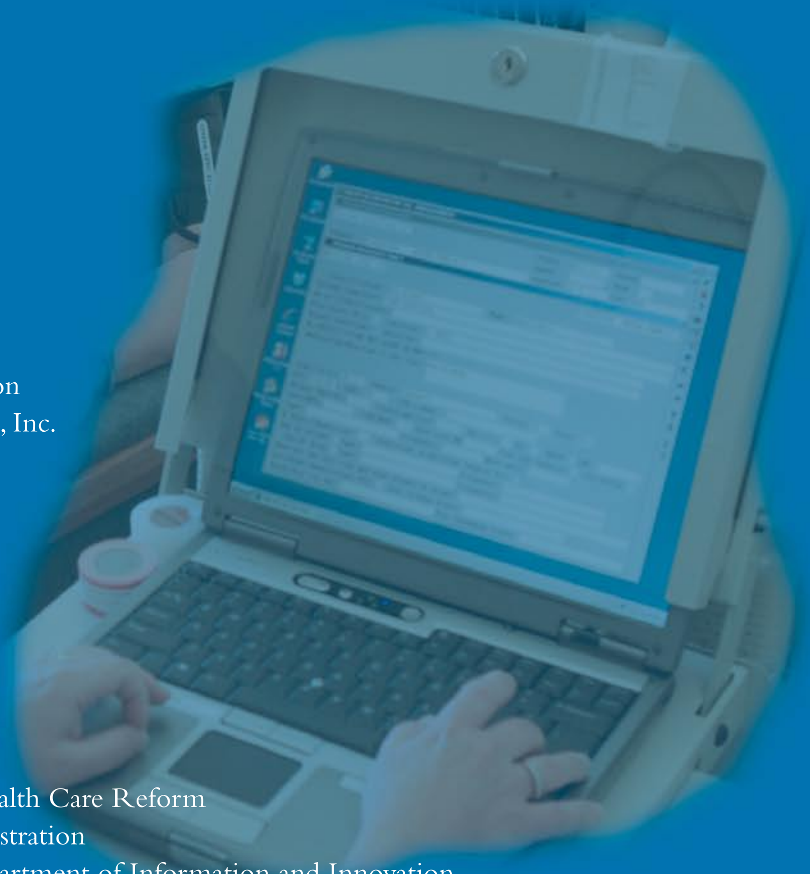
VERMONT HEALTH INFORMATION TECHNOLOGY PLAN

Strategies for Developing a Health Information Exchange Network



Submitted by:
Board of Directors
Vermont Information
Technology Leaders, Inc.

VITL
VERMONT INFORMATION TECHNOLOGY LEADERS

Submitted to:
Commission on Health Care Reform
Secretary of Administration
Commissioner, Department of Information and Innovation
Commissioner, Department of Banking, Insurance, Securities & Health Care Administration
Director of the Office of Vermont Health Access
Senate Health and Welfare Committee
House Committee on Health Care

July 1, 2007

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EXECUTIVE SUMMARY

The Vermont Health Information Technology Plan (VHITP) workgroup, convened by Vermont Information Technology Leaders (VITL) under contract with the Department of Banking, Insurance, Securities & Health Care Administration, is facilitating the development of a statewide plan as described in 22 V.S.A. § 903. The workgroup consists of more than 30 health care stakeholders with a shared vision.

Our vision is for a healthier Vermont, where shared health information is a critical tool for improving the overall performance of the health care system. The health care community will work together to achieve new efficiencies through the use of information technology in order to deliver better overall value and care to our citizens.

The workgroup considered many scenarios such as the one on pages 4 and 5 – in areas including medication history information for the benefit of emergency room patients; electronic laboratory results to support outbreak and food-borne illness management; and electronic medical records to help in the reduction of medical errors – all which help to illustrate the compelling benefits of an integrated electronic health information infrastructure for the sharing of electronic health information. These benefits include improved clinical outcomes, continuity of care, greater efficiency, and reduction of duplicate services.

Patient care today is an information-driven process. A statewide health information technology plan is a crucial step towards achieving this vision of effective, efficient, statewide use of electronic health information. The charge from the Vermont General Assembly was to first develop a preliminary plan which was delivered on January 1, 2007. This final plan positions Vermont to move forward and implement health information technology initiatives.

The workgroup's strategy for the development of the plan was rooted in the health care reform legislation, calling for eight specific requirements spanning education, funding, standards; a special focus on security, privacy, data ownership and governance; and the integration of existing initiatives such as the Blueprint for Health. Based on the legislative requirements, the VHITP workgroup developed a set of five core principles – with 40 supporting principles – to help guide the development of recommendations and, looking to the future, to provide a framework for all health information technology initiatives in Vermont:

I. Vermonters will be confident that their health care information is secure and private and accessed appropriately.

II. Health information technology will improve the care Vermonters receive by making health information available where and when it is needed.

III. Shared health care data that provides a direct value to the patient, provider or payer is a key component of an improved health care system. Data interoperability is vital to successful sharing of data.

IV. Vermont's health care information technology infrastructure will be created using best practices and standards, and whenever possible and prudent, will leverage past investments, and will otherwise be fiscally responsible.

V. Stakeholders in the development and implementation of the health care technology infrastructure plan will act in a collaborative, cooperative fashion to advance steady progress towards the vision for an improved health care system.

There are numerous initiatives on the federal, state, and local levels to implement health information technology on a widespread basis and foster health information exchange. So far, none of the bills introduced in Congress have been signed into law. For that reason, states have been diligently moving ahead with their own legislation and projects. A detailed inventory of the initiatives in Vermont is in Section 2. Historically Vermont health information technology projects have been developed separately and there is a risk that they may not be able to share information or utilize common resources. Adhering to the concepts, strategies, and standards laid out in this plan will help reduce that risk, but additional coordination efforts will be necessary.

The workgroup developed a set of core objectives, and defined a set of activities and targets to support achieving those objectives. The objectives are:

The Problem

A 64-year-old man with diabetes and coronary artery disease is insured through the Medicaid program. He has targeted chronic conditions so his case is selected for disease management services. Claim and eligibility data is analyzed and he is referred for completion of a health risk assessment. When the state's vendor calls to complete the assessment he decides not to participate so his name is not put on the list of people who receive phone calls or face-to-face visits from a nurse. He gets educational mailings but he usually throws them away. He regularly visits his local general practitioner and is sometimes referred for lab tests. He doesn't always go, but when he does, the results show that his health is declining. He doesn't always take his medication and he doesn't make recommended lifestyle changes. The cardiologist that he visits for his heart condition a couple of times a year doesn't know which tests he has taken or the results, so tests are sometimes duplicated. This man's health is out of control and it is likely that he will end up in the emergency room.

I. Encourage and enable the deployment and use of electronic health record systems within the state to increase the amount of health information that exists in electronic form.

II. Establish and operate the infrastructure necessary to promote secure electronic health information exchange to achieve the plan's vision.

III. Empower consumers to take an active role in electronic health information initiatives in Vermont.

IV. Enable public health agencies to leverage health information technology/health information exchange investments to monitor and ensure the public's health more transparently and quickly.

More detail on strategies to reach these objectives is in Section 5.

The VHITP workgroup selected a set of standards with an emphasis on those standards most essential to support health information exchange activities within the state. Although some well established standards are still evolving, health care organizations should adopt health information technologies that are consistent with widely recognized national standards to the extent possible while balancing internal needs with the broader objectives and goals of supporting cost-effective health information exchange across organizations and health care settings. The workgroup said that hospitals subject to certificate of need regulations should address the health information exchange standards, including the core standards, messaging standards, core semantic standards, health information technology infrastructure and applications, and standards for process interoperability. Hospitals should provide a discussion of applicability, explanation for inapplicability of selected standards, and describe the obstacles to adoption of applicable standards. The complete list of standards and descriptions of them are in Section 6.

VITL is coordinating the deployment of a number of initial projects in 2007 designed to provide immediate benefit to patients, demonstrate the capabilities of a statewide health information exchange network, and help exercise the technical and organizational infrastructure that is being developed for statewide health information exchange. While these projects do not by themselves lay the foundation of the technical infrastructure, they represent Phase I of the state's implementation. The VHITP tries to leverage these initial projects wherever practical while critically examining the attributes of these projects to ensure that the correct long-term strategy is not negatively affected by these opportunities. The VHITP workgroup chose a hybrid technology architecture, which combines features from centralized systems and distributed systems. The major components include:

- Integration engine (message hub and interface engine)
- Network infrastructure and standards based messaging
- Originating/participating systems (existing systems accessing or supplying data to the HIE network)
- Topical registries and applications
- Central data services

Section 7 provides more information about the various components and how they will work together in a comprehensive system.

The VHITP workgroup recognized that privacy and security are paramount issues. In focus groups, consumer group meetings, and surveys Vermonters expressed their support for electronic health initiatives, but they also expressed concerns about privacy and security. Their concerns fall into three categories:

1. *Security:* Vermonters are concerned about the ability of consumer systems to protect their health information.

2. *Authorized access:* Vermonters are concerned that their information may be inappropriately accessed even if the computer systems are secure.

3. *Control:* Vermonters are concerned that they will lose control of their health information in an electronic environment where physicians, specialists, and hospitals share their records.

The VHITP workgroup found that if these concerns are not addressed, electronic health initiative initiatives in Vermont will have limited success. On the other hand, controls that overly restrict the dissemination of information could reduce the benefits of health information exchange that were sought in the first place. The

The Promise

The same 64-year-old man with diabetes and coronary artery disease is insured through the Medicaid program. His case is selected for disease management services because he has targeted chronic conditions. Lab results, claim, and eligibility data are analyzed, and it is clear that he is headed for a health crisis. He is referred to the Care Coordination Program (CC) for special attention. The regional nurse and social worker get in touch with him and because they are local people who know his doctor and community he agrees to participate in the program. They work with the man and both his doctors to develop a collaborative plan for managing his conditions. Because lab data is available electronically they can easily follow up to ensure that the man has taken tests when they were ordered, and they can monitor the results. Both doctors get the results so there is no duplication and they can make better care decisions. The CC employees refer the man to the local Healthy Living Workshop where he improves his self-management skills. A health crisis is avoided and health dollars were spent appropriately.

challenge is to achieve a balance between the benefits and the concerns through strong legal protections and the appropriate application of policy and technology. The workgroup laid out a framework for developing privacy and security policies, which is detailed in Section 8. The workgroup also recommended that the health information exchange network adopt policies that comply with this framework.

Controls that overly restrict the dissemination of information could reduce the benefits of health information exchange that were sought in the first place.

Both health care practitioners and Vermont's citizens will need to be educated about health information technology and health information exchange, and their rights and responsibilities. To do that, the VHITP includes an education campaign design. The campaign will be conducted in three phases. Initially, outreach and education will cover basic issues of privacy and security, and be targeted to people who are affected by VITL's projects. As the use of health information technology in a community reaches a critical mass, a second phase of the education campaign will begin to reach all members of the local community. After the broad campaign is completed, there will be a need for ongoing follow-up to reach people who move into the community or otherwise were not previously reached. Section 9 includes an estimate of campaign costs, and samples of communications materials.

One of the most challenging aspects of health information technology – and health information exchanges in particular – is the development of a sustainable model to fund and financially support desired initiatives both in their pilot stages and ongoing operation. This plan identifies a number of important initiatives and activities that are required to fulfill the vision of health information technology for a healthier Vermont. Section 10 describes a variety of sources where funding may be obtained for those initiatives and activities. The plan recommends that the government appropriation through the Vermont General Assembly be at least $1 million a year for the next several years. The VHITP workgroup recommended that financing must be sufficient, equitable, fair, sustainable and broad based. The basic cost of operating the Vermont health information exchange network at current levels is $2.5 million a year, but that is expected to increase by $250,000 per year as additional projects and capacities are added. There is an additional cost of $500,000 per year for interfaces to allow for bi-directional communication between the health information exchange and participants.

The workgroup emphasized that physicians must have electronic health records for the health information exchange to be successful. Efforts are underway to raise funds for a $1 million pilot project to provide electronic health records for 12 physicians. A VITL physician practice survey found that more than 300 primary care physicians in Vermont are in need of electronic health records. This plan estimates that the cost of providing systems to those physicians is almost $25 million. VITL will work with the General Assembly to identify sources of funding for the deployment of EHRs in the non-hospital owned physician practices.

Section 11 contains a description of necessary governance and accountability elements for health information exchange, including a diverse board, advisory groups to assist in prioritizing projects, and an independent avenue to resolve concerns and disputes.

The implementation strategy chosen by the VHITP workgroup relies on a phased-in approach to building the health information exchange network, described in Section 12. Projects will be selected on several criteria, including their ability to help Vermont achieve a full health information exchange. VITL has developed an evaluation methodology to help place various projects into their strategic context. The methodology consists of a three step process to be carried out by a Project Review Committee:

- **Step 1: Evaluate outcomes**
- **Step 2: Evaluate infrastructure needs**
- **Step 3: Conduct business analysis**

Projects will be presented to the committee by the VITL board of directors, which will accept submissions formally or informally from VITL staff, stakeholders, individuals, or organizations. The committee, consisting of members appointed by the board through the VITL Nominating Committee, will maintain a list of projects and evaluations on VITL's website so that stakeholders can monitor progress. The public nature of the Project Review Committee review will be an important part of setting expectations appropriately and educating the public regarding the core mission of the health information exchange network.

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1 INTRODUCTION

Vermont's governor and General Assembly are nationally-recognized leaders in Medicaid changes, health care reform, and efforts to curb health care costs and improve health outcomes

Vermont is the second healthiest state in the country, according to the 2006 America's Health Status rankings published by the United Health Care Foundation,[1] joining five other New England states in the top-ten tier of this widely-read publication. Vermont is ranked third in health care quality, as measured by the June 2007 State Scorecard for Health System Performance compiled by The Commonwealth Fund. New England as a region, and Vermont in particular, have had successes in addressing such issues as prenatal care, immunizations, and health insurance for children. All states, however, are facing challenges in the burden of chronic diseases, increases in the number of uninsured, and rising health care costs.

Vermont's governor and General Assembly are nationally-recognized leaders in Medicaid changes, health care reform, and efforts to curb health care costs and improve health outcomes, as well as in the application of information technology to these issues. Gov. Jim Douglas was honored by the eHealth Initiative (eHI) in September 2006 for his contributions in health information technology (HIT) and electronic health information exchange (HIE).[2] These contributions included support for the Vermont Blueprint for Health Chronic Care Initiative and working with the General Assembly and Department of Health, in collaboration with Vermont Information Technology Leaders, Inc. (VITL), towards the development of a statewide HIT infrastructure. In accepting the eHI award, the governor said, "Health information technology is the conduit for the people of Vermont to receive world class care by creating information networks so they can tap into the resources they need to improve their quality of life."

1.1 Technology Plan Workgroup and Decision Making Process

In 2005, the Vermont General Assembly authorized development of the Vermont Health Information Technology Plan (VHITP), specifically:

"The commissioner shall facilitate the development of a statewide health information technology plan that includes the implementation of an integrated electronic health information infrastructure for the sharing of electronic health information among health care facilities, health care professionals, public and private payers, and patients. The plan shall include standards and protocols designed to promote patient education, patient privacy, physician best practices, electronic connectivity to health care data, and, overall, a more efficient and less costly means of delivering quality health care in Vermont."[3]

In October 2006, VITL established a working group to develop the plan in compliance with the legislation by drawing upon existing members of VITL's board of directors, advisory group, subcommittees, and other representatives from participant organizations. Currently there are more than 30 members (see Appendix D for a complete listing) representing a broad range of interests. The VHITP workgroup serves in an advisory capacity to the VITL board of directors

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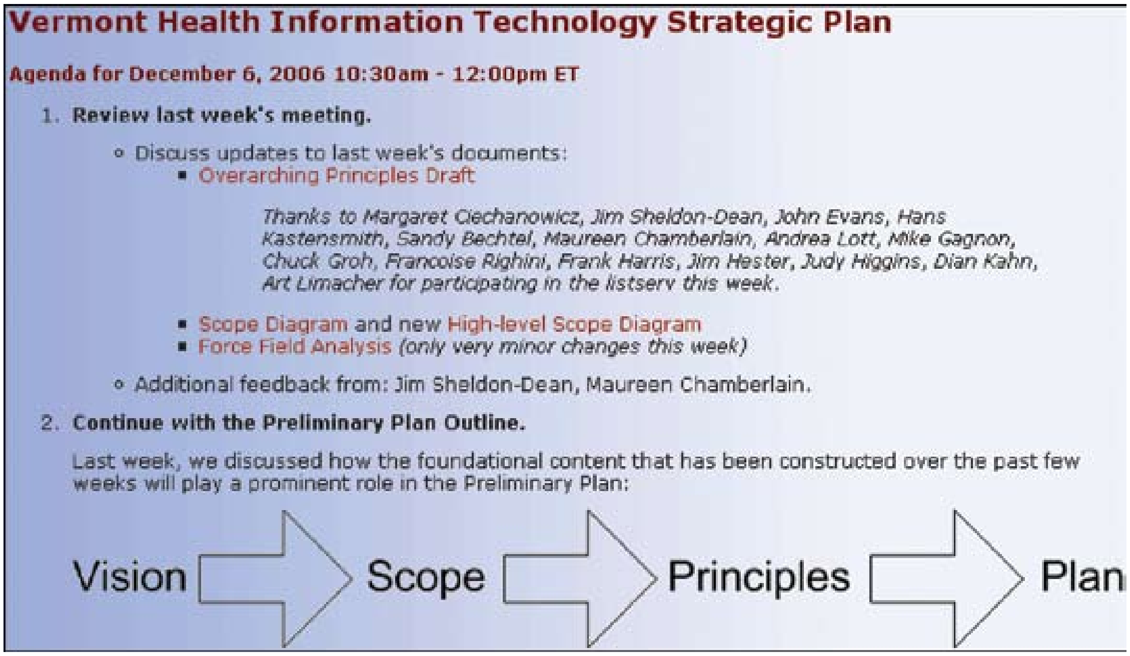
(see Appendix J), which submits its recommendations to the General Assembly. The workgroup had its kickoff meeting on November 1, 2006, and met weekly in person or via teleconference. In October 2006, HLN Consulting, LLC[4] was engaged to provide facilitation, research, and writing support to this effort. Part of that facilitation included the maintenance of a website[5] to manage documents, collect feedback, and post meeting agendas.

As required by its founding legislation, VITL delivered a preliminary plan on January 1, 2007 – a "Plan for the Plan" that described the strategy for developing the final plan, outlined efforts to date, and provided a preview of the key issues and specific steps which the workgroup expected to focus on in the final plan.

Decisions about what should be in the plan were guided by the requirements in the legislation and a set of principles that were developed. To reach a consensus by the workgroup, discussions were held in face-to-face meetings, by conference call, through exchange of email on a listserv, and through surveys on the project website.

Sometimes the workgroup was unable to reach consensus. In those few cases, there was a process for making decisions. The majority's recommendation and the minority opinion or dissenting views were reported to the VITL board, which has final authority for deciding what recommendations are contained in the plan.

Figure 1 **Part of a conference call agenda from the VHITP Workgroup website**



Vermont Health Information Technology Strategic Plan

Agenda for December 6, 2006 10:30am - 12:00pm ET

1. **Review last week's meeting.**
    - Discuss updates to last week's documents:
        - Overarching Principles Draft

          Thanks to Margaret Ciechanowicz, Jim Sheldon-Dean, John Evans, Hans Kastensmith, Sandy Bechtel, Maureen Chamberlain, Andrea Lott, Mike Gagnon, Chuck Groh, Francoise Righini, Frank Harris, Jim Hester, Judy Higgins, Dian Kahn, Art Limacher for participating in the listserv this week.

        - Scope Diagram and new High-level Scope Diagram
        - Force Field Analysis *(only very minor changes this week)*
    - Additional feedback from: Jim Sheldon-Dean, Maureen Chamberlain.
2. **Continue with the Preliminary Plan Outline.**

   Last week, we discussed how the foundational content that has been constructed over the past few weeks will play a prominent role in the Preliminary Plan:

1.2 Required Elements of the Plan

The legislation which authorizes development of this plan identifies eight key elements that must be included in it:

(1) Supporting the effective, efficient, statewide use of electronic health information in a variety of settings;
(2) Educating the public and health care professionals about electronic health information;
(3) Promoting the use of national standards for interoperability;
(4) Proposing strategic investments;
(5) Recommending funding mechanisms;
(6) Incorporating existing health care information technology initiatives;
(7) Integrating the HIT components of existing initiatives; and
(8) Addressing issues related to data ownership, governance, and confidentiality and security of patient information

The remaining sections of this document detail the vision, objectives, standards, and strategies necessary to satisfy these requirements.

Nurses in the Surgical Care Unit at Rutland Regional Medical Center record patient observations on computer terminals at the nurses station. Patricia Popovitch, R.N., (left) discusses a case with unit clerk Susan Bradish (right).

[1] United Health Foundation, "America's Health Rankings," 2006 Edition <http://www.unitedhealthfoundation.org/ahr2006/>.

[2] eHealth Initiative, "Vermont Gov. Douglas honored by eHealth Initiative for contributions to electronic health information exchange," 26 Sep. 2006 <http://www.ehealthinitiative.org/news/douglas.mspx>.

[3] Original <http://www.leg.state.vt.us/statutes/fullsection.cfm?Title=18&Chapter=221&Section=09417> and amended <http://www.leg.state.vt.us/docs/legdoc.cfm?URL=/DOCS/2006/ACTS/ACT215.HTM> legislation.

[4] See HLN Consulting, LLC website, <http://www.hln.com/>.

[5] See Vermont Health Information Technology Strategic Plan website, <http://www.hln.com/clients/vitl>.

Nyia Bean files paper charts at NVRH Corner Medical in Lyndonville. While paper records are still stored at the physician practice, the introduction of electronic medical records will soon free up this storage space.

2 HEALTH CARE REFORM ENVIRONMENT

2.1 Introduction

The health care environment in the United States is quite complex, as is the information technology landscape. Their intersection – health information technology – has introduced a whole new vocabulary of acronyms to describe aspects of information technology used to assist with the delivery of health care. The terms health information technology (HIT) and health information exchange (HIE) are related but different. HIT describes the overall technology and HIE describes the process of records exchange enabled by the technology. Similarly, the regional health information organization (RHIO) is the entity that operates a health information exchange network (HIEN). At the point of care, an electronic health record system[6] (EHR-S) is a computer-based software application that provides access to a patient's electronic health records by physicians or other health professionals. This section will describe the most important national and local initiatives related to HIT and HIE that are relevant to the plan and serves to provide an active context to the sections that follow.

2.2 National HIT Landscape

2.2.1 Setting the Stage

In 1996, the Institute of Medicine (IOM) launched a concerted, ongoing effort focused on assessing and improving the nation's quality of care. The first phase of the project concluded that the depth and impact of the nation's health care quality problem was "staggering."[7] The second phase presented a framework for understanding the gaps between "good quality care" and current practice. The findings serve as the foundation for a vision of radical transformation of the health care system.

Phase three of the IOM's Quality Initiative focused on implementation of that vision by identifying 20 priorities for national action and involving a broad set of stakeholders: clinicians, health care organizations, employers, consumers, foundations, researchers, government agencies, and quality organizations. Underlying many of these priority areas is an emphasis on the importance of information technology, including electronic medical records and national standards to promote quality improvements across IOM's six dimensions of quality care: safety, timeliness, effectiveness, efficiency, equity, and patient-centeredness.[8]

Many public-private collaborations, such as the Leapfrog Group and the Institute for Healthcare Improvement (spearheaded by Donald Berwick, M.D., Harvard Medical School) began to systematically address the issues of health quality. In the public sector, the U.S. Department of Health and Human Services began to develop the vision for the growth of local health information infrastructures to interoperate within a national network.

2.2.2 Federal Initiatives

At the national level, these efforts converged in President Bush's 2004 State of the Union address. He called for the majority of Americans to have interoperable electronic health records within 10 years and signed an executive order creating the Office of the National Coordinator for health information technology. He appointed Dr. David Brailer as its head. In July 2004, Dr. Brailer issued a progress report, "The Decade of Health Information Technology: Delivering Consumer-centric and Information Rich Health Care."[9] The report was subtitled "Framework for Strategic Action," and it set in motion a series of funding opportunities from foundations, government agencies, and the private sector.

The Markle Foundation and the Robert Wood Johnson Foundation established the eHealth Initiative. The Department of Health and Human Services created programs in the Agency for Health Care Research and Quality (AHRQ) and the Health Resources Services Administration. These organizations awarded grants for pilot projects for electronic exchange of health records among providers. The grants also promoted the use of health information technology to affect transformations in patient care, disease management, patient safety, and quality of health care services.

After the 2004 election, Health and Human Services Secretary Michael Leavitt moved to aggressively advance the President's call for Americans to have electronic health records within 10 years. In September 2005, he established the American Health Information Community (AHIC). This federally chartered advisory committee was given the responsibility to make recommendations to the Department of Health and Human Services (DHHS) for promoting the use of electronic medical records, establishing interoperable standards, and ensuring that the privacy and security of those records are protected. To carry out this mission, AHIC created seven workgroups[10]:

- Population Health and Clinical Care Connections Workgroup
- Chronic Care Workgroup
- Confidentiality, Privacy, & Security Workgroup
- Consumer Empowerment Workgroup
- Electronic Health Records Workgroup
- Quality Workgroup
- Personalized Healthcare Workgroup

Concurrent with the AHIC work, the Office of the National Coordinator released requests for proposals (RFPs) and awarded contracts to conduct studies and pilot projects for developing standards for interoperability, privacy and security, and identifying the lessons learned from early pilots. In 2006, the results were released in a report entitled "The HHS Health Information Technology, Major Accomplishments."[11] The report led to a new round of contracts focused on specific areas of HIT and HIE:

- **The Healthcare Information Technology Standards Panel (HITSP) to develop recommendations for health data interoperability standards**

  In August 2006, the AHIC recommended three sets of interoperability specifications approved by the HITSP. Secretary Leavitt accepted these standards that now form the basis for national interoperability. He also accepted the AHIC's recommendation to develop an adoption plan to integrate these standards into software for health care delivery systems by December 2007.

At the same time, the President issued an "Executive Order on Value Driven Health Care" requiring federal departments and agencies to use health IT based on interoperability standards recognized by the secretary of DHHS.

- **A four vendor consortia to develop nationwide health information network (NHIN) prototypes**

  By January 2007, the four vendors (Accenture, Computer Science Corporation, IBM, and Northrop Grumman) had developed four prototype architectures for a nationwide health information network. These prototypes demonstrate functional requirements, security, and business models for health information exchange. Their delivery marks the beginning of the next phase of work to create a "network of networks" using "trial implementations" to connect regional health information exchanges.

- **The Certification Commission for Healthcare Information Technology (CCHIT) to accelerate the adoption of health information technology by creating an efficient, credible, and sustainable product certification program.**

  By May 2007, CCHIT had certified nearly 90 ambulatory electronic health record products which meet baseline criteria for functionality, security, and interoperability. CCHIT will expand certification to hospital inpatient electronic health record products.[12] This will significantly increase patient and provider access to health information generated during hospitalization.

- **Health Level Seven (HL7), an international health standards organization, to develop specifications for a messaging standard that enables disparate health care applications to exchange key sets of clinical and administrative data.**

  HL7 has established a tentative standard that defines the set of functions needed in an electronic medical record. DHHS continues to work with HL-7, as well as others, to define standards for transmitting complete electronic health records, and through the Consolidated Health Informatics Collaboration with the Department Of Defense and Department of Veterans Affairs to work aggressively for the adoption of 20 endorsed standards to permit the exchange of information across the agencies.

- **The Health Information Security and Privacy Collaboration (HISPC) to investigate differences in security and privacy laws across the country.**

  Differing interpretations of the Health Insurance Portability and Accountability Act (HIPAA) Privacy Rule among states and businesses create a wide variety of organization-level business practices across the nation. RTI International, under contract to AHRQ, established HISPC to partner with 33 states, including Vermont, and Puerto Rico to study these issues. Each member of the collaboration investigated and reported on barriers, solutions, and implementation plans related to privacy and security. A national report will provide a summary of state privacy and security assessments, solutions, and implementation plans. The survey will help shape national public policies for HIT and HIE.

The HIT Accomplishments Report[13] recommends convening a forum of state leaders to reach consensus on cross-border issues of privacy, security, physician licensure, and health-care practice, and to define the states' roles in health information exchange.

Although progress has been made in the development of standards and formation of privacy and security policies, these efforts have not been uniformly successful or without controversy. Many of the original players have left and volunteers are approaching "burn out." Issues of privacy and patient control continue to create barriers to the adoption of HIT.

