

# TELE-CONFERENCING, TELE-COLLABORATING, TELE-MANAGING, AND TELE-REPORTING (TELE-CCMR) FOR COST-EFFECTIVE PUBLIC HEALTH

## EXECUTIVE SUMMARY

The Western Consortium for Public Health proposes a Public Health Tele-Conferencing and Remote Access Demonstration Project to evaluate the benefits of video-conferencing (i.e., use of integrated voice, video, graphical display, document/text sharing, database access, and fax to computer capacities) and remote pen-based data entry and query capacities via wireless telecommunication. The project team includes: California Department of Health Services, twelve county health departments, Lawrence Livermore National Laboratory, Pacific Bell, VTEL and Decade Software Corporation. A successful demonstration will reduce staff travel time and administrative costs, while increasing staff productivity, training, retention, cross-agency collaboration, and access to vital information.

## PROBLEM STATEMENT

California and the nation need easily accessible integrated information and communication systems to assure the public's health and safety. The current lack of system integration exacerbates the delivery of public health,<sup>1</sup> especially in remote rural areas. In many such communities, the local telephone companies have not yet provided any digital networks (ISDN or Switched 56kbps) upon which to build an integrated information and communication system. This situation is now changing and by July 1995 the majority of California should be covered by digital networks. Thus, for the first time the backbone of the information infrastructure needed by public health will be in place. Other essential technology also exists now, but public health still lacks a modern information architecture on which to deploy the latest technology.

One of the more serious information infrastructure problems for public health results from its dependence on mobile, out-stationed staff. In fact, conventional office-based information systems add to the workload of mobile practitioners by causing them to pre-record data, by hand, while in the field and then later to enter that same data into their office computer systems. In remote areas, this redundant data entry adds an estimated hour each day to their extraordinary downtime caused by the portion of each workweek (30%-65%) spent in travel.

In California, 11 of 58 counties are so geographically isolated that their populations are relatively small and their economic resources are severely limited. Consequently, their public and environmental health services must be provided by the State. Thus, the California Department of Health Services (DHS), Office of County Health Services (OCHS) provides core public health services in the following counties: Alpine, Amador, Calaveras, Del Norte, Glenn, Lassen, Mariposa, Modoc, Mono, San Benito, and Sierra. The map in **Appendix A** shows the extent of the State covered by this enterprise, ranging from the Pacific Northwest to an area southeast of the Monterey Bay, spanning nearly 500 miles from north to south.

Altogether, 35 public health programs (each with its own reporting form) and 13 environmental protection programs (requiring 20 data forms) are administered by DHS/OCHS from a centralized location in Sacramento. Traveling public health nurses and environmental health specialists are out-stationed in small offices throughout the 11 counties with limited ability to communicate with other healthcare and human service providers. These field staff are supervised by program managers located in Sacramento and also by supervising public health nurses and environmental health specialists located in five of the counties. **Appendix B** contains the OCHS County Roster, showing the number and type of staff responsible for the public health of all residents in these 11 counties. As of July 1995, more than 278,400 residents will be recipients of their public health services in these isolated communities.

A recent needs assessment of this mobile workforce identified the following problems:

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<sup>1</sup>For the sake of brevity, the term *public health* will be used to connote both public health and environmental health services.

- Increasingly excessive time spent on unproductive functions (specifically, travel and redundant data entry) rather than on services;
- Inability to meet requirements for staff development, training, and peer consultation;
- Inadequate staffing to meet community needs for public health services;
- Need to improve staff morale in order to retain and recruit qualified professionals;
- Need to increase staff capacity to meet community needs via remote database access;
- Need to increase capability to report quickly and meaningfully about possible threats to the community public health and safety, such as toxic spills and outbreaks of communicable diseases.

To ameliorate these situations, a public health information infrastructure demonstration project is proposed. This project has the following four goals:

1. To increase the capacity to deliver essential public health services in geographically isolated areas while maintaining current quality of services and not increasing costs;
2. To actively integrate clinical service delivery and information handling functions while improving the useability and efficiency of the latter;
3. To integrate communications and enhance collaboration among public and private sector stakeholders concerned about public health/safety at the local level; and
4. To pilot test public/private key RSA-DES encryption standards in a community setting.

