is made possible by partnerships with leading Silicon Valley companies and individuals. These partnerships include financial contributions, equipment donations, and volunteer involvement. Prominent corporate partners and individual leaders have come together to turn emerging technologies into solutions for many of the problems facing East Palo Alto.

Visit *Plugged In* on the World Wide Web at <http://www.pluggedin.org>.

*Technical Learning Centers and Schools*  
Foundation for Educational Innovation  
Washington, D.C.

Can a middle school use new technology to energize its students and develop new methods of teaching? The Foundation for Educational Innovation (FEI) worked with the Roper Middle School in Washington, D.C. to create a *Technical Learning Center* and take schoolchildren on "virtual visits" to distant museums and develop a new approach to teaching science.

FEI installed computer workstations at teachers' and students' desks and provided access to video conferencing facilities for students at Roper Middle School to create a *Technical learning Center*. The learning center was used as the hub for a series of "virtual visits" to museums. In a virtual visit, students and their teacher are connected via live video links to an "explainer" at a remote museum. The explainer speaks to the class, discussing exhibits that can be seen at the museum. As the project developed, FEI found that the approach they had been taking with virtual visits did not hold the attention of the students—they needed to find an alternative that allowed the students to participate more actively and to integrate the "virtual" experience into a clearly defined curriculum.

The project team worked with the JASON project, an underwater exploration project that can be used in science instruction. The team developed a curriculum based on a "Brief, Perform, Debrief" model. First, students studied water samples from the nearby Anacostia River and posted their findings on the Internet to get feedback from other students and experts. Next, the students linked with the JASON project to participate with other students around the country in a live exploration of the Florida Keys. In the "Debrief" phase, the teachers worked with students to understand what they had learned in the context of

their local environment. This new approach proved more successful than the original vision for the virtual visits.

In addition to developing a new curriculum model for virtual visits, FEI learned lessons about the way students interact with and perceive new communication technologies. For example, they set up live video teleconferencing over the Internet, but found that **the** video quality did not meet the students' high expectations for communication quality. However, they found that students did respond to the interactive nature of electronic mail and that the establishment of dialogues with other students across the country or even the world was more **important** than medium, whether text or video, with which those dialogues were conducted.

*The Tri-State Network Project*

Mississippi Department of Economic and Community  
Development  
Jackson, Mississippi

Can a community-based advanced telecommunications infrastructure help a community further its educational and economic goals?

Yes, and *The Tri-State Network* demonstrates that, working together, a community can develop a tool that can enhance the educational and economic development of the entire region.

The *Tri-State Network* Demonstration Project is impacting a region that includes parts of Alabama, Mississippi, and Tennessee. The project has implemented a community-based advanced telecommunications infrastructure that supports economic development efforts, focusing on Tishomingo County in northeast Mississippi as well as parts of Alabama and Tennessee. The advanced system includes two-way interactive video communications, two-way interactive data communications, Internet connectivity, voice-based information services, and a gateway to all existing Mississippi networks. Originally conceived as an educational initiative, the project has grown to encompass a more systemic approach to educational and community restructuring, including the development of an interactive framework and technological infrastructure to support the simultaneous advancement of the educational, economic, and social/cultural goals of the people in the Tri-State region.

Several network-based activities have been developed to support education, as well as business and industrial recruitment for **the** Tri-State area. In order to promote the marketing and development of an integrated business incubator, a 20-minute animated video "fly-through" of a large tract of land and buildings, formerly government-owned, has been produced. Consisting of an electronic compilation of existing studies, maps and other demographic data, the video will allow customized visualization of the site for potential business, commerce, industry, recreational enhancement or other land resource uses for future marketing and development of the area. In addition, a geographical information system (GIS), which electronically shows maps of the counties in the Tri-State region, is available on the network.

Educational enhancement for the region is also a focus of the project. For example, a prototype for a comprehensive cultural and educational network for schools and **the** community has been created by developing an electronic classroom at the Smithsonian Museum of Natural History in Washington, D.C. The classroom will eventually link local schools to the museum's vast resources for use as an educational tool for teachers and students at remote sites. Teachers from the Tri-State region have traveled to Washington to preview the classroom. The trip provided background for curriculum development for teaching modules **that** will use the Smithsonian's resources which can be accessed by students and teachers in the Tri-State region.

In order for the network to be used effectively, support for **the** general end user, and particularly educational and industry/business specific training on the use of the network, was essential. A comprehensive training plan was developed. Trainers traveled throughout the region, to Tishomingo County in Mississippi and into Alabama, to hold training sessions for people in the community to learn how to use the network. Community response has been enthusiastic. In Belmont, Mississippi, for example, the community realized the importance of adding a training facility at the local high school and contributed financially to make the lab a reality for students, teachers, and the community. Area businesses requested and received customized computer training sessions for their employees. In addition, local businesses discussed how to set up home pages on the Tri-State Web site.

Visit The Tri-State *Network* Project at <http://www.tristatenet.org>.

*Charlotte's Web*

Public Library of Charlotte and Mecklenburg County  
Charlotte, North Carolina

What is **the** role of a local public library system in the information age? The answer may be emerging on *Clzadoffe's Web*, a regional computer network with a broad range of information providers and users. *Clzadoffe's Web* was developed by the Public Library of Charlotte and Mecklenburg County (PLCMC) of North Carolina and a broad coalition of public and private organizations.

*Charlotte's Web* provides free access to community information, education services, library materials, and communication services. In addition to local libraries and schools, content providers include **the** police and fire departments, the building department, the local public television station, and many others. Users can find job listings, building permit information, comprehensive weather information, activities for children, and discussion groups about regional problems — among hundreds of other topics and communication services.

*Charlotte's Web* has also worked diligently to extend access to its services and train both content providers and users. *Clzadoffe's Web* has provided extensive training for public school teachers and has worked with the Charlotte schools to offer access to *Charlotte's Web* and the World Wide Web through computers in classrooms and school

libraries. The school system has developed a series of World Wide Web pages that link to curriculum materials for teachers and educational resources, such as web sites relating to math and science, for students. They have also set up public access terminals at library branches, neighborhood youth centers, and senior citizen centers, among other locations. They have developed a low-cost kiosk with a touch screen for use in public locations. In addition, *Charlotte's Web* has recruited volunteers (over 100 active volunteers at any given time) who serve as trainers of information providers and end-users. In their first year of operation, the volunteers contributed the equivalent of over \$150,000 in hourly services.

Replication and extension of the *Charlotte's Web* model are also underway. Local mini-hub sites have been established in the greater Charlotte region and the *Charlotte's Web* Mini-Hub software, documentation, and training materials have been distributed over the Web to hundreds of libraries, community organizations, and individuals across the country. In addition, the project has tackled legal and policy issues: It has developed a User Agreement and Acceptable Use Policy on topics such as intellectual property protection, system security, and appropriate usage standards.

PLCMC was named the 1995 Library of the Year by *Library Journal* for its efforts to build the "library of the future."

Tour *Charlotte's Web* at <http://www.charweb.org/home.html>.

*The Inland Northwest Community Access Network*  
(*TINCAN*)  
Eastern Washington University  
Cheney, Washington

Can citizens in rural, isolated areas get access either to local information or to national computer networks without high costs?

Yes, *TINCAN*, a community computer network, is providing six counties in rural Eastern Washington and one rural county in western Idaho with a local free-net and access to the Internet.

TIIAP provided start-up funding for *The Inland Northwest Community Access Network (TINCAN)* to serve Spokane, Stevens, Ferry, Pend Oreille, Whitman and Lincoln counties in Washington, and Kootenai county in Idaho. These are some of the poorest counties in the State of Washington, and some of the counties most difficult to reach with telecommunications. The network serves schools, governments, businesses, and everyday people who need to access information. It offers on-line public forums where citizens can discuss regional issues. *TINCAN* is used by colleges to deliver classes to place bound students in these remote communities; by city and county governments to post minutes of meetings, permit requirements, and other information that local residents need to be effective citizens; and by churches, clubs, non-profit agencies and others who want to share information about their activities with the larger world. An organization of older residents shares

information on services and activities for seniors in the region; a group of people with disabilities lists all accessible housing; and the arts community has an arts calendar and on-line discussion groups. The region is information rich, where before it was isolated.