Recognizing the many challenges for adopting HIT, a number of bills have been introduced in the U.S. Congress. However, none of the bills has been signed into law, as of this writing. On June 27, 2007, the Senate Health, Education, Labor and Pensions Committee approved legislation (S. 1693) designed to speed adoption of information technology systems by the U.S. health care system. The bill would provide $163 million in both fiscal 2008 and 2009 and unspecified amounts during the following three years for grants and loans to health care providers and states to spur adoption of health information technology. The "Wired for Health Care Quality Act of 2007" is similar to legislation passed by the Senate late in 2005 (S. 1418) that failed to advance beyond a House-Senate conference in 2006. HELP Committee Chairman Sen. Edward M. Kennedy (D-Mass.) is attempting to get Senate approval of the bill before the August congressional recess. In the meantime, there has been much activity on the state level, with more than 100 bills introduced in 20 states this year.

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2.2.3 State Alliance for eHealth

There is a growing recognition that state and local efforts are providing the laboratories for innovation and change. The National Governors' Association (NGA) is taking a prominent role through its **State Alliance for eHealth.** Vermont Gov. Jim Douglas and Tennessee Gov. Phil Bredesen are co-leaders of the initiative. With a $1.99 million contract from DHHS, the NGA created three taskforces comprised of key stakeholders with expertise in addressing state HIT issues:

- **The Health Information Confidentiality Taskforce** – to focus on state HIT privacy and security, and work emerging from the Health Information Security and Privacy Collaboration project.

- **The Practice of Medicine Taskforce** – to assess state law barriers to the practice of medicine, including the Clinical Laboratory Improvement Amendments, laws hindering the practice of telemedicine, malpractice, and other liability issues related to HIT.

- **State-level Health Information Organization Taskforce** – to address issues related to health information exchange. VITL is a member of this taskforce.

2.2.4 Role of Medicaid

Medicaid has become the anchor of HIT/HIE activities in many states and is playing a larger role in public health by focusing on disease management. Medicaid is often the most expensive component of state budgets. State Medicaid offices, including the Office of Vermont Health Access (OVHA), are implementing care coordination and care management programs in an effort to control costs and improve health outcomes. The Medicaid Information Technology Architecture is part of the Centers for Medicare and Medicaid Services response to the consolidated health informatics called for by Secretary Leavitt. At the May 2006 Medicaid

Industry Summit, presentations focused on the incorporation of a services oriented architecture to deploy electronic services like processing claims, enrolling providers, and verifying provider credentials. Other services like a portal, forms management, and external data interchange hub services perform high-level functions shared by many business processes.[14] Initiatives in Arizona, New York, and Missouri highlight how a Medicaid Management Information System can be leveraged in a statewide health information exchange effort.

The OVHA has been an active participant in the creation of Vermont's health information exchange, and is evaluating ways to utilize the infrastructure to benefit Vermont's Medicaid program and strengthen VITL. The OVHA is embarking on a multi-year project to modernize its technology system enterprise which will further explore the use of HIE as a key component of its future business processes.

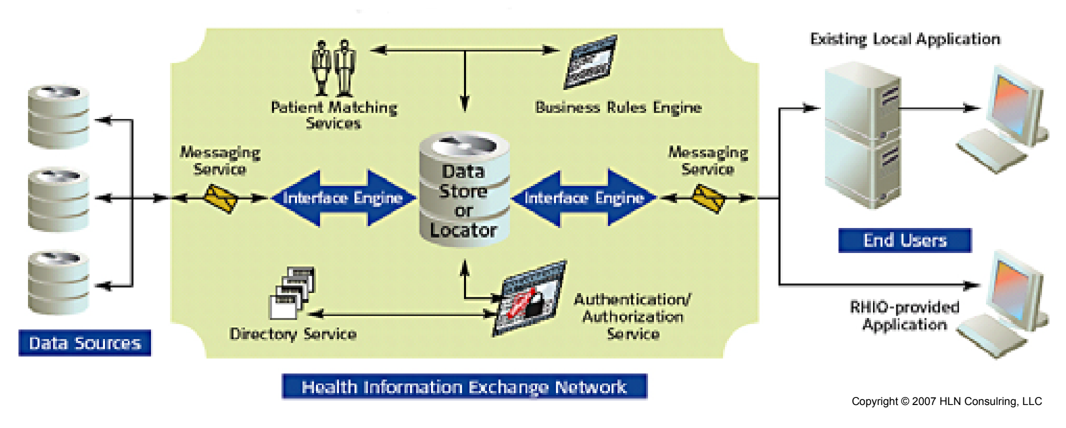
Health Information Exchange Basics

A regional health information organization (RHIO) is a collaborative focused on health information exchange. RHIOs operate health information exchange networks (HIENs) which are technical implementations supporting health information exchange between RHIO participants including physicians, laboratories, hospitals, pharmacies, patients, public health, and payers. A RHIO is primarily driven by the private sector, but often has public health and state government involvement. Usually RHIOs are focused on clinical data exchange, but also may focus on health services data and providing clinical applications. They can span a metropolitan area, a county, a state or a multi-state region. Interoperating RHIOs and HIENs across the country will form the nationwide health information network (NHIN).

Figure 2 displays a typical HIEN architecture composed of the following major components:

Data Sources: Systems that provide and/or receive data from the HIEN. Examples include provider-based electronic medical records, practice management systems, immunization and disease registries, surveillance systems, laboratory information management systems, imaging systems and pharmacy information systems.

Figure 2 – **Health Information Exchange Component Architecture**



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2.2.5 National Conference of State Legislatures

Although the national initiatives provide the blueprint, the growing role of the states is expected to advance HIT/HIE to an even greater extent than the national programs. The National Conference of State Legislatures HIT Champions[15] (HITCh) partnership provides state legislatures with information and technical assistance on important political and technical issues including:

- Planning for HIE
- Security and privacy
- Financing HIT in state health programs
- Informatics education
- Public health
- HIT and access; health reform and the safety net
- Electronic records
- Clinical applications, including telemedicine

Data Store: Central or distributed databases containing patient identification and health information. Data and document locator services are examples.

Interface Engine: A utility that provides translation of standard messages containing patient identification and health information being sent to or from the data store.

Messaging Service: A system that provides for the secure transport of information in and out of the HIEN.

Matching Service: A utility that provides reliable matching and linking of patient information received by the HIEN from disparate sources. A master patient index, record locator service, and patient locator service might be major components of this service.

Business Rules Engine: A repository for the business rules that control how the HIEN treats data and the business processes it supports. These rules are available consistently to all HIEN applications.

Authentication/Authorization Service: A utility that provides reliable identity verification of system users (authentication) and ensures that users access information and services that are appropriate (authorization).

Directory Service: A central repository for information about system users. In Vermont, this might incorporate the emerging master provider index.

End User Applications: Existing or new applications used to access HIEN patient and health information. Examples include provider and patient portals and electronic health records systems.

Vermont's health information exchange infrastructure and applications will likely be comprised of components similar to those described above.

HITCh also works with the State Alliance for eHealth and the American Health Information Management Association on the development of state-level HIE initiatives. One useful service the National Conference of State Legislatures provides is a survey of HIT/HIE legislation in all 50 states.[16]

2.3 Vermont HIT Landscape

Vermont's health care reform initiatives have generated a great deal of HIT activity in the public and private sectors and they have been incorporated into this plan. Most depend on electronic capability of providers in general and use of electronic health records (EHRs) in particular. The adoption of EHRs in hospitals and in physicians' offices is a prerequisite for full participation in the HIE. A 2005 survey conducted by the Bi-State Primary Care Association[17] found that 67% of rural Vermont primary care practices identified cost as the largest barrier to EHR adoption. Sustainability is also a key issue. Other barriers are purchasing hardware, receiving appropriate training, and minimizing productivity loss.

Funding will be needed to accelerate the adoption of EHR technology, especially in smaller, rural practices. Internet access, preferably broadband, is a minimum requirement. However, only 54% of rural practices reported they had broadband Internet access. The adoption of technology in practices is a major challenge for both public health and private sector stakeholders.

Selected Findings of Bi-State Primary Care Association Survey, 2005[17]

Rural practices using:	Currently
Computerized Scheduling	56%
Computerized Billing	63%
Computerized Claims	41%
Practice Management System	40%
Electronic Medical Record (EMR)	24%
Clinical Data accessed electronically	35%
Access to the Internet	72%
A Computerized Registry	16%

As a followup to the Bi-State Primary Care Association survey, VITL conducted a survey in May 2007 of all the physician practices in Vermont to determine the level of EHR adoption and practices' plans to acquire EHRs in the near future. The survey found that 31% of practices have some EHR capability, while 69% are still using paper medical records. Only slightly more than half of the practices with EHRs are using them to exchange data with other organizations, pointing out the need for the development of one or more health information exchanges that practices can access. Among the practices without EHRs, 30% said they plan to acquire one within the next 12 months (see Appendix G for the complete survey results).

In 2006, workgroup member Hans Kastensmith, a consultant to the Vermont General Assembly, prepared a report related to HIT in Vermont[19]. With respect to hospital-supported physician practice EHR systems, the report, updated in 2007, says:

"Currently half of the hospitals in Vermont are establishing, or in the planning stages of establishing, a service area regional health information organization of one form or another. Some projects are emerging as less formal initiatives than others who are putting into action a more structured approach. All of these individual initiatives essentially create a foundation from

VITL Provider Practice Survey, 2007[18]

Independent practices…	Currently
Using EHRs for all patients	13%
Using combination of EHRs and paper records	18%
Plan to purchase an EHR system in next 12 months	30%
Do not use EHRs	69%

An Interview With A Vermont Physician Who Uses an EHR

Bruce Bullock, M.D., is a Rutland, Vt., physician who enthusiastically supports using electronic health records and health information exchange. Dr. Bullock has had an electronic health record in his practice since 1999, but his ability to receive information from other sources is limited.

How are you currently using HIT in your practice?

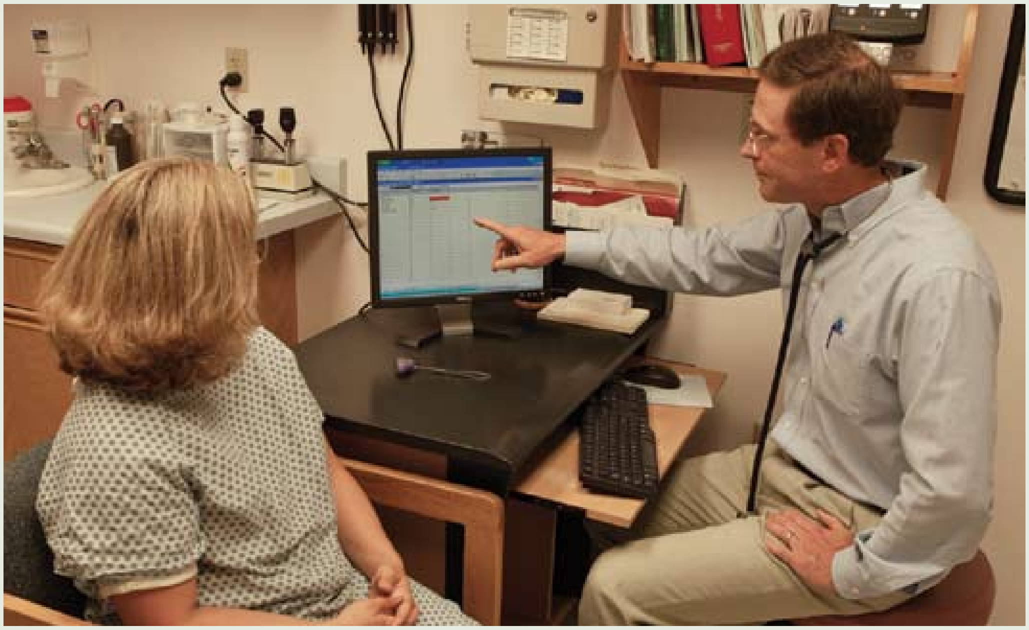
I use an EHR that performs our clinical documentation, scheduling, and billing functions. This computer program also includes messaging, laboratory data, radiology information, vital signs, and medication tracking. Virtually all the information needed to evaluate a patient's health history is accessible via the computer and new information can be recorded through the visit to produce a concise and useful electronic product that can be printed or electronically sent anywhere. We also have access to the Internet for the latest health care research and patient information and web sites. Our "product" is often a recommendation to patients based on information. The more accurately and efficiently we handle that tool to accomplish that task, the better our product will be.

How do you hope to use HIT in your practice in the future?

I would like to directly communicate with the hospital and other health care providers so that information can be used efficiently and is no longer a time consuming and expensive commodity. This would improve the reliability of the information we use to make decisions and provide the assurance that health care is coordinated no matter where in the system the patient receives care.

What is your vision for health information exchange in Vermont in the next five or 10 years?

I imagine a largely unified computerized system that would bring information, accuracy, confidentiality, security, and speed to the clinical environment with a seamless delivery to all areas of medical service. Medical recommendations and shared decisionmaking with patients and clinicians is based on the availability of information and knowledge. We have found that practicing medicine is more enjoyable and that patients have more faith and a better understanding of their personal health care when all of these elements are fused into a medical visit. Central players in the delivery of health care will need to embrace this change to organize, fund, and implement the resources to make it happen.



Bruce Bullock, M.D., of Rutland (right) uses an electronic medical record in the exam room to record data during a patient visit. Dr. Bullock often uses graphs and tables generated by the EMR in his discussions with patients.

which larger initiatives such as VITL and the national health information network can work from to establish the desired outcome of open statewide and national health care data exchanges. The projects differ in their individual approaches on interconnectivity with ambulatory practices in their service areas utilizing a single or combined design for the exchange of data. A number of hospitals propose fully-hosted and supported electronic medical records for their owned practices and are establishing a mechanism for non-owned practices to participate in the program through a contractual agreement. Others are in the process of, or planning on, interfacing with existing electronic medical records at practices in their service areas or a combination of a hosted electronic medical record for those practices lacking the technology and interfacing with existing systems."[20]

Bennington Physician Looks Forward to Health Information Exchange

"I currently use paper charts and some dictation to take care of my patients. I become dismayed when I compare my medical practice to my colleagues in banking, insurance and finance, and even the dealership that services my car. Whereas they have successfully brought their industries into the 21st century with computerization and proactively manage their clientele, and have done it well, my medical practice in comparison is still back in the early 20th century. With paper charts, it's hard for me to find the information I need either among charts, or within a single chart, and I have no idea how my patients are doing overall. I would like to be able to manage my patients as well as my dealership manages my car."

"I look forward to the day when I can bring my medical practice a hundred years forward into the early 21st century, to computerize my patient's records, and be able to network with other health care institutions. The result is that I can be a more effective and proactive physician: I will be able to gauge the progress of individual patients as well as my patient population in general; I will be able to retrieve patients that are about to 'fall through the cracks' before they slip through; I will be able to selectively notify a group of patients of significant medical developments that will be important to them. The bottom line will be that my patients, and Vermonters in general, will be healthier and happier."

Gregory King, M.D.
Bennington

Primary Care Health Partners is an example of a primary care practice organization that has plans to deploy an EHR system. The system will support its 32 physicians and 14 midlevel providers in seven locations in Vermont and two locations in New York. Chief Operating Officer Robert Bycer says that the organization hopes to use HIT to improve the quality and efficiency of delivering patient focused care. The goal is to get patients more connected with their doctors and involved in their health care.

His vision for health information exchange, Bycer said, is to "have a common repository to input and access patient data for all providers (e.g. hospitals, labs, doctors, urgent care centers, nursing homes, etc.) for all health care services delivered to and utilized by individuals to insure continuity and informed health care."

2.3.1 Health Care Reform in Vermont

Health care reform dominated the 2005-2006 biennium of the Vermont General Assembly. Lawmakers passed comprehensive reform legislation which Gov. Jim Douglas signed into law on May 25, 2006. Acts 190 and 191 (Acts Relating to Health Care Affordability for Vermonters) and additional action in 2007 provide the foundation for Vermont's health care reform initiatives that state government is working to implement.

As required by the reform legislation, the Douglas administration, led by Director of Health Care Reform Implementation Susan Besio, developed a five-year health care reform plan for Vermont. The plan was released in November 2006 and addresses a variety of goals to improve the quality of health care, contain costs, and make health care more accessible to Vermonters. VITL will play a key role in supporting the reform efforts. The five-year plan:

"financially supports Vermont Information Technology Leaders (VITL), a public-private partnership, as the entity to develop the statewide, integrated, electronic health information infrastructure for the sharing of health information among health care facilities, health care professionals, public and private payers, and patients. As a first step, the Medication History Pilot Project will reduce the risk of adverse drug events; improve the quality of health care for many Vermonters, and save health care costs. VITL also is the conduit for the Chronic Care Management Information System to support the Blueprint for Health. The legislation also requires that VITL develop a Vermont Health Care Information Technology Plan to address issues related to data ownership, governance, and confidentiality and security of patient information."[21]

VITL Initiatives

1. Comprehensive Medication History
2. Chronic Care Information System (Blueprint)
3. Creating a statewide health information exchange
4. Health Information Technology Plan
5. EHR system pilot for small practices

During the 2007 legislative session, the House Health Care Committee expanded VITL's role in Act 70, H.229[22], "Corrections and Clarification to the Health Care Affordability Act of 2006 and Related Legislation." (See Appendix I for the full text of Act 70). Major provisions for VITL and the Vermont Health Information Technology Plan (VHITP) include:

- Designating VITL "to operate the exclusive statewide health information exchange network (HIEN) for this state … Nothing in this section shall impede local community providers from the exchange of electronic medical data."

- Moving oversight responsibility from the Department of Banking, Insurance, Security and Health Care Administration (BISHCA) to the Department of Information and Innovation (DII).

- Directing the VHITP to include plans for "self sustainable funding for the ongoing development, maintenance, and replacement of the health information technology system."

- Addressing the use of the VHITP in the certificate of need application for providers.

- Creating an interim technology fund for use in promoting the adoption of EHR systems by primary care providers serving low-income Vermonters. The fund seeks to raise at least $1 million in voluntary contributions from a "broad range of stakeholders who would benefit from electronic health records, including commercial health insurers, in relation to the number of insured and self insured lives each services in Vermont, the Vermont Association of Hospitals & Health Systems, Inc., self insured employers, other payers, and other sources."

- Directing the VHITP to:
  a. "Incorporate the existing health care information technology initiatives in order to avoid incompatible systems and duplicative efforts."
  b. "Integrate the information technology components of the Blueprint for Health… the Global Clinical Record, and all other Medicaid management information systems being developed by the Office of Vermont Health Access, information

> technology components of the quality assurance system… and any other information technology initiatives coordinated by the secretary of administration pursuant to section 2222a of Title 3."[23]

The VHITP will co-exist not only with existing statewide efforts, but with emerging projects as well, including the State of Vermont Information Technology Planning and Analysis which brings with it certain standards and requirements for state-developed systems.[24] In addition, there are several other HIT-related initiatives, including a health insurance claims database, adverse events reporting to public health, and an advanced directives registry. All these projects are relevant to the overall HIT/HIE implementation in the state.

The Comprehensive Medication History Pilot Project is part of VITL's ongoing strategy to develop statewide infrastructure for health information exchange. With patient consent, hospital clinicians are able to electronically access a list of the medications a patient has purchased during the last year. The pilot is now operational in the emergency departments of the Rutland Regional Medical Center and the Northeastern Vermont Regional Hospital in St. Johnsbury. Following these initial deployments, the medication history service will be offered to all emergency departments in the state.

The Vermont Blueprint for Health Chronic Care Initiative is a public/private collaboration to address the growing health and cost burden of chronic disease. The Vermont Department of Health (VDH) and the Vermont Program for Quality in Health Care (VPQHC) are currently implementing pilot projects in two communities. Under contract to VDH, VITL is developing the Chronic Care Information System (CCIS) and will implement it as the foundation of the statewide network. The Blueprint engages patients and their providers in a technology-assisted interactive manner to support healthy lifestyles and encourage preventive and effective care in the community setting. The Blueprint is a patient-centered initiative and relies on technology tools including centralized information systems, patient follow-up tools and evidence-based treatment guidelines. The CCIS is being deployed in 2007.

2.3.2 Additional HIT Projects in Vermont

Among the most prominent health care cost containment programs is the Global Commitment to Health, a Medicaid waiver for restructuring Vermont's Medicaid program and addressing future needs in a holistic, global manner. The waiver is managed by the Office of Vermont Health Access (OVHA). As reported by the Kaiser Foundation, "This waiver makes Vermont the only state in the nation with a fixed dollar limit on the amount of federal funding. In exchange for taking on the risk of operating under a capped funding arrangement it gives Vermont a new flexibility to use Medicaid funds more broadly and to maintain and improve its public health care coverage and provide more effective services and to reduce the number of uninsured."[25] The nation will be watching Vermont's experiment as well as the electronic tools it employs to manage the new program.

The Global Clinical Record supports specific types of prior authorization approvals and the Early Periodic Screening, Diagnosis, and Treatment (EPSDT) program. The functions performed will be evaluated as part of Vermont’s multi-year Medicaid systems business process analysis and planned modernization to ensure that the investment is appropriately leveraged by the program and with a view towards expansion of health information exchange.

The Vermont Immunization Registry was established by state law in 1997. It was designed, developed, and operated by the Vermont Department of Health, which contributes its extensive knowledge in health surveillance, vital statistics, technology, and immunization.[26] The web-based registry relies on immunization administration records and histories entered by health providers, primarily in ambulatory settings. Increasingly providers with electronic practice management and EHR systems are demanding bi-directional standards-based records interchange as a step to fuller integration with their own systems. Immunization information is a common element in patient record summaries like the Continuity of Care Record. Adult flu, pneumonia and other vaccinations are required elements for chronic disease management, as well as for the Medicaid EPSDT program.

Increasingly providers with electronic practice management and EHR systems are demanding bi-directional standards-based records interchange as a step to fuller integration with their own systems.

The Vermont Department of Health is engaged in a set of Public Health Preparedness and Response Activities based on the national Centers for Disease Control and Prevention programs for disease surveillance, emergency preparedness, and response to natural or bioterrorism events, flu pandemic planning, and the development of a health alert network. These systems, operated by the VDH, rely on information from laboratories, hospitals, and private providers and need to support bi-directional data exchange.

The Vermont Advance Directive Registry (VADR) is a web-based registry operated by the Department of Health. VADR is designed to make Vermonters’ advance directives accessible to providers and others when it is needed. The free and voluntary service accepts registrations by

VITL President Greg Farnum (left) celebrates the go-live of the VITL electronic medication history service with (from center to right): Suzanne Sabataso, RN, RRMC clinical application analyst; Bastian Faggìnger, RN, RRMC triage nurse; Liz Morton, RRMC patient registration manager; and Bill Howard, GE Healthcare project manager.

fax or mail, scans registration documents, and makes them available for secure, web-based access by authorized persons.

Other state initiatives include purchase and implementation of an electronic record for mental health practitioners, and a prescription monitoring database for controlled substances.

2.3.3 Community and Hospital-based Initiatives

The Northeast Community Laboratory Alliance (NECLA) is an affiliation of community-based hospital laboratories in Vermont, formed in 1996 as a collaborative with Mayo Medical Laboratories of Rochester, Minn. This program supports laboratory data interchange among Vermont hospitals and is an enabling technology for the Blueprint for Health and for public health surveillance. Contributing to the success of these Vermont initiatives are three AHRQ projects; Southwestern Vermont Health (Improving Healthcare Quality via Information Technology), Mt. Ascutney Hospital and Health Center (Improving Rural Health Care: Implementing Innovative Integration Solutions), and Central Vermont Medical Center (Community Electronic Health Record).

At the Northeast Health Care Quality Foundation – the quality improvement organization for Maine, New Hampshire, and Vermont – there is a project funded by the Doctor's Office Quality – Information Technology (DOQ-IT) program. DOQ-IT is a national initiative sponsored by the Centers for Medicare and Medicaid Services that promotes the adoption of information technology, particularly EHRs, in the outpatient setting.

The Windsor Community Health Initiative (WCHI) is focused on improving infrastructure for better coordination of care in the Vermont towns of Windsor, West Windsor, Weathersfield, and Hartland.

Patients in the Day Surgery Unit at Northeastern Vermont Regional Hospital in St. Johnsbury are prepared for surgery with the help of an electronic medical record. Betsy Zorn, R.N. (right), takes vital signs and enters them into the electronic record.

The Vermont Coalition of Clinics for the Uninsured supports free clinics which "provide a range of primary and preventive health care services, including women's health services, physical therapy, nutrition counseling, mental health services, anonymous HIV testing and counseling, and referrals to specialized care, laboratory services and x-rays."[27]

Finally, the Creating Healthy Adolescents-A Model Prevention Project (CHAMP) is developing a new model for foster-home health services to reduce substance abuse among children in foster care.

To address a problem that spans virtually all health information exchange projects, the General Assembly called for a workgroup to be formed to make recommendations regarding the creation of a master provider index. Not to be confused with master patient index, a common HIE component with the same acronym, the master provider index would be a database designed to provide consistent, uniform provider identification across HIT projects throughout the state. The University of Vermont College of Medicine Area Health Education Centers program convened the workgroup,[28] which consists of representatives from a number of other ongoing HIT initiatives including at least five VHITP workgroup members.

The AHEC workgroup released its report in early 2007 with recommendations to convene "a governing advisory body that provides input regarding data collection for the Healthcare Workforce Database, which reports are generated, and to review requests for information to reduce redundancy of data collection across stakeholders." The workgroup also recommended that the "Operations of Vermont's Healthcare Workforce Survey and associated database should be overseen by the Department of Health." [29]

2.4 Conclusion

While each federal and state initiative is significant, collectively they will accelerate adoption of EHR systems. Historically Vermont HIT projects have been developed separately and there is a risk that they may not be able to share information or utilize common resources. Adhering to the concepts, strategies, and standards laid out in this plan will help reduce that risk, but additional coordination efforts will be necessary. Vermont will build on national efforts to improve the use of information technology in delivering health care. VITL, as Vermont's HIEN, will continue working with stakeholders to help meet the goals of improving quality of care for patients, helping contain costs, and providing better access to health care.

[6] We prefer this term to the many other acronyms used to describe these products (e.g., EMR, CPR) and we will use this term exclusively throughout the remainder of the report.

[7] Chassen M, Galvin R, "The urgent need to improve health care quality," JAMA 1998; 280:1000–1005.

[8] Berwick D, "A user's manual for the IOM's 'Quality Chasm' report," Health Affairs (Millwood) 2002 May-Jun;21(3):80-90.

[9] U.S. Department of Health & Human Services, "Complete Report – The Health IT Strategic Framework," 2004 <http://www.hhs.gov/healthit/framework.html#report>.

[10] Office of the National Coordinator for Health Information Technology, "American Health Information Community," accessed 18 Dec. 2006 <http://www.hhs.gov/healthit/ahic.html>.

[11] See http://www.hhs.gov/healthit/news/Accomplishments2006.html#2006

[12] See Appendix K

[13] See http://www.os.dhhs.gov/healthit/privacy/

[14] See http://www.cms.hhs.gov/MedicaidInfoTechArch/Downloads/mitasoa.pdf

[15] See http://www.hitchampions.org/

[16] See http://www.ncsl.org/programs/health/forum/Hitch/finance.htm

[17] Bi-State Primary Care Association, "Health Information Technology & Primary Care in Rural Vermont: An Assessment and Resource Inventory," Dec. 2005 <http://www.bistatepca.org/Bi-State Reports.htm>.

[18] Full survey results available in Appendix G.

[19] http://www.leg.state.vt.us/CommissionOnHealthCareReform/Update%20to%20Technology%20Report%20Vol_1_V_FINAL%20v_3.pdf

[20] Capitol Health Associates, LLC, "State of the State of Healthcare Information Technology in Vermont, Volume 1," Update, June 1, 2007, p. 10. <http://www.leg.state.vt.us/CommissionOnHealthCareReform>

[21] Vermont Agency of Administration, "Vermont Health Care Reform: Five-Year Implementation Plan," 1 Dec. 2006 <http://www.adm.state.vt.us/pdf/hcr5-yearstrategicplan.pdf>.

[22] H.229 was approved June 5, 2007 and amends 22 V.S.A. § 903

[23] See http://www.leg.state.vt.us/statutes/fullsection.cfm?Title=03&Chapter=045&Section=02222a whose full text is found in Appendix D.

[24] Vermont Agency of Administration, Office of the Chief Information Officer, "CIO IT Planning and Analysis," <http://www.cio.state.vt.us/planning_and_analysis>.

[25] Guyer, J, "Vermont's Global Commitment Waiver: Implications for the Medicaid Program," The Kaiser Commission on Medicaid and the Uninsured, Apr. 2006.

[26] Vermont Department of Health, "Registry Overview," accessed 18 Dec. 2006 <http://healthvermont.gov/hc/vtimms/overview.aspx>.