## APPROACH

Across the United States, underserved as well as rural areas have the same major problem: diminishing public sector resources compounded by difficulty attracting and retaining qualified professional staff. Clearly, a viable strategy for increased efficiency is to eliminate redundant tasks which demoralize staff while increasing their access to the support of colleagues as well as state and national databases. This strategy requires the use of two existing technologies which are basically unknown in the public health domain. The first is teleconferencing and the second is remote data entry/access via a pen-based computer to dramatically reduce manual data entry of public health data and provide access to critical databases. Thus, the proposed project will employ innovations in communications and computing by using Tele-Conferencing for "Tele-Collaboration" and "Tele-Management," and "Tele-Reporting" for data entry/access to databases, resulting in the acronym: Tele-CCMR. A demonstration of these technologies is critical before any wide-scale implementation of them is feasible. Information/communication experts have recently advised California's Governor that new statewide projects should be undertaken by initiating them first as smaller scale prototypes, thereby preventing the failures which have caused the Legislature to be wary of new information/communication projects.

Both desktop and roll-about Tele-conferencing will be employed in the central office of OCHS and in the 11 remote counties cited earlier. The use of pen-tablet data entry (with standard encryption techniques) by mobile public health professionals will be demonstrated in one rural county of 150,000 population (Yolo) proximate to Sacramento. By configuring the project as two sub-projects, the value of these two technologies will not confound one another in their evaluation. Furthermore, the project will be appropriately scaled in terms of cost and the necessary number of staff to evaluate the effects of the technologies. If both technologies were employed in the remote counties, the costs would be prohibitive for a demonstration project. However, the mobile staff serving the 11 counties will be involved during the design of the pen-based data entry and retrieval applications via teleconferencing with the staff in Yolo County and with developers. (Currently, these 12 counties all use the same database software, which the developer will modify to permit the pen-based entry/access.) This increased collaboration will enhance the transferability viability of the pen-based applications.

Moreover, this approach will permit **demonstration** of both technologies within minutes of Sacramento, providing access for the State Legislature and county administrators (who frequently attend meetings in Sacramento), as well as easy access for out-of-state guests to the demonstrations sites. Once the technologies have been demonstrated to be cost-effective by enhancing productivity, then DHS/OCHS will have sufficient information to prepare the budget justification language allowing for the maintenance as well as the expansion of this project to cover more applications and at least the remainder of the rural and remote counties by 1998.

Two diverse information infrastructure demonstrations will be conducted. The first will entail the use of ISDN and Switched 56 network to provide two-way telecommunications linkages for video-conferencing and data communications among field staff, supervisors, and DHS managers. This public health network will provide remote access for professionals and environmental specialists in 11 county health departments and provide access to other online conferences, newly developing teleconference-based trainings, and other information networks. In order to provide this access, DHS staff also require the capacity to provide video-conferencing technology in locations where administrative and training meetings are conducted in Sacramento and Berkeley.

In the second demonstration, a combination of wireless and wire-based networks and commercial off-the shelf (COTS) components will be used, along with public/private key and standard encryption techniques, to increase the efficiency of mobile public health professionals. Specifically, these mobile staff will be able to:

1. Capture data at point-of-service delivery, thereby reducing redundant data entry;
2. Access databases (beginning with the three most critical) as the need arises, e.g., to obtain an infant's immunization record;
3. Receive program alerts from central office, e.g., regarding a rabies outbreak;
4. Automate and securely transmit daily logs and forms; and
5. Utilize exception reporting concepts in lieu of narratives describing progress.

Each demonstration will result in a more appropriate use of public resources. Their outcomes will be measurable in terms of **reduced time** spent on **travel and clerical duties** and **increased levels of public health services, training, and peer-to-peer contacts** for professional **information exchange**.

