Introduction
The underpinning of functional integration is a strong information system. It is critical to the health center collaboration endeavor. Information and communications technology is integral to the efficient delivery of health care services and indispensable in a multi-faceted organization, such as a clinical Network. It is important for health centers to capitalize on technology’s solutions for faster and more accurate documentation, improved care and more efficient processing of information.

Recognizing this, the Community Health Access Network [CHAN] prioritized the development of systems standards and shared system resources to support a common vision for creative data applications. While all the systems work together to meet CHAN’s information needs, the Electronic Medical record system, by far, is the core of the toolbox. This paper focuses primarily on the role of the EMR in CHAN’s operations.

Access to accurate and relevant information in a timely way is important to clinical decision making and business management policy, and becomes more so all the time in today’s high-speed climate.
**History**

CHAN has incrementally and methodically constructed and utilized an information support system for its Member health centers. CHAN embarked on this endeavor in 1997, with the development of a state and federally funded relationship between the community health centers in New Hampshire.

A wide area network (WAN) connects the Member sites. CHAN manages the system with Network-level staff and uses common, centrally installed software for the core business functions of accounting, practice management and electronic medical records. CHAN has combined available resources, both internally and through external partners, to create an enduring information system with the potential for expansion. In the process, it made prudent decisions about product-to-product interface to enhance system utility.

Originally, the Network Members established mutual standards for software selection and operations at the separate sites. At that time, all but one of the Centers adopted the same practice management system, PCN®, and all moved to an electronic medical record system, Logician®. Similarly, several of the Centers in the Network were also using the same financial management / billing support software.

This arrangement necessitated careful coordination between the system keepers at each site to ensure or strive toward the core uniformity of data collection, storage and output expected by the Network. It soon became evident that a more central configuration of the system would provide efficiencies and better support the desired level of integration. CHAN then orchestrated the implementation of a Wide Area Network (WAN) beginning in 1999.

CHAN first centralized the information and communications systems, locating its servers, routers and systems administration staff at its’ lead health center agency, Lamprey Health Care, Inc. This brought together the infrastructure, equipment and staff resources, for a constellation of shared information technology services. The current WAN configuration enables the Membership to access base operation services such as email, and ongoing system support at an apportioned cost.
CHAN Members have migrated to the central system services on various timetables. Four of the five members are fully participating in the available central software. The remaining practice independently uses one or more of the same software products and will move to the central servers in 2003 when opportunities present through conversion and upgrades.

**Development**

CHAN has worked steadily towards systems integration over the last few years. The original information technology work plan focused on infrastructure. CHAN set about to design and “construct” the necessary components for the separate Members to participate in shared resources. With that foundation, CHAN advanced the integration with centralized, unified and universal applications (i.e. practice management, communications, and EMR.)

More recently, the project activities fell into the major categories of system customization to the Network’ business needs; training and staff development; systems documentation; and output reporting and management.
The scope of work focused on three functional areas being integrated:

- Web-based Communications
- Electronic Medical Records
- Practice Management System
- Financial Accounting System

The development approach includes a strategy for using the various software components to their full potential, and capitalizing on available resources. To that end, software packages are carefully chosen to easily interface to avoid operational redundancy. The Network implements software modules with a priority of facilitating major health center functions first; and, pioneers and secures automated data links among disparate systems to support the transfer of data between departments within a health center, as well as between the practice and external business.

- **Web-based Communications**
  CHAN created a centrally located virtual private network using Frame Relay and T1 lines. The Member practice sites connect into the central servers to access E-mail and Internet services, as well as common software tools for practice management, passing through layered security.

  The Network also has a WEB site with a public access component and a private, ‘Members-only’ section. Members are able to gain access to an intranet web site through a secure, interactive WEB page on the public site. CHAN Members are able to correspond with each other; access documents such as policies, minutes or forms, etc; forward data for common structured storage; and, manage staff registration for training sessions.