[27] Rural Assistance Center, "Vermont Coalition of Clinics for the Uninsured," accessed 18 Dec. 2006 <http://www.raconline.org/success/success_details.php?success_id=130>.

[28] University of Vermont College of Medicine Area Health Education Centers, "Master Provider Index," accessed 18 Dec. 2006 <http://www.med.uvm.edu/ahec/TB8+BL+I.asp?SiteAreaID=291>.

[29] "Recommendations of the UVM AHEC Workgroup regarding the Advisability of Creating and Sustaining a Master provider Index (MPI)", January 2007, http://www.med.uvm.edu/ahec/downloads/MPIReportJanuary2007.pdf assessed June 4, 2007

3 VISION

3.1 Introduction

The VHITP workgroup proceeded within a structured roadmap (Figure 3) in order to develop the foundation of the plan.

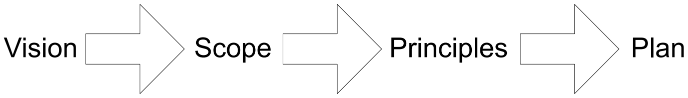


Figure 3 — **Project Roadmap**

Three key components were defined in advance of the plan:

Vision: A succinct articulation of the desired end-state of HIT deployment in Vermont which speaks to as many stakeholders as possible, and is durable through the plan's development and beyond.

Scope: The boundaries within which the vision will be discussed and implemented based on stakeholders and functions.

Principles: Shared beliefs about health information technology that help establish both shared understanding and shared language, and serve as a guide for the elements of the plan.

3.2 HIT Vision for Vermont

The VHITP workgroup's vision for health information technology for the state of Vermont is as follows:

> *Our vision is for a healthier Vermont, where shared health information is a critical tool for improving the overall performance of the health care system. The health care community will work together to achieve new efficiencies through the use of information technology in order to deliver better overall value and care to our citizens.*

Information technology cannot work in a vacuum. For this vision to be fulfilled, and for the plan to be successful, stakeholders must examine how they use information technology to deliver their services and serve their clients in a more cooperative way. The workgroup recognized the business aspects of health care, and said they must be sensitive to the realities of the marketplace and its effect on cooperation.

Key concepts surrounding the vision relate to quality of care improvement, greater efficiency, better control of costs, and reduction in redundancy of services delivered to patients, all with measurable observations if possible. Some of these key concepts were incorporated by the VHITP workgroup into the principles.

3.3 Use Narratives

It is important to understand *how* HIT can help improve the health of Vermont's citizens. A set of use narratives were developed to illustrate the outcomes and benefits of HIT deployment in Vermont. Each of these narratives portrays two contrasting situations, a description of the situation *now*, and a description of how the situation *might* play out in a richer HIT environment. Three use narratives follow; additional narratives can be found in Appendix C[30]:

An otherwise healthy patient has blood drawn and sent to the lab for routine work-up during an annual physical.

Today	VHITP Vision
The results of the blood work-up are mailed or faxed back to the primary care physician along with many other lab reports for other patients. Some miscommunication may occur. There may be a delay in notifying patients of lab test results, values out of normal ranges may not be flagged, or some results may be misplaced, requiring tests to be done again. A patient may seek care from another physician or at another hospital, and if the initial lab test results are not readily available, the work may have to be redone.	With the patient's consent, the results from the lab are electronically sent back to the physician's EMR through the statewide health information exchange. The physician's EMR screens the incoming lab test and determines that the patient's cholesterol level is indeed too high. Past lab test results are also available in the EMR for comparison and trend analysis. The physician and nurse receive an alert in the EMR's messaging sub-system which indicates that follow-up with the patient is necessary. An e-mail message is also sent to the patient instructing him to contact the physician. Unnecessary repeat tests are avoided and the quality of the patient's care is improved.

A patient who has recently visited an ER or been an inpatient at a hospital goes for a follow-up visit to her primary care physician.

Today	VHITP Vision
The doctor requests copies of paper records and hopes they arrive complete and in time for the patient visit. Expense is incurred in copying, receiving, tracking, and filing these paper records.	With the patient's consent, the primary care physician's EMR requests updated patient records from the hospital's EMR. The patient is registered with the statewide MPI and records are available from both the primary care physician and the hospital. A timely transfer of information is automated with little marginal expense on the part of the hospital or the practice. Care decisions are made with complete information.

Due to rising flood waters, residents and businesses need to quickly relocate from their present premises to temporary or shared quarters (and some out of state). Because of the speed with which events unfold there is little time to pack and remove medical records that may be critical to ongoing or future patient care.

Today	VHITP Vision
Paper-based provider records are at best inaccessible, at worst severely damaged or destroyed. Patients and providers need to try to reconstruct events as best as possible from records that may be held at ancillary facilities (e.g., labs, pharmacies) or larger facilities that may be better protected (e.g., hospitals). This can take a lot of time and result in inaccurate conclusions based on incomplete data, or costly retesting and re-examination.	Almost all patient records captured in EMRs at provider sites survive the flood. They were less susceptible to loss or damage from natural disaster because their physical container is more durable (electronic storage versus paper) and records are typically backed up at another location or in an easily portable format (disk or tape image is compact and portable versus photocopy of paper records). Electronic records stored at an alternate location are available for redeployment. In this case, the HIEN gave providers (large and small) a place to send medical records electronically for back-up storage even if they are not shared with other providers. Personal health records stored centrally by the HIEN and available online to patients also helped speed up access to records. The quality of patient care is maintained because data is complete and unnecessary re-testing and re-examination is avoided.

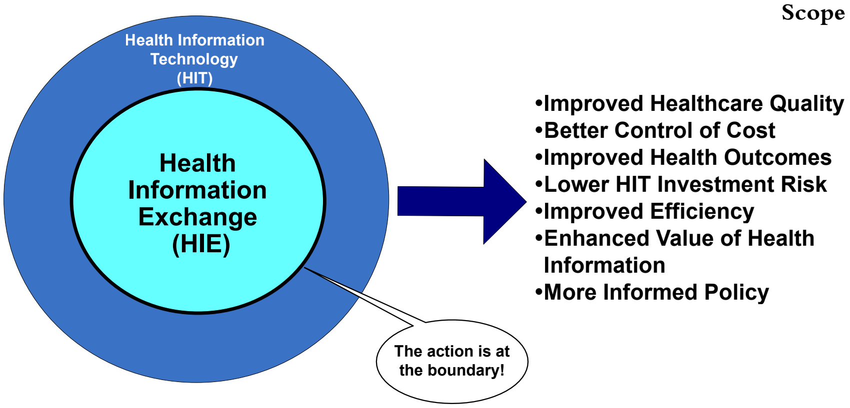
These narratives describe the limitations of paper-based records and some of the benefits that would come from an increase in HIT deployment coupled with secure data exchange enabled by a HIEN.

3.4 Scope

A key element in the VHITP workgroup's discussion was the appropriate scope of the plan. Health information technology (HIT) is the infrastructure and data that helps to automate health care processes. It can be found within the many stakeholder organizations relevant to health care, and even by extension includes the information technology capabilities of patients and other citizens. Health information exchange (HIE) is the part of HIT that enables interoperability between systems and organizations. Together, through proper investment, they provide opportunities to improve the overall health care system represented by the outcomes in the diagram at right.

Figure 4 is presented to show the relationship between HIT in the outer ring and HIE in the inner ring. The boundary between the two is where the action is; this plan balances a desire to guide the stakeholders to implement

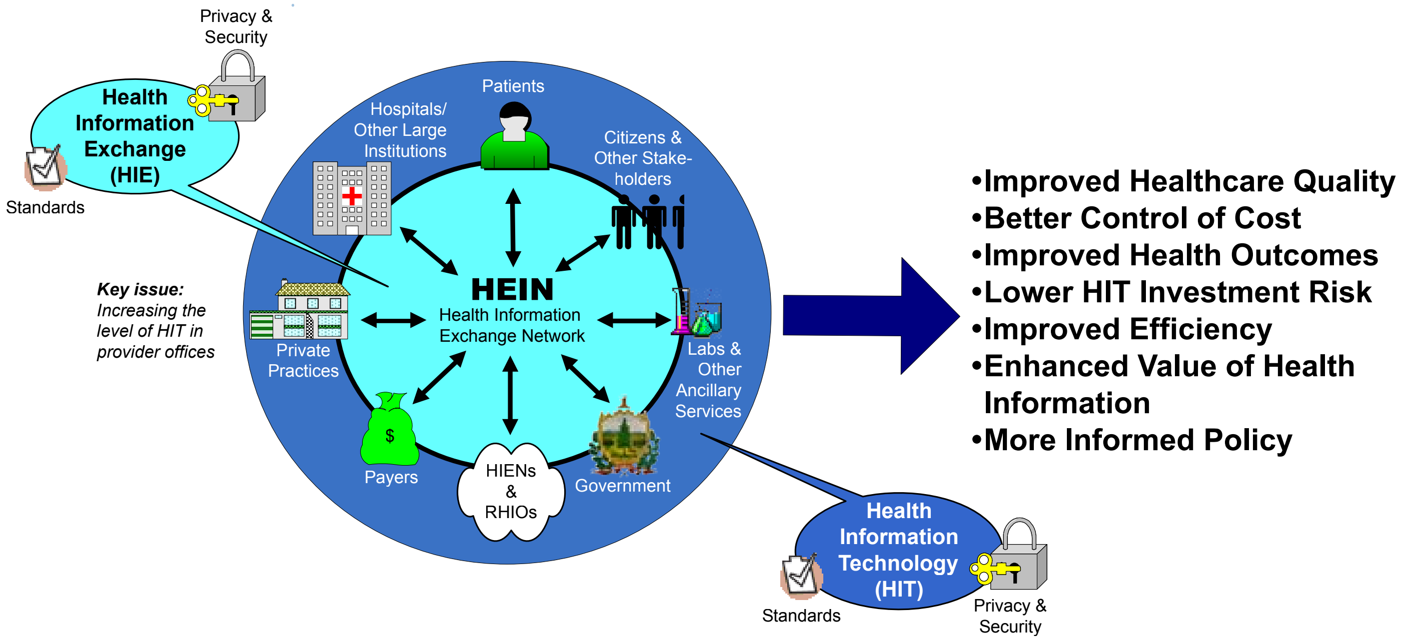
Figure 4
Overall Project Scope



compatible systems and data while not being too intrusive on their right to determine the best technological course for their organizations or interests. The VHITP offers strategies for promoting the broad adoption of HIT (including HIE) and criteria for the compatibility of stakeholder HIT investment decisions with the state's direction.

It is important to note that although VITL plays an important role in the facilitation of HIE as well as in the development and implementation of the VHITP, the scope of the plan is not limited to VITL activities. It is intended to be a statewide plan to cover a broad range of HIE and HIT activities across a variety of stakeholders. The stakeholders are both numerous and diverse, as displayed in Figure 5.

Figure 5
Detailed Project Scope



Stakeholders include patients, health care consumers, and citizens to health care providers, both large and small (hospitals and other large institutions, private providers), payers, laboratories and providers of other ancillary services, government at all levels (local, state, federal) as well as existing and emerging health information exchange initiatives in Vermont and neighboring states.

At the center of the diagram is the infrastructure for a health information exchange network (HIEN). This includes many of the technology components illustrated in Figure 2 in Section 2, and the elements described in the technology section. Moving outward from the center area in Figure 5, the plan focuses on standards and other key issues related to HIE, such as privacy, security, and governance.

Standards for HIT in general, and HIE in particular, ensure that investments by different organizations are made consistently. Standards ensure that different systems within different organizations interoperate – that they are able to exchange health information in a consistent format and with consistent terminology and meaning. Just as postal mail can be exchanged worldwide through a consistent set of standards (addressing, size, postage and payment), so, too, can health information be exchanged despite its inherently more complex and diverse nature.

Towards the outer edge of the circle, the plan maintains a balance between setting standards for HIT solutions and preserving organizational autonomy. Early in its process, the VHITP workgroup recognized that the plan could not possibly cover *all* aspects of HIT across *all* stakeholders. Often, the boundary is at the *application:* the plan may define security standards and data exchange protocols for a particular class of clinical applications. For example, while not dictating any particular look-and-feel or promoting any particular product. One area of exception is the adoption of electronic medical records in small private provider offices. Increasing the penetration of HIT among small practices is a key focus of the plan and this may involve detailed recommendations at the application level.

3.5 Principles

Principles are a set of basic, but shared, beliefs about HIT and its role in the state. These beliefs, negotiated among the stakeholders, flow from the vision and scope, and form the conceptual basis for moving ahead and developing the plan. Over the course of several meetings during the development of the preliminary plan, the VHITP workgroup drafted, discussed, and ratified a comprehensive set of 40 principles. They are organized under five overarching principles (see full list in Appendix A):

I. Vermonters will be confident that their health care information is secure and private and accessed appropriately.

II. Health information technology will improve the care Vermonters receive by making health information available where and when it is needed.

III. Shared health care data that provides a direct value to the patient, provider or payer is a key component of an improved health care system. Data interoperability is vital to successful sharing of data.

IV. Vermont's health care information technology infrastructure will be created using best practices and standards, and whenever possible and prudent, will leverage past investments, and will otherwise be fiscally responsible.

V. Stakeholders in the development and implementation of the health care technology infrastructure plan will act in a collaborative, cooperative fashion to advance steady progress towards the vision for an improved health care system.

3.6 Conclusion

The vision for using HIT to improve health care in Vermont can be achieved by distributing and promoting a set of common use cases, which illustrate how HIT can be used. A set of principles, agreed to by all stakeholders, is very important in guiding the direction of HIT and HIE projects, while at the same time allowing some flexibility among individual projects.

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[30] Note that acronyms and terms are defined in the Glossary in Appendix B.

4 KEY STAKEHOLDER GROUPS

The survey found that a majority of Vermonters feel putting health care information into electronic form and exchanging data between health care organizations is generally a good idea.

4.1 Introduction

The VHITP addresses many key stakeholders, including patients and providers, small practices and large institutions, government and payers, and other groups shown in Figure 6. This section will discuss important factors related to each key stakeholder group and its relationship to HIT/HIE issues.

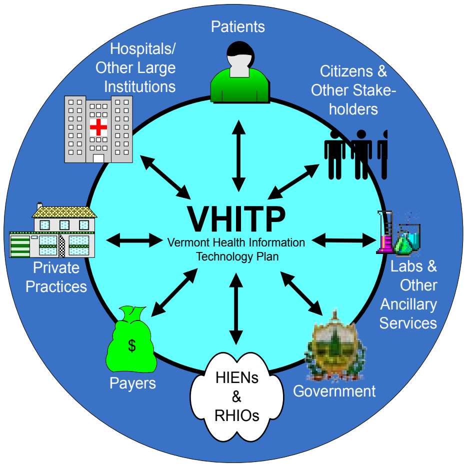


Figure 6
Key Stakeholders

4.2 Patients, Citizens, and Consumers

Health care consumers are not necessarily patients; citizens are not necessarily consumers. Consider:

- The son or daughter of an elderly parent in a nursing home, for example, may be a health care consumer while not simultaneously being a patient.
- Recommendations made in the plan and laws enacted by the General Assembly may be evaluated by the public not necessarily as potential health care patients or consumers, but as tax-paying citizens.

The interests of these three groups – consumer, patient, and citizen – are not always the same. The patient, for example, may place more value on privacy than the consumer; the citizen may place more value on cost effectiveness than the patient. While any given individual may be a patient, a consumer, and a citizen at the same time, the three categories essentially represent different stakeholders. Several steps were taken to elicit citizen feedback during the course of the development of the plan, including focus groups conducted as part of the Health Information Security and Privacy Collaboration initiative, a statewide survey, and a series of teleconferences with consumer group representatives.

To gather the views of a broad cross-section of Vermonters, a professional telephone survey was commissioned. Using a scientific, random sample methodology, interviews were conducted with 500 residents across the state. The survey found that a majority of Vermonters feel putting health care information into electronic form and exchanging data between health care organizations is generally a good idea. Among the benefits cited were doctors having more up-to-date data, quicker access to information, and making it easier to transfer data between health care providers. Most Vermonters said they believe it is likely that electronic medical records will lead to better health care.

But a sizeable number also have some concerns about electronic health records. Those include the security of electronic records, the possibility of data being lost, and information being misused or unauthorized people gaining access to private information. Those worries were reflected in the results of a question about the security of electronic health records compared to paper records. Thirty-four percent said they are very concerned about the security of electronic medical records, while 42% said they are somewhat concerned. Twenty-three percent said they are not concerned.

A slight majority (51%) said that critical information about them, such as lists of allergies, medications, and medical problems should be available to all the doctors or nurses taking care of them, but they should decide who can see the rest of their electronic health records. Another 31% said doctors and nurses should have full access to their electronic health records, while 14% said it is important for patients to decide which doctors and nurses have access to their electronic health record.

A strong majority said they would be comfortable participating in an electronic health record system, with 29% being very comfortable and 56% being somewhat comfortable. Likewise, a majority said they would be interested in using the Internet to review their own electronic health records. A large majority (67%) said there should be a balance between patient privacy and the degree to which health care providers have access to health information about their patients. The full results of the survey are in Appendix F.

A strong majority said they would be comfortable participating in an electronic health record system, with 29% being very comfortable and 56% being somewhat comfortable.

The VHITP workgroup explored what it means for HIT initiatives to be "patient-centered" and whether the patient is the central figure amongst all parties. In the clinical setting, patient-centered care relates to a method of patient interaction on a more personal level with the goal of improving patient satisfaction and outcomes. For many physicians, patient-centered care is a core value,[31] though there is some variability in what exactly patient-centered care means and how it can be measured.[32] The same challenge is encountered in the context of HIT and HIE. The definition of patient-centeredness differs among the HIT plans and initiatives in other states. Patient-centric HIT may be associated with any of the following:

- Some degree of patient control over electronic health information (for example, what information is stored, how it is shared, or with whom it is shared).
- Electronic health information systems designed for use by the patient (such as web-based patient portals or personal health record systems).
- Improved patient satisfaction with the health care system (for example, as a result of a decrease in duplicate laboratory tests due to better information management).
- The ability to enhance patient-centric care through information technology (such as through improved patient-doctor communication).
- Improved clinical outcomes as a result of better information at the point of care.

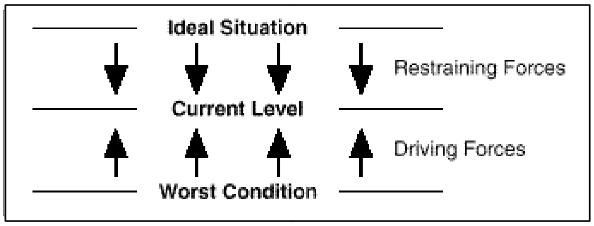
Patient-centeredness is an important but complex issue. Most stakeholders would agree that HIT should be patient-centered, yet few would agree on what exactly that means or how it could be measured. There is a need for more dialogue and education on the issue in order to reach consensus.

4.3 Hospitals and Other Large Institutions

Academic hospitals and other large institutions tend to have well established HIT programs, and this is generally true in Vermont. Yet even these institutions can benefit from statewide direction. Particularly in the area of health information exchange and collaboration with other stakeholders, hospitals are encouraged to adopt the standards set forth in Section 6 of the plan in order to improve interoperability and lower costs. The use narratives in Appendix B identify a variety of scenarios involving hospitals and how HIE can improve the health of patients in their care. Hospitals' infrastructure and activities will be leveraged as the plan is implemented, and the institutions are encouraged to remain active in statewide HIT planning.

4.4 Smaller Private Practices

Figure 7
Force Field Analysis Methodology



The ability to exchange electronic health information rises and falls with the presence of health information in electronic form. In many cases, the weakest link is the small private practice, where a strong business case has not yet been made for the investment in electronic health record systems (EHR-S). A recent study by the Center for Studying Health System Change shows that while the proportion of physician practices exchanging clinical data has risen from 2001 to 2005, there is a widening gap between small and larger practices.[33]

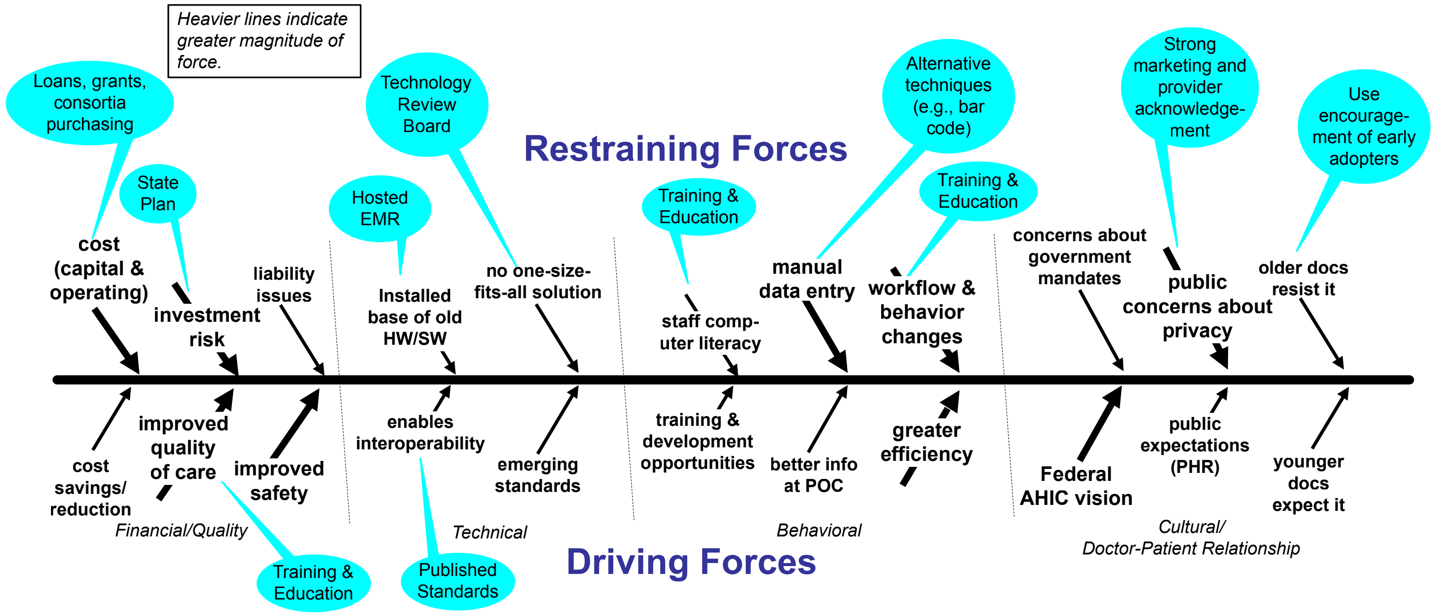
The plight of small private providers is significant enough to warrant special attention and consideration. Strategies are needed to encourage HIT adoption in general, and participation in HIE specifically. As part of its analysis, a force field analysis was completed to help capture the driving and restraining forces toward small practice participation in HIE.

In this methodology, driving forces push a situation towards the best possible outcome. Restraining forces push in the opposite direction towards the worst possible outcome. The current situation exists because of this equilibrium. The goal is to reduce the number and power of the restraining forces through some mitigating action while increasing the number and power of the driving forces to push to the desired outcome.

Figure 8 captures the force field analysis for small private practice HIE participation.

While appearing complex at first, this diagram is fairly straightforward to understand. Driving forces are on the bottom, pointing upward; restraining forces are on the top, pointing downward. The forces are divided into four groups of factors: those related to financing and quality; technical factors; behavioral factors; and those relating to organizational culture, in particular the doctor-patient relationship. Thicker lines mean the force of the factor is considered stronger. The driving and restraining forces are purposefully paired: each driving force is matched with a corresponding restraining force, though they may not be of the same magnitude. Finally, the balloons contain mitigating strategies that can work against these forces, driving or restraining.

Figure 8
Force Field Analysis



A recent study indicates that only 11% of savings from EHR system deployment accrue to the provider – the remainder goes to the payers through a reduction in unnecessary tests and more automated record handling.[34] Strategies presented in this plan are aimed specifically at increasing small provider participation in HIT and HIE activities in Vermont by addressing this and other barriers to HIT adoption.

4.5 Laboratories and Other Ancillary Services

Ancillary services are important providers and consumers of electronic health information. Diagnostic services such as laboratory and imaging, as well as treatment services including pharmacy, physical therapy, rehabilitation, health education, nutrition counseling and weight-loss all play a role in the health information exchange infrastructure that will help to achieve the vision laid out in the plan. Laboratories, imaging services, and pharmacies in particular have been active participants in early health information exchange initiatives in Vermont and elsewhere. Laboratory results in the right place at the right time can help a physician make a timely diagnosis of a chronic illness such as diabetes; the sharing of radiological images across health care providers can help reduce duplicate services; and prescription data available to an emergency department can help avoid life-threatening adverse events. Various use narratives (see Appendix C) further describe the role of these ancillary services in HIE activities. The VHITP workgroup included a member of NECLA and a representative from a pharmacy benefit manager, as well as a number of members who work with ancillary services.

4.6 Payers

Payers will play an important role in the development of a health information exchange. Claims data and other administrative payer data will be useful in supporting core HIEN applications. Payers can expect that HIE, effectively applied, has the potential to reduce duplicative tests and improve quality. VITL's Medication History Pilot Project will help payers improve customer satisfaction and cut costs by reducing medication errors. The Blueprint for Health project will improve the treatment of chronic conditions, which are responsible for much of the cost borne by payers. Payers will benefit from the availability of de-identified clinical data extracted from the exchange to monitor trends, drive improvements, and enhance wellness programs for their covered lives.

The needs of payers – insurance companies, self-insured employers, and government programs – were carefully considered in the development of the final plan. The VHITP workgroup included a representative from one of the state's largest commercial health plans, and a representative of the Office of Vermont Health Access, which runs the Medicaid program.

A recent study indicates that only 11% of savings from EHR system deployment accrue to the provider – the remainder goes to the payers through a reduction in unnecessary tests and more automated record handling.[35] This savings may serve as a foundation for more active participation by payers in HIEN funding.

During a patient visit at NVRH Corner Medical in Lyndonville, patient Raymond Labounty discusses his care with Joyce Dobbertin, M.D., who uses an electronic medical record on a laptop to enter and retrieve data.

4.7 Government

Government at all levels — federal, state, and local – plays a role in planning for and participating in infrastructure for electronic health information and health information exchange. Some elements of that involvement have already been covered in this plan, including:

- The Office of the National Coordinator as a planner in standards, funding, and security and privacy.
- Vermont Medicaid as a payer.
- Public health as a provider of 10 essential functions[36] spanning surveillance, diagnosis, connecting health care providers, education, and law enforcement.
- The Vermont General Assembly, Governor's Office, the Vermont Department of Health, the Vermont Department of Information and Innovation, the Office of Vermont Health Access, and BISHCA in policymaking, planning, and funding; including the development of the plan and the development of shared infrastructure ranging from telecommunications to health information exchange services.

Several of the initial projects being undertaken by VITL have strong participation by both public health and BISHCA. See the discussion of these projects in the Environment section, and in the use narratives in Appendix C.

4.8 Regional and Local Health Information Organizations

HIT and RHIO activity in surrounding states will impact Vermont at the border points where patients and services may overlap. Some RHIO initiatives envision plans to deploy across multiple states or conduct business regionally. VITL members and staff have been participating in regional HIT conferences to promote information sharing and lessons learned. The following is a brief review of RHIO/HIE activities in states neighboring or bordering Vermont. A fuller treatment of this topic is found in Appendix E.

Massachusetts, an early entrant into RHIO activity with multiple sources of foundation, health plan, and government funding may be farthest ahead in infrastructure and governance.

Massachusetts, an early entrant into RHIO activity with multiple sources of foundation, health plan, and government funding may be farthest ahead in infrastructure and governance. It already had the Massachusetts Health Data Consortium which collaborated in the first Markle Foundation report on Connecting Communities for Better Health. In all, the state has 11 AHRQ-funded projects; two projects funded by Bridges to Excellence, a non-profit quality organization; one project sponsored by the Doctor's Office Quality - Information Technology (DOQ-IT) program, a national initiative promoting EHRs, six HIEs, two RHIOs, and nine state-funded initiatives.[37]

Blue Cross and Blue Shield is funding a $50 million project to provide EHRs to physician practices in North Adams, Brockton and Newburyport. The practices will be linked to hospitals, laboratories and other providers in each community. The eventual goal is to link these communities — and others — to Massachusetts' emerging RHIO, called MA-SHARE.[38] In Massachusetts, the management of patient consent has been the overriding issue, even more challenging than the technology.[39] While Massachusetts has a mature governance structure, health care organizations have not started to exchange information, and they warn that even when the EHR software and services are given to providers, deployment schedules are often vastly underestimated.