Access to the Internet is critical for rural communities. But bringing the Internet to rural areas is not a trivial feat. Most rural communities in the area can use the Internet only by paying long distance charges, which makes it prohibitive for schools, individuals, and businesses to access information through the Internet. *TINCAN* spreads the cost of access across the entire network, making use of collaborative arrangements, such as shared T-1 lines, to ensure that rural residents can get on-line without long distance charges.

*TINCAN* has been a catalyst for a vibrant collaborative effort that has involved both the public and the private sector. New equipment has been donated by private industry. A local small business Internet provider donated the Internet connection. Both public and private sector organizations donated technical expertise to design and install the computer network. Their efforts not only got the system on-line, but also in the process they trained college students who serve as the system administrators. Since the project has operated from the beginning as a collaborative effort, all organizational partners contributed and all benefitted.

*The United Neighborhood Houses*  
New York, New York

Can a small social service organization with a tight budget use the same advanced technology information tools as large corporations to improve the efficiency of its workers and the delivery of services and education to its clientele?

Yes, and *The United Neighborhood Houses (UNH)* of New York City demonstrate how other public service providers can, too. *UNH* has created a model computer network that links *United Neighborhood Houses* offices with five settlement houses, supporting 250 work stations. Through the local area network (LAN) in each building and the wide area network (WAN) linking the buildings throughout the city, *UNH* workers are able to share data and access records from a number of different agencies, and, through *UNH* "family rooms", local residents are able to acquire basic educational and computer skills, connect to the Internet, and access job listings. In addition, each *UNH* system user has a personal Internet address for e-mail. In effect, *UNH* settlement houses have become public telecommunication centers.

Using the *UNH* system, a social worker was able to assist a recent Chinese immigrant by accessing information over the Internet from China about mental health treatments. In other instances, adults have received English-as-a-second-language (ESL) and graduate-equivalen-

cy degree (GED) instruction, 6-to-12 year old “latch-key” children have received after-school computer skills training, and pre-schoolers have gained access to HeadStart program instruction and play therapy on the *UNH* system.

In addition, the *UNH* project is tackling some important economic issues. Wrestling with the high cost of installing and maintaining equipment, they have contracted with a local technical college and are using student interns to reduce these costs. They are also working on cost and organizational models for others who would like to replicate their work.

*Telecommunications Using Native Americans to Develop  
Rural Alaska (TUNDRA)*  
Bethel, Alaska

How can rural groups overcome a core obstacle to the full implementation of the NII — the cost of the “last mile” in delivering services?

*Telecommunications Using Native Americans to Develop Rural Alaska (TUNDRA)* is demonstrating how to surmount this obstacle. Large portions of the information superhighway have been built and the cost to use it from any network access point is dropping. In many remote or isolated communities, however, the cost of reaching a network access point may be prohibitive. In rural western Alaska, the cost of a telephone call from a village to a network access point in Anchorage is \$24 per hour during the daytime. *TUNDRA* has reduced this cost to \$4 per hour in the daytime and \$2 per hour in the evening.

In addition to lowering telecommunications costs, *TUNDRA* is providing needed hardware, Internet training, and is setting up local communication services as well as links to major information services in Alaska. This means that the people of the Delta in Western Alaska can not only access the Internet, but also communicate with people in other local villages and link to database services and professional service providers in Alaska. Children in rural villages can access the same Internet resources as children in urban areas who live close to network access points; village clinic health aides can communicate with health care professionals in Bethel; and village residents can access the State Library Electronic Doorway (SLED) and the University of Alaska Computer Network.

One of the important features of *TUNDRA* is that it has been developed by a public-private partnership, led by the Distance Delivery Consortium and Bethel Broadcasting, Inc., but connects to AT&T/Alascom, a commercially owned and operated network. *TUNDRA* also complements satellite delivered education services offered through the Distance Learning Consortium. Like many TIIAP projects, *TUNDRA* has led to a valuable indirect benefit of fostering greater cooperation and of sharing technology among local organizations.

### *SmartCities*

Kansas City Area Development Council  
Kansas City, Missouri

How can a city or region accelerate the deployment of advanced telecommunication services? What benefits can they derive from a robust telecommunications infrastructure?

The Kansas City Area Development Council is addressing both of these questions through its *SmartCities* project. Working with a broad coalition of public and private sector organizations, the Kansas City Area Development Council developed a blueprint for modernizing the information infrastructure in the greater Kansas City area. Their efforts have been extremely fruitful, having resulted in the accelerated deployment of advanced technologies and services. For example, integrated services digital network (ISDN), a high speed digital transmission service, has been deployed by SBC in the Kansas City area two years ahead of schedule. Further, it is available to all citizens in the metropolitan community.

A number of new services and benefits have followed these efforts. For example, over 25 Kansas City area civic and business leaders are linked via a video conferencing network. Also, the accelerated availability and use of the Internet has resulted in a large scale community network, developed in collaboration with the Greater Kansas City Chamber of Commerce. The network connects the majority of small businesses, suburban and metropolitan communities, and service organizations. Also, there has been a large scale development of Internet home pages by local businesses.

These advanced technologies and associated services are helping attract new businesses to the Kansas City area. Companies seeking to build in a particular area can access local zoning regulations and communicate with the Chamber of Commerce as well as with city agencies. Through the network, business prospects can tour real estate, interview local businesses and receive presentations via video conferencing.

The *SmartCities* project also has given Kansas City a reputation as a leader in adopting new technologies. The group has received significant media attention in national magazines and newspapers, which have described Kansas City as “wired for the information highway,” and as a “cybercity.” This attention further supports their goal of attracting new business.

Visit *SmartCities* on the World Wide Web at: <http://www.smartkc.com>.

### *Coordinated Care for Tuberculosis Patients*

Columbia University  
New York, New York

Can the information infrastructure be used to combat serious public health problems such as tuberculosis?

Columbia University, the New York City Department of Health, and the Visiting Nurse Service are using a variety of advanced information and telecommunications technologies for tuberculosis (TB) detection, treatment and prevention. The project is employing a four-pronged approach.

First, the project has linked the information systems of the three agencies, enabling the electronic sharing of case reports by the different health care professionals that are involved in the ongoing care of TB patients.

Second, the project has automated protocols for detecting new cases of TB. Lab results are automatically analyzed and checked for signs that indicate possible TB cases. Confirmation of new cases of tuberculosis at the Columbia-Presbyterian Medical Center automatically triggers electronic mail messages to the city health department, who is responsible for tracking the spread of the disease.

Third, the project employs wireless communication links between visiting nurses in patient homes to health records stored at the hospital. Visiting nurses retrieve lists of patients and relevant data as they go about their home visits, and they update records as they meet with patients. The fourth element developed by the consortium is a touch-screen kiosk, in English and Spanish, that provides health information for TB patients. The kiosk, located in one of the city's TB clinics, is used frequently; over 250 pages are accessed each clinic day. Physicians report that the patients they see are more engaged in discussions about treatment and are asking more informed questions than before.

A formal evaluation of the project is underway, but anecdotal evidence indicates the effectiveness of information technology in fighting tuberculosis. For example, the automated system detected an active case of TB that a clinician had assumed was cured, and appropriate treatment was resumed. In another case, the system discovered that a clinician incorrectly assumed that a patient was no longer contagious; the patient was placed back in an isolation room.

The Visiting Nurse Service, having started with eight hand-held wireless computers for its nurses, is now using 50 units, and has plans to purchase hundreds more. The health department is asking other New York health care organizations to report their TB cases electronically, in the format developed by the project. The educational kiosks will also multiply — the city is deploying them in five additional clinics.

Learn more about this project at: <http://www.cpmc.columbia.edu/appldinf>.

*Making Healthy MUSIC*  
Newark, New Jersey

Can an electronic communications network help an inner city community revitalize itself?