The proposed project is consistent with the TIAP mandate of reducing disparities in the use of the National Information Infrastructure, both directly and indirectly. Residents of rural underserved areas will benefit directly from the increased services of public health professionals. Instead of having to wait days for a public health nurse to be "on site," videoconferencing can be used to receive services on a real-time basis. Tele-collaboration will enhance the work environment of mobile public health staff who are as difficult to recruit and retain as inner-city public health staff due to their isolation. Indirectly, demonstrating the effectiveness of these technologies in rural areas will facilitate adoption in California's urban areas of underservice. Furthermore, this project will be the first use of highspeed digital services in these remote areas and preliminary discussions with all the local phone companies indicate that this demonstration project will encourage them to ensure successful implementation of these services.

Tele-CCMR fulfills the TIAP mandate on four significant technological points, because the project:

1. **Uses open and public standards.** The communications network will use the basic rate digital (ISDN and Switched 56kbps) service. These services are available nationwide and they are much less expensive than the higher speed services such as ATM, frame relay, or satellite. The video conferencing equipment will conform to H320 standards and use mobile roll-about units, instead of static wall mounts. Since all videoconferencing vendors will support H320 standards by the end of this year, all project sites will have this capability. The software will use TCP/IP as its transport protocols and, therefore, any Macintosh, Windows PC, or Unix workstation will be able to act as part of the data network. Access to databases will be via ANSI standard SQL. Thus, this project supports the NII commitment to open standards.
2. **Serves as a prototype for conducting government business in the 21st century.** Traditional **mainframe** models of computing are increasingly **outmoded**, yet **entrenched**. Recent public policy documents have been openly critical of traditional information technology development processes as unworkable and high risk in that they attempt too much in too short a time period without the benefit of input from endusers. (*State of California Task Force on Government Technology Policy and Procurement: Report to Governor Pete Wilson, September 1994*). By involving end users and their line managers from the outset and by adopting modular system design concepts, this project will demonstrate significant efficiencies at the local level — ones which can be expanded, integrated, and replicated in other health and human service areas.
3. **Produces a significant and measurable payback, estimated to be three years.** Forms automation and "onsite" data entry are attractive to local governments as they eliminate direct cost items and

- reduce work time. Employee time is essentially freed for other tasks. Video-conferencing will reduce travel time significantly. At least 20 work days per year per employee will no longer be spent driving to and from meetings as a result of video-conferencing and other "Tele-management" activities, and approximately 35 days of clerical time will no longer be spent in redundant data entry.
4. **Yields important long-term effects.** An array of critical management and communications problems must be solved by California's state and local governments in order for them to respond adequately to the dramatically shrinking resources and rapidly expanding demand for public services. This project offers the opportunity to demonstrate to California's county administrative officers (who support this proposal) and to other government agencies (such as education, corrections, transportation, employment, and law enforcement) effective electronic communications tools and approaches to solve their common problems in managing and collaborating with mobile and remote staff and their staffs' problems with redundant data entry and inaccessible databases. Furthermore, these generic issues are similarly problematic for California's, and the nation's, vast service industry as well as private agencies. Thus, this project will be important for a much larger audience than just public health.

## **PROJECT IMPLEMENTATION PLAN**

A joint partnership among the Western Consortium for Public Health (WCPH), DHS, Lawrence Livermore National Laboratory (LLNL) Open Systems Laboratory(OSL), Pacific Bell, VTEL, and Decade has been created for the purposes of planning and implementing this project which will be directed by Jane Walsh, WCPH, and managed by Gwendolyn Doebbert, DHS, Center for Health Statistics (CHS). WCPH administrative staff will provide project leadership and administrative and fiscal support. In addition, WCPH will take the lead role in the evaluation and dissemination of the demonstrations' results. CHS/OCHS staff will manage the day-to-day project activities and will serve as liaison with the 12 county health jurisdictions, the California Conference for Local Health Data Management, the California Conference of Local Health Officers, and other endusers. LLNL will have primary responsibility for developing, testing, and demonstrating the wireless forms automation effort, including secure encryption and digital signatures. Decade Software will provide modifications to existing software. Pacific Bell will have primary responsibility for developing, testing, and demonstrating the video-conferencing/Tele-collaboration functions. VTEL will have lead responsibility for testing and demonstrating Tele-conferencing at DHS management sites.

