Evaluation of the Telecommunications and Information Infrastructure Assistance Program for the 1994 and 1995 Grant Years

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Executive Summary

This report presents the findings of an evaluation of the U.S. Department of Commerce's Telecommunications and Information Infrastructure Assistance Program (TIIAP). Administered by the National Telecommunications and Information Administration, TIIAP is designed to help communities make use of new and emerging technologies. The evaluation study was designed to assess the activities and achievements of the first grant recipients, those receiving funding in FY94 and FY95.

The results presented here provide a comprehensive look at the impacts of the TIIAP investment, in terms of the nature and degree of the effects on the organizations implementing the projects, other organizations that were involved with the projects, the individuals and communities that were served by the projects, and the specific value added by the TIIAP funds. By targeting areas where telecommunications has been problematic (e.g., because of geographic or economic barriers), the activities supported by TIIAP have both increased access to a variety of technology-based services and enhanced collaborations within and across a variety of communities.

OVERVIEW OF THE TELECOMMUNICATIONS AND INFORMATION INFRASTRUCTURE ASSISTANCE PROGRAM

Under the direction of the U.S. Department of Commerce's National Telecommunications and Information Administration (NTIA), TIIAP began in 1994, a year when information technology was on the verge of an unprecedented expansion. TIIAP provides matching grants to a wide range of nonprofit organizations—schools, libraries, hospitals, public safety entities, and state and local governments—to make use of innovative technologies. A major goal is to bring these technologies and their benefits to persons in the inner-city and rural areas and to other groups that have difficulty accessing the information infrastructure. The program has the following objectives:

- To increase awareness in the public and nonprofit sectors of the National Information Infrastructure (NII) and its benefits;
- To stimulate public and nonprofit organizations to examine the potential benefits of investments in the NII;
- To provide a variety of model NII-related projects for public and nonprofit organizations to follow;
- To educate the public and nonprofit organizations about best practices in implementing a variety of NII-related projects; and
- To help reduce disparities in access to, and use of, the information infrastructure.

TIIAP funds projects that intend to improve the quality of, and the public's access to, education, health care, public safety, and other community-based services. Grants may be used to purchase equipment for connection to networks, including computers, video-conferencing systems, network routers, and telephones; to buy software for organizing and processing all kinds of information, including computer graphics and databases; to train staff, users, and others in the use of equipment and software; to pay staff salaries; and to purchase communications services, such as Internet access. Grant recipients are also

expected to evaluate the projects and disseminate their findings.

Since its inception, TIIAP has generated tremendous interest. Between 1994 and 1998, the program received more than 5,300 applications, requesting $2.1 billion, from across the country. Over the same period, TIIAP has awarded 378 grants in 50 states, the District of Columbia, and the U.S. Virgin Islands. Across these 378 projects, approximately $118 million in Federal grant funds have been matched by more than $180 million in non-Federal funds. In line with project goals, a significant portion of TIIAP funding has gone to rural regions, where telecommunications has the power to create new opportunities for geographically isolated communities and their residents.

The program currently has five application areas (community networking; education, culture, and lifelong learning (ECLL); health; public safety; and public services) and three grant categories (access, demonstration, and planning). Access grants help communities increase their capacity to access the information infrastructure. Special emphasis is placed on increasing the access of traditionally underserved populations and narrowing the gap between the information haves and have-nots. Demonstration grants help projects use telecommunications and the information infrastructure to solve problems within their communities. Special emphasis is placed on developing successful models that could be replicated by other communities. Planning grants enable communities to develop strategic plans for improving the telecommunications and information infrastructure in a particular area.

One of the unique characteristics of TIIAP is that despite its brief history, the program has evolved considerably since its inception in 1994. First, the program has made several changes to its funding categories. During its first year, the program funded two types of projects: demonstration and planning. In 1995, the program began funding access projects as well. Over time, however, access and planning projects have been de-emphasized. Second, the distribution of projects among the primary application areas has changed, e.g., the number of public safety projects has increased while the number of ECLL projects has decreased. Third, the average length of grants has increased. Fourth, the standards for project acceptance have become more stringent. For example, there is an increased emphasis on involving the underserved rather than simply serving them; increased emphasis has been placed on the use of the information infrastructure to solve community problems, as opposed to building the infrastructure itself; and increased importance has been placed on projects' plans for evaluation and dissemination. Finally, TIIAP has increased its own dissemination efforts and improved the quality of the quarterly data that are collected from projects.