- **Electronic Medical Record**
  The star product for much of our integrated program data has been Logician® EMR software, which has provided the flexibility to accommodate the link adaptations. There has been growing support in the New Hampshire marketplace for medical practice software, particularly electronic medical records (EMR). The State has occasionally made a small amount of ad hoc funds available for the health centers’ dedicated EMR infrastructure development. Another local element, which has figured positively in CHAN’s EMR implementation process, is a software user group comprised of all NH health centers utilizing the same EMR product. This environment has fostered creativity, the sharing of resources, and the discovery and development of talented staff skills.

- **Practice Management System**
  At the same time, the Network Members are also facing the erosion of the practice management system support through business consolidation activities
among software vendors and a limited array of affordable products available. The CHAN Member practice sites, except one, use the same system software, currently PCN®. The last site uses a MacIntosh OS based practice management product, which is also now involved in the same consolidation effort by Medical Manager.

PCN has been in place at the Centers since 1996. Its utility to the centers and to the Network has reached a plateau. The system is not meeting the data needs and will not meet HIPAA regulations without upgrades. Further integration with Logician® EMR is not possible with this product. The three available data links from the central database supplied by PCN are all assigned and in use. CHAN is not able to add any additional Members to the central support without a major investment. Market information about the future plans for this product prompt the Centers and the Network to proactively prepare for PCN’s departure and replacement. The systematic conversion of all the Member sites to Millbrook Practice Manager Solution® begins in October 2002.

- Financial Accounting System
To support an interest in financial administration integration, the Members also identified content for standardized and focused oversight. To achieve uniform functionality, common data definitions and output format were accepted.

Among the five Members, at first, three different accounting software packages were in place. Wishing to migrate to a common tool, in 2000 the Network installed a new Great Plains product, Dynamics®, to support the integrated organizational analysis.

Current Capability and Capacity
CHAN has an established WAN and contracts with several Health Center staff specifically dedicated to the support of the system and the users of the shared software programs. The setup is based on a central service design and personnel shared with and between the Member health centers.

The WAN has been instrumental in the accelerated implementation of the chosen Network standard software. It has allowed Centers that were not fully equipped or staffed to transition to central support. The individual needs of different sites are a major factor in planning and implementing this system, and the WAN has allowed for the necessary flexibility.

The system is currently sized to support the CHAN Network operations and accept an anticipated moderate future growth to the complement of users. Consideration will be given in 2003 to the system’s needs for hardware, license capacity and long distance systems interface associated with an anticipated membership expansion with remotely located practice sites. Because of the
potential doubling of user count and the likely introduction of software not standard to the CHAN Network, review of hardware, license and distance interface ability must be reviewed

Currently, approximately 2.0 FTEs (six persons) in the Information Systems operations support approximately 200 users. While sufficient for a defined scope of operational and maintenance responsibilities, to provide consistent and dedicated resource to system development and expansion activity would warrant additional staff hours.

**Implementation Recommendations**

Thoughtful pre-planning is essential for such a major task as this. A thorough look at how a practice currently functions, what its human and technical assets are, and what its overall workflows consist of, is the best way to prepare for the migration to automated systems.

For a project to work efficiently, especially in a situation like CHAN’s, where there are a number of differently staffed and technically equipped sites to take into consideration, a clear view of the end goal is important. One or more project leader(s), preferably with clinical expertise, with the ability to oversee the project from an overall management standpoint is very essential.

The size and nature of the practice site has direct impact on the automation process. Naturally, a practice with a large number of staff and patients will need a different training model than a small practice. Generally, however, CHAN has found it very helpful to select individuals to “pioneer” the use of the system and champion the new system. As their knowledge and enthusiasm for its possibilities grows, they make the ideal teachers/mentors for the next set of learners. While formal presentations and hands-on work with tutorials are always helpful, the benefits of motivation from enthusiastic individuals cannot be overstated.

In general, CHAN has found that the process of practice automation needs to be clinically driven. Though IT staff are clearly an integral part of any network function, their role should be one of support and information rather than the driving force behind the project. The practitioners, clinical staff and administration need to decide how the day-to-day functions of the site will best be supported by the practice management software or EMR, and how to implement this as efficiently as possible.