Implementation and dissemination will cover 18 months. Activities include two major sub-projects: video-conferencing and forms automation. Video-conferencing will take place in the 11 remote counties cited in the Problem Statement. Forms automation will be demonstrated in Yolo County, which uses the same software and hardware as DHS, as do many California County governments. A time line of major activities and milestones appears in **Appendix C**.

In the initial phase, the project team will work extensively with endusers, assessing the specific requirements of each staff person in terms of skills and resources and the idiosyncratic needs presented by each of the remote sites (offices, clinics, homes, automobiles, etc.) After this assessment period, the systems engineers of LLNL and Pacific Bell will refine the project's technical requirements, including modification of existing hardware and software and the specifications for new equipment. Working with OCHS staff, county managers, and endusers, the project team will refine its implementation plan, phasing it for maximum benefit. Then the project team will develop a detailed training, implementation, and support plan for endusers, including data integrity and security.

## **SYSTEM ARCHITECTURE**

The video conferencing equipment will provide interactive communication to other locations using an ISDN or Switched 56kbps network, depending on the type of service available in each of the 11 rural county locations. Because Mono County is divided by mountainous terrain, it will house two test locations for video-conferencing. In Yolo County, the site of the pen-based forms automation sub-project, additional hardware in the form of pen-based computers will be installed. The pen-based computers will be configured with

internal storage and communications capability (ISDN or wireless) using PCMCIA technology. Project transmission of data from remote pen-based applications will use standard encryption techniques to ensure secure communications over an insecure channel. The goal is to enable mobile staff to query databases as well as transmit completed forms in real-time. A local archive that will later be downloaded is envisioned as the first stage. Handwriting recognition will be customized to enhance recognition accuracy. An electronic mail gateway will be used so that real-time E-mail alerts can be sent to designated staff, based on the severity of the situation. A diagram of the project's architecture is located in **Appendix D**.

The project will reuse existing hardware and software wherever possible. However, to capture efficiencies of automation, new hardware and software will be required. The video-conferencing sub-project will require 9 self-contained units (TV set, camera, and network interface boxes) and 18 "desktop" PC based units with an add-in card, camera, and network interface boxes. The forms automation sub-project will require three units for out-stationed field workers and two servers (Sun Sparc 20 Workstation-class) for information intermediation.

With regard to new software, code will be created using the client-server technique and off-the-shelf packages. The code will interface to existing databases and E-mail systems and translate existing forms into images and menu options. Recent releases of WWW client and server software will be employed to minimize the time required to automate the forms as well as to provide RSA-DES encryption of the data. Recently, these standards have been recommended for CDC's use in transfer of immunization data.

As described in the following section, each subproject will be developed and tested by either LLNL or Pacific Bell and will intimately involve endusers, their supervisors, and managers. Performance standards for each system will be developed and overall project evaluation will be conducted by WCPH using measures of state/local costs, client satisfaction and access to services, employee satisfaction, and workload/task-time to determine cost-effectiveness of the application. The project will have the capacity to interface to new databases as needed and the capacity to add new workgroups to the system on a modular, "sized" basis. Software for new/modified input forms can be prepared on short notice. In addition to the use of existing software and hardware where possible, the approach reduces project risk and increases system flexibility to adapt to new programs or reassigned work.