STUDY OVERVIEW

In 1997, TIIAP initiated a series of activities intended to produce a broad-based external evaluation of the use and impact of these grants. Although considerable anecdotal information already existed, program managers felt that it was important to conduct an independent assessment of the program's implementation and impact.

This report presents findings from a study, conducted in Federal fiscal year 1998, of the 206 projects that received TIIAP funding in 1994 and 1995. The study used several data collection strategies to assess projects' implementation and impact:

- A comprehensive document review of the applications and quarterly progress reports submitted by the 206 projects funded in 1994 and 1995.
- A mail survey of the 206 projects funded in 1994 and 1995. The response rate to this survey was 92.4 percent.
- Case studies of 25 TIIAP projects funded in 1994 and 1995. The sites that were visited

represented a cross-section of all projects funded in the program's first 2 years.

The evaluation was conducted by Westat, a Rockville, Maryland, research and consulting firm.

SUMMARY OF FINDINGS

Characteristics of Grant Recipients and Project Partners

While the 1994 and 1995 TIIAP grants were provided to a wide variety of organizations, we found that education and community organizations represented the two most common categories of grant recipients. Education organizations also represented the most common category of partner organizations.

A wide variety of organization types served as grant recipients. Overall, two-fifths of access and demonstration grant recipients were education organizations, including institutions of higher education (23.7 percent) and K-12 schools or school systems (13.7 percent). In addition, just over one-third were community service organizations, including social service agencies (24.4 percent) and libraries (6.1 percent).

TIIAP projects involved multiple partnerships. Grant recipients in demonstration and access projects established new (or continued existing) partnerships with an average of 3.4 organizations[1] (the number of organizations that grant recipients informally collaborated with was likely much higher). Over three-quarters of the projects partnered with at least one educational organization—generally a higher education institution (33.1 percent) or K-12 school or school system (27.8 percent). In addition, a significant proportion of projects (60.9 percent) formally collaborated with at least one private sector entity. In fact, almost one-quarter (23.4 percent) of all demonstration and access partnerships were with private sector organizations. Grant recipients in planning projects partnered with an average of 3.7 organizations. Of the 177 partners listed, 27.7 percent were educational organizations, 24.3 percent were government organizations, and 23.7 were community organizations.

The primary contributions of project partners involved human resources. While demonstration and access partners assisted in a variety of ways, their primary contribution was providing personnel (60.2 percent of projects), intellectual capital (59.3 percent), or space or facilities (48.1 percent). Education partners tended to provide the broadest array of contributions. Not surprisingly, private sector partners were most likely to provide equipment, equipment discounts, and reduced rates for services. The most common contribution among planning partners was providing intellectual capital (64.4 percent).

Establishing and maintaining partnerships was a valuable, yet demanding, activity. Findings from the survey and case studies suggest that projects can take some pragmatic steps to strengthen their partnerships, including (1) identifying partners who are truly committed to the project; (2) establishing clear written agreements delineating all roles and responsibilities; and (3) communicating with all project partners on an ongoing basis.

Implementation of Demonstration and Access Projects

The goals, outcomes, and implementation strategies identified by the 1994 and 1995 demonstration and access projects were clearly responsive to the priorities identified by the program. In addition, the majority of projects reported meeting or exceeding their original implementation objectives.

[1] It should be noted that this average number is somewhat lower than what might be expected from anecdotal information obtained during the site visits. We cannot say for sure why this occurred. One possibility is that the burden of reporting detailed information on each partner organization caused some respondents to limit their answers to this item.

The community needs addressed by TIIAP projects were responsive to the program's funding priorities. Three-quarters of the demonstration and access projects cited at least one of the following as being a "major" *community improvement goal* for their project: improve training and community learning opportunities (74.6 percent), and serve long-term telecommunications needs (73.9 percent). Planning projects, not surprisingly, placed an even stronger emphasis on serving long-term telecommunications needs (87.5 percent). These findings suggest that most projects were striving to help targeted end users take advantage of accelerating technological advances and/or stimulate broad-based community improvements.

The barriers to access addressed by TIIAP projects were consistent with the program's emphasis on reaching the underserved. The vast majority (89.6 percent) of demonstration and access projects were designed to overcome technological barriers in the community. In addition, consistent with the program's emphasis on reaching the underserved, over three-fourths of projects addressed geographic (e.g., rural isolation) or economic (e.g., extreme poverty) barriers.