It is very important to know what information and support that Management, IT and clinical staff will need to have in order to effect these changes. Project
Leaders need to recognize and communicate to staff that jobs will change, a steep learning curve is not uncommon, and that flexibility from all participants will make the process much easier. Staff members can and should take part in developing EMR supported work flows. This will not only increase the efficiency of the process; it will also give an initial boost to the involvement and understanding of all participants.

Realistic projections of costs, time, staffing and equipment requirements are essential. The project manager, or management team, should make sure that these factors are thoroughly examined, and that reasonable budgets and target dates are selected in order to make the transition under the most comfortable circumstances possible.

**Evaluation**

Adapting an EMR System requires a multi-dimensional approach involving a variety of end-user representation. All along, CHAN viewed the EMR system as an enhancement to the process of care delivery, not merely a charting tool. Our EMR product, Logician®, is extremely flexible and offers the practice tremendous potential as a database for information extending beyond the typical patient record. CHAN chose to systematically implement the system in phases (by module) as well as in stages (by location) according to site readiness and need.

As users increased their proficiency and expertise with the system, an operational review was conducted to determine whether any fine-tuning was necessary to maximize system utilization.

Tasks formerly requiring considerable work force hours have been radically changed in many cases, to point-and-click simplicity, once the initial work of setting up the system and entering patient information was completed. Some personnel were freed up to perform other service tasks, contributing to improved patient service and care.

The speed at which information can be gathered, processed, tabulated and saved is also a major factor in making patient visits simpler and more effective. Patients have responded with enthusiasm to the prompt handling of their inquiries, prescriptions refill requests, triage needs, and visit scheduling. They have also appreciated the more accessible format the information assumes, as when a clinician is able to generate a data graph for them, visually illustrating their health history or therapeutic progress.
Mutually established benchmarks, created during the implementation planning process, were evaluated. Established measures focused on productivity, economics, staff impact/development, and quality of care.

**Productivity**
The Network noted an increase in individual productivity, in that each system user, once comfortable with the system and its functions, can perform his/her work more easily and efficiently. While overall patient volume served in a given day may remain unchanged, both staff and patients note a level of quality in service and care received. Further, providers report a better ability to complete documentation obligations and end-of-session follow-up in a timely fashion.

Some benefits of EMR in terms of productivity:

- Streamlined department and clerical tasks reduce workload, freeing up staff to perform higher-level tasks and for to use time more efficiently for patient care.
- Phone calls are handled immediately or returned more promptly with access to the chart information.
- Consistent and legible chart notes, prescriptions etc. reduces risk potential, increases efficiency and the quality of patient care.
- Communication between departments is expedited reducing waiting time for staff and patients.
- Clinical staff can access patient information mutually, reducing visit delays, as information is compiled quickly and accurately.
- Lab results and diagnostic tests can merge electronically and accurately to patient charts, along with immediate status information on referrals, tests, therapy and physician orders reduce patient waiting time and staff workload.
- Quality assurance reporting capabilities monitors the accuracy and consistency of patient data and the provision of preventive services and practice performance

**Economics**
The entry cost of the EMR is high, but CHAN executed most of the implementation to date through grants. There are many opportunities for savings in operating costs. Similar to the effect on productivity, there is reduction on operating costs with EMR in individual areas, but overall there is not yet a corresponding increase to revenue.
Generally, the outlay of funds for the required equipment and staffing adjustments are made up in the benefits of EMR, which include:

- Reduced costs of filing supplies, storage space, and personnel required to maintain paper records.
- CPT/ICD-9 coding helps to ensure correct billing for services reducing under-coding and lost charges.
- Clinical information is available to all sites eliminating the duplication of paper documents.
- Interfaced billing and demographics provides accurate data eliminating staff time spent on data duplication.
- Patient charts are immediately accessible saving provider time spent waiting for record retrieval.
- Automated retrieval of patient follow-up, compliance, and progress.
- Preventive health maintenance tracking encourages patients to schedule appointments for overdue or necessary services.
- Easier compliance with chart requests and chart audits
- Information from the patient chart required for daily phone tasks is immediately accessible improving staff efficiencies and customer service.
- Charting and document signature can be accomplished from any workstation allowing fast review at times and locations that are convenient to the provider.