Newark Public Schools, in partnership with the New Community Corporation and the New Jersey Medical School of the University of

Medicine and Dentistry-New Jersey, has created an electronic community network, known as *MUSIC*, that brings together children, parents, health care providers, the school system, and other community organizations. The principal goal of the project is to improve the delivery of primary health care to community residents by empowering the community to begin to focus on and manage their own health issues. A secondary goal of the project is to redefine the relationship between the local school and the community in order to foster higher levels of student literacy.

Community residents use grant-provided computers in their homes or in the homes of their neighbors to access the *MUSIC* system, through which they can communicate directly with local health and social services providers and participate in discussions. Information resources, such as a weekly calendar on available health services, school bulletins, on-line news from the *Newark Star Ledger*, and the Newark Public Library, are also available through the *MUSIC* system.

Since the first batch of computers was installed in February, 1995, community residents have been using the system to participate in discussion groups involving issues such as parenting and AIDS. Participants are also using the network to express themselves, writing poetry and creating computer-based art. After a tragic drive-by shooting of a 15 year-old girl, a young girl expressed her sorrow in a poem that she posted to the network within hours of the incident. Residents also use the network to communicate with the local elementary school, the area's major medical center, and the housing agency that manages the apartments in which all of the participants live. The school's principal uses the network to communicate regularly with parents. He has included several of the network participants in school-based planning teams and uses the network to get parental input into the school's operations. The University of Medicine and Dentistry-New Jersey has staff available to answer e-mailed questions from the participants and to participate in some of the health-related discussion groups.

In addition to facilitating communication and providing greater access to community information, the project appears to be strengthening the community and stimulating residents to work together to solve the problems that their community faces. For example, after a second drive-by shooting in the fall of 1995, project participants organized and demanded a meeting with local police to discuss safety issues in the neighborhood. The residents have since instituted a neighborhood crime watch.

A multi-media photo essay on the *Making Healthy MUSK* project can be viewed on the World Wide Web at: <http://mmassey.www.media.mit.edu/people/mmassey/MUSICintro.html>.

## Getting Started

All of the TIIAP projects required careful planning in order to create a grant proposal. Such planning helped to create a disciplined, business-like approach to the project. In addition, planning fostered communication with other groups (sometimes resulting in partnerships), pinpointed real needs in the community, identified barriers or obstacles, and encouraged personnel to come to grips with technological issues.

This chapter details a planning process specifically for a non-profit, public service application of the information infrastructure.

### Planning for the Information Age

*Gathering Information.* The first step in the planning process is to gather information. Most TIIAP projects used two or more of the following methods to gather information from community leaders, potential partners, technology resource organizations, and the end-users for whom the service was intended:

In-person interviews

Focus group meetings

Telephone surveys

Brainstorming sessions

Review of research data about the community from census records and other sources

Review of relevant state or community planning documents created by other groups

An inventory of existing technology and technological resources.

Individuals who are not familiar with some of these techniques (for example, the use of focus groups or telephone surveys), can often find assistance from faculty members and academic staff at a local college or universities. Such individuals are often willing to provide advice about appropriate evaluation techniques and how to conduct the planning research.

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### TIIAP AT WORK:

*Ohio*  
**ACEnet**

In rural Ohio, 26 small local businesses are marketing their products on the World Wide Web through a TIIAP-supported project developed by the **Appalachian Center For Economic Networks** in Athens, Ohio.

What issues and questions should a planning effort try to address? TIIAP project leaders identified the following as critically important:

Who are potential partners?

What services do end-users need and what do they actually want?

Will end-users require training, and, if so, how will it be provided?

What assets (people, funding, and technology) does the organization bring to the project?

What needed assets or resources are missing, and who can supply them?

Whose support will be needed to successfully implement the project?

What are the barriers to implementation of the project, both internal and external, and what options are available to overcome them?

What is the technological infrastructure in the community, and what components are available?

Who are the local equipment and/or service vendors in the community, and which ones are considered most reliable?

What are the political, social, and cultural elements that exist within the community, and what factors from each of these might affect the project?

In addition, each specific project plan will often have a set of important planning questions that are unique to its particular subject area. For example, a telemedicine project may have to address issues of patient privacy and state regulation, and a K-12 education project may have to address curriculum and teacher certification issues.

*Developing a Plan.* When information gathering has been completed, it is then possible to craft a plan. Some of the principal elements in such a plan may include:

A vision statement that describes the project goal in broad terms.

A description of the specific problems or needs to be addressed, the services that will be provided, and the intended outcomes.

A listing of potential project partners and their specific roles, along with other community groups who may provide support.

A description of staffing requirements and the roles that each staff member will have.

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## TIIAP AT WORK:

Colorado

### The Western Brokering Project

The Western Interstate Commission for Higher Education (WICHE) in Boulder, Colorado, is testing and refining a plan to build an ongoing capacity to "broker" the educational resources of western colleges and universities, and to make higher education more widely available to underserved and place bound students throughout the region through the use of existing telecommunications networks. Visit WICHE at: <http://www.wiche.edu>

A marketing plan that details who the intended end-users are, **how they** will learn about the service, and how the group plans to attract key stakeholders in the community.

A description of user requirements that includes a plan to provide training, if needed, as well as a listing of any software or hardware that users may require.

A detailed technology plan that specifies hardware and software needed to provide the service, the network or transmission delivery system, and, if applicable, the equipment needed at public access points, such as schools or libraries.

A business plan that specifies the costs of the project and projected funding, both during and after the grant period.

An evaluation plan that incorporates early checkpoints to determine if the project needs a course correction, as well as outcome measures to be used after the project has been fully implemented.

A timeline for implementation.

A detailed budget.

The value of partnerships becomes apparent throughout the planning process. First, many TIIAP projects found that it was very helpful to get input from intended users early in the planning effort. Such input can be used to identify real needs and potential obstacles, and, at the same time, to win acceptance for the service. Similarly, by contacting potential partners and community leaders early in the process, project managers found **that** they were able to open communication lines with the community. This communication can assist in the long process of gaining commitments to the project and breaking down potential obstacles. Many TIIAP project leaders had to overcome a “culture of isolation” among community agencies and a history of not working together. While challenging, these new partnerships became one of the projects’ greatest benefits.

### Developing an Evaluation Plan

Project evaluation is sometimes perceived as mysterious, costly or, at best, a threatening process. However, a good evaluation is not a pass/fail-style report card; rather, it is the ongoing feedback required to keep a project on track. Evaluation helps a project by providing feedback on key issues at periodic points in the development of a service. Many of the TIIAP projects reported that the evaluation process kept them focused on basic objectives and simple tasks that they needed to complete.

The definition of goals and objectives drives the evaluation plan: what is a project trying to accomplish? In addition to primary goals, such as to provide information to people **who** lack access to it, or to improve

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### TIIAP AT WORK:

*New York*  
The National Child Abuse  
Prevention Network

The Cornell University Family Life and Development Center in Ithaca, New York, has developed plans for a National Child Abuse Prevention Network that will effectively link child abuse prevention and intervention agencies, and children’s services advocates and professionals throughout the country.

business opportunities for small businesses in rural areas, a project may have associated long-term goals, such as reducing the cost of delivering a service through technology or improving the efficiency of a service organization.

The evaluation plan outlines how to measure if the objectives are being met. Measurements can include the cost of providing a service, how much a service is used, the attitudes or satisfaction levels of those receiving the service, and specific measurements of impact, such as how many students passed a distance learning course. If possible, it is often helpful to compare these measurements with a similar service that does not use advanced telecommunications by using control groups. For example, one could study satisfaction levels of patients who receive medical care through telemedicine services with those who travel to receive the care in person.

Evaluations are sometimes divided into two categories: formative and summative. A formative evaluation examines how a project is doing in its early phase. Feedback during this phase can help a project group to refine or improve the service and keep the project on track toward its objectives. A summative evaluation examines overall objectives and results after a project is well underway. It should reveal if the identified needs or problems are being met, how well, at what cost, and if users are satisfied with a service. It can also be used to determine if the project should continue, expand, and be adopted by other groups.