TIIAP projects successfully achieved their implementation objectives. The 1994 and 1995 demonstration and access projects used a wide array of implementation activities to help achieve their community improvement goals. Across all application areas, the most common implementation activities were (1) providing information or services via the World Wide Web; (2) establishing an information service, resource center, or other centralized location for information exchange; and (3) establishing a network to provide community services. For nearly every strategy proposed, the majority of projects reported meeting or exceeding their original implementation objectives.

Few of the 1994 and 1995 projects supported by TIIAP invested the staff or financial resources needed to collect valid and reliable impact data. Some projects did collect information on system usage and end-user satisfaction. However, the mail survey and case studies uncovered little evidence that these early projects obtained data that could be used to assess real progress toward their community change goals.

Insufficient planning posed the greatest obstacle to implementation. Projects reported a variety of obstacles that hindered projects' efforts to complete their implementation activities in a timely or effective manner. Across all 1994 and 1995 demonstration and access projects, the most common obstacles stemmed from underestimating the amount of effort and time required to complete project activities (68.9 percent). In addition, a substantial proportion of projects reported a lack of commitment on the part of partners and/or community stakeholders (46.7 percent), a lack of staffing (40.7 percent), or difficulty estimating the resources required to implement their planned network (40.0 percent). Interestingly, only one-quarter encountered incompatibility problems with their technology (26.7 percent) and/or found that the technology they were using had become obsolete (25.2 percent). In some instances, the problems encountered by a project were serious enough to affect its ability to achieve its implementation objectives. For example, projects encountering extensive *planning problems* were more likely than other projects to report that they did not meet their implementation objectives for (1) integrating disparate communication systems, and (2) creating an interactive network for distance learning, teleconferencing, or telemedicine. In addition, projects encountering extensive *technology problems* were more likely than other projects to report that they did not meet their implementation objectives for (1) creating a network to refurbish and/or distribute donated computer equipment, and (2) establishing access sites for reaching the information infrastructure.

Projects' emphasis on implementation issues overshadowed attention to community benefits. Most respondents identified at least three distinct *long-term outcomes* that their projects were designed to achieve. However, an analysis of these responses suggests that many grant recipients tended to focus on whether an initiative had been successfully executed, as opposed to whether the initiative had helped to address a broader community problem.

Accomplishments and Impacts of Demonstration and Access Projects

Many programs perceived technological achievements to be their primary accomplishment. Others identified community improvements that resulted from their technological achievements. When survey respondents were asked to identify their project's single most important outcome, just over half of the projects used this open-ended item to describe a *technological* achievement (e.g., "provided a technology backbone for the community and region"). The remaining projects used this open-ended item to describe a *community impact*.

Successful demonstration and access projects shared a set of common traits. First, across all application areas, successful projects addressed community change goals that would benefit the greatest number of community residents. Second, they tackled community problems that were specific, well defined, and easily addressed through technological innovations. Third, they involved community stakeholders who were in a position to bring about the types of changes needed to resolve their problems. Conversely, projects addressing complex social issues that are influenced by factors beyond the control of the stakeholders (e.g., reducing poverty) generally reported less success in achieving their community change goals.

TIIAP projects successfully reached underserved community segments. Ninety (90.2) percent of the 1994 and 1995 demonstration and access projects provided benefits to disadvantaged and underserved community segments. Nearly two-thirds of the projects reached end users (65.2 percent) and indirect beneficiaries (61.4 percent) who lived in rural areas. The percentage of projects impacting people living in geographically isolated areas and people living in conditions of extreme poverty were nearly as high (59.8 percent and 59.1 percent for end users and 57.6 and 66.7 percent for indirect beneficiaries, respectively). Not surprisingly, end users tended to be concentrated (e.g., in a single community, in one or two adjacent counties in a state), while indirect beneficiaries were more dispersed (e.g., all counties in a state).

The magnitude of impact for TIIAP projects was extensive. The demonstration and access projects estimated that they provided services to over 10 million end users. The number served by individual projects ranged from a minimum of 15 to a maximum of 5 million (for a health demonstration project). The majority of projects, however, reported serving between 400 to 20,000 end users. In addition, the number of end users impacted was found to be associated with the length of a project's grant period, implying that funding projects for a longer duration to ensure that they have adequate time to get up and running may pay off in terms of the number of end users who are ultimately impacted.

The TIIAP projects strengthened organizational partnerships. Over half (52.7 percent) of projects reported that the grant recipient's relationship with its partner organizations changed as a result of the project. Among projects reporting a change, over 90 percent indicated that they had forged stronger and expanded working relationships with and among their partner organizations. In many cases, these organizations have continued to share information and work closely on the continuation of the project. Additionally, a number of projects reported new joint ventures that were direct outcomes or expansions of the TIIAP project.