## **QUALIFICATIONS OF PARTNERS**

For the past 18 years, the staff of WCPH have coordinated with DHS on numerous projects, many dealing with the development of information systems and the use of data. Since 1984, WCPH has continuously assisted DHS on several major information and innovation projects. Jane McCann Walsh, who will be the Project Director and Chair of the Project Team Coordinating Council and *ex officio* member of the Project Implementation Team, has been the primary staff person engaged in these efforts. In addition to designing and supporting statewide information systems, Ms. Walsh has served on six DHS planning and data advisory bodies. She has designed and managed numerous program evaluation projects. She serves as: the WCPH Director of Technical and Information Services (managing her own projects), a member of its management team, Chair of its Computer Committee, and Supervisor of its Computer Systems Administration staff.

In the past seven years, the WCPH has also extended its technical support of DHS particularly in areas requiring extensive information and program development, such as *Healthy Cities* and *Healthy Communities*. WCPH also manages the California Public Health Foundation (CPHF) which conducts research projects under the direction of DHS staff. Combined, these two organizations represent more than 30 million dollars worth of research, development, and demonstration projects annually. WCPH and CPHF both have national and international reputations in public health as well as in public administration. (For example, WCPH conducts the Centers for Disease Control and Prevention's *Public Health Leadership Institute* and administers a major Family Planning management support program for the Agency for International Development, and CPHF manages California's comprehensive, statewide Tumor Registry.) Essentially, the spheres of influence of WCPH and CPHF provide far-reaching opportunities for dissemination of this project's results. The extent of their influence will be extended by June 1995 when they will begin use of the WWW for dissemination. The Western Consortium for Public Health's capability statement is included in **Appendix E**.

DHS is the largest department within California State government and is the largest state health agency in the nation. It is the state's largest insurer, arranging for personal health care for 5.2 million residents. DHS also has the lead responsibility for disease prevention, health promotion and protection, quality assurance, and health policy setting throughout the state. Since these functions are all information based, DHS maintains hundreds of databases and disease registries. Many of these data repositories hold millions of large records (>3000 mb/record). Due to DHS' responsibility for the health of Californians, DHS has initiated or is a key participant in several public/private health information/communication (I/C) policy, planning, and development projects. Under the guidance of Dr. Peter Abbott, Chief of OCHS and Acting Chief of the DHS Center for Health Statistics, and Gwendolyn Doebbert, Assistant Chief for Health Information Policy, DHS has successfully undertaken a variety of initiatives to improve the public health through effective applications of electronic (I/C) technologies. Ms. Doebbert will serve as the Project Manager and Chair the Project Implementation Team.

Several of the latter programs are being undertaken with Pacific Bell, a leader in audio and video-conferencing applications. Pacific Bell, a subsidiary of Pacific Telesis, is the regional Bell operating company and provides over 15 million access lines in California. Pacific Bell has supported efforts to enhance California's communication infrastructure through a number of initiatives by: publicly committing to spend 16 billion dollars to build an information superhighway that can support interactive videoconferencing throughout its service territory; spending 700 million dollars this year in the FCC broadband PCS auction, thereby receiving the right to build a wireless communications network that will offer a range of mobile communications capabilities; by offering to provide any public school in its service territory with ISDN for two years; by offering over 25 million dollars in network services to seed the development of new network-based services in the medical, educational, and public service arenas. William Halverson is the designated Pacific Bell partner and he will serve on the Project Team Coordinating Council as well as the Project Implementation Team.

LLNL is widely recognized for its leadership and excellence in information technology. LLNL/OSL was created in 1988 to support a major business re-engineering effort at LLNL. Over the last seven years, OSL has developed extensive expertise in the areas of heterogeneous distributed computing architectures, high speed networks, user authentication and authorization technology, and client/server applications. Currently the OSL has active projects in the areas of pen-based computing, Secure Web Servers, and Digital Cryptology using Public Key/Private Key technology. LLNL/OSL is a partner in the \$16.5 million dollar award from the National Institute of Standards and Technology (NIST) to the Healthcare Open Systems and Trials (HOST) consortium. OSL is working with Macro International to field a distributed computing application to support case management workers in the health and social services domains. The client/server application being implemented relies heavily on the open systems lessons learned in the OSL. David Seibel and Lawrence Snyder will represent LLNL, with one of them serving on the Project Team Coordinating Council and Jo Sander will serve on the Project Implementation Team.