In general, the evaluation should be conducted by someone outside the project team. Some of the TIIAP projects used an evaluator from a nearby college, an affiliated agency, or a hired consultant. The practical steps in planning an evaluation are to identify an evaluator or evaluation team, design the evaluation, develop a budget, and determine how **the** project team will work with the evaluator.

Some of the ways to measure if objectives are being met include: tracking records of performance (for example, student test scores, sales of small business products on the Internet, the number of Internet “hits,” or the records of patients who receive telemedicine treatment); conducting a survey of end-user attitudes and levels of satisfaction; comparing costs to deliver a service; and conducting focus group meetings with staff and end-users. The specific design of an evaluation, of course, will vary depending upon **the** specific project and the service it delivers.

### TIIAP Planning Projects

During the first two years of the TIIAP program, organizations were allowed to apply for planning grants to create a comprehensive plan for the development and use of advanced information infrastructure. Organizations undertook such planning projects for a number of reasons. In some cases, they were developing a service that was intended to serve an entire state or region and, therefore, required an extensive planning effort. In many instances, a considerable amount of time was required to assess needs and to organize people and organizations. A

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### TIIAP AT WORK:

*Nebraska*

#### The Nebraska Statewide Telecommunications Infrastructure Plan

In Nebraska, an extensive statewide planning study came to a surprising conclusion: there was no need to design a new telecommunications architecture. New services could be built on existing networks by aggregating demand and negotiating service agreements with existing private telecommunications providers.

This study by the **Nebraska Department of Administrative Services** benefited by building upon an earlier state planning study and focusing carefully on costs. The study also found that infrastructure needs in Nebraska lie primarily at the community level. The study recommended the formation of local communication technology committees and some technical assistance for local communities. To learn more:  
<http://www.doc.state.ne.us>

separate planning study provided the time to conduct this work. In other instances, TIIAP planning projects have conducted large scale inventories of existing technologies and resources in a region, have identified public and private sector partners to fund major efforts, have designed large scale telecommunication networks, have worked with complex political and cultural environments to forge broad-based coalitions, and have tackled telecommunications rate structure obstacles.

These planning studies have yielded some surprising findings and useful lessons. In one statewide planning study, it was determined that there was no need to design a totally new state telecommunications network. Instead, the state was able to use existing telecommunications networks, thereby saving considerable financial resources. In another study designed to plan shared telecommunication services among colleges in a rural area, the project team discovered that the local colleges viewed each other as competitors. The project team was able to work through these concerns and to demonstrate the benefits of group sharing of telecommunication resources. Although the colleges continued to view each other as competitors, they nevertheless found ways to work together because of the benefits associated with the sharing of telecommunications resources.

Some organizations receiving TIIAP planning monies discovered unanticipated benefits from receiving grants, even those that were of relatively modest size. First, receipt of the grants brought attention to their projects and led many groups to contact them. This, in turn, led to new partnerships. Second, receipt of the TIIAP grants often elevated the status of the organizations in their communities, thus helping to open doors. This phenomenon was particularly true of smaller organizations that were then often able to gain easier access to upper-level management of public and private-sector groups within their communities. Third, receipt of TIIAP planning grants frequently helped in securing additional revenue and commitments for the implementation of the project following the planning study, often enabling groups to leverage the planning funds and to attract new investments. In this regard, the TIIAP planning grant often indirectly served as seed funding for the larger project.

### Funding and Financial Sustainability

Two key issues that must be resolved in the planning process are identifying sources of funding and planning for financial sustainability.

*Identifying Funding.* For most TIIAP projects, funding resembled a patch-work quilt, with monies derived from many sources. Such funding often included donated equipment and in-kind services, as well as direct contributions of funds. Common sources of funding included:

- Federal grants (TIIAP and others)

- State grants and state agency payments for services received

- Local foundation grants

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### TIIAP AT WORK.

*California*

#### The Universal Access Project

The **World Institute on Disability (WID)** is making the NII accessible to individuals with disabilities and language minorities by encouraging manufacturers to develop information technologies that are flexible, inclusive, and of universal design. WID has developed and widely distributed both a videotape and a primer on universal design.

Corporate grants, and payments for services received

In-kind donations of goods or services

Fundraisers (raffles, dinners, etc.)

Payments from other non-profit agencies for services received

All of the TIIAP projects received funding from multiple sources, as required by the program. While raising funds from multiple sources involved a lot of work, it was viewed by project directors as a positive factor because it led them to develop relationships that increased the likelihood of finding sustained funding to carry them beyond the demonstration project phase. Indeed, a strong recommendation from the TIIAP project directors for those considering similar projects was to consider carefully probable sources of short and long term funding for their projects-from the very beginning.

TIIAP projects also demonstrated how funding from one source (whether from TIIAP or another source) can be leveraged to attract additional funding. Financial support, even if it is modest, brings legitimacy and status to an organization, and makes the organization a more serious contender for other funding in the minds of many potential funders.

It is useful, perhaps, to draw a distinction between funding and revenue. Funding is often general or linked to a broadly defined task; for example, to help a project get started or to provide information services for a community. Revenue, on the other hand, is generally tied to specific services delivered to a specific end user. The TIIAP projects and others like them often begin as a funding-only model, but then move to a combined funding and revenue, or revenue-only, model over time.

*Planning for Sustainability.* One important lesson from the TIIAP projects is that planning for financial sustainability is an ongoing pursuit that must begin at an early stage in project development. A useful starting point in this effort is the development of a business plan. A business plan addresses many questions related to sustainability:

What do you want to do?

Who will benefit from the service?

Who cares about the service?

What will it cost to provide the service?

How will you generate revenue, from whom, and how will that revenue change over time?

A business plan should also assess whether end-users can afford the service. If they cannot, who will pay or otherwise subsidize their use of the service? The business planning process forces a project to realistically confront these crucial questions. The answers, in turn, may inform a proj-

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*After initiating its NetWellness project, the University of Cincinnati received funds from the State of Ohio to continue the service beyond the TIIAP grant period.*

ect that they need to re-organize what services they provide, how they provide them, and how services are marketed to end-users.

A project may be sustained from a single revenue source, but it is more likely that funding to sustain an effort will come from many sources and for a number of services. Some of the sources for sustaining funds may be identical to those that helped a project get started; for example, donated equipment, discounted telecommunications services, and payments for specific services by non-profit organizations. Other sources of funding that may contribute to the sustainability of a project include:

Submitting joint grant applications with another organization to a new outside funder for an expanded service. For example, a provider of health information could apply for a grant with a state public safety agency to deliver their information as well.

Sponsorship of the project's Web site or service by a business, much as public television stations attract underwriters for their programming.

Selling the project's core service to new groups, such as local businesses.

Providing adjunct services to businesses or non-profit groups for fees. For example, the project could undertake setting up e-mail accounts, training, creation of Web sites, network services, classes about the Internet, and technical or management consulting.

The specific mix of funds will vary considerably among projects. The wide range of potential funding sources suggests that a project should remain flexible about the services it provides. There may be a need to add some services or to change the mix of services in order to sustain the project on an ongoing basis. Developing a strategy to pursue these or other sources of revenue will require an assessment of opportunities and competition in a specific area or region. It should also be noted that providing some of these services may require the establishment of a for-profit subsidiary.

The TIIAP project directors identified many useful ways to inform the public and potential users about their projects. Among them are the following:

Speak at professional meetings, write articles for professional journals, and solicit trade magazine articles about the project.

Issue press releases to news media about project accomplishments, future plans, and success stories.

Demonstrate the project at community workshops, technology fairs, and other local events.

Develop and distribute a media kit that contains recent press releases, newspaper and magazine articles about the project, testimonials, and a sample photograph or printout of the service.

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*"Whether it's a public or private sector partnership, the relationship needs to be mutually advantageous and clearly defined from the beginning."*

**Amy Borgstrom**  
Appalachian Center for Economic  
Networks  
Athens, Ohio

Choose partners who can help disseminate information about the project to their constituencies.