During the past two years, New Hampshire has established a number of forums and organizations to promote HIT and HIE around the state, including the New Hampshire Health

Information Center,[40] a collaboration which includes the New Hampshire Medicaid program, and which performed a survey and prepared a NH Connects for Health briefing paper.

The Governors Citizen's Health Initiative at the University of New Hampshire received a $350,000 grant from the U.S. Department of Health and Human Services to assist with the effort to create statewide electronic medical record system. New Hampshire has formed the NH Citizens Health Initiative to work on policy initiatives and provide a citizen information site.[41] As reported by the *Union Leader* newspaper, beginning March 1, 2007, New Hampshire residents will be able to access online cost estimates, based on insurance claims data, for common procedures and tests at facilities across the state. New Hampshire's HealthCost Web site was jointly created by the state's health and insurance departments. The state since 2005 has required insurance carriers and third-party administrators to submit claims data for all members covered by policies issued in New Hampshire, and New Hampshire will be the first to make the data available to the public.

New York State has also collaborated with the eHealth Initiative to assist in the development of HIE/HIT strategies in collaboration with a number of ongoing projects in the state, via a summit series and direct engagement of eHi staff. Key to the New York activities is the establishment of a capitalized technology fund, NY HEAL, which has awarded and continues to award competitive grants to local initiatives in New York City and throughout the state ensuring a geographic mix and giving special status to projects which include safety net providers. NY HEAL funding phases are for expansion and deployment of current projects, not to new ones.

New York has a mature private initiative; the Taconic Independent Practice Association (IPA) in Fishkill. This initiative was initially AHRQ funded and provides a model for physician management of a shared EHR enterprise. The Health Information Management Systems Society reports that New York has four AHRQ-funded initiatives, one Bridges to Excellence project, one DOQ-IT project, 24 HIEs, eight private HIT initiatives, four RHIOs and 11 state initiatives, of which the capitalized fund is the major one. Like Vermont and New Hampshire, New York enjoys leadership from its governor and legislature, and has significant Department of Health and Medicaid program collaboration. New York Medicaid participates in eRX which provides data to providers, plans, and RHIOs.[42]

Like Vermont and New Hampshire, New York enjoys leadership from its governor and legislature, and has significant Department of Health and Medicaid program collaboration.

Other non-bordering New England states such as Maine, Connecticut, and Rhode Island have varying degrees of RHIO and HIEN activity. Rhode Island has an AHRQ grant for a statewide RHIO, and two HIEs. The Rhode Island legislature has authorized a $20 million bond to establish a statewide repository of electronic health records and is developing a master patient index to facilitate interoperability and sharing patient data between public and private health care sectors. In June 2007, a contract was in the process of being awarded. Rhode Island leads all states in e-prescribing, but has not yet exchanged any data.[43]

Like Vermont, Maine has a chronic care technology planning project. Maine has an AHRQ-funded grant for improving care in a rural region with consolidated imaging records funded by AHRQ. Maine has five state initiatives including MHINT, which seeks to establish a statewide electronic health record sharing system to begin implementation in 2007 with a 2010 completion date. Maine's *HealthInfoNet* delivery model is based on a clinical data repository with the Continuity of Care Record data standard as the foundation for the EHR. Its financial model is based on initial user contributions for the demonstration model, but is expected to change to a revenue model based on a set of services: prescription medication management; e-prescribing and medication reconciliation; clinical messaging/secure messaging; Maine mandated surveillance reporting; statewide standardized disease management system and registry; and clinical quality and performance reporting.[44]

4.9 Conclusion

For Vermont, the concurrent statewide activities in Maine, New Hampshire, Rhode Island, and Massachusetts can serve as models, or they can learn from Vermont as they have similar challenges. The activities in New Hampshire and New York can inform specific types of deployments as well as conduct HIE across state boundaries for patients and services, as well as for disease surveillance and preparedness activities that are interstate. Different areas of health focus such as patient safety, cost and quality data, or "low hanging fruit" such as e-prescribing or clearinghouse services are of particular interest. The large role of Medicaid programs in New York and New Hampshire, the use of the state university as a convener, the methods of engaging and informing the public, and the solutions to privacy and consent challenges, provider adoption, and use of EHR technology provide useful models.

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[32] Beach MC, Saha S, Cooper LA, "The Role and Relationship of Cultural Competence and Patient-Centeredness in Health Care Quality," Commonwealth Fund Report Oct. 2006.

[33] Grossman JM, Reed MC, "Clinical Information Technology Gaps Persist Among Physicians," Center for Studying Health System Change Issue Brief No. 106, Nov. 2006.

[34] See Lohr, Steve, "Risks and Rewards: Who Payes for Efficiency?" New York Times, June 11,2007 < http://www.nytimes.com/pages/business/businessspecial3/index.html>

[35] See Lohr, Steve, "Risks and Rewards: Who Payes for Efficiency?" New York Times, June 11,2007 < http://www.nytimes.com/pages/business/businessspecial3/index.html>

[36] Public Health Functions Steering Committee, American Public Health Association, "The Essential Services of Public Health," accessed 18 Dec. 2006 <http://www.apha.org/ppp/science/10ES.htm>. For more information on this topic, see <http://www.health.gov>, operated by the U.S. Department of Health and Human Services.

[37] Project statistics on state initiatives based on: Healthcare Information and Management Systems Society (HIMSS), "HIT Dashboard," accessed 18 Dec. 2006, <http://www.hitdashboard.com>.

[38] See http://www.himss.org/content/files/rhioconnection/200611.htm and http://www.mahealthdata.org/ma-share/mission.html

[39] See John Hamalka and Micky Tripathi, "The School of Hard Knocks: Lessons from the Field," HIMSS/eHealth Initiative Connections Communities Regional Forum, Boston, MA, May 10, 2007. <http://www.himss.org/HIEForums/agenda_boston.asp>

[40] See http://www.nhhic.org/index.html

[41] See http://www.steppingupnh.org/

[42] See Rachel Block, Comprehensive Models Required for Sustainable HIT and HIE Models- a New York State Study, HIMSS/eHealth Initiative Connections Communities Regional Forum, Boston, MA, May 10, 2007.

[43] See Laura Adams, "The School of Hard Knocks: Lessons from the Field," HIMSS/eHealth Initiative Connections Communities Regional Forum, Boston, MA, May 10, 2007.

[44] See Dev Culver, "Roadmap for Sustainability," HIMSS/eHealth Initiative Connections Communities Regional Forum, Boston, MA, May 10, 2007.

5 STRATEGY AND OBJECTIVES

5.1 Introduction

The strategy for the development of the VHITP is rooted in health care reform legislation, calling for eight specific requirements spanning: education, funding, standards; a special focus on security, privacy, and governance; and the integration of existing initiatives such as the Blueprint for Health. Based on the legislative requirements, a set of five core principles were developed – with 40 supporting principles – to help guide the development of recommendations and to provide a framework for all future health information technology initiatives in Vermont. This section identifies the core objectives and corresponding key activities required to implement the ideas in this plan along with specific implementation targets. These objectives and strategies need to be revisited at least annually given the rapid pace of advancement in both medical practice and health information technology.

For private and ambulatory practices, it is important that EHR systems be CCHIT-certified to ensure a minimum, consistent level of functionality.

5.2 Core Objectives

The VHITP workgroup established the following core objectives for a planning cycle of five years. The balance of the plan details the programs that will be established to see them through:

I. Encourage and enable the deployment and use of electronic health record systems within the state to increase the amount of health information that exists in electronic form.

Rationale: Without a pervasive deployment of electronic health record systems, automated health information exchange cannot take place efficiently.

Activities: Programs will be established to assist smaller providers in affording the cost of acquisition and deployment of these systems. Larger institutions will be encouraged to make systems investments that are consistent and compatible with the standards and technology architecture in this plan. Technology financing programs are discussed in Section 10 of this plan.

Targets: By the end of the five-year planning cycle, penetration of CCHIT-certified EHR systems will be evaluated with the following goals:

Organizations using basic EHR-S features by the end of…

	Current*	2008	2009	2010	2011
Hospital-owned practices	15%	20%	35%	50%	60%
Practices with more than two physicians	10%	12%	20%	35%	50%
Practices with one to two physicians	14%	16%	25%	40%	55%

**Baseline is practices reporting on VITL physician practice survey that all medical records are electronic but systems are not necessarily CCHIT certified.*

For private and ambulatory practices, it is important that EHR systems be CCHIT-certified to ensure a minimum, consistent level of functionality. When CCHIT certifies hospital inpatient systems those sites should deploy certified systems as well. Systems developed by health care providers within their organizations and deployed at their own sites should conform to the published CCHIT functional criteria for similar commercial applications.

II. Establish and operate the infrastructure necessary to promote secure electronic health information exchange to achieve the plan's vision.

Rationale: A central infrastructure can enable the interoperability of health information between stakeholders to operationalize the projects identified for implementation. EHR and ancillary systems will seek to comply with standards that promote their ability to interoperate with other systems through this infrastructure.

Activities: Over a period of several years, central infrastructure components will be acquired and deployed to support specific projects to be identified that support the use narratives that have been developed. Some components will evolve through multiple iterations as technologies and standards become available. The standards for this architecture are described in Section 6 of this plan; the technology components are described in Section 7.

Targets:

1. By the end of 2008, initial components of the infrastructure will be deployed and operational.
2. Incrementally build additional components of the architecture which will become operational as new applications and data services are implemented.

III. Empower consumers to take an active role in electronic health information initiatives in Vermont.

Rationale: Health information access is not only for providers, but for health care consumers (patients and their proxies and caregivers) as well. Consumers have the right to view their records and ensure that their records are used appropriately. Furthermore, access to personal health information is an opportunity for consumers to take more control over their own health by being better informed about steps that have been taken and steps that can be taken to improve their health. Finally, patient-centered outcomes will be improved as more Vermont consumers understand the issues surrounding electronic health information, make use of electronic services, and contribute to and support statewide planning and implementation efforts.

Activities: Issues of privacy and security are discussed in Section 8 of this plan; education is discussed in Section 9. VITL will continue to engage consumer groups, conduct surveys, and maintain consumer representation on its board. VITL will act as a resource for personal health record (PHR) initiatives in order to provide data exchange services, promote standards and policies that protect consumer rights and that are consistent with the plan, and provide education for consumers and health care providers regarding PHRs.

Targets:

1. By the end of 2007, security and privacy policies will be developed for the two initial HIEN projects consistent with the framework described in Section 8.
2. As HIEN projects are implemented, outreach and education will be conducted for affected individuals related to their rights and privileges.

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Over a period of several years, central infrastructure components will be acquired and deployed to support specific projects to be identified that support the use narratives that have been developed.

3. Minimize the percentage of patients who "opt out" of HIEN projects by carefully tracking and analyzing their occurrence and then addressing identified issues.
4. By the end of 2009, the HIEN will provide data services to populate PHRs.

IV. Enable public health agencies to leverage HIT/HIE investments to monitor and ensure the public's health more transparently and quickly.

Rationale: Public health agencies have a legal obligation to not only monitor the public's health but to respond to emergencies when they occur.

Activities: Consistent with national initiatives such as the Public Health Information Network, the HIEN infrastructure will be used specifically to enable state and local public health agencies to receive reports of communicable disease occurrence from providers, to receive and disseminate information related to emergencies, and to perform more passive surveillance of community health using available health data. VITL will ensure that specific projects are evaluated for their public health relevance.

Targets:

1. By the end of 2009, the HIEN will provide data services to support public health reporting.
2. By the end of 2010, the HIEN will provide data services to support passive public health surveillance.

The HIEN infrastructure will be used specifically to enable state and local public health agencies to receive reports of communicable disease occurrence from providers.

Computers on wheels are playing a greater role in patient care at Rutland Regional Medical Center. Margie Francescani, R.N. (right), talks with surgery patient Lonny Lamb and enters data into the portable computer.

6 STANDARDS

6.1 Introduction

Standards play an important role in the VHITP framework. The plan adopts proven standards whenever possible and plans for the use of emerging standards to facilitate HIE and to influence – but not mandate – general HIT good practice. In many cases technical standards for health care information systems are not fully mature. Indeed, most health care organizations use standards in one way or another for the interchange of information between disparate systems both within and outside of their organizations. Generalized standards are often not fully effective within health care organizations' operational systems because they may not be sufficiently detailed enough to document or describe *all* health care episodes or transactions required by an organization, or are otherwise poorly structured for this purpose. Thus, the standards described in this section are meant first and foremost to guide HIE implementation and can only serve as general guidance for a health care organization's internal HIT projects (including EHR system selection). The intent is eventually to have every health care organization abide by minimum interoperability standards such that all can take advantage of the HIEN as well as achieve the vision stipulated at the beginning of this plan.

The standards described in this section are meant first and foremost to guide HIE implementation and can only serve as general guidance for a health care organization's internal HIT projects (including EHR system selection).

A key issue related to standards is the interdependency between Vermont's HIE/HIT goals and the requirements of federally-administered programs. National requirements are imposed on state and local government organizations that administer public health and health care assistance programs. The VHITP workgroup was sensitive to the interdependency of national and state requirements and standards. The diverse experience and contribution of the VHITP workgroup represents both private and government perspectives. A fertile communication forum has evolved encouraging discussion, idea sharing, and consensus building. Group and individual discussion occurs across private and public boundaries.

One additional note is required: The term "standard" is used loosely in this plan to mean any identified convention supported broadly by the HIT community that provides guidance to Vermont HIE and HIT deployment. Some of the standards identified in the table in this section are not maintained by standards development organizations *per se* but are widely accepted and appropriate nonetheless.

6.2 Interoperability

The reason for the Vermont HIEN to adopt standards is to enable the *interoperability* of health information. However, this term has been used frequently with little agreement on just what it means. One of the major standards-setting bodies in health care is the Health Level 7 (HL7) organization. Recently, the HL7 Electronic Health Record Interoperability Work Group published a white paper[45] whose purpose was to consider interoperability, develop a consensus definition, and to discuss implications for future standards work. After reviewing and analyzing 100 definitions, the workgroup agreed upon a three-part definition:

1. **Technical interoperability** focuses on the physical transmission and receipt of health data, its transport between participating systems. Much of the work here is on message formats and reliable, secure message transport.
2. **Semantic interoperability** focuses on ensuring shared meaning between sending and receiving partners – ensuring that the meaning of what was sent is consistent with the

understanding of what was received. Much of the work in this area is focused on medical terminology which can be referenced consistently by all parties.

3. **Process interoperability** focuses on higher-order workflow concepts that make data sharing a richer and more valuable experience. Work in this area tries to understand how shared health data supports the specific activities and workflow of the organizations that use it and the integration of health data into the work setting. Issues of data usability and timeliness are examples of process interoperability concerns.

The HL7 EHR Interoperability Work Group went on to define an Interoperability Model Draft Standard for Trial Use[46] (DSTU) which defines the characteristics that records need to meet these three levels of interoperability.

Many of the standards for technical interoperability (and to a lesser degree process interoperability) are relatively mature and have been in use for many years. Of the above three types of standards, semantic interoperability is the most difficult to achieve. Semantic (terminology) standards may be particularly problematic if the HIE standards are applied to HIT or health care operations. Frequently data translation or abstracting techniques may be more appropriate to support HIE than the direct use of these standards in HIT systems. Therefore, a health care organization should not necessarily be expected to demonstrate consistency with the semantic (terminology) standards in connection with any proposed HIT or EHR system project, but should be expected to either be consistent with standards or to utilize techniques which support semantic interoperability.

6.3 Standards Initiatives

The standards chosen by the VHITP workgroup for HIT/HIE support all three types of interoperability described previously.

Along with the HL7 DSTU, the following initiatives were also examined and considered:

The Health Information Technology Standards Panel[47], a public-private partnership funded by a U.S. Department of Health and Human Services contract to develop interoperability standards for local, regional, and national health information exchanges. Because so many standards development organizations are involved in this effort, HITSP standards serve as a useful starting point.

The Consolidated Health Initiative,[48] whose objective is to enable sharing of health information between various federal agencies by adopting existing standards.

Medicaid Information Technology Architecture (MITA),[49] which is intended to promote integrated business and IT across the Medicaid enterprise to improve the administration of the Medicaid program. The plan ensures that Vermont's HIE infrastructure will meet the MITA interoperability requirements and its guidelines for state and federal policies and legislation.

Public Health Information Network (PHIN),[50] a maturing national standard. PHIN is the Centers for Disease Control's vision for organizing, standardizing, and managing the collection and dissemination of public health information. It requires the use of fully interoperable information systems in the many organizations that participate in public health. PHIN requires policy, technology, and vocabulary standards for interoperability between public health agencies, CDC, private health entities, and other national, state, and local organizations.

Vermont Office of the Chief Information Officer Policy and Procedures[51] serve as a useful reference in certain standards areas.

6.4 Selected Standards

The VHITP workgroup has selected the following standards with an emphasis on those standards most essential to support HIE activities within the state. Although some well established standards are still evolving, health care organizations should adopt health information technologies that are consistent with widely recognized national standards to the extent possible while balancing internal needs with the broader objectives and goals of supporting cost-effective health information exchange across organizations and health care settings. More specifically, hospitals subject to certificate of need regulations will address the HIE standards listed in this chapter, including the core standards, messaging standards, core semantic standards, HIT infrastructure and applications, and standards for process interoperability. This includes a discussion of applicability, explanation for inapplicability of selected standards, and obstacles to adoption of applicable standards.

6.4.1 Core Technical Standards for Health Information Exchange

The following standards establish the core technical requirements for health information exchange within the state, though they may also represent good practice for applications and systems within an organization as well. To ensure technical interoperability with the HIEN, organizations should implement these standards:

Core Technical Standards for Health Information Exchange

Area	Standard	Description
Network Connectivity	Internet Engineering Task Force (IETF) Transmission Control Protocol/Internet Protocol (TCP/IP) Version 4	This is the *de facto* networking standard of the Internet and most mature intra-organizational local area and enterprise-wide networks.
Web Applications	Web Browser compatible with IETF Hypertext Transfer Protocol (HTTP) Version 1.1	This represents the minimum level of compliance for web-based applications. Specific applications may be dependent on other software or compatibility (e.g., Java, Javascript).
Transport Encryption	IETF Transport Layer Security (TLS) Version 1.0/Secure Socket Layer (SSL) Version 3.0	This is the *de facto* transport encryption protocol of the Internet. Note that transport encryption is only necessary when data is transported over public (insecure) networks and not when data is transported over private (secure) networks.
Authentication	Username/Strong Password Public Key Infrastructure (PKI) Hardware Tokens Biometric Devices	Many strategies exist, and their specific use will depend on the application. Specific rules may differ for username/password for specific applications. Multi-factor authentication may also be necessary for some applications.

6.4.2 Messaging Standards for Health Information Exchange

The following standards define the message formats and transport standards to support technical interoperability within the HIEN. Depending on the specific messaging requirements, different elements from this table apply.

Messaging Standards for Health Information Exchange

Area	Standard	Description
Message Formats	Digital Imaging and Communications in Medicine (DICOM) PS 3 – 2007[52]	Enables interoperability with medical images, especially with respect to imaging devices and other medical systems.
	Health Level 7 (HL7) Version 2.n Messaging Standard[53]	This is the message standard supporting clinical data exchange in widespread use within the medical community. While Version 2.5 is the version currently released, earlier subversions of the Version 2 standard may be in use and may continue to be recommended in some instances.
	Health Level 7 (HL7) Version 3.0 Messaging Standard[54]	This version is emerging over time as the preferred standard, replacing Version 2. This will be a gradual transition over a number of years.
	Integrating the Healthcare Enterprise (IHE) Technical Frameworks[55]	These technical frameworks provide pre-developed profiles which serve as implementation guides for HL7 messages intended to serve specific purposes.
	Accredited Standards Committee (ASC) X12 Standards Release 004010[56]	Electronic data interchange standards most relevant to processing insurance claims and other business activities in health care.
	National Council for Prescription Drug Programs (NCPDP) SCRIPT Standard Version 8.1[57]	Developed for transmitting prescription information electronically between prescribers and providers – using standard EDIFACT and ASC X12 data tables where possible – addressing the electronic transmission of new prescriptions, changes of prescriptions, prescription refill requests, prescription fill status notifications, cancellation notifications, and relaying of medication history.
Message Transport	Centers for Disease Control and Prevention Public Health Information Network (PHIN)[58]	PHIN is a framework to promote interoperability among public health reporting systems. PHIN standards will be relevant for a subset of HIE activities related to systems and functions with its domain.
	SOAP, Web Services[59] ebXML[60]	Various transport mechanisms may be employed by HIE applications to enable interoperability between systems.
Clinical Document Construction	Health Level 7 (HL7) Version 3.0 Clinical Document Architecture (CDA/CDA R2)[61]	Provides a model and architecture for the development of documents that are both machine readable and human readable to enable data exchange between systems. Specific clinical documents may be developed and required for specific HIE functions.

6.4.3 Core Semantic Standards for Health Information Exchange

To ensure that health information transferred between organizations retains its meaning, the following terminology and coding standards should be used when sending or receiving data to or from the HIEN. Depending on the specific data exchange requirements, different elements from this table apply.

Core Semantic Standards for Health Information Exchange

Standard	Description
CMS' Healthcare Common Procedure Code System (HCPCS)/American Medical Association (AMA) Current Procedural Terminology (CPT®) Fourth Edition (CPT-4)[62]	This is the standard coding for procedures widely used in the healthcare community: Level I: Hospital Outpatient Procedures (CPT4) Level II: Products, supplies and other services
Centers for Disease Control and Prevention (CDC) Race and Ethnicity Code Sets [63]	These code sets are based on current federal standards.
College of American Pathologists Systematized Nomenclature of Medicine Clinical Terms (SNOMED CT®)[64]	This is the standard coding used for a wide variety of medical and health care terms.
International Classification of Diseases, Ninth Edition, Clinical Modifications (ICD-9-CM)[65]	This is the standard coding used for diagnoses and procedures by hospitals: Volume 1 & 2: Hospital diagnoses Volume 3: Inpatient hospital procedures
International Classification of Diseases, 10th revision, Related Health Problems (ICD-10 CM)[66]	This revision to ICD-9-CM contains a number of important improvements. This standard is not yet widely implemented.
Logical Observation Identifiers Names and Codes (LOINC®)[67]	This is the standard coding for laboratory and clinical observations used by health care systems and messaging (like HL7).
National Library of Medicine (NLM) Unified Medical Language System (UMLS) RxNorm[68]	This is the standard for coding the names of drugs and dose forms.
National Drug Code (NDC)[69]	This is a universal product identifier for human drugs.

Many organizations deploy EHR systems using internal coding schemes like Medcin® which map to codification standards identified above.[70] These semantic interoperability requirements are met through the use of data translation or technical interfacing techniques. Indeed the HIE itself may take on much of the responsibility to implement these standards within the HIE architecture and play the role of creating the necessary cross references to ensure semantic interoperability. A health care organization should not necessarily be expected to demonstrate consistency with the semantic (terminology) standards in connection with any proposed HIT or EHR system project, but should be expected to either be consistent with standards or to utilize techniques which support semantic interoperability.

6.4.4 Recommendations for HIT Infrastructure and Applications

Though not required to support HIE activities, the following recommendations support best practices in health information technology and should be viewed as desirable elements of any system or application. The plan does not intend to intrude on basic technology implementation within participating organizations, but does need to insist on compatibility with general purpose components. To the degree that *applications* are delivered over the Web, it may be more relevant to ensure browser compatibility regardless of the underlying platform.

HIT Infrastructure and Applications

Area	Standard	Description
Application Architecture Alternatives	Multi-tier, with separation between presentation layer, business logic, and data	A multi-tier architecture better ensures application scalability and security.
	Service-oriented Architecture	SOA is especially useful for loosely coupled, network applications that are typical of many HIE implementations.
Clinical Context Management	HL7 CCOW[71]	Enables visual integration of different health care applications
Database Access	ANSI Structured Query Language (SQL)	This is the *de facto* query language for commercial and open source relational database management systems.
Web Applications	Rehabilitation Act of 1973 Section 508 Compliant[72]	Application user interfaces must be accessible to individuals with disabilities.
Directory Services	IETF Lightweight Directory Access Protocol (LDAP) Version 3.0	This is the *de facto* directory storage and access protocol of the Internet.
Authentication	Single Sign-on (SSO)	In conjunction with other authentication strategies, SSO provides a more comprehensive solution that makes the management of credentials for multiple systems easier for users.

6.4.5 Recommendations for Process Interoperability

Though not required for HIE in Vermont, these standards represent industry best practice to help ensure process interoperability between systems.

Standards for Process Interoperability

Standard	Description
Health Level 7 (HL7) EHR System Functional Model[73]	This serves as a reference to the features desirable for an electronic health record system from the user's point of view.
Various subject matter or project specific requirements including Unified Modeling Language (UML) Version 2.0 compliant use cases	HIE systems and applications should have a specific body of descriptive material concerning their desired purpose and functionality.
Certification Commission for Healthcare Information Technology (CCHIT) certified Ambulatory and Inpatient Electronic Health Record Products[74]	Only CCHIT-certified systems are recommended for deployment by participating organizations. In addition, the state may recommend a smaller subset of certified systems as being "preferred" for deployment. Certification for hospital inpatient products is not yet complete.[75]
Health Level 7 (HL7) EHR Interoperability Model Draft Standard for Trial Use (DSTU)[76]	This is a companion standard to the Health Level 7 (HL7) EHR System Functional Model and clinical messaging. It provides a means of ensuring interoperability through the development and implementation of interoperability profiles which specify a set of characteristics within a data exchange transaction. This draft standard is early in its development and will take several years to mature.

6.5 Standards Compliance and Maintenance

The previous standards for the HIEN are provided as a guide to ensure that appropriate investments in HIT are made statewide, with particular emphasis on ensuring that investments promote interoperability between systems with as little difficulty as possible. Organizations and other stakeholders are encouraged to conform to these standards to enable full participation in the Vermont HIE experience. The VHITP offers strategies for promoting the broad adoption of HIT (including HIE) and criteria for the compatibility of stakeholder HIT investment decisions with the state's direction. The plan balances a desire to guide the stakeholders to implement systems compatible for data exchange with the HIEN while not being too intrusive on their right to determine the best technological course for their organizations or interests. It should be noted that compatibility with the HIEN is one aspect of many which organizations must consider when implementing HIT. These aspects can at times be conflicting and compromise decisions are sometimes necessary.

Under Vermont law (18 V.S.A. § 9440b, 22 V.S.A. § 903), the Vermont Health Information Technology Plan shall serve as the framework within which certificate of need (CON) applications for the purchase or lease of health care information technology that are subject to regulation by BISHCA shall be reviewed. Certificates of need may not be granted or approved by the commissioner unless they are consistent with the plan. CON applicants will address the HIE standards listed in this chapter including the core standards, messaging standards, core semantic standards, HIT infrastructure and applications, and standards for process interoperability including a discussion of applicability, explanation for inapplicability of selected standards, and obstacles to adoption of applicable standards.

Standards will be reviewed annually to ensure that they are up-to-date based on changes at the national level and the advancing needs of health care in Vermont. VITL's Standards and Architecture Workgroup will be responsible for this review and for recommending changes to these standards with adequate stakeholder input.

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[45] Health Level 7 EHR Interoperability Work Group, *Coming to Terms: Scoping Interoperability for Health Care,* February 2007, < http://www.hln.com/assets/pdf/Coming-to-Terms-February-2007.pdf>.

[46] See http://www.hl7.org/ehr/downloads/index_2007.asp

[47] See Health Information Technology Standards Panel website, <http://www.hitsp.org/>.

[48] See Consolidate Health Initiative website, <http://www.hhs.gov/healthit/chiinitiative.html>.

[49] See Medicaid Information Technology Architecture website, <http://www.cms.hhs.gov/MedicaidInfoTechArch>.

[50] See Public Health Information Network website, <http://www.cdc.gov/PHIN>.

[51] See Office of the Chief Information Officer website, < http://cio.vermont.gov/policy_procedures>.