Pacific Bell and LLNL/OSL have collaborated on the installation of the ISDN at LLNL, on the creation of the Bay Area Gigabit Network (BAGNET) testbed, and in the 1994 Telemedicine demonstration conducted by the National Information Infrastructure Testbed (NIIT) Consortium, at the Sam Rayburn Building, in Washington, D.C. This latter project, for which Bill Halverson was the technical director, demonstrated by connecting hospitals, researchers, and a simulated national healthcare card clearance center that high speed communication technology can be used from anywhere in this country to provide real time access to medical records and to enable collaborative diagnosis. Pacific Bell and LLNL/OSL also jointly conducted/ sponsored a 1994 symposium on Open Interoperable Systems in Healthcare, attended by the Project Team's Coordinating Council.

VTEL is the leader in providing Telemedicine and Distance Education Video-Teleconferencing systems to rural America. Since its incorporation as Video Telecom in 1986, VTEL has established itself as a pioneer in the design, manufacture and world-wide marketing of interactive video-conferencing systems. VTEL which is headquartered in Austin, Texas, centers has 24 centers in the U.S., including northern California. Karen Lee will represent VTEL on the Project Implementation Team. Decade Software Corporation has developed Epitome (a full-featured Public Health Nursing Data Management System) and Envision

(Environmental Health Data Management System), which are currently used by the 12 demonstration counties. As a Tele-CCMR partner, Decade will produce the necessary modifications to Eptome and Envision required to interface with the remote pen-based data entry and access applications. Kevin Delaney will represent Decade.

**Bio-sketches of key staff are presented in Appendix F and the Budget Narrative provides more detail on their respective tasks for the proposed project.**

## **PROJECT BENEFICIARIES**

Primary beneficiaries of this demonstration project will be **mobile public health staff** in the participating counties, their **managers**, and **administrators** in DHS/OCHS. Secondly, the residents of these counties will benefit from increased public health services. The project's overall mission is to demonstrate to State Legislators and County Supervisors and Administrators the cost-effectiveness of these technologies to public health in California and elsewhere. Assuming that mission succeeds, the public health information infrastructure in California will be improved significantly and, correspondingly, the public's health should improve, too.

Strong community support has already been demonstrated by active participation in the needs assessment and other planning activities of this project's initial phase. The attached letters of support, in **Appendix G**, articulate the strong support which this project has received from a wide array of endusers and stakeholders. Although letters of support from all of the participants in the planning phase cannot be included, it should be noted that organizations such as the Centers for Disease Control and Prevention, California's Health and Welfare Agency, the California Conference of Local Health Officers, and the University of California Schools of Public Health have been involved as well as those cited in the discussion of the Project's **Implementation Plan**. Particular attention has been given to including major program areas within DHS which: target underserved populations, maintain major health databases, or have responsibility for distance learning and training.

## **EVALUATION**

Each demonstration in this project has been designed to improve staff productivity by the use of advanced communication and information technology and, thereby, to increase the availability of services, keeping costs contained and maintaining quality. Therefore, the basic question in the evaluation of whether or not this project is successful will be: **Does service productivity increase?** If the evaluation yields a positive answer to that question, then it should also reveal which functions decreased and the extent to which they decreased. If the answer is negative, then the evaluation will reveal how staff time was actually spent, providing intelligence for reconfiguring the staff/technology interface to optimize resources.

The tracking of **staff time by function** should be as unobtrusive as possible in order to prevent a distortion in the results. Preliminary investigations suggest that the basic time/function reporting system used by these mobile staffs is adequate to use as a baseline and sufficient to maintain during the course of the demonstration. During the early detailed, site-specific needs assessment period, project staff will further review the actual records kept by the mobile staff to determine whether or not they are sufficient for analyzing the distribution of staff time spent on: direct service delivery, indirect services, travel, record keeping, reporting, supervision, and any other clerical functions. It appears that the forms used currently will need to be revised somewhat in order to add discriminating functions for the tele-conferencing demonstration, such as peer consultations.