Identify potential project champions among business and community leaders who can become evangelists for the project; invite them onto your board.

Use the service itself to distribute press releases, training materials and background information about the project. Also, invite e-mail inquiries from the press or other community organizations.

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*"Find a person in business who is passionately interested in helping your mission."*

*Patricia Wang-Iverson  
Research For Better Schools  
Philadelphia, Pennsylvania*

## Developing Partnerships

Another key activity is to form partnerships. Partners play a crucial role in providing advice, complementing a project group's strengths, and developing community support for a project. It is important to identify local officials, key community leaders and other stakeholders who can leverage support for the project. Groups such as senior citizens and community business organizations can also serve as powerful advocates.

Many of the TIIAP projects found that they could more easily develop new partner relationships after the project had been launched, because their funding, status, and services then attracted greater attention. The potential sustaining partner may also be an external organization or an internal one. For example, in the case of a group within a large state government agency, they might find a potential sustaining partner in another part of the state agency.

Another potential sustaining partner is a foundation, especially a local community foundation whose mandate is to support local community services. Foundations can help in a number of ways. They can provide ongoing funding, they can provide modest financial support that can be leveraged into additional funding, they can refer other potential funders to the project, and they can refer clients to the project (for example, another project that the foundation is funding that needs the project's services).

A number of TIIAP project leaders offered clear advice about how to transform potential sustaining partners into actual partners: become indispensable. This is particularly important for partners who use the service during an early phase at no cost or at a greatly reduced cost. In order to convert them to becoming paying customers, they must feel that the project's services are essential to their operation. This can more readily occur if the service is integrated into their operation. It can also occur if the two organizations share infrastructure, such as a database or telecommunications network. In trying to move a potential partner into the role of a financial supporter or paying customer, it is important to show expertise, value, and good customer service for the current client base as well as to demonstrate that the project will provide essential services to the community and to the partner in the future. Emphasizing localism-local ownership, development of a local skill base, and support from local vendors-can also help to win support. In this way, a project demonstrates that it is a true community resource. In

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addition, success stories and testimonials from current user organizations can aid in winning over future partners.

In general, a project group needs partners that will complement its own talents and resources. For example, a number of the TIIAP projects needed technical expertise in the development of their project plans. In some instances, telecommunications companies provided expertise as **an** in-kind contribution; in other cases, computer science departments at local colleges became partners and offered assistance.

Many TIIAP project leaders also stressed the importance of finding local partners. Local partners were often more likely to be available when needed and could help introduce the project into the community. The best potential partners were often organizations with whom the project group had **an** ongoing current relationship.

Questions to be asked in identifying potential project partners include:

Does the potential partner recognize and support your project's mission?

What is in it for them? Partnerships need to benefit both organizations.

Is there a clearly defined role for the partner? Some TIIAP projects defined **the** role of each partner from the beginning, and communicated this role to each partner in writing.

Is the potential partner a competitor?

Many non-profit organizations compete. While it is still possible to develop an effective partnership with a competitor, there must be an incentive for both organizations to work together. Cost savings through shared telecommunications resources can often provide the motivation.

A few TIIAP project directors found it helpful to identify "product champions" in a potential partner organization — people who believe strongly in what the project is doing, and whose careers stand to benefit if the project is successful. One TIIAP project director suggested, "Find **stones** that roll," meaning **that** project directors should focus their energies on working with people who want to participate, rather than attempting to persuade the reluctant. Partnership-building also requires frequent communication and openness; it is important to remember that project directors are building a relationship. Some face-to-face meetings are initially important in order to start the relationship-building; e-mail and other electronic communications can assist in keeping the process on a smooth track over time.

### Choosing Among Information Infrastructure Alternatives

Planning which technologies to use and how to deploy them has been a significant challenge for the TIIAP projects.

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*"I look for simplicity in technology.  
It's the information that's important."*

*Hal Gangnath  
Goodwill Industries International  
Bethesda, Maryland*

Some TIIAP projects reported that their business plans for moving from startup to ongoing service had to be reformulated because the technology on which they were based had changed so quickly. Others reported that they felt as if using new technologies rendered them permanent “beta testers”: just as they mastered a new set of equipment or software, everyone moved on to the next generation of equipment or software. This was particularly the case for software and network equipment connected to the World Wide Web.

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*“I want to know will it work, what does it do, and how much does it cost — not a lot of techno-babble.”*

*Terry Grunwald  
North Carolina Client and  
Community Development Center  
Raleigh, North Carolina*

While there were many differences in approaches taken by project groups, there were also many points of consensus. For example, one area in which there was broad agreement was the pace of technological change. TIIAP project directors agreed that technology is advancing so rapidly that planning becomes very difficult. A lesson to be derived from this experience is to follow technology trends carefully, remain flexible, and be prepared to shift or adapt.

*Strategic Approaches.* Successful projects had a strategy for dealing with the challenge of rapid technological change. First, it is important to monitor technological change and assess what is critical for the project’s service versus what is hyperbole or “nice to have.” Second, caution is advised by many TIIAP project directors about the most advanced “leading edge” technologies, sometimes dubbed “bleeding edge” technologies. Many of the TIIAP projects have adopted technology that is slightly behind the most advanced in order to take advantage of lower costs, and the stability that is often associated with technology that has a track record. Third, it is recommended that a group try to assess the anticipated life cycle for a piece of equipment or software and ask if it is long enough to meet the project’s needs.

In planning which technologies to use, TIIAP project directors were occasionally left to choose between “high-tech” and “low-tech” alternatives. In general, high-tech solutions seemed to provide more options, were often easier to use, and tended to be more attractive to certain groups, particularly young adults who often liked the “bells and whistles” that accompanied these technologies. However, high-tech choices also tended to be more expensive and occasionally less reliable. Low-tech solutions, on the other hand, were typically apt to be less expensive, more reliable, and to have a more comfortable familiarity for certain groups, particularly older adults. However, low-tech solutions sometimes involved older equipment that required more frequent repair or that could not handle heavier use as the project got underway.

One determining factor in deciding which level of technology may be appropriate was to ask a number of questions. First, what are the technical skills and resources of the organization? In addition, can the organization manage the technology and repairs, or will they have to rely on a vendor? In general, it was considered wise to match the technological skills within an organization with the demands of the technology. One TIIAP project director suggested that, “Bleeding edge technology should probably stay within universities and high-tech centers.” Indeed, there was a general consensus that for most groups it was probably wiser to stay a few steps behind the most cutting-edge technology,

while, at the same time, trying to utilize technology that would not become obsolete overnight.

It is equally important, however, not to become paralyzed by the fear that equipment will become rapidly obsolete. Finally, it may be necessary to have different timelines for long-term technology planning versus long term organizational, revenue and service development planning. While it may be possible to develop five-year plans for the overall project, long-term technology planning may have to be limited to two to three years.

**Practical Lessons Learned.** Many practical lessons regarding technology selections also emerged from the TIIAP projects. First, although there were some notable exceptions, many advanced services were not available in rural areas. One TIIAP project director from a rural area observed that he could not gain access to services that were widely advertised as being available to anyone, anywhere. Second, many TIIAP project directors agreed that information technologies are heavily marketed and very competitive. Other practical lessons learned from the TIIAP projects included:

Seek out competent technical people who are able to speak in plain English to those who may lack technical expertise.

Engineers at local telecommunications companies can be very helpful in teaching project groups the “tricks of the trade.”

Many state and local government agencies have significant database expertise and can be an important source of help.

Watch out for so-called “technophiles” within your organization or end-user organizations. They often want to simply play with expensive technological “toys,” and cannot necessarily be counted upon to make wise recommendations.

Be careful in dealing with beta products (that is, products that are still in a testing stage), or products that are not supported by a vendor.

Leasing equipment may be an appropriate choice under some conditions, and can help an organization from being locked into an equipment purchase that might soon become obsolete.

Although donated equipment can be very welcome, there may be a downside in terms of repairs.

If possible, try to standardize terminal equipment within your organization. Having to install new software or a new service on twenty-five personal computers, each from different equipment manufacturers and with a different configuration, can be frustrating, costly, and time-consuming.