[52] See http://medical.nema.org/

[53] See http://www.hl7.org/

[54] See http://www.hl7.org/

[55] See http://www.ihe.net/Technical%5FFramework/

[56] See http://www.x12.org/

[57] See http://www.ncpdp.org/

[58] See http://www.cdc.gov/phin/

[59] See http://www.webservices.org/

[60] See http://www.ebxml.org/

[61] See http://www.hl7.org/Library/standards_mem1.cfm#CDA

[62] See http://www.ama-assn.org/ama/pub/category/3113.html

[63] See http://www.cdc.gov/phin/vocabulary/race.html

[64] See http://www.snomed.org/

[65] See http://www.cdc.gov/nchs/about/otheract/icd9/abticd9.htm

[66] See http://www.cdc.gov/nchs/about/otheract/icd9/abticd10.htm

[67] See http://www.regenstrief.org/medinformatics/loinc/

[68] See http://www.nlm.nih.gov/research/umls/rxnorm/

[69] See http://www.fda.gov/cder/ndc/index.htm

[70] See http://www.medicomp.com/highbandwidth.htm

[71] See http://www.hl7.org/special/Committees/ccow_sigvi.htm

[72] See http://www.section508.gov/

[73] See http://www.hl7.org/ehr/downloads/index_2007.asp

[74] See http://www.cchit.org/

[75] See Appendix K

[76] See http://www.hl7.org/ehr/downloads/index_2007.asp

7 TECHNOLOGY

7.1 Introduction

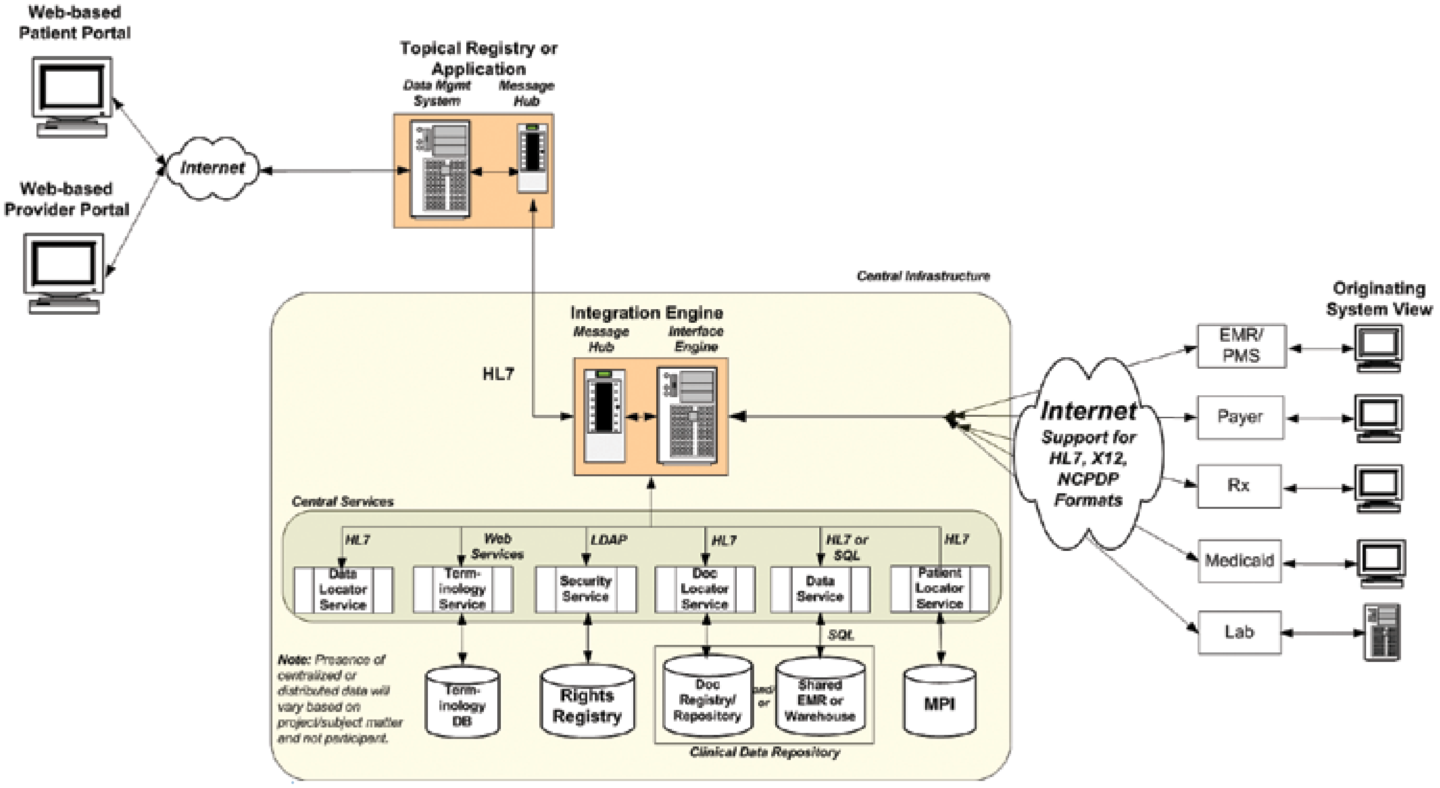
There are many issues to consider when developing a statewide HIT plan. In the end, however, the recommended technology is essential to fulfilling the objectives of the plan. HIT – and its corresponding HIE components – is complicated. Many stakeholders are looking for recommendations for new investments or for assurance that existing investments will be compatible with Vermont's technical direction. The objective of this section of the plan is to identify the technical architecture necessary to support the plan's objectives while being consistent with the standards identified in Section 6.

One strong driver for the recommended technical architecture is the reality on the ground: VITL is coordinating the deployment of a number of initial projects in 2007 designed to provide immediate benefit to patients, demonstrate the capabilities of a statewide HIEN, and help exercise the technical and organizational infrastructure that is being developed for statewide health information exchange. While these projects do not by themselves lay the foundation of the technical infrastructure, they represent Phase I of the state's implementation. The VHITP tries to leverage these initial projects wherever practical while critically examining the attributes of these projects to ensure that the correct long-term strategy is not negatively affected by these opportunities.

7.2 Architecture Overview

The following diagram displays the proposed architecture for the HIEN in Vermont:

Figure 9
Proposed Vermont HIEN Architecture



This proposed architecture contains many of the elements of the more generic HIEN diagram displayed in Figure 2 in Section 2. Figure 9 represents the architecture for the *fully deployed* HIEN: Vermont's phased implementation would require the majority of the core components to be deployed initially, with the remainder being deployed or enhanced as needed to support new projects or functionality.

The architecture contains quite a few central components. Two important clarifications need to be offered:

a. Though VITL operates the statewide HIEN in Vermont, smaller, more localized HIEs may develop within networked organizations within the state, such as a hospital network for its local service area. This architecture recognizes that smaller HIEs could function, and would be able to interoperate with the statewide HIEN as long as they comply with the standards described in Section 6 or there is an interface compliant with Section 6. The technical architecture of these smaller HIEs may not be the same as that of the HIEN, because many of the statewide architecture components described in this section would not be needed at the local level. The HIEN architecture should support telemedicine implementations that may be required to enable more remote sites to participate.

b. The presence of central components is required for certain types of interoperability, but should not imply that data is necessarily centralized in all of the projects deployed using this architecture. To be successful, a hybrid implementation will be deployed where some data is stored centrally to enable quicker access, and other data will be located in a more distributed fashion and accessed via locator services.

Typically HIENs are deployed using one of two main models for providing access to patient data.[77] A *centralized* model stores patient and health care data physically within the HIEN's central infrastructure and provides direct access to consolidated information about a patient. This approach allows for quicker access to data, the opportunity for data normalization and can better position the HIEN to support community-wide data analysis. It does require, however, fairly extensive central infrastructure and coordination among parties, as well as staff capable of working on data consolidation. In a *distributed* (also known as a federated or record locator service) model the HIEN's core contains a master index of all patients in all participating systems but does *not* contain any actual clinical records. Participating systems use the index to identify where they might find relevant patient records and then issue a second query to fetch those records from the source system. This allows partner organizations to retain greater control over their patients' records as health data is not replicated in a central repository. However it may take longer to satisfy a data query as a participating system may not be available at a given moment. In addition, the data retrieved may not be in a standard semantic format (lab test results may have different names, for example).

While the architecture employs a central master patient index, the decision to place health data in a central warehouse will be made on a project-by-project basis. VITL's Medication History Pilot Project, for instance, uses a distributed model to access medication history close to the source where it originates. The model enabled rapid deployment at relatively low cost, and is well-suited to the limited number of technically-sophisticated data providers and the lack of system-wide data analysis requirements. The Blueprint for Health Chronic Care Information System, on the other hand, centralizes chronic care information in a clinical data repository which is accessed through a master patient index. This model allows the CCIS to offer a rich,

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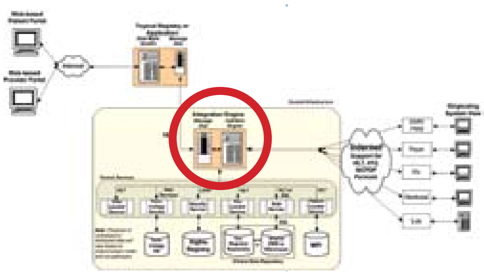
Though VITL operates the statewide HIEN in Vermont, smaller, more localized HIEs may develop within networked organizations within the state, such as a hospital network for its local service area.

registry-based application capable of scaling to a relatively large number of heterogeneous, practice-based data providers – some with EHRs, some without. The VHITP accommodates both needs in a single architecture.

The VHITP architecture is a *hybrid* architecture.

7.3 Architecture Details

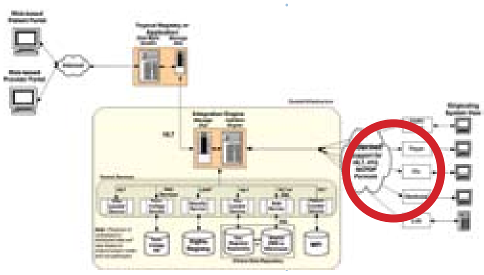
The following descriptions explain the major components of the architecture:



Integration Engine: The core of any HIEN is the exchange of data contained in messages between participants. The integration engine has two major components: a *message hub* that stands ready to receive, queue, and forward authorized messages from source systems to destination systems, and an *interface engine* that, when necessary, provides the proper translation of message formats so that a receiving system can understand what the sending system is transmitting. Transactions in and out of the integration engine must take place securely.

Network Infrastructure and Standards-based Messaging: For HIE to be supported, participating sites need to be connected on a common wide-area network. Based on the principles developed by the VHITP workgroup, the Internet should be leveraged wherever possible as the network of choice between sites. With proper care, Internet connectivity can be safe and secure, and less costly than point-to-point connections. Bandwidth requirements will vary from site to site, but are usually quite modest for small sites (other than those that might be implementing digital imaging or radiography). Broadband connections (via DSL or cable) are considered essential for even small sites as they offer a persistent connection at reasonable speeds and cost. Larger sites may need leased lines of varying speeds, and rural sites may have more limited connectivity options. Encryption is essential for transactions that are passing over the Internet; existing technologies are widely deployed to support this feature.

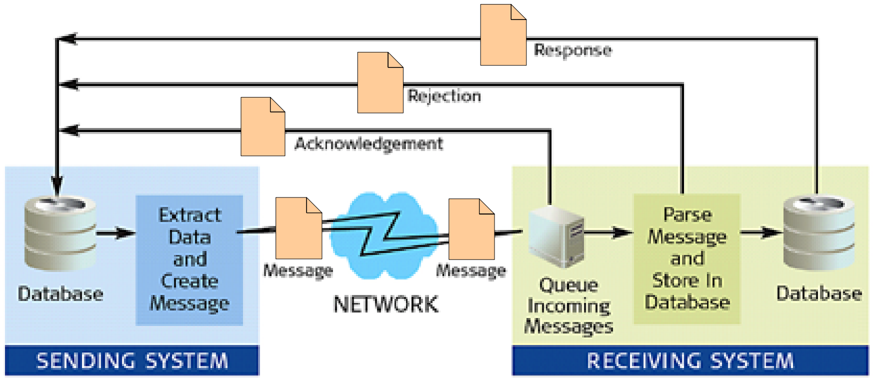
Interoperability between systems will be achieved primarily through *messaging.* Several message standards are available and relevant to HIEN systems, including Health Level 7 (HL7), X12, and NCPDP. How this messaging works is illustrated in Figure 10. The sending system extracts data from its database and creates a standard message. This message includes a message header, or envelope (information about who is sending it and where it is intended to go), and a message body (some kind of data payload to be carried). The message body might contain data bound for the receiving system, or it might contain a structured request for data from the receiving system. The message is then transported across a network (often using a secure and encrypted channel over the Internet) to a message queue in the receiving system to wait its turn for processing (this is in the integration engine described previously).



When the message is processed, it is read and interpreted by a message parser in the receiving system which checks the message header and evaluates the contents in the body. Based on the business rules in the receiving system, the contents are stored in the receiving system's database, held for further processing, or rejected. An acknowledgement message might be sent back to the sending system, or a rejection message might be sent instead. If data was requested and found, a response message would be sent back.

For clinical messages based on HL7, the architecture is not specific about the styles of messaging that may be implemented. Two major approaches are used: A *data-centered* approach uses traditional structures to represent the data set being transported by the message. In simple cases, this might mean a single row in a file to represent a record with a header row before the data or a separate file containing more detailed field descriptions, code sets, or semantic explanations. More sophisticated examples include HL7 or X12 messages which follow a well-developed, standards-based syntax detailed in implementation guides or profiles.

Figure 10
System to System Messaging



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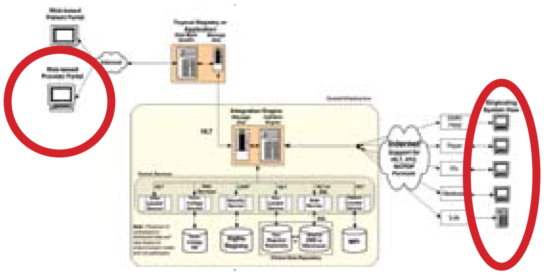
In a *document-centered* approach, the data is pre-arranged in a document format which is usually quite structured. Simply opening up and examining the document itself conveys its contents in an organized, labeled fashion. The best example of this approach is ASTM's Continuity of Care Record[78] (CCR), which contains a pre-determined set of data in a pre-determined format. HL7 has created a more generic architecture for creating data in this style (Clinical Document Architecture, or CDA), and the two organizations have combined the two by developing an implementation of the CCR using CDA technology called the Continuity of Care Document (CCD). Both CCR and CCD represent *summaries* of clinical information about a specific patient.

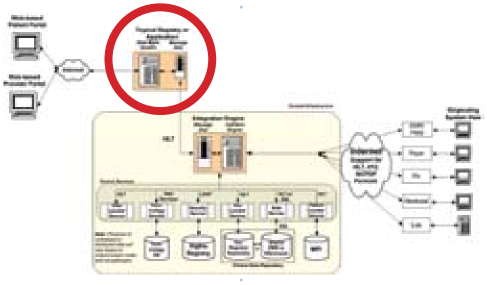
The architecture can accommodate either a data-centered or a document-centered approach to messaging. For example, a key feature of standards-based messaging under this architecture will likely be technical frameworks, or integration profiles, from the Integrating the Health Enterprise project.[79] The profiles draw upon existing standards to solve specific interoperability problems in specific health care domains. A number of these profiles are already developed; some are still under development or not even begun. Some of the profiles use a data-centered approach (like the laboratory technical framework), and some use a document-centered approach (like the patient care coordination technical framework). It is important that the HIE choose the appropriate approach for the problem at hand, confident that the underlying infrastructure can support it.

Originating/Participating Systems: These are primarily *existing* systems and applications used to access HIEN patient and health information *or* to supply data through the messaging infrastructure. Examples include provider or patient portals, or provider/hospital electronic health records systems, pharmacy systems or clearinghouses, laboratory systems, or payer/claims processing systems.



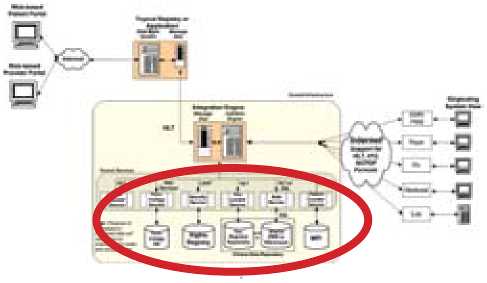
In addition to these existing systems, the HIEN will offer additional, web-based systems of its own to its two largest stakeholder groups: to health care providers through a provider portal and to patients/citizens through a patient portal. The exact capabilities and features of these systems will emerge over time through the phased implementation of the HIEN.

The Vermont HIEN architecture will not proscribe about the functionality or architecture of these participating systems. Each system needs to fulfill the functional requirements of programs, organizations, and purposes it supports. As described in Section 6, it is when it comes to *interoperability* that these systems need to be aware of their compliance and ability to participate in the HIEN.



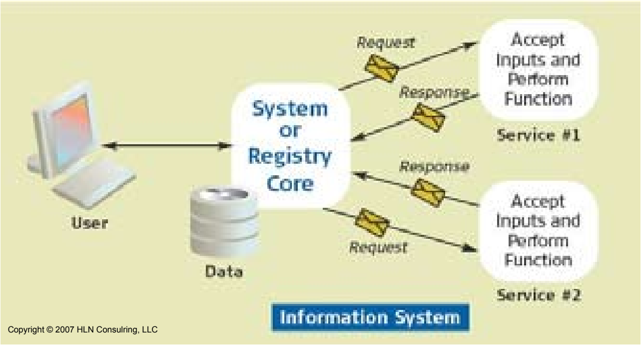
Topical Registries/Applications: Various entities – including the state – will offer access to topical or subject-specific databases and systems to enhance the provision of care to patients or to support a required public health or community health function. Though these systems usually contain less data than a fully-functioning electronic health record system, they can provide fundamental data sources for a HIEN. In Vermont, the Department of Health offers both a statewide immunization registry and a chronic care information system. Techniques for accessing the data differ, but over time these systems must comply with the interoperability standards of the overall HIEN. Providers and patients may have different functionality and data views within applications.

Central Services: Aside from the integration engine, the core of the HIEN is a set of central services that provide a set of shared features to the various systems that will be deployed on the HIEN infrastructure. These services will be phased in over time; some have interdependencies with each other or other HIEN components.



The central services function within a flexible and modular construct called *service-oriented architecture* (SOA, see Figure 11). The concept of SOA is not new. For years, software developers have created systems with application programming interfaces (API) which define how systems and subsystems interact with one another by exchanging data in reliable, structured ways. Many of the core services that are used to operate the Internet began as functions with APIs which developed into internationally-recognized standards. In an SOA, complex systems are created which are comprised of discreet functions, or services, that make themselves available to other systems on a network and perform specific tasks. These services form system building blocks capable of being reused over and over again in the context of different needs and applications. Diverse systems can share important algorithms, features, and capabilities by relying on these shared services rather than reproducing this functionality each time it is needed.

Figure 11
Service-oriented Architecture



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The Vermont HIEN will deploy the following set of central services through its phased implementation:

Security Service: The security service maintains authentication credentials as well as access rights (authorization) for HIEN participants, be they individual users or entire systems. A central rights database contains a permanent record of credentials, contact information, and access audit logs. Systems or applications participating in the HIEN use this service to provide consistent identity management, sign-on, and access control.

Patient Locator Service: This service enables searches for patient demographic data by using the master patient index (MPI). Patient matching represents one of the cornerstones of an HIEN implementation. An MPI is the means to reliably match and link patient information collected from disparate sources. Various strategies can be employed within the MPI to match records or de-duplicate sets of records that appear to have the same patient represented more than once. The patient locator service does not provide direct access to any medical data, it merely indicates to an authorized requesting system that a particular patient exists within the HIEN and how that system might locate more information about the patient.

Data Service/Document Locator Service: A two-part service provides access to clinical data that is accessible from within the HIEN. The data service provides access to central data, identified or de-identified, that may be stored within HIEN databases. It also provides pointers to data that might be stored in distributed locations or databases. The document locator service performs a similar function except that it enables searches for document-centric rather than data-centric information. Once again, these documents may be stored centrally in an HIEN document repository or may be distributed elsewhere in the HIEN. The presence of centralized or distributed data varies based on the project or subject matter.

Clinical Data Locator Service: More specialized than some of the other services, the medication search service is an important component of the VITL Medication History Pilot Project. This service will assist in the distributed search that has been designed to support locating clinical information for patients within participating systems.

Terminology Service: For systems to successfully interoperate they need to do more than just be able to exchange information. The information needs to be properly *understood* by both the sending and receiving systems. This is referred to as *semantic interoperability.* The Terminology Service ensures that medical terms are used consistently by all HIEN applications and systems by providing consistent mapping and translation of any relevant terminologies. The terminology service will maintain a mapping of standard terminologies (like LOINC and SNOMED) to any non-standard coding or definitions used by particular systems. Data interchange, however, will rely on the standard definitions supported and provided by this service.

Each of the services maintained and operated by the HIEN conform to an interface standard which defines the means that other systems and services use to submit requests and receive results. The table to the right identifies the interface standard for each service described above.

Service	Interface Standard
Patient Locator	HL7
Data	SQL or HL7
Document Locator	HL7
Security	LDAP
Terminology	Web Services
Clinical Data Locator	HL7

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[77] For a fuller treatment of this topic see Arzt, Noam H. *The New Alphabet Soup: Models of Data Integration, Part 1,* Journal of Healthcare Information Management, 20(1), Winter 2005 and *The New Alphabet Soup: Models of Data Integration, Part 2,* Journal of Healthcare Information Management, 20(2), Spring 2006.

[78] See http://www.astm.org/cgi-bin/SoftCart.exe/COMMIT/COMMITTEE/E31.htm?L+mystore+lcdp9568+1176255826

[79] See http://www.ihe.net/

8 PRIVACY AND SECURITY

If patients believe their information is not private and secure, they may opt-out of health information exchange; ask a physician not to take notes; or withhold important information or choose not to seek health care at all.

8.1 Introduction

"Vermonters will be confident that their health care information is secure and private and accessed appropriately."

This first principle of the VHITP recognizes that maintaining the privacy and security of Vermonters' health information is critical to the success of health information exchange in Vermont. This section of the plan explains why privacy and security are critically important; summarizes applicable federal and state law; acknowledges the work on privacy and security at a national level; and proposes the creation of a comprehensive privacy and security framework that protects the privacy of Vermonters and earns their trust.

8.2 The Critical Importance of Privacy and Security

Privacy and security are critically important to the success of the VHITP because Vermonters will only support electronic health information (EHI) if they know their information is kept private and secure. Health care delivery is one of the most personal services in our society and privacy is a fundamental element of this service. The portable nature of electronic health information – that it can be transmitted, shared, and searched much more easily and widely than paper-based information – can improve patient care but also poses new and complex risks to patient privacy. If patients believe their information is not private and secure, they may opt-out of health information exchange; ask a physician not to take notes; or withhold important information or choose not to seek health care at all.

Vermonters expressed support for EHI initiatives during focus groups, consumer group meetings, and surveys. They also expressed concerns about privacy and security. Their concerns fall into three categories:

1. **Security:** Vermonters are concerned about the ability of consumer systems to protect their health information. They often learn from news reports about identity theft and security breaches in which thousands of Social Security numbers and credit card information have been disclosed from systems thought to be secure.

2. **Authorized access:** Vermonters are concerned that their information may be inappropriately accessed even if the computer systems are secure. They are concerned that an acquaintance, family member, prospective employer or insurance company may access information that they should not. They fear embarrassment if an acquaintance or family member accesses highly sensitive information about them and discrimination if an employer learns about a medical condition. They do not want to be the target of unwanted marketing from insurance companies.

3. **Control:** Vermonters are concerned that they will lose control of their health information in an electronic environment where physicians, specialists, and hospitals share their records. They worry that their ability to withhold sensitive information may be more limited.

If these concerns are not addressed, EHI initiatives in Vermont will have limited success. On the other hand, controls that overly restrict the dissemination of information could reduce the benefits of health information exchange that were sought in the first place. The challenge is to achieve a balance between the benefits and the concerns through strong legal protections and the appropriate application of policy and technology.

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8.3 Federal and State Laws that Protect Privacy and Security

Federal and state law recognizes the importance of maintaining the privacy and security of health information. Congress enacted the Health Information Portability and Accountability Act of 1996, commonly known as "HIPAA," which directed the secretary of the U.S. Department of Health and Human Services (DHHS) to develop the first broadly applicable federal privacy and security regulation related to health information. DHHS issued the HIPAA Privacy Rule in 2000, followed by a modification in 2002, and the HIPAA Security Rule in 2003.

The HIPAA Privacy Rule addresses how health care providers, health plans, and health care clearinghouses use and disclose health information, whether it is in written, spoken, or electronic form. The rule creates minimum nationwide standards for making sure an individual's health information is kept private:

- These standards require that health care providers and health plans adopt privacy practices and inform patients and beneficiaries of these practices.
- They require that health care providers and health plans limit their uses and disclosures of health information to only the minimum necessary for purposes of payment and health care operations.
- These standards also give rights to patients and beneficiaries including the right to access a copy of their medical records, to request to amend their records, and to request an accounting of when their health information has been disclosed in certain circumstances.
- They require that if a provider or health plan uses or discloses health information for purposes other than treatment, payment, or health care operations, that an individual's authorization is obtained in most cases.
- The standards also specify those situations in which providers and plans may disclose health information without an individual's authorization, such as public health matters (e.g., contagious diseases or gunshot wounds).

The HIPAA Security Rule specifically applies to health information in electronic form. The Security Rule addresses how providers, health plans and clearinghouses protect and control access to an individual's electronic health information. The rule requires a set of safeguards ranging from administrative (security policies and procedures, for example) to physical (limiting physical access to buildings or servers, for example) to technical (requiring encryption and passwords, for example).

The Vermont General Assembly has enacted several laws stricter than HIPAA that govern the use and disclosure of health information. The Vermont laws are not preempted by HIPAA as the federal law does not override state laws that provide greater protection to an individual's privacy. These Vermont laws include the patient privilege statute, the mental health statute, and the hospital and nursing home patient/resident bill of rights, which together generally require an individual's written consent for disclosure to third parties even if it is for the purpose of treatment. As a result, Vermont providers often seek the consent of patients to use and disclose information consistent with the HIPAA privacy regulations for the treatment of an individual, the payment for the individual's treatment, and for health care operations related to providing treatment.

8.4 Protecting Privacy and Security in the Information Age

Even without the complexities introduced by electronic health records or health information exchange, providers have for many years faced challenges in complying with health information privacy law. First, there is the challenge of understanding a patchwork of state laws and federal laws, including HIPAA, which were developed at different times and for different purposes, and are not necessarily compatible with each other. Second, there is the challenge of communicating compliance practices to patients. For example, developing privacy policy notifications in plain language, when the underlying law is complex and the preemption of one law over the other is unclear, is extremely difficult. Educating patients and managing patient expectations over complex issues such as data ownership and scope of disclosure for health care operations – even only for paper records – is burdensome to providers and can be frustrating for patients.

Developing privacy policy notifications in plain language, when the underlying law is complex and the preemption of one law over the other is unclear, is extremely difficult.

The prospect of the electronic sharing of information increases the number of challenges that providers face. Some of the new challenges include:

- How do providers know that other exchange providers are not accessing their patients' information in the health information exchange beyond what is necessary for treatment or is otherwise compliant with minimum necessary access restrictions?
- What level of patient consent or authorization should be obtained prior to releasing data to a health information exchange or to a particular provider in a health information exchange?
- How does a provider educate patients on privacy practices and patients' rights as it relates to their electronic record in a health information exchange?
- How does a provider satisfy patient requests to amend or correct health information in an electronic record consolidated through a health information exchange from multiple sources?
- How does a practice ensure that the appropriate security safeguards are in place to protect its patient data across a health information exchange?
- How does a provider share data with an out-of-state provider and stay in compliance with both states' privacy laws?

8.5 Privacy and Security Work at the National Level

The federal government and nearly all 50 states are working to develop laws, policies, and technologies to address these challenges. As part of its strategy for implementing a national health information network, the U.S. Department of Health and Human Services established an Office of the National Coordinator (ONC) which is seeking to identify and address privacy and security issues through a variety of initiatives.

In 2005 the ONC awarded multi-year contracts for demonstration projects that include the examination of privacy and security issues. In 2006, the National Committee on Vital and

Health Statistics set forth recommendations on protecting the privacy of patients' electronic health information. Also in 2006, the American Health Information Community formed a workgroup to focus on privacy and security issues.

The U.S. Government Accountability Office has also been monitoring national privacy and security issues and has issued two reports on the topic. National organizations such as the Markle Foundation and the Health Information Management and Systems Society have convened workgroups and published reports and toolkits for states to use in addressing privacy and security issues.[80]

In June 2006, the Agency for Healthcare Research and Quality, in conjunction with the National Governors Association, awarded contracts to 34 states to assess, through a collaborative process, interstate and intrastate privacy and security issues. Vermont's Health Information Security and Privacy Collaboration (HISPC) team was led by VITL and has conducted group discussions and one-on-one interviews with approximately 40 individuals to collect information about operational practices related to the current exchange of health information in paper or electronic form. VITL's HISPC team documented variations in business practices and barriers to privacy, security, and health information exchange. Based on these variations, the team identified a number of important topic areas relevant to the plan, and developed seven state-level goals and two national-level goals to help overcome the barriers. The goals are organized by topic area:

- Goal #1 – Education;
- Goal #2 – Infrastructure;
- Goal #3 – Evolving technology requirements;
- Goal #4 – Specific access control solutions;
- Goal #5 – Patient consent and control;
- Goal #6 – Emergency access to health information; and
- Goal #7 – Policymaking mechanisms for HIE.