Over 80 percent of TIIAP projects disseminated information about their initiatives. Most notably, projects reported responding to almost 79,000 unsolicited requests from outside organizations. In addition, they provided written materials to over 335,000 organizations (although some of these materials may have been designed to describe the project to potential end users, as opposed to other organizations). A significant number of organizations (5,489) received project information through site visits or tours. There was a fairly strong correlation between the length of the grant period and the number of dissemination recipients, suggesting that funding projects for a longer duration increases a project's dissemination activities.

TIIAP projects have promoted the diffusion of innovative applications of information infrastructure. Most projects (85.9 percent) and all of the community networking demonstration projects considered their TIIAP projects worthy of replication. In addition, over two-thirds (69.6 percent) "strongly" or "moderately" agreed that their project innovations provided a "marked advantage" over alternative ways of providing similar services; three-quarters (75.6 percent) indicated that their innovations were easily documented and, therefore, could be easily communicated to others; and just over two-thirds (68.9 percent) indicated that their project innovations could be easily implemented by others with a reasonable amount of effort and expense. Furthermore, one-third (34.2 percent) of respondents indicated that they knew of other organizations that had used information about their TIIAP-related activities to undertake similar ventures. These respondents cited over 80 specific organizations that had adopted ideas from their projects.

Federal funding has been crucial to the success of these initiatives. Three-fourths (75.2 percent) of projects reported that they probably never would have been implemented without the support they received from the TIIAP program (the remaining 24.8 percent indicated that they would have been implemented using alternate funding sources). In addition, projects that received a larger TIIAP award appeared to be less likely to perceive that they would have been able to obtain alternative funding.

Sustainability and Project Expansion

Nearly 90 percent of the 1994 and 1995 demonstration and access projects were still in operation at the time of the mail survey. Specifically, 53.3 percent were still in full operation; 17.0 percent were serving a function that had changed, grown, or expanded; 11.1 percent were serving fewer end users than intended; and 8.1 percent were providing a limited range of services.

Lack of maintenance funding was the chief threat to project sustainability among demonstration and access projects. Respondents in the 37 demonstration and access projects that were no longer operating at full capacity (or had ceased operating entirely) were asked to identify the factors responsible for the decrease in their projects' activities or scope. Nineteen of these projects ceased or cut back project operations due to a lack of funding for ongoing maintenance of the project operations or systems. Many of these projects also reported that personnel and staffing problems (15 projects) and technological obsolescence (13 projects) inhibited sustainability.

Almost four-fifths of the 1994 and 1995 planning projects indicated that their telecommunications plan had been partially or fully implemented at the time they completed the mail survey. The remaining 11 planning projects indicated that they were still working to secure the necessary funding, personnel, or partners needed to implement the plan (10.4 percent), or that their plan had not been implemented and no steps were being taken to initiate implementation (6.2 percent).

Nearly two-thirds of demonstration and access projects had expanded to serve additional end users beyond those targeted in the proposal. These projects have not only increased the numbers of persons being served and the numbers of access sites and nodes for their wide area networks, many also have taken advantage of the Internet's capabilities to dramatically broaden the service area covered by their projects. The total dollar amount of additional equipment or resources that were leveraged in connection with these expansions was over $93 million. The majority of projects leveraged funds in the range of $100,000 to $1 million. Our analyses found that projects funded for 21 months or longer were more likely to have expanded to serve additional end users than were projects funded for a shorter duration. In addition, demonstration projects were more likely than access projects to have expanded to serve additional end users.

Nearly two-thirds of demonstration and access projects had generated spin-off activities that provide additional services not included in the TIIAP proposal. The dollar amount for additional equipment or resources that was leveraged in connection with these spin-off activities was approximately $41 million. The majority of projects leveraged spin-off funds in the range of $300,000 to $700,000.

Most demonstration and access projects were able to secure funding for a broad array of operating expenses. The three most frequently cited ongoing operating expenses for which funding was secured were access lines (75.6 percent), maintenance and upgrades (65.2 percent), and personnel and contractual salaries (61.5 percent). In addition, several of the site visit projects reported that they secured funding by becoming revenue generators, e.g., began collecting user fees for website development or training.