The EMR has enabled CHAN to do the clinical data collection it needs, while providing clinical tools for the clinical staff and patients. Medication management, automated lab results, chronic disease management and chart legibility are areas of health center operations, which have improved significantly. Standardized encounter screens have been developed for the episodic and scheduled exam visits; diabetes, asthma, and peri-natal case management and other specialized aspects of office care. CHAN has been able to share and exchange the screens develop with other CHC’s outside the Network that use the same EMR.

➢ **Staff Impact / Development**

Though the systematic practice changes brought about by a transfer to EMR might suggest a sudden reduction of staff, CHAN’s has been more one of restructuring of job responsibilities, and of retraining, than one of turnover.
Overall, it has been possible to computerize staff tasks. For example, the staff previously responsible for filing and retrieval of paper records has now been retrained to handle electronic patient check-in, appointments, and similar tasks at the reception area.

As a clinical tool, the technology has transformed the work flow of the practice and placed information at the center of decision-making and care coordination. Technology has also accommodated staff work styles and schedules to allow access to clinical information and perform record keeping outside the limitations of office hours. Staff autonomy and job satisfaction are positive outcomes of the technology supported enhancements.

- **Quality of Care**

Performance improvement and quality oversight are areas of the practice that have benefited from EMR systems support. The system affords unprecedented flexibility in population-based assessment and targeted client outreach, and program impact evaluation. Both staff and clients are enthusiastic about the ease and flexibility afforded to the care process through a more thorough and up-to-date system of care. Examples include:

- Patient medical records are accessible by clinical staff 24 hours a day; are easier to access and more complete with downloaded diagnostic test information, legible and timely medication, problem list and allergy list updates.

- Interdisciplinary care is facilitated within the Health Centers, as social workers, nutritionists, health educators, and other contribute to and review the patient’s record.

- Referrals to specialists are coordinated and documented through the EMR, with all appropriate clinical information included.

- Protocols remind providers and clinical staff of preventive care measures and chronic disease monitoring.

- Reports are run regularly, which identify patients who are past due for preventive care or for chronic disease management measures. Patient reminder letters are generated and recorded within the EMR.

- Security is vastly increased from that associated with paper records, which could get misplaced and had the potential to be seen by unauthorized persons.

- Graphical data representations of patient progress can show the patient in a very visual form, which can be both helpful and encouraging.
Development Scope
CHAN intends to fully integrate selected business functions utilizing the automation and information management tools it has available. In particular, these include the Logician® EMR, Practice Management systems and Dynamics® Accounting software.

The Network’s plan is to have all Network Members using a core set of system features supported by uniform policy and inter-agency connections; and, system-to-system links to the centralized service.

Data
Data analysis and trending has a prominent role in CHAN’s overall plan for the most beneficial use of EMR. CHAN seeks to expand its primary care knowledge base, to assure that best practice is incorporated into the centers’ operations and assess program impact. The recording, calculation and resultant sharing of this information using up-to-date technological methods will greatly improve the efficiency of performance monitoring and reporting to state and federal agencies. Trends, problems and other information can be tracked with much greater efficiency and speed, and the resultant data will enrich the overall pool of statistical information available.

CHAN is building a comprehensive clinical data set from the combined sources of Practice Management and Electronic Medical Records Systems. The database is standardized for the Network. It currently contains a repertoire of approximately 7000 unique HIPAA compliant data elements. The resultant data dictionary is valuable resource with the potential for its export to other settings.

This data makes it possible for CHAN to develop a variety of custom original performance monitor reports. CHAN is diligently compiling a portfolio of clinical and operational management reports that represent individual health center activity as well as aggregate Network performance against mutually selected markers.

The existing systems and current data organization lend opportunity to networking with others to compile an expanded data resource representing whole regions. CHAN is ideally poised for inter-entity and inter-regional data sharing and supports the development of a common data dictionary to be available as a potential foundation for unified data reporting and outcomes measurement with entities external to CHAN.
➤ Technical Assistance
CHAN has developed proficiency with the development and implementation of new software systems in the health center setting, through firsthand experience. As a Network, CHAN has helped to pioneer the use of EMR in the regional market. As a result, a complement of distinctive competencies has emerged within CHAN.