As opposed to the seven state-level goals, the HISPC group looks to national efforts to lead the way in two additional topic areas:

- Goal #8 – Standards for patient identifiers; and
- Goal #9 – Standards for consent.

Together, these nine HISPC goals were designed to complement the plan in one or more of the following ways:

- To inform the plan on key security and privacy-related issues such as consent;
- To further develop a topic area in the plan, with a specific focus on privacy and security;
- To explore specific technical solutions in accordance with the plan; and
- To establish a framework to manage the evolving nature of standards set forth in the plan.

Vermont's Health Information Security and Privacy Collaboration (HISPC) team was led by VITL and has conducted group discussions and one-on-one interviews with approximately 40 individuals to collect information about operational practices related to the current exchange of health information in paper or electronic form.

Several significant initiatives have emerged from the HISPC and VITL collaboration. These include establishing a process for receiving input from consumers and health care practitioners, developing recommendations related to privacy and security, providing input on technical architecture, and working with various groups to find a balance between patient privacy and the appropriate level of physician access to records.

Moving forward, concurrent with the publication of the plan, AHRQ is expected to award Vermont and the other HISPC states a first round of contracts to conduct implementation activities towards the state-level goals. VITL intends to utilize the HISPC resources in the implementation of the plan, beginning with the education goal.

The HIEN is uniquely positioned among stakeholders to lead Vermont in the continued development of privacy and security protections for electronic health information and health information exchange.

8.6 Creating a Comprehensive Framework for Protecting Privacy and Security in Health Information Exchange

The HIEN is uniquely positioned among stakeholders to lead Vermont in the continued development of privacy and security protections for electronic health information and health information exchange. The VHITP workgroup recommends the creation of a privacy and security framework for the HIEN to utilize as it builds its infrastructure, connects health care providers, and educates patients.

The framework will be based upon a set of privacy and security principles already established by the VHITP workgroup:

1. **Security and confidentiality:** Data must be safe from harm and accessible only to those with a "need to know" as defined by rules delineating data access from every category of authorized user (patient, provider, payer, others).

2. **Patient Privacy:** Patient privacy shall be maintained through appropriate development and implementation of policies involving disclosure, consent, and sharing. The physical implementation of systems should allow for audit and reporting of data access and sharing.

3. **Consumer Privacy:** Consumer privacy, security, and confidentiality shall be considered paramount to the successful use and exchange of health information.

4. **Secure Identity and Access Rights:** User identities should be immune from repudiation,[81] and access rights should be traceable and verifiable.

5. **Data Stewardship:** Data stewards across all settings shall serve as custodians for data in their care, and should be responsible (along with all providers and users of data) for ensuring the proper documentation, collection, storage, and use of data within their purview.

6. **Ethical Use:** Data used in health information exchange must be used ethically according to usual and customary standards of practice in the medical community.

7. **Data Ownership:** Vermont law generally recognizes the creator of the data in a medical record as the owner of the data with responsibilities for managing and retaining it. Vermont and federal law have established access rights for the patient, who is the subject of that data. The HIEN provides a secure conduit for appropriate access by patients, providers, and public agencies consistent with state and federal law.

In addition to the VHITP workgroup principles, the framework will utilize the Markle Foundation's nine core principles for ensuring privacy in a networked health information environment.[82] Each principle is listed below, followed by a brief explanation of the way that the principle will apply to the privacy and security framework in Vermont:

1. **Openness and Transparency.** Policies and procedures related to the exchange of health information should be developed through transparent processes, and the importance of communicating to stakeholders cannot be overemphasized.

2. **Purpose Specification and Minimization.** Health information exchange initiatives should strive to be specific in their purpose so that individuals can best understand how their health information is being used.

3. **Collection Limitation.** Health information collection should be lawful, fair and done so with the knowledge and consent (also known as "authorization") of patients.

4. **Use Limitation.** Using health information for a purpose that is beyond what was originally intended and communicated, also known as "secondary use of health information," should be avoided whenever possible and exceptions should follow the principle of openness and transparency.

5. **Individual Participation and Control.** Although the degree and type of participation and control may vary, HIE initiatives and the privacy protections that apply to them should strive to address these principles.

6. **Data Integrity and Quality.** HIE initiatives must ensure valid, consistent, understandable, and secure data while presenting minimal obstacles to smooth and efficient use.

7. **Security Safeguards and Controls.** Security safeguards are critical to ensuring the privacy of patient data and should be implemented in a consistent and disciplined manner across all stakeholder organizations.

8. **Accountability and Oversight.** HIE stakeholders must be accountable for their actions that affect the privacy of health information. The organization of HIE should be structured in a way that assigns oversight responsibility within and across organizations.

9. **Remedies.** Patients and consumers should be confident that organizations and individuals who violate policies and laws regarding security and privacy will be sanctioned.

The framework will have several components: (1) the HIEN will adopt policies and procedures consistent with the requirements of the HIPAA Privacy and Security Rules; (2) the HIEN will actively seek to be a leader in the state and amongst its various member organizations in tackling the large, inter-organizational and cross-state privacy and security challenges that are constantly evolving both at the national and local level; (3) the HIEN will create a strategy to help providers meet their legal obligations, especially in those cases where the obligations are complicated by cross-provider, cross-state, or health information exchange boundaries; and (4) the HIEN will implement consumer education initiatives on privacy and security issues.

Using health information for a purpose that is beyond what was originally intended and communicated, also known as "secondary use of health information," should be avoided whenever possible and exceptions should follow the principle of openness and transparency.

(1) Policies and Procedures

The HIEN should adopt policies and procedures that are consistent with the requirements of the HIPAA Privacy and Security Rules. These policies and procedures address the administrative processes, organizational structure, security safeguards, and compliance mechanism of the HIEN, including:[83]

a. Administrative processes

- Adopt written privacy and security practices, including auditing and incident procedures, risk management and security management policies
- Train staff and users
- Develop processes to investigate and respond to complaints
- Establish an incident response program to respond to privacy and security incidents in a planned and coordinated fashion
- Ensure that patients, either through their providers or directly through the HIEN, can request amendments or corrections to their records that are stored in or accessible to the HIEN
- Ensure that patients, either through their providers or directly through the HIEN, can receive an accounting of disclosures of data via the HIEN

b. Organizational structure:

- Establish written agreements with data sharing partners
- Identify specific privacy personnel

c. Security safeguards:

- Establish administrative safeguards related to security responsibility and incident planning as described previously in "Administrative processes"
- Establish physical safeguards including access controls to facilities and workstations
- Establish technical safeguards including authentication, authorization, accounting and encryption

d. Compliance mechanism:

- Address violations of the privacy practices in a consistent, timely manner
- Perform regular monitoring and assessment of privacy policy compliance
- Maintain written records of privacy-related activities

The HIEN should also be a leader in the state and amongst its member organizations in tackling the large, inter-organizational and cross-state privacy and security challenges.

(2) Leader in Addressing National and State Privacy and Security Issues

The HIEN should also be a leader in the state and amongst its member organizations in tackling the large, inter-organizational and cross-state privacy and security challenges that are constantly evolving both at the national and local level. The HIEN should:

- Develop technologies to improve security
- Educate patients on privacy issues
- Establish policies on "break the glass" emergency exemptions, cross-state information exchange, and secondary use of health care data

For example, in the technology area, improvements in authentication, role-based access, and accounting technology are needed to help build secure solutions that are scalable across a growing number of stakeholder organizations:

Authentication
Authentication is the process of verifying that the person accessing health information is in fact the person that he or she claims to be.

Role-based access
Authorization is the process of verifying that the person accessing health information is permitted to access the information based on policies and procedures.

Accounting
Accounting is the process of recording that information was accessed: what information, by whom, from where, and when it was accessed.

Although there are a variety of national efforts, Vermont is positioned to be a leader in deploying technologies to solve security challenges in these areas. The HIEN should seek to develop specific policies and initiatives, including:

- Authentication requirements
- Architectural support for cross-domain authorization
- A commitment to move beyond passwords to "strong" authentication
- Accounting standards

(3) Creation of strategy to help providers meet their legal obligations

As discussed in section 8.4, the challenges that providers face in complying with privacy and security requirements and addressing patients' privacy and security concerns are significantly greater in an environment of health information exchange than in a paper environment. The HIEN should strive to help providers comply with the law, adopt security and privacy principles, and utilize the infrastructure of the HIEN to provide patients with the benefits of HIE while protecting the privacy of their information.

(4) Education of consumers about privacy and security issues

As discussed in Section 9, education is critical to the success of the VHITP. Because security and privacy issues are complex, addressing potential concerns first and foremost involves an understanding of the risks, the steps that stakeholders have taken to address them, and the benefits of electronic health information. One of the most important responsibilities of the HIEN is to educate both patients and providers on security and privacy issues.

VITL also has a responsibility to ensure that consumers feel their rights would be protected, and that there is a mechanism for consumers to express concerns or doubts about these protections. VITL expects to add a formal, independent avenue to resolve disputes or complaints raised by citizens or other stakeholders with respect to the HIE. Several branches of state government, including BISHCA and the Department of Disabilities, Aging & Independent Living have ombudsmen who provide this independent function. VITL should benefit from an advisory committee comprised of citizens and advocates to assist in the proper handling of these concerns. The VITL board of directors is trusted to act according to the organization's mission without a conflict of interest, but would benefit from input from a different point-of-view when dealing with these situations. While VITL cannot police the activities of provider sites directly, it can address issues related to the data exchange itself. The exact policies and procedures have yet to be developed, but once finalized they will be clearly communicated to all stakeholders through VITL's outreach and education activities.

Patients entering the Emergency Department at Northeastern Vermont Regional Hospital in St. Johnsbury are now offered the option of participating in VITL's medication history service. If they consent during the registration process, a list of the medications the patient has been on during the last year prints out for use in the medication reconciliation process.

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[80] See Markle Foundation. "The Connecting for Health Common Framework: Resources for Implementing Private and Secure Health Information Exchange." 2006. Also See Healthcare Information and Management Systems Society. "Privacy and Security Toolkit." 2007.

[81] To be immune from repudiation means that an authorized user cannot deny activities performed under his or her identity, such as access to electronic health information.

[82] Markle Foundation. "The Connecting for Health Common Framework: Resources for Implementing Private and Secure Health Information Exchange." 2006.

[83] For a fuller treatment of this topic, see Centers for Medicare and Medicaid Services, Regulation and Guidance HIPAA Educational Materials. <http://www.cms.hhs.gov/EducationMaterials/02_HIPAAMaterials.asp>

9 EDUCATION

9.1 Introduction

The concepts introduced in the VHITP are new to many stakeholders – not only the general public, but also health care professionals. An understanding of the potential of technology to improve health care delivery, as well as an understanding of its risks and tradeoffs, is critical to successful adoption. Therefore, a comprehensive effort to educate patients, practitioners, and other groups is a central part of the plan.

9.2 Themes

Based on the plan's overarching principles, the educational effort has three major themes:

Security and privacy:	Communicate complex issues in a clear, consistent manner with the goal of enhancing Vermonters' confidence in the security and privacy of their electronic health data (Principle I);
Benefits to patients/ practitioners:	Educate on the potential of health information technology (II) and, specifically, health information exchange (III) to improve patient care, with the goal of increasing patient and practitioner interest and desire to participate in the health information exchange;
Good governance:	Demonstrate that health information exchange in Vermont will be conducted in a responsible, open manner (IV); and involve stakeholders, including patients, in the decision making process as new technologies, systems, policies, and procedures are adopted (V).

9.3 Messages

For each of the two major audiences of an educational campaign (health care professionals and consumers), there are separate sets of messages that should be communicated.

For practitioners, the messages should include:

- Options are available so you can choose the technology that fits best with your practice;
- VITL has the expertise to help you implement HIT/HIE;
- This is going to benefit your practice, lower costs and reduce work in the long run; and
- Available systems are interoperable: they are ready and they work.

For consumers, the messages should include:

- In Vermont, we're holding ourselves to higher privacy and security standards than the federal government;
- There are many benefits to participating in the health information exchange, such as improved care, more patient safety, availability of health data in an emergency, greater

convenience, saved time;

- You don't have to type or use a computer to participate and get the benefits;
- Patients have protections, such as audit trails, the right to opt-in/out, and a complaint resolution process.

9.4 Specific Campaign Proposals/Timeline

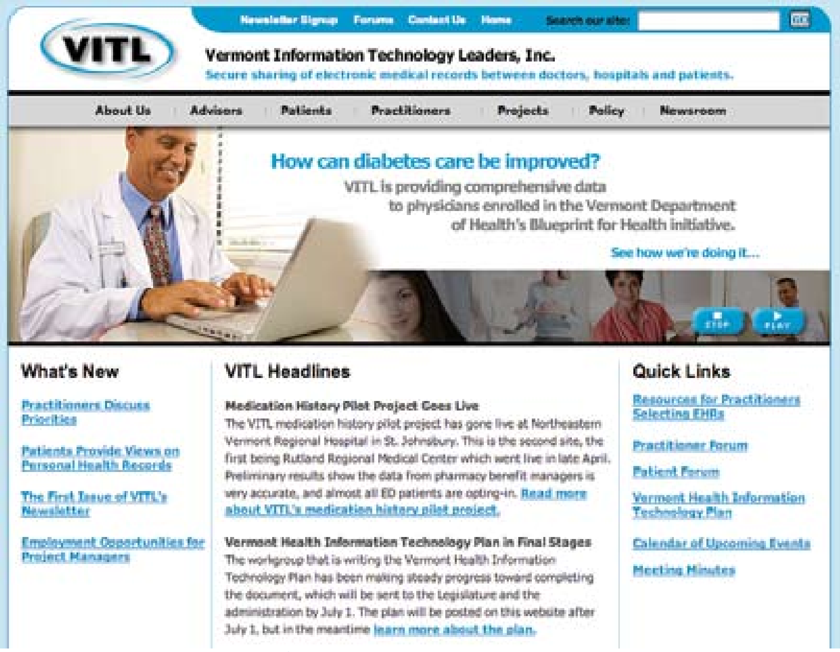
The educational campaign should be conducted in three phases:

Phase I: Basic outreach and education
Phase II: Local campaigns to achieve optimal opt-in levels
Phase III: Follow-up opt-in drive

VITL's website will be an importrant tool for educating professionals and consumers.

Phase I: Basic outreach and education

Initially, VITL should undertake a basic campaign to educate health care practitioners and consumers about the benefits of HIT/HIE, explain some of the security safeguards and privacy protections that already exist (such as virtual private networks and audit trails), and explain the recommendations made in this plan. The purpose of this phase is to elevate the basic level of understanding among Vermonters of HIT/HIE, in preparation for a larger future campaign. More focused education may have to be undertaken during this phase, such as communicating to practitioners and vendors how the Interim Health Information Technology Fund works.



Vermont Information Technology Leaders, Inc.
Secure sharing of electronic medical records between doctors, hospitals and patients.

How can diabetes care be improved?
VITL is providing comprehensive data to physicians enrolled in the Vermont Department of Health's Blueprint for Health initiative.
See how we're doing it...

What's New
Practitioners Discuss Priorities
Patients Provide Views on Personal Health Records
The First Issue of VITL's Newsletter
Employment Opportunities for Project Managers

VITL Headlines

Medication History Pilot Project Goes Live
The VITL medication history pilot project has gone live at Northeastern Vermont Regional Hospital in St. Johnsbury. This is the second site, the first being Rutland Regional Medical Center which went live in late April. Preliminary results show the data from pharmacy benefit managers is very accurate, and almost all ED patients are opting-in. Read more about VITL's medication history pilot project.

Vermont Health Information Technology Plan in Final Stages
The workgroup that is writing the Vermont Health Information Technology Plan has been making steady progress toward completing the document, which will be sent to the Legislature and the administration by July 1. The plan will be posted on this website after July 1, but in the meantime learn more about the plan.

Quick Links
Resources for Practitioners Selecting EHRs
Practitioner Forum
Patient Forum
Vermont Health Information Technology Plan
Calendar of Upcoming Events
Meeting Minutes

Health care practitioners represent a key constituency to educate in this phase. A national survey by the eHealth Initiative Foundation found that 67% of the public trusts their doctors the most to deliver to them information about the security of health information exchange. Yet the same study found that practitioners present the strongest resistance to health information exchange, with worries about security, liability, and cost. If practitioners can be educated about the value and benefits of HIT/HIE, they will be in the best position to influence other Vermonters.

Methods to accomplish the goals of this phase may include:

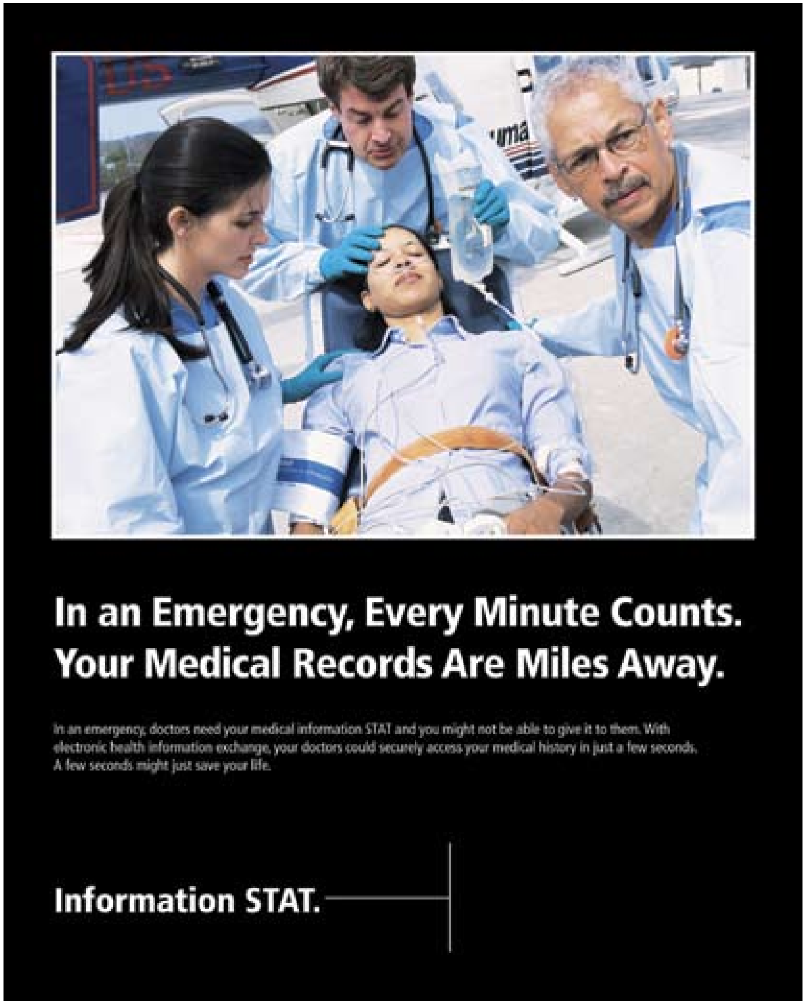
- Distribute summaries of the VHITP written specifically for practitioners and consumers.
- Distribute the VITL newsletter to physicians, physician assistants, nurses, practice managers, and interested consumers.
- Compile and distribute to practitioners a set of peer-reviewed journal articles on how HIE has been able to improve care in other locations.
- Prepare brochures written specifically for practitioners and consumers on VITL and Vermont's HIE.
- Exhibit at professional conferences, such as those held by the Vermont Area Health Education Centers and the Vermont Department of Health. Also exhibit at events frequented by consumers, such as health fairs.

- Hold educational events for practitioners and consumers, or participate in events being held by organizations such as the Area Health Education Centers.
- Speak at meetings of health care professionals, such as hospital medical staff meetings. Arrange for VITL to speak at consumer-oriented meetings, such as service club luncheons.
- Place articles in communications that practitioners read, such as the Vermont Medical Society's *Green Mountain Physician* and AHEC's *Primarily Vermont* newsletters. Profile early adopters of HIT and the benefits they've received.
- Produce short videos on HIT/HIE, VITL's pilot projects, and Vermont EHR early adopters that can be streamed from VITL's website.
- Identify physician champions who can speak at staff meetings and public events.
- Conduct an earned (non-paid) media campaign, including op-ed pieces (see sample below), meetings with newspaper editorial boards, and news stories to increase public awareness of HIT/HIE. News coverage of VITL's pilot projects (medication history and Blueprint CCIS data services) can help increase public awareness of the benefits of HIT/HIE.

Phase II: Local campaigns to achieve optimal opt-in levels

Because patients trust their doctors the most for information about HIE, it would be ideal that communications asking patients to consent to having their data on the HIE come from an individual's physician. Physicians could participate in this phase on a voluntary basis. A letter signed by a physician (produced and paid for by VITL) would outline the benefits expected from HIE, as well as the patient's rights, privileges and protections.

A sample paid newspaper advertisement from the eHealth Initiative



In an emergency, doctors need your medical information STAT and you might not be able to give it to them. With electronic health information exchange, your doctors could securely access your medical history in just a few seconds. A few seconds might just save your life.

People are more receptive to local campaigns involving local physicians and their community hospital. To create a local campaign, implementation of HIE should be coordinated so that as many physicians as possible in a community/hospital service area are brought online at the same time. A local campaign will generate earned media (news stories, editorials, opinion pieces, letters to the editor) and create critical word-of-mouth. This can be reinforced with articles in hospital newsletters, as well as paid advertising in local newspapers and on local radio stations. Local media, both news stories and paid advertising, should precede direct mailings, so that patients will have a greater understanding of what they are being asked to do when they receive the mailing and are more likely to act.

To reach patients in a community who do not have a primary care physician, communications can be distributed through emergency departments and other local health care and social services agencies. The opt-in level in a community can be monitored during the campaign and additional communications used if necessary.

Methods to accomplish the goals of this phase may include those in Phase I, plus:

- Direct mailings of physician-signed letters and brochures to patients, with instructions on how to participate in the HIE (i.e., using an online "consent wizard" or filling out a form and returning it).
- Placement of collateral materials (brochures, exam room posters, displays) at physician offices, hospitals, other health care-related sites. Patients can be handed materials at check-in or check-out.
- Paid advertising in printed newspapers, on newspaper Internet sites, and radio stations.
- Creation of a demo web site with sample data so consumers can "test drive" a personal health record and see how they can benefit.

Phase III: Follow-up opt-in drive

After the initial opt-in drive is completed, VITL should plan on conducting an ongoing follow-up campaign to reach people who have recently moved to Vermont, parents of newborns, and people who have previously not opted in.

Phase I

Plan summaries	$7,000
Distribute newsletter	$9,000
Peer review articles	$4,000
Brochures	$3,000
Exhibit	$6,000
Hold Events	$10,000
Speaking	$2,000
Videos	$11,000
Earned media	$8,000
Total Phase I	***$60,000***

Phase II

Direct mailings	$500,000
Collateral materials	$50,000
Newspaper	$150,000
Radio	$240,000
Demo site	$20,000
Total Phase II	***$960,000***

Phase III

Mailings	$75,000
Newspaper	$52,000
Radio	$84,000
Total Phase III	***$211,000***

There should be a mechanism so that when a new patient arrives at a physician practice or a hospital, if he or she is not in the HIE, the patient (or the patient's guardian/parent) is provided with communications materials explaining the HIE and asked for consent.

If a high level of consent is not achieved statewide, there will need to be a follow-up media campaign to reach people who have previously not opted in and convince them to do so. Methods for this phase are the same as in Phase II, except mailings would be targeted to consumers who have not already opted in by comparing mailing lists to the list of consumers who have opted in (with data obtained from the VITL master patient index) and eliminating the duplicates.

Radio advertisements
(from the eHealth Initiative InformationSTAT public education and communications toolkit)

- http://toolkit.ehealthinitiative.org/assets/Documents/EmergencyPublicRadioAnnouncement.mp3
- http://toolkit.ehealth initiative.org/assets/Documents/HurricanePublicRadioAnnouncement.mp3

9.5 Education Campaign Budget

Phase I can be conducted by VITL's in-house communications staff working with vendors. VITL should develop an RFP for advertising agencies to bid on Phase II and Phase III of the education plan. Proposals should include pricing for the specified components of the educational campaign. Above are some rough estimates of the costs. It is suggested that a pilot local opt-in campaign be run to determine what works best and the amount of effort needed, before developing the budget necessary to achieve sufficient statewide opt-in.

9.6 Sample Communications

Earned media – opinion/editorial piece

Electronic Health Records Increase Efficiency and Improve Care

By Greg Farnum

For a small and rural state, Vermont is very fortunate to have an excellent health care system. Our hospitals are equipped with cutting-edge diagnostic imaging and surgical technology. We receive care from physicians, nurses, and other health care workers who have a high level of training and expertise. Agencies are delivering a wide variety of services in our communities.

But there is one area of Vermont's health care system that can be improved. Many health care providers are still using paper medical records. The paper process has changed remarkably little in the last few decades: A physician dictates his or her findings, that dictation is transcribed, and more pages are added to your chart. When a physician or a nurse needs to review your medical history, he or she has to flip through a stack of poorly organized information.

Electronic health records make the process of storing and retrieving your medical information much more efficient. Data is arranged on the computer screen so that the physician or nurse finds everything easily, and sees trends that are almost impossible to pick up on with paper records. For example, the results of your last five cholesterol tests can be displayed side-by-side in a chart, so both you and your doctor can quickly see how well you are doing.

In an emergency, health care workers can use electronic health records to immediately access a list of your prescription drugs, allergies, and current medical problems. Having this information available in the emergency department, or even in the ambulance on the way to the hospital, means that you'll have better care and there will be less chance of an error because critical information about you wasn't available.

There are several other benefits that electronic health records provide. Patients don't keep answering the same questions over and over, each time they visit a new location. There is less need for duplicate tests, as physicians' offices and hospitals have access to results of previous tests done elsewhere.

Some people are concerned about the privacy and security of electronic health records. Great care has been taken to protect the privacy of patients and make these systems extremely secure. Electronic health records are designed so that health care workers can only access the data that they need to do their jobs. When information is sent from one health care facility to another, it is encrypted and travels over a secure private network.

Electronic health records keep a detailed audit trail, which records who looked at what pieces of information. This log can be reviewed by patients at any time using a secure Internet site. That's a protection paper records just can't provide.

Vermont Information Technology Leaders, Inc., the public-private partnership that will operate Vermont's health information exchange, is complying with both national standards and Vermont's patient privacy law, which sets a stricter standard than federal law. VITL does not sell any data.

With support from Gov. Jim Douglas and the Vermont Legislature, VITL is helping Vermont health care providers implement electronic health records. It's a big job that will take several years to accomplish. But a state-of-the-art electronic records system will make our health care system even better.

Greg Farnum is the president of Vermont Information Technology Leaders, Inc., in Montpelier.

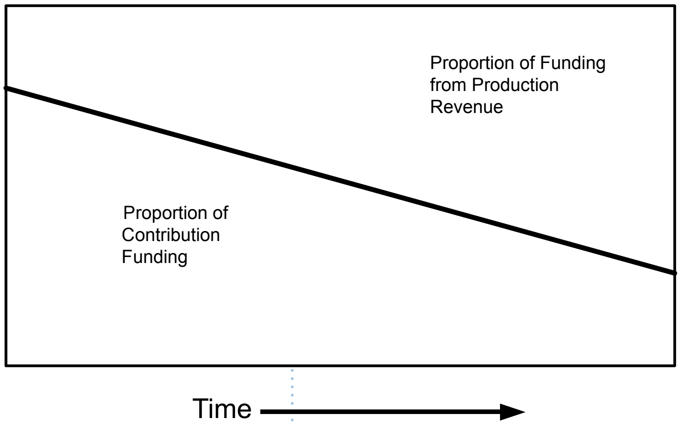
10 FUNDING AND FINANCING

10.1 Introduction

One of the most challenging aspects of HIT – and health information exchanges in particular – is the development of a model to fund and financially support desired initiatives both in their pilot stages and ongoing operation. In Act. 191 of the 2006 session of the Vermont General Assembly, lawmakers said financing of the health care system overall should be "sufficient, equitable, fair, and sustainable." Those same principles should be applied to financing HIT and HIE. Funding should also be broad-based.