For many groups, it makes sense to outsource some technology-related work. This should be done locally.

## Replicating Model Projects

A core feature of the TIIAP program is to support the development of projects that can serve as models which can be adopted in other communities.

Replicating a successful model project in a different community is not a simple process. Each of the TIIAP projects was developed within a context of local technological infrastructures, partner organizations, community economics, cultural values, and user needs, among other factors. Rather **than** simply copy a project, a new group seeking to develop a service like the model service should learn what happened in the model project, extract the core elements that span specific social, economic, and technological contexts, and adapt the model to the new context, taking into account the unique context of the community where the application must take root and grow.

Many TIIAP projects have had a large number of inquiries about their project by other organizations in their community or other communities. As other communities express an interest in developing similar services, it is then helpful for a project group to offer guidance about implementation along with specific adoption tools, such as packages of training materials, planning documents, and descriptions of the telecommunications network and host equipment. However, it is essential that organizations seeking to adopt a service also adapt it to their specific context.

The TIIAP projects offer a few additional lessons about planning. First, much of what happens in a project cannot be fully anticipated during the planning stages of a project. This suggests that a plan should have some flexibility built into it so that the project can adapt to unanticipated and unplanned contingencies. Second, timelines are often too ambitious. It is important to set a realistic timeline, and to manage expectations about what *can* be accomplished in a given period of time. Finally, planning is not a one-time activity. It is a continuous process. The project plan should be reviewed periodically, updated, and changed as needed.

## Moving Forward

Once a plan is in place, a project begins the practical steps that move it forward to providing the desired service or product. These steps include hiring and managing staff, working with partners, marketing the project, interacting with equipment and service suppliers, overcoming obstacles, managing costs, and working with end-users. The TIIAP projects are a source of many practical lessons and tips about implementing new information infrastructure projects in a variety of settings. The following summarizes what grant recipients have told us are the most important steps and issues in getting a project underway.

### Hiring And Managing Staff

The TIIAP projects found that it was very important to define staff roles clearly, and to know precisely what qualities are desirable before recruiting and hiring staff. In addition, a clearly defined organizational structure was considered essential in order to focus newly hired staff on the project. Specific suggestions for hiring and managing staff include:

When interviewing potential staff, be sure that they understand and support the project mission.

Because most staff members will have to interact with both technical and non-technical people, project staff should be comfortable working with both.

Technical staff need to be skilled in explaining technical issues in plain English for non-technical staff and end-users.

Because much of the work on the TIIAP projects involves coalition-building and marketing to end-user organizations, it is important to have some staff who are skilled community organizers.

Particularly in large non-profit or government agencies, it is important to have staff that are familiar with procedures. It is essential to have at least one staff person who knows about business and cost management, and knows how to get a purchase order approved. Within large organizations, such a person can often be hired or borrowed from the internal organization. Alternatively, it may be possible to identify a seasoned staff member who will train a new staff member.

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*"Technology is the easy part. The hard part is finding people who know what they're talking about and who will focus on your mission."*

*Adrian Horton  
Greater Kalamazoo TeleCity USA  
Kalamazoo, Michigan*

*Qualifications.* The TIIAP projects found that they were able to identify and hire high caliber staff, in part because as new telecommunication projects, they were perceived as offering valuable career experience. TIIAP project directors also cautioned that moderate staff turnover should be expected. The experience gained on TIIAP or similar projects made staff very attractive to other organizations.

Some projects were restricted in how they could staff a project because of hiring freezes in their agency or organization. This occurred more frequently in state agencies. Under these conditions, project directors often had to rely primarily on consultants. Many projects used consultants for at least some of the work. One guiding principle offered by a few TIIAP project directors was that consultants should be used as facilitators and trainers. They should raise the skill level of the project staff so that when the consultant leaves, the knowledge that they brought will remain with the project group.

Other guidelines and suggestions about finding staff included the following:

Hire local people where possible. One project director observed, "Think globally, but hire locally." This practice draws upon, and, in turn, builds expertise in the local community.

College students can often be a good source of inexpensive part-time labor. The experience is valuable for them, and some may move into a full-time staff position after graduation.

Look for experienced staff within other parts of your organization or a partner organization. Many TIIAP projects "piggybacked" on human resources available from other local agencies, either by hiring or borrowing staff.

Volunteers are a vital source of labor. Some TIIAP projects began with an all-volunteer staff and later hired some full-time workers. Volunteers are also a good pool from which to hire regular staff.

After hiring staff, the TIIAP projects found that a comprehensive orientation program was very valuable in educating staff about the project's mission, and in integrating them into the overall organization. Staff development should continue on an ongoing basis to raise skill levels, and to keep everyone up to date on technology as well as programmatic changes. Staff development can also be used to build institutional capacity. For example, staff should be trained to understand many job functions, so that when turnover occurs, the organization can continue to function without serious interruption.

### Working With Partners

Partners in the TIIAP projects tended to be a mix of local funders, user organizations, vendor-partners, and government agencies that provided community, technical, and often financial support. Throughout the implementation process, it was considered important to maintain good

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"It is important to train a critical mass of people in the local community."

Clarence Wright  
Arkansas Delta Housing Development  
Corporation  
Forrest City, Arkansas

*In Mississippi, the state Department of Education has developed Tech Crews in each district to train those who need assistance. The Tech Crews consist of 5 to 7 high school students.*

relationships with each partner, and to move forward towards a goal or objective for each partner. For example, in the case of a non-profit agency that was using the service at little or no cost, **the** goal was frequently to make the service so valuable to the user organization that they would adopt it and pay for it from their operational budget after initial funding came to an end.

TIIAP project directors found that maintaining partner relationships took significantly more time than initially anticipated. A number of projects found efficiency in mixing occasional face-to-face meetings with continuous electronic mail contact and voice teleconference meetings. In addition, the TIIAP projects found that it was very important to establish clear expectations and responsibilities with each partner, especially with regard to financial issues. Put these expectations and responsibilities in writing so that no misunderstandings arise during implementation.

Many TIIAP project directors found that partners looked to them for technical support and advice. While the partner may have purchased their equipment or telecommunications service directly from a vendor, the vendors did not offer such technical support. Often, partner organizations and end-users did not understand the nature of the problems they encountered. Rather than contacting their vendors, they called the people they knew and trusted — the project directors. While this interaction was positive in that it often strengthened the bond between the project team and their partners, it could also lead to unanticipated setbacks or delays.

In **some** instances, the partnership with a vendor turned sour; for example, if the vendor could not provide promised equipment **on** time or would not meet a request for an advanced service. Under these conditions, direct and persistent contact was the recommended first course of action. However, in the event **that** this approach failed, a project had to decide whether to complain at a higher level and risk alienating the commercial partner. One strategy that worked in some instances was to use the project's board and other stakeholders in the community to work with the commercial partner. Project board members and other stakeholders often knew the senior management team at the commercial partner organization and were occasionally able to work out problems.

Most non-profit organizations had a good deal of experience in dealing with other non-profit organizations, and many had considerable experience working with government agencies. However, few had experience dealing with large telecommunication or computer companies. It was therefore considered important to understand the motivations, business protocols, and corporate culture of these commercial organizations.

One TIIAP project director observed that private companies were often willing to become a partner because they believed it would advance their business in the long run. Non-profit organizations were more likely to have an impact on such organizations by appealing **to** issues of long term profits or good public relations than by simply asking for a charitable donation in support of a good cause.

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*"Companies don't respond well to tin cups. They respond much better to partnerships when both people put something on the table."*

**Bethany** Baxter  
Appalachian College Association  
Berea, Kentucky

*"We add value by organizing information **for** community groups- then, over time, we get written into their budgets. "*

**Karen** Michaelson  
The Inland Northwest Community  
AccessNetwork  
Cheney, Washington

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*"Be shameless about telling your story  
and its relevance to **your** community."*

*Steve Snow  
Charlotte's Web  
Charlotte, North Carolina*

*The South Carolina State Budget  
and Control Board **put together** a  
traveling road show and brought it to  
conferences, PTA meetings, and even  
shopping malls to show the possibili-  
ties of the South Carolina  
Information Highway Project  
(SCIWAY).*

Research potential partners. Local libraries and newspapers have considerable information about local companies. Read a company's annual report. To learn about the corporate culture of these organizations, a non-profit group might also rely on telecommunications experts who have moved from the corporate to the non-profit world (as was the case in a few TIIAP projects), on an outside consultant, or on an individual in the partner organization who has an interest in the project.