Further, CHAN seeks to position itself in the marketplace as the experienced resource for integrated information technology. This will be based on CHAN’s continued infrastructure development and a stepped-up schedule of opportunities for providing technical assistance and consultation to others in our area and around the country.

CHAN’s contract staff is an available resource for peer coaching on how to get started with systems development and system-wide software implementation. CHAN offers helpful tools to guide others in their systems development efforts, having originated the framework for the major policy and the work flow decisions to be made that are generally necessary in conjunction with implementation.

CHAN’s systems consultation portfolio takes global perspective of how the actual software will be used for consistent business operations. The scope includes systems design, WAN and VPN development, WEB-based utilities; data dictionary; inter-agency data management agreements; clinical application via data management consistency and customization; network-wide consistency in systems set-up; automated formulary and indigent drug program management.

➤ Systems Advancement
The development of the Community Health Access Network’s information system infrastructure continues to reach out towards new heights in automating business processes for the member health centers. Over the recent years, CHAN concentrated heavily on its’ efforts to build and fully integrate the systems to support the Members’ collective shared programs. Increased efficiency of each site enriches that of the network, and the Network provides the systems and information necessary to achieve this.

CHAN’s overarching goal is to stabilize the software product applications installed throughout the Network and to promote the broad use of technology among other Centers and Networks. Now that the groundwork for these systems has been laid, and much of the training and implementation has been completed, CHAN is ideally poised to complete the major installations. The next iteration of its’ technology and systems development will be on the important mainstays of the information infrastructure. The priorities are to replace the Practice Management System and to support best clinical practice with the expansion of the EMR installation. Areas of focus that need to be addressed:
- **Practice Management Software Change and Upgrade**
Implement a single common, centrally supported practice management software package for Network members, as a full replacement and upgrade for the current software.

- **Insulate CHAN’s investment and advance the efficacy of the EMR software.**
Identify and activate a plan and protocol for the continued long-term use of the established EMR software. Convert and integrate all CHAN members to the Network central service for EMR, including the transfer of existing EMR data and an upgrade of the product release version.

- **Active participation in Best Practice dissemination and Technical Assistance**
Prepare concrete information, products and presentations related to the CHAN information systems, for the ready transfer of knowledge to those just entering this arena. Be available for and seek out opportunities to share our experiences with other health centers and Bureau sponsored Networks.

- **Preparation for Integrated Network Expansion**
Identify a strategy to align with additional safety-net participants that may include individual centers or entire Network systems. Evaluate total system capacity needs, with the expectation of optimizing strengths and resources of potential business and program participants.
Future Program Direction and Objectives

CHAN is committed to advancing the access to and the utility of technology for the Network and others. Its’ goal, in part, is to provide the tools and develop the provider proficiency through technology to enhance the services provided to Health Center clients. To do so, CHAN will solidify the systems infrastructure; extend the integration of its system with other parties; and create learning opportunities for others and itself.

“With the initial systems development completed, CHAN is now moving to perpetuate the system and optimize its ongoing operations. For example, it is preparing to extend and incorporate the technology into ongoing work relationships. This includes crosswalks between software, formulary management, direct links with referral sources, electronic report submission and other ‘next dimension’ functions. Additionally, CHAN will need to make a system software change for practice management and a major upgrade for EMR to remain current and ‘ahead of the curve’.

Achieving this initial goal and mainstreaming the implementation throughout the network tests the system’s current capability. The central and Member site hardware, telephone line connections and Member user access all need to be bolstered to assure user capacity within the Network and to introduce and match to the resources of the external partners. CHAN expects to have to introduce new technology to the system infrastructure that is intended to minimize data management disruption that arises from episodic product variation and changes.

Long-term, CHAN seeks to facilitate the availability of health care delivery data for the Bureau of Primary Health Care and others, that highlights the powerful work and distinctions of the health center movement. Technology-based solutions for the clinical practice are one of the safety-net’s hallmark integration successes. The ongoing objective is to further advance CHAN’s expertise, not only with the various software products, but also with their application and management.