This plan identifies a number of important initiatives and activities that are required to fulfill the vision of HIT for a healthier Vermont. RHIOs have struggled with issues of financial sustainability since their inception: there are no magic bullets or easy answers to achieving a fully self-sustaining operation. Typically, there are two types of revenue: contributions from sources such as government appropriations and grants, and production funding from HIE operations. As the HIE matures over time, the proportion of contribution funding usually declines, while the proportion of funding from business operations, such as subscription fees and transaction charges, increases as the RHIO adds services and gains customers (see Fig. 12). But contribution revenue remains an important source of funding. According to a survey of RHIOs conducted in 2006, "… RHIO leaders continue to perceive a need for grants and other forms of contributed income throughout the life of an organization, and that this perception is borne out in fact, as, on average, 50% of income remains contribution income in the production period."[84]

Figure 12
Mix of Funding for HIEN



As a Vermont non-profit corporation,[85] VITL understands its primary mission as serving the public good rather than being driven to create a profit or even maximize its revenue. In this respect, VITL's operational model must be *sustainable* in the long run, but not necessarily *commercially viable* in the traditional sense of a for-profit corporation. To maintain its status as a charitable organization, VITL must consider a wide range of revenue sources and models (see sidebar) that best serve its principal beneficiaries – the citizens of the state of Vermont.[86] HIT, and HIE in particular, are necessary elements of our health care system and will over time become universal fixtures in that landscape. Just as we have relied on public utilities to develop other forms of basic infrastructure (electric power, telecommunications), so, too, does Vermont need VITL to lead the way in promoting and developing HIT and HIE for the public's well being.

10.2 Sources of Funding

Funding for HIEs and RHIOs can come from a number of sources, including:

- **Federal Government:** The federal government has been a disproportionately large provider of funds for HIE activities, primarily through a set of grants and contracts aimed at testing and promoting new techniques and concepts, as well as categorical funding from the Centers for Disease Control and the Centers for Medicare and Medicaid Services focused on improving the health of particular segments of the population based on socio-

Examples of Revenue Models

There are a number of possible models for organizing funding from available sources. Combination or hybrid models are also possible:[104]

Model	Key Features
Public Funding Model **Current Use:** **VDH Blueprint CCIS**	HIE is considered a "public good" and funded with public funds to accomplish a specified mission. Eligible organizations, individuals and entities may participate in its activities. One or more stakeholders may be "taxed" to support the funding required to provide services under this model. Funding may also ultimately come in part from federal or foundation grants and contracts.
Organizational Membership Model	Member organizations pay a one-time or recurring fee to participate in the HIE, and receive specific benefits from their membership. One of the advantages is a more predictable cost for the member organization, and a more predictable revenue stream for the HIE.
Personal Membership Model	For HIEs that cater primarily to personal health records, individuals pay a one-time or recurring fee to receive specific services from the HIE. Keeping this fee low encourages participation, thereby raising the overall revenue level for the HIE potentially to the point of sustainability.
Transaction Fee Model **Current Use:** **VITL Medication Pilot**	Organizations, individuals, or entities that use HIE services pay a pre-negotiated fee per transaction. A variation of this model supports a tiered fee based on size of the organization and/or the volume of transactions; usually large payers subsidize small providers (as in Massachusetts). Totally self-sustaining models using this approach include Maine Healthinfornet and North Carolina's NCHICA. Massachusetts promoted a model in which the HIE functions as a utility and is regulated as a utility. Physicians may be more interested in the business services such as electronic lab results than in the database, and this is the approach of Massachusetts.[105] Model may require minimum guaranteed transaction level for participating entities. Transactions could be represented by specific records retrieved or on a per-patient basis. Examples of this model include UHIN in Utah and NEHEN in New England which is being used in Massachusetts. If excess fees are collected, HIE is likely expected to offer rebates to participants or lower the following year's fees appropriately. Advantage is a lower up-front cost for participating organizations, though total cost (and revenue) may be harder to predict than other models. One hybrid alternative is to have a relatively modest membership fee along with a transaction fee to recognize that different organizations (even of the same type or size) may begin using the HIEN at different times and at different rates. It is possible that a transaction fee produces a disincentive for participants to use the HIE. HIENs should justify their transaction fees in an open and transparent manner, and, if they are operating as public or quasi-public utilities have an obligation to do so.
Data as Currency (Banking) Model	Stakeholders are both suppliers and consumers of data. To the degree that they supply data to the HIEN they receive "credits" which can be used to "retrieve" data that they need. If, in a given period, they retrieve a greater value than they supply they owe a participation fee to the HIEN; if they supply more data than they receive they receive a credit that can be used in a later period to retrieve data.

economic, racial/ethnic, or health/disease status.[87] Federal appropriations, however, can be unreliable and are rarely guaranteed year-to-year.

- **State and Local Government, including Public Health**: Increasingly, state appropriations are being set aside to fund HIE activities. Funding may be provided directly to a named RHIO (or RHIOs), or offered competitively to projects. New York's HEAL grants are a good example of this: They strive for geographical representation and give preference to projects that include safety net providers. A similar fund, created by pending legislation in Minnesota (MN H 842 and S888), gives preference to providers located in rural and underserved areas. State funding is also embedded in public health programs and activities. In North Dakota, for instance, the state funding was to the Information Technology Department. Some states are updating their Medicaid HIT systems so as to integrate financial and program management with patient care (e.g., Ohio). Some states are leveraging state purchasing (e.g., Tennessee, Virginia, Washington, and Michigan) and some are considering tax credits (e.g., Georgia, West Virginia, and Wisconsin).[88] The state of Vermont has made a substantial contribution to VITL through its appropriations in Fiscal Years 2006, 2007, and 2008 (a total of $2.1 million). In addition, various state agencies and home health agencies have made investments in HIT.

  Public health also can be a source of revenue for RHIOs, typically through categorical funding to achieve specific program objectives. In Vermont, state funding of the Chronic Care Information System as part of the Blueprint for Health is an example of just such an initiative. Increasingly, federal funding sources upon which state and local governments rely for much of their program funding recognizes the value of shared information technology infrastructure and permits spending on these kinds of statewide initiatives.

- **Hospitals:** HIE often begins with larger, more established institutions which provide a critical mass of data necessary for start-up and which are more capable of implementing technologies at the core of HIE functionality. Vermont's hospitals are already making investments in upgrading their HIT and clinical applications. They are also investing in HIT for physician practices that they own and operate. Under Stark safe harbor rules, hospitals are allowed to donate to physicians hardware, software and training for e-prescribing. They can also provide software, information technology, and training services for EHR systems under certain conditions.[89] Vermont's hospitals have already made a substantial contribution to VITL. As HIT projects are added, hospitals will continue to be important partners.

- **Payers, public and private:** Health plans and other payers are a potential source of funding, both through their operational entities as well as the not-for-profit foundations that many of them support. In some states, health plan contributions are voluntary. Elsewhere they are a mandatory assessment to ensure a steady, more predictable source of funds for HIE activities. While Health and Human Services Secretary Leavitt's initiative on value-driven health care is not funded, it is directed to government and private purchasers of health insurance and includes the use of HIT in its four cornerstones of health IT standards, quality standards, price standards, and incentives to provide consumers with access to a full range of information about the quality and cost of their health care options.[90] In Vermont, payers are contributing to VITL by providing access to claims data for the medication history service and other projects. Vermont's governor and a number of Vermont-based employers have endorsed principles which can be a driver for using HIT to reduce costs and improve

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quality of health care. A recent study indicates that only 11% of the savings from EHR system deployment accrue to the provider – the remainder goes to the payers through a reduction in unnecessary tests and more automated record handling.[91] This savings may serve as a foundation for more active participation by payers in HIEN funding.

- **Provider Practices:** About 30% of Vermont physician practices have made some investments in EHRs.[92] However, most provider practices rarely have the capability to provide more than the most basic infrastructure and staff attention to participate in HIE activities. More often than not, funding needs to flow to provider practices – especially smaller ones – to enable them to participate at all. Under federal rules, hospitals can provide HIT to physician practices, but physicians must contribute 15% of the cost.

- **Foundations and other philanthropies:** A number of private foundations and philanthropies have offered grant programs to promote HIE and HIT adoption. The Robert Wood Johnson Foundation has been notable for its national programs (including InformationLinks[93]), though many state and local programs exist as well. In addition, as 501(c)(3) corporations, most RHIOs can legitimately perform traditional fundraising activities in their communities by stressing the public good that they provide.

- **Ancillary Services Providers and Manufacturers, including pharmaceuticals:** Ancillary health care service providers, like laboratories and pharmacies, may also be a source of HIT/HIE funding. Health care product manufacturers, including pharmaceutical companies and their not-for-profit foundations, can likewise be asked to contribute funds for HIE activities. Their contributions may be voluntary or legislated. Consistent with VITL's primary mission of serving the public good, HIEN data would never be sold or provided for inappropriate commercial purposes.

- **Employers:** A number of large, national employers – often self-insured – have initiated HIEs or employee portals of their own to provide access to health care data available through their network of participating physicians or from claims processing. To enhance the quality and quantity of data available to their employees, these large employers may be called upon to contribute funds to support community-wide HIE infrastructure from which they and their employees will benefit.

- **Patients and private citizens:** Some HIEs appeal more directly to patients and provide products and services to meet their needs. If patients and private citizens perceive value in these services they may be willing to provide payments for what they receive. When spread over a large number of individuals in a state or region, the per-person charge can become quite modest. Ongoing patient education is key to establishing and maintaining this perceived value in patients' minds.

While the connection between HIT, cost reduction, and quality improvement is still being assessed nationally, early evidence suggests that practices large and small can achieve positive financial and quality benefits from HIT investment.[94] A more systematic approach toward deployment of HIT in a community should reap more benefits than a haphazard "every organization for itself" approach. Large-scale HIT projects underway in Great Britain, Canada, Australia, and New Zealand, as well as continuing investments by the Veterans Administration and Department of Defense in health care services, should provide additional evidence as those implementations mature.[95]

About 30% of Vermont physician practices have made some investments in EHRs. However, most provider practices rarely have the capability to provide more than the most basic infrastructure and staff attention to participate in HIE activities.

10.3 Funding Needs

Vermont has two primary needs for HIT funding under this plan:

1. **Funding for core HIE infrastructure, services, and education:** Vermont must develop a strategy to fund the start-up as well as ongoing operations and continuing development of HIE infrastructure and other required HIT components into the foreseeable future.

2. **Funding for physician EHR system deployment:** Vermont chooses to do more than just encourage EHR-S deployment, it wants to facilitate and enable that deployment especially for medical practitioners and physician practices serving low- and moderate-income patients in the state. The following section describes funding strategies for both a pilot program as well as an ongoing program.

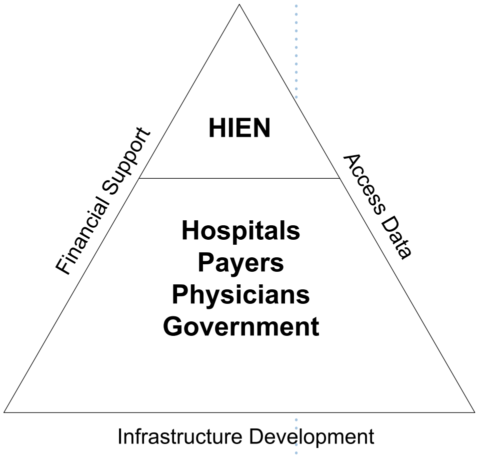
10.3.1 Support for VITL Core HIE Infrastructure, Services and Education

Core infrastructure funding will consist of a mixture of one-time capital investments as well as ongoing operational costs. To date, VITL has chosen to contract for much of its basic infrastructure and pay for these services (server provision and operations) monthly from operating funds. Based on VITL's current business plan, and projects that have been initiated to date, the basic annual cost of operating the HIE is approximately $2.5 million. This includes the current cost of VITL staff and consultants, as well as operations cost to a primary vendor for technical operations. As more projects are added, one could expect an incremental $250,000 per year in additional staff and core expenses for the next several years (so the second year it would be $500,000 additional, etc.), as well as additional operations and system development/deployment costs depending on the project selected.

It is expected that VITL will use a mix of funding sources and a mix of strategies during its lifetime, and that these sources and strategies will change over time as VITL moves through different phases, from start-up (creation), to transition (initial projects), to production (sustained operations).[96] In addition, changes in the health care system are necessary over time to more equitably match benefits received from HIEN data and the reimbursement incentives for health care providers. While VITL cannot alone change this reimbursement system, it can continue to advocate for such change and be ready to adjust its activities accordingly.

As an organization serving the public good, VITL understands that a substantial part of its revenue does and will continue to come from public funds. This is important not only during the current capacity-building phase but also ongoing for the foreseeable future. Significant funding, however, will also need to come from organizational membership as well as transactional fees for services. Funding should be equitably and fairly obtained from all the sources. Fig. 13 illustrates that the HIEN will be built on a foundation of investments from various stakeholders.

Figure 13
HIEN Built On Investments By Stakeholders



There is a danger that VITL will make decisions about projects to undertake based first and foremost on financial considerations and less on its strategy as a public utility. Likewise, revenue generated from one activity may subsidize the activities of another. It is important that VITL minimize *unintended* cross subsidies – the potential in complex projects for areas that generate excess revenue to pay for excesses in areas that operate over their budgets. As a public utility, VITL's goal is to enable *all* appropriate stakeholders to participate in HIE regardless of their ability to pay, much as government provides public roadways funded by direct (e.g., tolls) and indirect (e.g., general taxes) sources. Some participants may be required to help fund HIE activities even if they do not perceive that they themselves are ready to take advantage of this new technology. The *potential* to access health data is as real a service as the actual access itself (e.g., we all willingly pay for fire stations in our neighborhoods so that they are there when we need them).

To ensure a proper balance with respect to this issue, the following strategy for revenue generation is recommended:

- A core amount of the operating budget for VITL should continue to come from a mixture of legislative appropriation and federal contribution funds, as they become available [public funding model]. As part of this, the Vermont General Assembly should take appropriate steps to limit VITL's liability with respect to the services it provides. This core funding needs to total at least $1 million per year for the next two to four years. Other sources of revenue should replace a portion of these funds over time.

- Additional production funding from the Department of Health and other state agencies should be provided to support publicly-financed health projects that leverage the HIE infrastructure. The Blueprint for Health Chronic Care Information System and the Vermont Immunization Registry are good examples of such projects.

- Participating stakeholders – the suppliers and users of data – should pay to participate in the Vermont HIEN. This may be an annual membership fee [organizational membership model] or transaction fees tied to data access [transaction fee model] or some combination of the two. The VITL Medication History Pilot Project is already piloting a transaction fee approach and will provide valuable experience about how this concept can be operationalized on a larger scale.

- Traditional fundraising should be explored as a potential source of revenue for VITL. By providing a public good, VITL can appeal to any number of stakeholders who may value what is being provided. VITL may need to increase its staff to provide professional fundraisers to this effort, which is common for not-for-profit organizations.

A core amount of the operating budget for VITL should continue to come from a mixture of legislative appropriation and federal contribution funds.

The HIE will have to prove its value to its participants. This incremental approach to funding – and scaling it to the HIE's activities – ensures that the HIE structure and function can respond nimbly both to the needs of its stakeholders as well as the changing landscape of local, regional, and national events.

The HIE will only succeed with the participation of its stakeholders – those entities that supply data as well as those entities that use data. It is important that VITL find a way to offset some of the cost of interoperability that is borne by participating organizations, large or small, as a way to remove a significant barrier to their participation. Funding in this domain is required primarily for the development of software interfaces between vendor or custom products deployed at participant sites and the central HIE infrastructure. Both the VITL side and the stakeholder side of a data sharing transaction require an interface. These interfaces will be governed by specific project needs, and will follow the standards defined in the Section 6.

Wherever possible, the state will try to leverage products deployed more widely at sites by developing an interface *once* and then encouraging its replication at all applicable sites. These interfaces can cost anywhere from $5,000 to $150,000 a piece depending on the systems involved and the transactions to be supported. A fund should be designated, either earmarked by the General Assembly or carved out of VITL's operating or contract revenues, of no less than $500,000 per year to support this work. It is common for interfaces to need periodic adjustments to stay in operation, so some funds may need to be allocated for this maintenance.

VITL can be seen as part of a "safety net" for those provider sites that are either too small or too remotely located to warrant investment in HIT/HIE on their own.

VITL can be seen as part of a "safety net" for those provider sites that are either too small or too remotely located to warrant investment in HIT/HIE on their own. VITL will provide leadership to help ensure over time that all relevant stakeholders can participate in the HIEN since everyone benefits from universal participation.

10.3.2 Funding for Physician EHR System Deployment

One widely-cited study estimates that "initial EHR costs were approximately $44,000 per FTE provider per year and ongoing costs were about $8,500 per FTE provider per year" and that revenue losses from reduced patient visits during training and implementation averaged $7,473 per FTE provider.[97] Further, studies show use of EHR systems is directly related to the size of the practice. Compared with solo practices, practices with 10 to 19 physicians were more than twice as likely to use EHR systems, and practices with 20 or more physicians were three times as likely to use them.[98]

In order to help address the barriers to EHR system adoption, Act 70 of the 2007 session of the Vermont General Assembly (H.229) establishes an Interim Technology Fund to finance pilot projects for providing EHR systems to small, independent primary care practices serving low- and moderate-income Vermonters. The legislation sets a goal of raising $1 million, and asks for voluntary contributions from payers, hospitals, and others to fund this activity, while leaving somewhat open-ended the long-term funding for this project. As mentioned previously, a recent study indicates that only 11% of savings from EHR system deployment accrue to the provider – the remainder goes to the payers through a reduction in unnecessary tests and more automated record handling.[99] This savings should serve as a foundation for contributions by payers in this project.

The project has several specific purposes, including:

- Improve the adoption rate by providers of certified EHR systems,[100] especially by those providers least likely to adopt systems on their own;
- Encourage the acceptance of EHR systems by patients as part of a larger education campaign surrounding the benefits of health information technology to their overall health and quality of care;
- Lower some of the most difficult barriers to adoption (see Section 4.2.3), especially cost and perceived risk;
- Position Vermont to be able to better test interoperability between provider sites, especially sites which would otherwise not be able to participate but represent an important venue for care and an important source for health records. These pilots allow Vermont to understand the assumptions and implications of these activities before committing to more full-scale implementations.

The process would work like this:

- Use a structured evaluation process to identify two or three EHR systems that comply with the standards in this plan, and provide a functionally-rich, cost-effective solution for provider organizations.

- VITL would establish and publicize criteria for the selection of pilot sites.
- Once interested sites are identified, they would be evaluated based on the pre-established criteria and rated based on factors like financial need, patient mix, etc.
- Sites would be chosen for the pilot based on applicant evaluation and available funds.
- Funds would be used to purchase or lease items such as hardware, software licenses (including certified EHR systems), broadband connections, installation and configuration services, and training and support services.
- Sites would be required to make a contribution to their own deployment, either in the form of partial matching funds or by initially receiving this funding as a loan which will be forgiven if they remain deployed for a specified period of time (e.g., three years from initial deployment).

VITL would then provide the infrastructure and context through its statewide projects for these sites to then be able to exchange health information with other providers consistent with the data sharing and consent policies being developed for Vermont. As part of this program, participating sites will be required to contribute patient demographic data to the HIEN master patient index as it is deployed; integrated EHR systems chosen by VITL for deployment under this program will be specially enabled for this function. VITL will track, study, and evaluate the effectiveness of this program and report the results to the Vermont General Assembly.

The following table identifies the estimated use of the initial $1 million in program funds:

Average cost of system acquisition per provider[101]	$32,000*
Average ongoing annual cost per provider[102]	$10,000
Total 3 year cost	$62,000
Number of providers in Pilot Project	12
Pilot Project 3 year direct costs	$744,000
Staffing for Implementation	$256,000
Total Pilot Project costs	$1,000,000

**Cost is for an integrated EHR and practice management system*

The following table identifies costs for the deployment of EHRs to non-hospital primary care providers in Vermont.[103] VITL will recommend to the General Assembly by Jan. 1, 2008, sources of funding for the $24.7 million needed for the deployment of EHR-S in the non-hospital owned physician practices.

Number of **non-hospital physician practices** in VT	256
Number of non-hospital **physician practices** needing EHR Systems	158
Number of non-hospital **primary care practices** needing EHR Systems	122
Number of non-hospital **primary care providers** needing EHR Systems	318
3 year cost per provider direct costs	$62,000
Total 3 year direct costs for non-hospital primary care providers needing EHR Systems plus 25% for clinical consulting and process re-engineering	$24,700,000

While the goal is near-universal deployment of EHR systems to all practice sites in Vermont, there will likely be some providers who simply are unable to change their business practices quickly enough to absorb this technology within the planning period. Additional education and support services may be required to enable these remaining sites to catch up. Ongoing technical support may be required to assist smaller sites in maintaining smooth operations.

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[84] *Funding RHIO Startup and Financing for Life: The Survey of Regional Health Information Organization Finance,* Health IT Transition Group, June 2006, p. 16.

[85] VITL's application for IRS Section 401(c)(3) status is pending as are applications for many RHIOs.

[86] *Funding RHIO Startup and Financing for Life: The Survey of Regional Health Information Organization Finance,* Health IT Transition Group, June 2006.

[87] See http://www.hhs.gov/healthit/contracts/ and http://www.ahrq.gov/fund/

[88] See http://www.hitchampions.org/

[89] Note that non-profit hospitals may benefit from the IRS guidance of May 11, 2007 that should allow tax-exempt hospitals to proceed with plans to share certain health information technology with physicians. The IRS guidance states that the IRS will not treat the benefits that a tax-exempt hospital, qualified under Section 501(c)(3), provides to its medical staff physicians as impermissible private benefit or inurement as long as the benefits fall within the range of HIT and related services permissible under the HHS regulations. In addition, the hospital's arrangement to provide HIT and related services to physicians at a discount must meet certain criteria:

- The HIT subsidy arrangement must require both the hospital and the participating physicians to comply with the HHS regulations on a continuing basis.
- The arrangement must provide that, to the extent permitted by law, the hospital may access all of the electronic medical records that the physician creates using the HIT and related services subsidized by the hospital.
- The hospital must ensure that the HIT and related services are available to all of its medical staff physicians.
- The hospital must provide the same level of subsidy to all of its medical staff physicians, or otherwise vary the level of subsidy by applying criteria related to meeting the healthcare needs of the community.
  See http://www.dwt.com/practc/healthcr/bulletins/05-07_IRSGuidance.htm

[90] See http://www.hhs.gov/transparency/

[91] See Lohr, Steve, "Risks and Rewards: Who Payes for Efficiency?" New York Times, June 11,2007 < http://www.nytimes.com/pages/business/businessspecial3/index.html>

[92] VITL Physician Practice Survey, May 2007

[93] See http://www.rwjf.org/newsroom/featureDetail.jsp?featureID=1387&type=3&iaid=

[94] See Robert H. Miller and Christopher E. West, "The Value of Electronic Health Records in Community Health Centers: Policy Implications," Health Affairs 26(1), January/February 2007 and Robert H. Miller et al, The Value of Electronic Health Records in Solo or Small Group Practices, Health Affair 24(5), September/October 2005.

[95] See Cathy Schoen et al, "On the Front Lines of Care: Primary Care Doctors' Office Systems, Experiences, and Views in Seven Countries, Health Affairs Web Exclusive, November 2, 2006.

[96] See *Funding RHIO Startup and Financing for Life: The Survey of Regional Health Information Organization Finance,* Health IT Transition Group, June 2006.

[97] See Robert H. Miller et al, The Value of Electronic Health Records in Solo or Small Group Practices, Health Affair 24(5), September/October 2005.

[98] See Catharine W. Burt and Jane E. Sisk, Which Physicians and Practices Are Using Electronic Medical Records? , Health Affair 24(5), September/October 2005.

[99] See Lohr, Steve, "Risks and Rewards: Who Payes for Efficiency?" New York Times, June 11,2007 < http://www.nytimes.com/pages/business/businessspecial3/index.html>

[100] See http://www.cchit.org/

[101] Includes license fees, hardware and system software, estimated short-term loss of productivity, and staff setup time.

[102] Includes ongoing software maintenance, periodic hardware replacement, hosting fees, and support staff.

[103] Data is from Provider Survey conducted by VITL, May 2007. See Appendix G.

[104] Some of these models drawn from material found in the *Final Report on Development of State-Level HIE Initiatives,* Foundation of Research and Education of American Health Information Management Association, September, 2006. <http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1_032792.pdf>

[105] See HIMSS/eHealth Initiative Connections Communities Regional Forum, Boston, MA, May 10, 2007. <http://www.himss.org/HIEForums/agenda_boston.asp>

11 GOVERNANCE AND ACCOUNTABILITY

11.1 Introduction

A health information exchange (HIE) is a cooperative venture among many different stakeholders and interested parties. To ensure an orderly and equitable approach to the planning and operation of the HIE and related activities, a clear system of governance and accountability needs to be implemented in advance of any technical implementation. This section reviews the current legal backdrop for VITL as well as the foundation for its ongoing organization. As HIT/HIE activities grow and mature, VITL will continue to evolve to meet the emerging and changing needs of the state.

11.2 Legal Backdrop

VITL was created to promote HIT and HIE in the state.[106] It is charged with the development of the VHITP and with the development and execution of a number of pilot projects and efforts. VITL was incorporated as an non-profit corporation on July 22, 2005. It is a multi-stakeholder corporation shaped through participation by a broad base of providers, payers, employers, patients, state agencies, and information technology vendors. Under Vermont 22 V.S.A. § 903 (c)(2), VITL is recognized as *the* regional health information organization in Vermont.

The VITL board of directors is comprised of representatives from many of the stakeholder groups mentioned above, including providers, purchasers, payers, and patients. Some members are designated in statute by virtue of their role:

- The commissioner of the Department of Information and Innovation
- The director of the Office of Vermont Health Access (or designee)
- The commissioner of the Department of Health (or designee)
- The commissioner of the Department of Banking, Insurance, Securities & Health Care Administration (or designee)

VITL's by-laws further stipulate the number and term limits of board members, but not their affiliations. While other board members may represent the perspectives of major organizations within the Vermont health care landscape, they serve on the board as appointed individuals rather than as official representatives of those organizations.

The board meets on a monthly basis to discuss current business, to review the work of its committees, and to analyze the strategic direction of the organization. All contractual relationships and significant operational decisions are reviewed and finalized by the board.[107]

VITL Standing Committees

Privacy Committee
The Privacy Committee's members are VITL's experts on HIPAA regulations and applicable Vermont state laws in the areas of confidentiality and security of patient information.

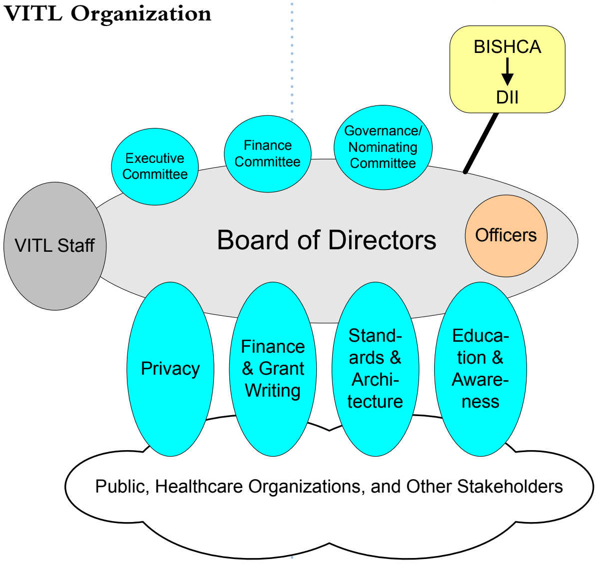
Finance and Grant Writing Committee
The Finance and Grant Writing Committee provides informed business advice on a financing model that will allow VITL to eventually operate based on revenues created from its operations.

Standards and Architecture Committee
The Standards and Architecture Committee's members serve as VITL's knowledge experts in data, system interoperability, interface messaging, data standards and technical architectures for the medication history pilot and the statewide health IT plan.

Education and Awareness Committee
VITL's Education and Awareness Committee is tasked with developing a public awareness campaign to assess any confidentiality concerns of patients and/or healthcare providers. In addition, the Education and Awareness Committee will be running focus groups to collect feedback from physicians on the necessary clinical components of a health information infrastructure.

VITL's organizational structure includes several committees. Three are formalized in the by-laws (Executive Committee, Finance Committee, and Governance and Nominating Committee) to manage ongoing business issues and are comprised of board members and officers. Additionally, VITL currently maintains four standing committees (see page 79) which meet regularly around pertinent topics and which are staffed by subject matter experts. Some board members participate on these committees, but membership is primarily comprised of non-board participants from a wide variety of stakeholders and public representatives. Each of the VITL standing committees has provided input on specific aspects of projects, such as the VITL Medication History Pilot Project and the development of this plan. Other than limited exceptions related to the Executive Committee, committees make recommendations to the board but do not have independent decision-making authority.

Figure 14
VITL Organization



As of June 2007, VITL has five employees in the positions of president, chief operating officer, communications director, senior project manager, and executive assistant. The number of employees will likely increase as needs expand and the budget is available.