The projects demonstrate that partnerships between non-profit organizations and telecommunications companies can be mutually beneficial. A non-profit organization through its application might provide a solution to the marketing or use of a new technology that the large company could adapt and offer in commercial settings.

### Marketing the Project

The TIIAP projects found that it is important for non-profit organizations delivering community services to think like businesses. This means marketing a non-profit service to specific, targeted end-users and organizations, as well as general promotion to attract the interest and support of the broad community.

General promotion lets people know that a project exists and attracts inquiries from community organizations. The TIIAP projects found that even if groups thought they were highly visible, many people in a community did not know who they were or what they did. In order to raise the level of awareness, it was considered important to show people in the community what services a group offered and to promote the service as widely as possible. In promoting the service, it was considered more effective to relate the project to community needs than to emphasize technology. Other suggestions from the TIIAP project directors included the following:

Take the project to the people and demonstrate it at school events, community festivals, the local Chamber of Commerce, and other events that are appropriate for the services the project provides.

Choose partners who can help to promote the project.

Identify and court local stakeholders who can become evangelists for the project, including elected officials.

Exchange e-mail addresses and use e-mail to communicate about the project with others.

Media attention can also be extremely useful. The TIIAP projects found that local media such as newspapers thrive on human interest success stories, especially when there is an element in the story that lends itself to an interesting photograph. A project can suggest stories to the local paper or television station. It is also useful to contact a local reporter who covers technology and present the project's story to this reporter.

Marketing a project to specific organizations involves more background research and targeting than general promotion. A few lessons from the TIIAP projects include the following marketing tips:

If possible, send a senior staff member from your organization to meet with the lead executive from the potential user organization, as well as with their senior technology staff person (if the organization has one). Physical presence is important.

Don't just tell them what the project can do, show them. Further, make repeat visits to demonstrate interest and to communicate understanding of their needs.

Offer to help them implement the service and provide training for their staff.

Remember that managers inherently ask, "What's in it for my organization?" Be prepared to answer this, even if the question is not asked directly.

### Working With Equipment Vendors And Technical Consultants

Overall, the TIIAP project directors reported varying experiences with equipment vendors and technical consultants. While many vendors performed superbly, and some went well beyond the role of vendor to become trusted advisers and collaborators for a project, others offered little help beyond that which was strictly specified in their contract. In a few instances, difficulties with vendors created significant problems. For example, in one TIIAP project a vendor's implementation of a high speed network connection was five months behind schedule, resulting in a considerable delay to the project. In another instance, a project experienced significant delays when a key vendor declared bankruptcy.

Some valuable lessons emerged from these experiences. First, non-profit groups need to assess equipment vendors very carefully. Second, develop contingency plans. Try to anticipate potential delays or difficulties and assess how they might affect the project. Third, some projects clearly need assistance or training in how to work with vendors. For example, a social worker or a librarian may not have had experience in preparing a Request For Proposals (RFP) for vendors, or in negotiating equipment contracts. Finally, there is generally a need for more information-sharing among project directors about equipment, networking, and other technical issues.

Technical consultants were extremely helpful, and often essential. However, the general attitude of TIIAP projects was to use consultants sparingly, and to use them primarily to move the project group ahead on the learning curve. Several TIIAP project directors warned against the pitfalls of becoming completely dependent on outside sources of expertise. When consultants were used, it was considered helpful to involve them early in the development of the project so that they could

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*"You can't tell people what technology can do for them because they can't imagine what it can do, but you can show them the possibilities."*

*Karen Michaelson  
The Inland Northwest Community  
Access Network (TINCAN)  
Cheney, Washington*

### An Equipment Vendor Checklist

- Does the vendor provide service support for their products?
- Is the vendor local?
- If not, will they be available when needed?
- Are they reliable and financially stable?
- Can the vendor provide you with the names of other customers so you can check their performance track record?
- What is their record of delivering equipment on time?
- Will they offer advice on technical issues?

become familiar with the project, and could provide early advice if the project appeared to be heading in the wrong direction. Some TIIAP projects were able to save money because a vendor-partner provided a consultant at no cost or paid for an outside consultant to help the project.

## Overcoming Obstacles

Obstacles and problems commonly go hand-in-hand with innovation. Below is a list of several common obstacles encountered by various TIIAP projects.

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### TIIAP AT WORK:

Virginia

George Mason University

The George Mason Institute of Public Policy successfully introduced over 3,000 students, teachers, government workers, business people and community leaders to the Internet. Along the way, they identified and dealt with many obstacles, including:

- Teachers needed training on how to integrate the Internet into classroom curriculum.
- End-users needed many levels of support, such as help lines and self-help groups.
- The biggest cost barrier was not network access but wiring and equipping classrooms.
- The variety of the installed base of hardware and software complicated implementation.

*Weak Telecommunications Infrastructure, Especially in Rural Areas.* In some poor rural areas, fewer than half of all households have a telephone, and some areas lack digital telephone service.

*Low-End Equipment.* Old equipment may not have modems or sufficient memory to access new telecommunication services, may not display readable text, and may require more frequent repair.

*Lack of Interoperability.* Equipment that operates using one standard may not be able to communicate or share information with equipment that uses another standard. For example, some video-conferencing systems use different standards and therefore cannot be linked to each other.

*Rapid Change in Technology.* The pace of technological change is so rapid that it frequently makes planning difficult.

*Delays in Delivering or Installing Equipment.* Vendor delays in delivering or installing equipment can interrupt a project's timeline and add significantly to costs.

*Demands for Training.* The need to train many end-users was perhaps the largest burden faced by many TIIAP projects. Training demands were even higher when there was a high turnover in end-user organizations.

*Turf and Territory Issues.* Some individuals and organizations are very protective when faced with any *form* of change.

*State Regulations.* Some state regulations bar the interstate delivery of academic courses, while others bar the practice of medicine across state lines. State tariffs governing telecommunication services can also reduce the flexibility of companies in pricing new services.

*Cultural Protection.* Some groups who have experienced threats to their cultural values in the past are very protective of their cultures and sometimes fear that technology may become a new form of cultural invasion.

*Lack of Time.* Many professionals function under heavy workloads that restrict their available time. It is difficult for them to find the

time to learn about new technology services, to receive training, and to integrate the services into their work environment.

In general, the TIIAP projects dealt effectively with these obstacles, as noted in the following two sections, and in the information provided throughout this report.

## Managing Costs

Some project costs can be anticipated and built into a project budget; for example, new equipment and regular staff. However, other costs are sometimes hidden or can quickly escalate well beyond the initial project budget. Among the unanticipated or higher-than-expected costs experienced by some TIIAP projects were the training of end-users, the retro-fitting of old equipment, internal wiring, ongoing equipment maintenance, and network connection costs. There are a number of strategies for dealing with and satisfactorily resolving each of these cost issues.

For example, with regard to the retro-fitting of old equipment, it is first important to decide which equipment is worth the cost of upgrading. If the cost of an upgrade begins to approach the cost of new equipment, it may not be worth retro-fitting. The cost of internal wiring in buildings and ongoing maintenance can also be significant. Some TIIAP projects have received help from vendors, while others have tried to reduce these costs by training volunteers to do some of this work, or by hiring local students from a technical college.

Network connection costs, such as high-speed data lines, can be real budget-breakers. Before deciding on a network solution, it is essential to investigate all options thoroughly. In some instances, it is possible to negotiate favorable rates from vendors. In other cases, competing vendors can drive the price down as each tries to secure a contract for services.