For this demonstration, it will be important to distinguish between time spent providing direct services versus time spent in indirect services, such as: collaborating with colleagues, remote case management, and databases access. These are the functions which are expected to increase the most with the assistance of teleconferencing. Once the pen-based application is fully operational in Yolo County, that system will be used to distinguish between time spent providing services from time spent recording data, especially because the two functions will be so thoroughly integrated. **All staff**, including supervisors and managers, involved

in each demonstration sub-project will be included in this analysis of time spent for each staff function. Time/function data will be analyzed for a **one month period prior to training** for implementation, and then during the **third, fifth, and seventh** months of implementation. At the same time as the time and function data are collected, both **staff and client satisfaction** data will be obtained. A brief questionnaire will be given to a sample of **25 clients in each county**, once prior to the implementation and once at the **sixth** month after implementation. This client satisfaction questionnaire will also inquire about time spent waiting for services as well as perceptions about the quality of services. **All staff** will also be given a job satisfaction questionnaire during the same time periods as the clients. This questionnaire will include questions about the amount and adequacy of training for their service delivery work and information functions. The questionnaire used for the staff supervisors and managers will also ask about: the accessibility of their staff for time-sensitive communication, before and after the demonstration; and observations concerning quality of service.

Program cost data will be obtained from OCHS and Yolo County, for the year prior to implementation and for the last three quarters of the demonstration period, in order to analyze the full costs of each demonstration technology. In addition to **staffing costs**, this analysis will examine **costs for travel**, hardware and software, and support staff. Samples of staff reports, before and during the sixth month of the demonstration will also be obtained from Yolo County and a content analysis will be performed, with DHS assistance, on these reports to determine whether they adequately communicate the programmatically intended information.

Cost data will be compiled and the differences between the pre-demonstration and demonstration periods will be measured for: (1) personnel costs of travel time, (2) travel costs, (3) service delivery costs and (4) data recording/entry and reporting costs. Effectiveness will be measured in terms of the amount of time staff transfer from the functions of travel and data recording/entry to actual client service and indirect services such as accessing patient education information for clients. Effectiveness will also be gauged in terms of staff: (1) job satisfaction; (2) perceptions about service delivery and information training; (3) accessibility to clients and supervisors; (4) supervisor's assessment of the quality of services; (5) time spent in indirect services; and (6) record keeping and reporting quality, which will be assessed by experts. These cost and effectiveness data elements will be combined with the project's implementation costs, e.g. hardware, software, training.

## **DISSEMINATION**

In the early stages of this project, the project team will seek funds from a California-based healthcare foundation in order to establish an Internet bulletin board which would permit a broader, nationally based group of experts to be involved in the actual implementation issues (both information/communication and public health issues) concerning these two demonstrations. This bulletin board would continue to be used during the demonstration phase to describe both the successes and constraints of the project and to enlist interested technicians and public health administrators in a discussion of the technologies' pros and cons.

During the demonstration period, the project team will conduct three seminars on the project's technology applications with live illustrations of their functionality and utility. Key state legislators, legislative staff, governor's office staff, and key decision makers in the Health and Welfare Agency, particularly within DHS, will be invited to interact in these hands-on applications. In addition, staff from the United States Department of Health and Human Services who are engaged in the National and Health Information Infrastructure developments will be invited to participate in these seminars. Through WCPH's network of over 500 research, demonstration, evaluation, and education projects world-wide this demonstration project will receive extensive exposure via intra-staff communications which use Internet e-mail and an e-mail based weekly "newsletter" which is used primarily to highlight the more innovative activities of staff. Finally, the cost-effectiveness evaluation will be incorporated into a document which will describe how both the technical and service delivery aspects of this project were accomplished. This document will be prepared by the project team in a manner to allow each of the participating organizations to incorporate it into a publication of their own for distribution to appropriate clients and constituencies. The combined public service mailing lists of these organizations contain thousands of appropriate recipients for such a document.