SUMMARY AND CONCLUSIONS

The results of this evaluation show that the TIIAP program is achieving its mission to improve the nation's knowledge of and access to the information infrastructure. And we found that the fundamental strength of the program is that it readily adapts itself to a wide variety of contexts and purposes. The 1994 and 1995 TIIAP projects helped to change the way in which millions of end users and other beneficiaries access information and services. This evaluation has identified five key areas in which the program has made important impacts:

- The TIIAP program supported a considerable number of projects that enabled disadvantaged and underserved communities to gain access to the information infrastructure. Examples of the tangible benefits realized by residents of these communities include increased access to (1) cutting-edge medical technologies; (2) up-to-date employment listings within and across communities; (3) a wide range of government and community services; (4) educational and reference materials from prestigious institutions; and (5) up-to-date news and information from around the world.
- The TIIAP program has also enabled a considerable number of public and nonprofit agencies to dramatically change the way in which they interact with their clients. These improvements often enhanced the capacity of organizations to serve the general public. They also enabled these agencies to dramatically increase the number of citizens receiving a wide range of social services.
- The TIIAP program has helped to expand the universe of teachers and learners of all ages. In some cases, this has occurred because TIIAP-supported projects exposed educators to valuable new information resources and curriculum materials. In others, TIIAP has enabled teachers to embrace innovative strategies such as interactive learning. In still others, TIIAP has enabled educational

institutions (at all levels) to use distance learning to expand the geographic horizons of traditional classrooms.

- The TIIAP program helped to foster increased collaboration at both the local and global levels. In some cases, these continued collaborative efforts have focused exclusively on technology-related issues. In others, partnerships forged by TIIAP have proliferated into such non-technology areas as long-range business and community planning.
- Finally, and perhaps most important, TIIAP has demonstrated the value of investing relatively modest amounts of Federal seed money in innovative technology applications. Evidence from the mail survey and case studies suggests that most of the projects needed TIIAP's financial support to proceed beyond the conceptual phase. The high success rate among the 1994 and 1995 grant recipients (as measured by the range of impacts and the proportion of projects still in operation after Federal funding had expired) suggests that TIIAP invested wisely.

The evaluation also found two main areas where the 1994 and 1995 TIIAP projects would have benefited from additional technical assistance:

- The TIIAP program funded a number of projects that lacked a long-term vision of how their technologies would eventually benefit the community. Some projects adopted a given technology before first conducting a needs assessment to weigh alternative options. In some of the projects we visited, this resulted in the development of a technology that was either not needed or severely underutilized. The experience of these projects suggests that grant recipients should not implement a given technology before first completing an extended planning phase that includes a comprehensive community needs assessment.
- Few of the 1994 and 1995 projects supported by TIIAP collected outcome data. Some projects did collect information on system usage and end user satisfaction. However, the mail survey and case studies uncovered little evidence that these early projects obtained data that could be used to assess how their activities benefited the greater community. For example, few projects systematically collected data on how TIIAP-supported activities contributed to narrowing the gap between the technology haves and have-nots. A lack of outcome data weakens a project's ongoing capacity to assess ways in which it can better serve its clients. It also hinders the Federal government's ability to document the full impact of its investment in new and emerging technologies.

As stated previously, it is important to note that the TIIAP program has since taken a series of important steps to address these two issues. Specifically, the program has revised its application and evaluation procedures to ensure that grant recipients (1) clearly identify a set of community change goals and corresponding long-term outcomes at the outset of their projects, and (2) develop and implement a robust evaluation plan that enables projects to systematically assess progress toward their community change goals. The program has also enhanced the data collection requirements imposed on all grant recipients and expanded its oversight of individual projects. As part of this effort, TIIAP will soon be initiating an online collection system that will require grant recipients to identify and assess progress toward a series of measurable outcomes. Taken together, these steps should further enhance the program's capacity to monitor the activities of individual projects, to identify promising practices, and to target projects in need of technical assistance.

It is also important to note that program staff have used the successes and mistakes of previous grant recipients to inform the development and implementation of future projects. The findings of this study suggest that such technical assistance

is especially needed in the following areas: (1) setting goals; (2) using evaluation data to improve program effectiveness; (3) conducting and using needs assessments; (4) identifying effective strategies for allocating staff and financial resources; (5) developing realistic implementation schedules; and (6) identifying practices for sustaining projects beyond the TIIAP grant period. In addition, TIIAP staff can perform an important function by helping grant recipients remain informed of new and emerging technologies.

The diversity of projects supported by TIIAP provides the program with a powerful opportunity to inform the next generation of innovative telecommunications applications. Many of the lessons learned by the 1994 and 1995 projects are included in Chapter VI of the report.