The high demand for training experienced by many TIIAP projects can also escalate costs unexpectedly. One strategy to manage this cost is to train people at an end-user organization to become trainers, and then to shift the burden of training over to them. Alternatively, project volunteers can be trained to help end-users develop technical skills, thereby reducing the burden on regular staff and the associated cost for the project.

## Working With End-Users

At the end of the day, a project's value to the community is based upon how well it has met the needs and wants of the end-users — the individuals that must interact directly with the new technology, and they people they serve. Several issues arise in creating a service that meets these goals. First, in more cases than not, end-users have had limited experience with new technologies. For example, the TIIAP projects found problems in the skill levels of some teachers and doctors. The

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### General Cost Management Strategies

Purchase equipment through local or regional coops.

Negotiate software discounts based upon volume purchases for all project end-users or obtain software licenses through joint purchases with a local or state government agency,

Learn system operation "best practices" from other projects or state agencies who have significant experience in managing similar systems.

Seek subsidized network rates from commercial groups based upon non-profit status.

Join state or non-profit networks where rates are likely to be lower.

Use volunteers and technical college students to reduce the number of regular staff.

remedy involves training and time. While training is essential to build skill levels and understanding of new technology, the most significant obstacle was finding time in the busy schedules of teachers, doctors, or other users.

Many of the TIIAP projects found that the training needs of end-user organizations were much greater than they had expected. As a result, training often claimed significant resources. High staff turnover also multiplied the problem, making training a continuous activity. One useful tactic was to “train the trainers”; that is, to use core staff to train volunteers, student interns and staff of end-user organizations, who, in turn, could train new users.

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## TIIAP AT WORK.

### *Missouri* The St. Louis Integrated Immunization System

St. Louis University worked with local health departments and the Missouri Department of Health to develop an integrated immunization information system to serve the greater St. Louis area. The system tracks immunization status, helps physicians identify which immunizations each child needs, sends out reminder cards to parents, and is helping to raise the overall rate of immunization in the region.

Understanding the end-user environment and how this context will affect the impact of the project is important to ensure success.

First, some end-user organizations may have inadequate infrastructure for the effective use of new telecommunication services; for example, several workers may share two telephone lines. Project staff may need to work with the end-user organization and recommend how they might upgrade their telecommunications infrastructure. Many end-user organizations relied on project staff not only for this type of advice, but also for consultation on a broad range of equipment needs and repairs. It was important but difficult to put boundaries on such inquiries.

Second, it was considered to be highly useful to understand the service environment at an end-user organization. What is their business, what services do they provide to their customers or clients, and what is their organizational culture? A technology project works best when it fits into the service environment of the end-user organization. This involves approaching the organization not as a technology project but as a group that can support and enhance the educational, informational, or health services that they currently provide.

In addition, the TIIAP projects discovered an important group of end-users: the “want nots.” “Want nots” are to be distinguished from “have nots,” or people who do not have access to information technologies. The “want nots” have access or are offered access, but reject it for several possible reasons. First, some reject technology because they see it as a cultural invasion and perceive it as a threat to their cultural environment and values. Others have had disappointing experiences in the past with new technologies — it may not have worked well or did not meet their needs --and fear that the new service will also be disappointing. In working with “want nots,” it is important to understand their environment and cultural values, as well as what went wrong in their past experiences with technology. It is then useful to show them exactly how the new technology works, explaining it not in terms of technology, but as a service that supports their needs and values.

Most end-users do not care at all about the underlying technology that delivers a service. Instead, they care about the content delivered by the service and the quality of the experience they have when using it. This

means that the content must be useful, timely, and well organized. Further, the service must be easy to use, and it must display content quickly. Children in particular have become used to high quality production values.

Many of the TIIAP projects created information services delivered through the Internet, and learned a few important lessons about creating content for this environment:

Be wary of content with a long download time, such as complex graphics. Users become impatient if they have to wait long to receive information.

Content should have an appropriate depth and breadth of information. Breadth involves the number of topics or content areas; depth involves the amount of content behind each topic area. If depth and breadth are too thin, a service will not be useful. If breadth and depth are too broad and deep, the service may be difficult to use and people may not be able to find the information they want.

Time-sensitive content, such as schedules and news about events, should be updated regularly;

Users like well-designed graphics, but they do not like anything that reduces the functionality of a screen; for example, a complex graphic behind text that reduces legibility.

Interactive communication is a vital complement to information. End-users find value in communicating with other users and experts in a field through e-mail and electronic forums.

Many design consultants can help create the user interface for a service, such as content menus and major navigation options. Also, many colleges now teach design principles for Web sites and other information services. Student interns may be available to assist a project. It is also useful to pre-test or "beta test" an initial version of the information service with potential end-users, and then to modify the design based upon feedback from those users.

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## TIIAP AT WORK:

*Illinois*

### **Chicago Community Information Consortium**

In Chicago, a community-based organization is helping a variety of local neighborhoods access data that assists communities in promoting community reinvestment and community development. Neighborhood groups use Home Mortgage Disclosure Act (HMDA) data on-line, along with other Federal and local government data, to create profiles of their communities.

## Next Steps

In the June, 1996 workshop, project directors were also asked about their experience with TIIAP and how the program could best serve its constituents and maximize its impact.

The TIIAP grant recipients made a number of suggestions about how the TIIAP program can help new grantees get started. Some of these suggestions are in the process of being implemented. For example, the TIIAP project directors suggested that the learning from earlier projects be collected and passed on to new grantees. This *Lessons Learned* report is intended to support that request.

A few suggestions called for more communication among the staffs of TIIAP projects. Regional workshops, online forums to exchange tips and seek guidance, a mentoring program that links existing TIIAP projects with new grant recipients, and more general sharing of information about technology were among the recommendations made. The TIIAP projects also felt that they would benefit from guidance about how to conduct evaluations, and how to plan for the transition to ongoing, financially sustainable projects.

In addition, the TIIAP project directors endorsed TIIAP's plan to conduct a systematic evaluation of the program's impacts. They would like baseline data for all of the projects in order to better understand the progress being made by other non-profit and public service organizations. Further, many TIIAP project directors believed that some of the TIIAP funding should be awarded as multi-year grants, noting that two years (the current maximum grant period) is not always enough time to get a project off the ground, evaluate its impact, and develop financial sustainability.

Feedback from the TIIAP projects suggests that the TIIAP program is serving important roles in the community. First, it is helping local government agencies as well as education, social service and other local groups to become anchor tenants on the NII and thereby attract others to use the NII. Second, it is helping to change the role of many government agencies, libraries, schools, and other information agencies from information repositories to customer-driven service providers. Third, it is raising the level of information technology skills in the broad community as the TIIAP projects train people in their local communities who in turn become trainers of others.

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### TIIAP AT WORK:

*California*

#### PUENTE Learning Center

Distance learning can be valuable in bringing together teachers and learners who are separated by several miles as well as those who are separated by hundreds of miles. The PUENTE Learning Center uses a high speed video/audio/data link between its East and South-Central Los Angeles campuses to serve young people and adults who don't have access to traditional educational delivery systems.

By seeding these projects across the country, the TIIAP program is:

Helping to build a critical mass of users for the NII;

Adding discipline to the process of planning local NII applications;

Showing the private sector the feasibility of some telecommunication applications that they might otherwise have passed over; and

Helping to close the gap between the information haves and have-nots by extending access to the information superhighway to remote rural communities and inner-city neighborhoods.

Finally, it should be noted that in creating new telecommunications applications, the TIIAP projects are building and strengthening local communities. These are not futuristic cyberspace outposts. They are real-world communities where people live and work. The TIIAP projects are helping people in their communities to work more productively and to live better. In this way, TIIAP is a catalyst for economic, educational, and social development in communities through information infrastructure.

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#### TIIAP AT WORK:

##### *Pennsylvania* Faces of Adoption

The **National Adoption Center** displays photos of children who are up for adoption on the World Wide Web. Interested couples can contact local member organizations to find out more information. Over a hundred of these organizations now have electronic tools that make it easier for them to contact the national office. Visit the National Adoption Center at:  
<http://www.inet.net/adopt>