Because state funding played a prominent role in VITL's startup, the General Assembly initially charged the Department of Banking, Insurance, Securities & Health Care Administration (BISHCA) with oversight responsibility to ensure that VITL appropriately completes its statutory obligations. Vermont 22 V.S.A. § 903 shifts that oversight responsibility to the Department of Information and Innovation (DII).

The organizational structure for VITL is depicted in Figure 14.

11.3 Ongoing Organization for VITL

VITL's organizational structure will serve the state and its citizens well as utilization of health information exchange becomes a standard business practice in the health care system:

- Its status as an independent, legally established, entity responsible to a board of directors with members from a broad base of stakeholders, including the public sector, will help ensure that its primary commitment is to the common good. Vermont will benefit because VITL is neither a direct arm of government nor part of any other organization in the state's health care environment. VITL is a true example of a public-private partnership.

- Its non-profit status and commitment to openness helps ensure a transparent discussion and decision-making process accessible to all individuals and businesses that are interested.

- Management committees staffed by board members responsible for making decisions about VITL's organization, management, and board.

- Standing committees staffed by board members, members of the health care community, and the public provides the opportunity for all interested parties to participate and to share their differing perspectives.

- A professional staff responsible to the board through VITL's president helps ensure accountability to the organization's mission.

As VITL grows and matures over the next few years, some additional organizational elements should be considered, including:

- Formalizing, in the organization's by-laws, a board which is even more representative of the various stakeholder groups or types to help ensure the diversity of perspectives necessary for good decision-making.
- Creating an advisory group (or groups) to provide insight and advice to the board about prospective projects and other decisions. In particular, it will become increasingly important to ensure that appropriate avenues for consumer input and advocacy are available and are considered in the decision-making process. Vermont's ongoing work as part of the Health Information Security and Privacy Collaboration is likely to result in specific recommendations for additional oversight, and even policy development, related to patient consent and information sharing.
- Adding standing committees or closing-out existing committees, as needs change.

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[106] See 18 V.S.A. § 9417. Health information technology < http://www.leg.state.vt.us/statutes/fullsection.cfm?Title=18&Chapter=221&Section=09417>

[107] See http://www.vitl.net/interior.php/pid/2/sid/3

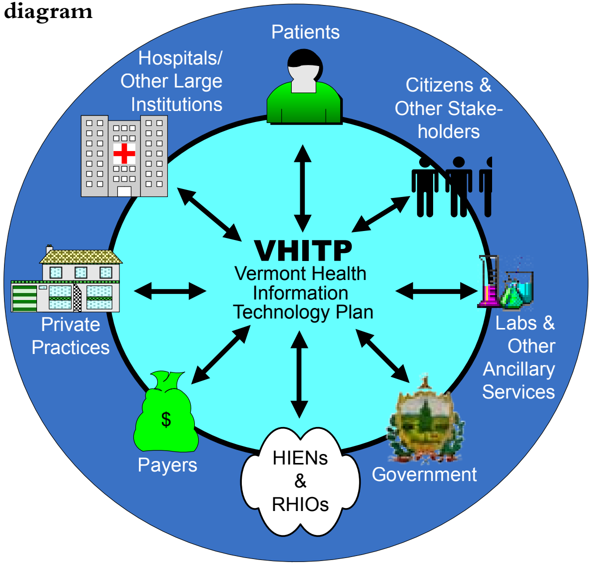
Diagnostic imaging at the Northeastern Vermont Regional Hospital in St. Johnsbury has gone digital, with images now being stored on computers. Richard Bennum, M.D., a radiologist at the hospital, reviews digital images on two large computer displays and dictates his findings.

12 MOVING FORWARD

12.1 Introduction

A roadmap for implementation is needed in order to achieve the objectives of the VHITP. With four core objectives and over a dozen use narratives, the plan's ultimate vision relies on technical, organizational, educational, and financial foundations to be in place. However, these foundations will be built incrementally over time and have complex dependencies. For example, physician practices cannot fully benefit from the central infrastructure of a health information exchange without broader penetration of EHR systems. Meanwhile, EHR systems cannot be deployed widely across small practices without additional funding mechanisms in place; but some funding mechanisms rely on the benefits to be achieved from health information exchange. It is imperative that care be taken to implement projects and make investments in a strategic way that recognizes such dependencies, and that incremental contributions to the infrastructure improve future sustainability while bringing us closer to the vision set forth in the plan.

Figure 15
Stakeholder diagram



For the most part, the implementation of the VHITP is an implementation plan for VITL. As shown in Figure 15 and described in previous sections, the HIEN is a leader in connecting stakeholders and tackling the barriers to electronic health information and health information exchange. The plan does not dictate individual stakeholder technology initiatives, nor is the HIEN the *exclusive* developer of technology to exchange information across stakeholders. Rather, the plan seeks to set the strategic direction of cross-stakeholder initiatives, utilizing the HIEN where it is best suited to help turn the shared vision into a reality.

The impact of VITL's activities on the stakeholder community will be significant, and the participation of stakeholders in these activities is expected to be significant as well. Figure 16 shows the dependency relationships between each of the major activities resulting from this plan and each of the stakeholder types. As is clear from the table, there are many primary dependencies (denoted by a P in a particular cell) and even many secondary dependencies (denoted by an S in a particular cell). Active engagement and cooperation among stakeholders will be key to the plan's success.

12.2 Key Success Factors for the Plan

Many hours of work by many different people went into the production of this plan, yet we recognize that it is not the end, but only the beginning. In order to get the most value from the ideas presented in this document, stakeholders must do the following to enable the plan's success:

- **Embrace the vision** for HIT/HIE in the state as expounded upon in the principles detailed in this document. Only with a clear, shared vision can we work toward a common goal.

Figure 16 **Stakeholder Engagement Matrix**

Stakeholders

(P=Primary, S=Secondary)

		VITL	Hospitals	Private Providers	Payers	Patients	Citizens & Others	Ancillary Services	Government	Other HIENs
Core HIEN Activities	Promote EHRs	P	P	P	S				S	
	Operate HIEN	P	S	S	S	S				
	Empower Consumers	P	P	P	P	P	P		S	
	Enable Public Health Surveillance	P	P	P	S	S		P	P	S
	Establish HIE Standards	P	P	P	S			P	P	S
	Recommend HIT Strategies	P	P	P				P	P	S
Privacy & Security	Recommend Policies	P	P	P	P	P	P	P	P	
	Address Key Issues	P	P	P	P	P	P	P	P	
	Create Strategies for Providers	P	P	P	S	S	S	S	P	
	Educate Consumers	P	P	P	P	P	S	S	S	
Education	Basic Outreach	P	P	P	P	P	S	S	S	
	Local Campaigns	P	P	P	P	P	S	S	S	
	Opt-in Drive	P	P	P	P	P	S	S	S	
Funding	EHR Systems	P	P	P	S					
	Core HIE	P	P	P	P			S	P	
	Interfaces	P	P	P	S			P	P	
Governance	Diverse Board	P	S	S	S	S	S	S	S	
	Standing Committees	P	S	S	S	S	S	S	S	
	Advisory Committee(s)	P	S	S	S	S	S	S	S	
	Independent Arbiter	P	S	S	S	S	S	S	S	
VITL Project Selection Strategy		P	S	S	S	S	S	S	S	S

- **Accept the four core objectives and fund their implementation:**

  I. Encourage and enable the deployment and use of electronic health record systems within the state to increase the amount of health information that exists in electronic form.

  II. Establish and operate the infrastructure necessary to promote secure electronic health information exchange to achieve the plan's vision.

  III. Empower consumers to take an active role in electronic health information initiatives in Vermont.

  IV. Enable public health agencies to leverage HIT/HIE investments to monitor and ensure the public's health more transparently and quickly.

These activities will take years to accomplish and will require funding both within stakeholder organizations and within the HIEN.

- **Adopt the standards** and best practices detailed in this document. These standards promote and enable interoperability, and suggest reasonable recommendations for both HIE and HIT implementation. These standards are meant to provide guidance to organizations while at the same time not interfering with their internal HIT needs and decisions.

- **Deploy the technology** necessary to bring HIT to life, both within and between organizations. It is the hope of the VHITP workgroup that this plan serves as a catalyst both for more sustained investment in HIT within organizations as well as HIE growth between organizations and stakeholders.

- **Ensure that data stays private and secure** through strong policy and effective practice. Vermont requires well developed, well understood, and well communicated policies that guide providers, patients, data processors and other stakeholders to act responsibly towards protected health information.

- **Educate stakeholders** and encourage their active participation in HIT/HIE projects and activities. Patients move in and out of the health care system and require constant education and re-education about their rights and responsibilities. Providers similarly need to be reminded of the options available to them for managing health data. Technical staff need to be trained on current and emerging technology and standards to best be able to support their organizations.

It is the hope of the VHITP workgroup that this plan serves as a catalyst both for more sustained investment in HIT within organizations as well as HIE growth between organizations and stakeholders.

12.3 Summary of Projected VITL Costs

The following table summarizes the costs projected throughout this plan for VITL to complete the activities recommended in this plan:

Section 9.5	Education campaign budget	$1.2 million total
Section 10.3.1	VITL base annual operating cost	$2.5 million/year
Section 10.3.1	VITL incremental staffing and core operating expenses	$250,000/year added to previous year's total
Section 10.3.2	EHR system pilot project cost	$1 million total
Section 10.3.2	EHR system deployment to remaining non-hospital primary care providers	$24.7 million
Section 10.3.1	Interfaces for HIEN	$500,000/year

The individual plan sections noted above have detailed discussions of these items.

12.4 Project Selection Strategy for VITL

While developing the VHITP, VITL was approached by stakeholders to take part in a variety of different electronic health information initiatives. These included, for example, personal health records, hosted EHR systems, prescription monitoring, and e-Prescribing. Each initiative has the potential to make a positive contribution, but limited resources and complex dependencies demand discipline in selecting the right projects at the right time. It was through the process of evaluating these initiatives, their impact on the EHI landscape in Vermont, and the degree to which the HIEN should be involved, that VITL developed an evaluation methodology to help place projects into their strategic context. This methodology will continue to be used to prioritize opportunities, and it plays a central role in the ongoing development of VITL's implementation plan.

Outcomes
Broad use
Quality improvement
Increased efficiency
Patient centeredness
Security and privacy
Public image of EHI

The methodology consists of a three step process to be carried out by a Project Review Committee (PRC):

- **Step 1: Evaluate likely outcomes**
  Consider the degree to which a particular initiative will result in outcomes that contribute to health care reform in Vermont and are consistent with plan principles. Priority is given to projects with the potential for greater impact.

- **Step 2: Evaluate infrastructure needs**
  While Vermont is building its electronic health infrastructure, projects that exercise the infrastructure – both technical and organizational – should take priority. Over time, the weight of these criteria should change as the infrastructure matures.

Utilization of Technical Infrastructure	Utilization of Organizational Infrastructure
Clinical data repository	Provider agreements
Master patient index	Privacy policies
Interfacing	Governance
Security	Workflow
Data aggregation	Education and outreach
Auditing	Stakeholder participation

- **Step 3: Conduct business analysis**
  Once the priority of an initiative is known, its feasibility, sustainability, and cost-benefit must be studied in order to mitigate risk and fine-tune the role that the HIEN should play.

Business Analysis

Fulfills unmet need
Technical feasibility
Technical sustainability
Financial sustainability
Synergy with other projects
Reasonable timeframe
Measurable results

Projects are presented to the PRC by the VITL board of directors, which will accept submissions formally or informally from VITL staff, stakeholders, individuals, or organizations. The PRC, consisting of members appointed by the board through the VITL Nominating Committee, will maintain a list of projects and evaluations on VITL's website so that stakeholders can monitor progress. The public nature of PRC review is an important part of setting expectations appropriately and educating the public regarding the core mission of the HIEN.

By performing the outcome evaluation first, the PRC sets the overall priority of an initiative in the context of Vermont's overall health information technology strategy, without regard to whether it is a good "fit" for the HIEN.

By performing the outcome evaluation first, the PRC sets the overall priority of an initiative in the context of Vermont's overall health information technology strategy, without regard to whether it is a good "fit" for the HIEN. Infrastructure analysis, the second step, is performed for all projects even if they are of a relatively lower overall priority. Sometimes a project identified as a high priority for the state will score low on the infrastructure analysis because of an unmet dependency or a lack of reliance on the HIEN. Conversely, a project with a relatively low overall priority may be selected for implementation because it fills a strategic hole in the HIEN's technical or organizational infrastructure. Once a project is identified as an implementation candidate via the first two steps, the business analysis is performed. Here a project with a high overall priority and a strong infrastructure score may be rejected because it is already being implemented by other stakeholders, or is not financially sustainable. Such a situation may result in the proposal of an alternative project or strategy that offers a more targeted use of the HIEN's exclusive assets. Project-specific implementation plans are developed for those that are not rejected at step 3.

12.5 Conclusion

Vermont and the nation have a long way to go to meet the President's call for pervasive EHR system deployment by 2014, and the deployment and use of enabling technology to promote and provide health information exchange to support effective and efficient patient care. This plan provides the guidance necessary for Vermont to move successfully down the path towards meeting these objectives. There is still much work to be done, and we call upon the entire community to work together to ensure that the plan's vision for a healthier Vermont is fulfilled.

APPENDIX A:
VERMONT HEALTH INFORMATION TECHNOLOGY PLAN PRINCIPLES

Overarching Principles

I. Vermonters will be confident that their health care information is secure and private and accessed appropriately.

II. Health information technology (HIT) will improve the care Vermonters receive by making health information available where and when it is needed.

III. Shared health care data that provides a direct value to the patient, provider or payer is a key component of an improved health care system. Data interoperability is vital to successful sharing of data.

IV. Vermont's health care information technology infrastructure will be created using best practices and standards, and whenever possible and prudent, will leverage past investments, and will otherwise be fiscally responsible.

V. Stakeholders in the development and implementation of the health care technology infrastructure plan will act in a collaborative, cooperative fashion to advance steady progress towards the vision for an improved health care system.

Detailed Principles

I. Vermonters will be confident that their health care information is secure and private and accessed appropriately.

1. **Security and confidentiality:** Data must be safe from harm and accessible only to those with a "need to know" as defined by rules delineating data access from every category of authorized user (patient, provider, payer, others).
2. **Patient Privacy:** Patient privacy shall be maintained through appropriate development and implementation of policies involving disclosure, consent, and sharing. The physical implementation of systems should allow for audit and reporting of data access and sharing.
3. **Consumer Privacy:** Consumer privacy, security and confidentiality shall be considered paramount to the successful use and exchange of health information.
4. **Secure Identity and Access Rights:** User identities should be immune from repudiation,[108] and access rights should be traceable and verifiable.
5. **Data Stewardship:** Data stewards across all settings shall serve as custodians for data in their care, and should be responsible (along with all providers and users of data) for ensuring the proper documentation, collection, storage, and use of data within their purview.
6. **Ethical Use:** Data used in health information exchange must be used ethically according to usual and customary standards of practice in the medical community.
7. **Data Ownership:** Vermont law generally recognizes the creator of the data in a medical

record as the owner of the data with responsibilities for managing and retaining it. Vermont and federal law have established access rights for the patient, who is the subject of that data. The HIEN provides a secure conduit for appropriate access by patients, providers, and public agencies consistent with state and federal law.

II. Health information technology will improve the care Vermonters receive by making health information available where and when it is needed.

8. **Ease of use:** Applications must be easy to use for both novice and expert users.
9. **Consistency:** Interfaces should be similar enough to present a consistent look and feel to the user, though different interfaces might be necessary for different types of users.
10. **Comprehensiveness:** The patient record should be as complete and comprehensive as possible.
11. **High data quality:** Applications must help ensure valid, consistent, understandable, and secure data while presenting minimal obstacles to smooth and efficient use.
12. **Timeliness:** Data must be available in as near real-time as possible from the point of creation.
13. **Ease of access:** Data must be easy to access for all groups of authorized users regardless of their level of technical expertise. Ease of use comes first and foremost for health care providers who access systems.
14. **Multiple uses:** HIT planning, investment, and implementation must give consideration to multiple uses of data with appropriate formats for each, including its primary uses for clinical decision support, research, planning, evaluation and public health surveillance and oversight.

III. Shared health care data that provides a direct value to the patient, provider or payer is a key component of an improved health care system. Data interoperability is vital to successful sharing of data.

15. **Role of HIE:** Health information exchange is an important component of HIT and will drive improvements in the overall health care system.
16. **Common base of data:** A common base of data must be created to facilitate sharing and minimize redundancy. This data may be physically or logically consolidated (there may or may not be a central database).
17. **Structural Redundancy:** Data that is captured in many systems and sources is unavoidable. This redundancy can provide advantages in terms of speed of access and recoverability.
18. **Documentation:** Detailed information about data must be created, maintained, and made available to assist in data quality assurance.
19. **Accuracy:** Data must be accurate and complete (there is often a tradeoff between these two). Clinical data must be reviewed routinely by an appropriate person to ensure accuracy.
20. **Population-based:** Records should be populated prospectively, starting with birth record information for newborns, and retrospectively using historical information, to construct as complete a health record as possible. Accurate patient matching is crucial to this capability. Accommodation needs to be made for patients who are born outside of the state to ensure that their records are included.

IV. Vermont's healthcare information technology infrastructure will be created using best practices and standards, and whenever possible and prudent, will leverage past investments, and will otherwise be fiscally responsible.

21. **Platform Neutrality:** There will be no predetermined platform architectures.[109]
22. **Reliability:** Systems must operate reliably and be resilient to natural or technical disasters.
23. **Business continuity and disaster recovery:** Vermont must be able to meet the health care needs of its population during times of crisis.
24. **Leverage Networks:** Wherever possible, existing networks should be leveraged to minimize cost and complexity.
25. **Use of the Internet:** Wherever possible, secure use of the Internet as a wide-area network should be supported and encouraged.
26. **Standards:** Where relevant, government (national, state, and local) and industry standards for health care information technology shall guide technical decisions in planning, investment, and implementation. Standards should be adopted to the extent possible for both HIE and some other areas of HIT (for example, in the area of data encoding).
27. **Adaptability:** Applications must be easily adaptable to changing functional and technical requirements.
28. **Cost effectiveness:** Information technology must contribute to the cost effectiveness of the processes it supports, and must be cost effective from the point of view of the system as a whole. Determining cost effectiveness should consider both tangible and intangible benefits.

V. Stakeholders in the development and implementation of the health care technology infrastructure plan will act in a collaborative, cooperative fashion which will advance steady progress towards the vision for an improved health care system.

29. **Support of Mission:** HIT initiatives must support the specific mission and goals of the state. All those associated with health care have a responsibility to actively participate in progressing toward the state's vision of an improved health care system.
30. **Multi-Dimensional:** HIT deployment must balance the needs and perspectives of all stakeholders, including the health care provider dimension, personal health dimension, and population health dimension.
31. **Practical Now, Ideal Later:** HIT in Vermont needs an appropriate vision of the future, but compromises will need to be made now to ensure progress within the frame of practical implementation.
32. **Agree to Disagree:** Civility will reign in reaching consensus agreements when stakeholders disagree on complex issues.
33. **Plan as a Living, Evolving Document:** The Vermont Health Information Technology Plan will be a living, evolving document once it is released, to allow adaptation to changing circumstances and evolving standards. The technology plan will have as smooth transitions as are possible to new technologies to reduce severe impacts on infrastructure and investments.
34. **Measure Impact:** Accepted metrics will be used, where possible to judge the impact and performance of using health information technology to improve value to the community.
35. **Governance:** State HIT planning and implementation shall have clear and strong processes for governance that is inclusive of the interests of all affected parties consistent with the highest standards of its participants.

36. **Stakeholder Education:** Education of all stakeholders (public, providers, health plans, others) will be critical to promoting the understanding of the potential of health information technology and health information exchange in improving health care delivery.
37. **Equitable Use:** Health information exchange must be used equitably by the participants to minimize any secondary effects due to such issues as competitive marketplace pressures or personal gain.
38. **Role of VITL:** VITL is a health information exchange for the state of Vermont, responsible for facilitating the exchange and use of health care information electronically across organizations in the state in a secure and efficient manner.
39. **Role of the State of Vermont:** The state of Vermont plays a critical role to support health information technology adoption across the state, particularly as it relates to certificate of need (CON) review, state agency participation, legislative compliance, and inter-state exchange.
40. **Do No Harm:** Chosen directions should result in minimal adverse impact on patients and existing business and clinical processes and activities.

[108] To be immune from repudiation means that an authorized user cannot deny activities performed under his or her identity, such as access to electronic health information.

[109] Predetermined platform architectures might include a particular computer operating system, programming language, database, or software from a particular vendor. Standards help to promote interoperability while allowing for platform independence across organizations.

APPENDIX B:
GLOSSARY OF TERMS

AHIC American Health Information Community

AHIC is a federally-chartered advisory committee that provides input and recommendations to HHS on how to make health records digital and interoperable, and assure that the privacy and security of those records are protected.

AHRQ Agency for Healthcare Research and Quality

AHRQ is the nation's lead federal agency for research on health care quality, costs, outcomes, and patient safety.

ANSI American National Standards Institute

ANSI coordinates the development and use of voluntary consensus standards in the U.S. ANSI has a federal contract to run the HITSP standards harmonization project.

ASP Application Service Provider

ASPs offer software applications on a hosted basis, running on a remote server, and the service is usually paid for on a monthly subscription basis. It is an alternative to purchasing software.

BISHCA Vermont Department of Banking, Insurance, Securities and Health Care Administration

BISHCA has contracted with VITL to develop the health information technology plan.

Blueprint Vermont Blueprint for Health

The Vermont Department of Health has launched the Blueprint for Health Initiative to improve the way chronic conditions are managed, such as diabetes. VITL is providing comprehensive data services to the Blueprint for Health's Chronic Care Information System.

Bridges to Excellence

Bridges to Excellence is a non-profit multi-state, multi-employer coalition developed by employers, physicians, healthcare services researchers and other industry experts to reward quality across the health care system.

CCHIT Certification Commission for Health Information Technology

CCHIT is a voluntary, private-sector organization launched in 2004 to certify health information technology (HIT) products such as electronic health records and the networks over which they interoperate.

CCIS Chronic Care Information System

See Blueprint.

CDC Centers for Disease Control

Founded in 1946 to help control malaria, the CDC is the nation's best known public health agency. Its activities include preventing and controlling infectious and chronic diseases, injuries, workplace hazards, disabilities, and environmental health threats.

CHAMP Creating Healthy Adolescents-A Model Prevention Project

CHAMP has a primary goal to develop a new foster-home based health service model designed to reduce substance abuse among adolescents in State custody.

CHF Congestive Heart Failure

CHF is a condition in which the heart has been weakened and can't pump enough blood to the body's other organs.

CON Certificate of Need

The CON program administered by BISHCA ensures that licensed health care facilities and services are necessary, non-duplicative and distributed fairly throughout the state.

CPT Current Procedural Terminology

CPT is a set of codes used in the process of billing for health care services.

DICOM Digital Imaging and Communications in Medicine

DICOM is a standard for distributing and viewing any kind of medical image regardless of the origin.

DII Department of Information and Innovation

The Vermont Department of Information and Innovation works with state agencies to provide integrated communication and information technology services to the people of Vermont through a cost effective environment in which information is shared for the benefit of government and the public.

DOQ-IT Doctor's Office Quality-Information Technology

The DOQ-IT program is a national initiative that promotes the adoption of EHR systems to improve quality and safety for Medicare beneficiaries in small- and medium-sized physician offices.

eHI eHealth Initiative

The eHealth Initiative is an independent, non-profit organization whose mission is to drive improvement in the quality, safety, and efficiency of healthcare through information technology.

EHR Electronic Health Record

An EHR is a computer-based patient medical record that can be used to collect and look up patient data by physicians or health professionals. The term electronic health record is often used interchangeably with electronic medical record, but an EHR may include data supplied by patients.

EHR-S Electronic Health Record System

An EHR System is a computer-based software application that provides access to a patient's EHR by physicians or health professionals.

EKG Electrocardiogram

An EKG is a print out produced by an electrocardiograph, which shows the electrical activity of the heart over time.

EMR Electronic Medical Record

An EMR is a medical record in digital format that includes data from laboratory tests, diagnostic procedures, physical exams, medication lists, etc.

EPSDT Early Periodic Screening, Diagnosis, and Treatment

EPSDT is the child health component of Medicaid. It's required in every state and is designed to improve the health of low-income children, by financing appropriate and necessary pediatric services.

GCR Global Clinical Record

GCR is an electronic record that organizes clinical data and supports specific operational functions for the Agency of Human Services.

HHS Health and Human Services

The Department of Health and Human Services is the U.S. government's principal agency for protecting the health of all Americans and providing essential human services.

HIE Health Information Exchange

HIE is the pooling and sharing of demographic and clinical data between health care providers. Related to HIT; whereas HIE is the process of sharing demographic and clinical data, HIT is the technology that can enable the process.

HIEN Health Information Exchange Network

An HIEN connects various health information exchanges and regional health organizations together.

HIMSS Healthcare Information and Management Systems Society

HIMSS is a membership organization for healthcare IT professionals.

HISPC Healthcare Information Security and Privacy Collaboration

Thirty-four states and U.S. territories have signed agreements to join the HISPC project to assess how organizational business policies, practices, and state laws regarding privacy and security affect health information exchange on a national level.

HIT Health Information Technology

HIT is used for the organization, analysis and generation of health data to treat patients and for insurance and other reimbursement, or for planning, quality assessment, research, and legal purposes.

HRSA Health Resources and Services Administration

HRSA is an agency of the U.S. Department of Health and Human Services. It is the primary federal agency for improving access to health care services for people who are uninsured, isolated or medically vulnerable.

IOM Institute of Medicine

The IOM is a non-profit organization that provides unbiased, evidence-based, and authoritative information and advice concerning health and science policy to policy-makers, professionals, leaders in every sector of society, and the public at large.

HITSP Health Information Technology Standards Panel

This organization of 18 independent entities serves as a cooperative partnership between the public and private sectors for the purpose of achieving a widely accepted and useful set of standards to facilitate the exchange of health information.

HL7 Health Level 7

HL7 is a standards developing organization that has created a standard for interfacing different health information systems and exchanging data.

HLN HLN Consulting, LLC

HLN provides a wide range of technology consulting services to public health agencies and their not-for-profit partners and is contracted by VITL to facilitate the development of the VHITP.

MHINT Maine Health Information Network Technology

An organization created to oversee the development of the statewide electronic clinical information sharing network in Maine. The name was recently changed to HealthInfoNet.

MITA Medicaid Information Technology Architecture

MITA is a national framework to support improved systems development and health care management for the Medicaid program.

MPI Master Patient Index

A software application that identifies and links pieces of data for each patient.

NECLA NorthEast Community Laboratory Alliance

An affiliation of community-based hospital laboratories.

NHIN National Health Information Network

An Internet-based data exchange that will allow medical providers to share health data to improve care.

ONC Office of the National Coordinator

ONC is a government agency (part of HHS) that oversees and encourages the development of a national, interoperable (compatible) health information technology system to improve the quality and efficiency of health care.

OVHA Office of Vermont Health Access

OVHA is the state office responsible for the management of Medicaid, the State Children's Health Insurance Program, and other publicly-funded health insurance programs in Vermont.

PHIN Public Health Information Network

PHIN is a national initiative of the CDC to implement a multi-organizational business and technical architecture for public health information systems.

PHR Personal Health Record

The Personal Health Record is an electronic, ubiquitous, lifelong resource of health information needed by individuals to make health decisions. Individuals own and manage the information in the PHR, which comes from health care providers and the individual. The PHR is maintained in a secure and private environment, with the individual determining rights of access. The PHR is separate from and does not replace the legal record of any provider. [110]

QIO Quality Improvement Organization

Under contracts with the federal government (through the Quality Improvement Organization Program, part of the Centers for Medicare & Medicaid Services), QIOs monitor the appropriateness, effectiveness, and quality of care provided to Medicare beneficiaries. QIOs work with hospitals and physician practices on quality improvement projects.

RFP Request for Proposals.

Organizations that are seeking to purchase something or hire a contractor may issue a request for proposals.

RHIO Regional Health Information Organization

An organization that has been created to facilitate the exchange of health care information in a certain geographic area.

RLS Record Locator Service.

The RLS provides authorized users of a regional health information network with pointers to the location of patient health information across the network. This would enable users to access and integrate patient healthcare information from the distributed sources without national patient identifiers or centralized databases.

RTI Research Triangle Institute International

RTI is coordinating a national effort with 34 states and U.S. territories to identify best practices and develop solutions for sharing electronic health records that will lead to the formation of a National Health Information Network.

VADR Vermont Advance Directive Registry

VADR is a web-based registry designed to make Vermonters' advance directives accessible to providers and others when it is needed.

VDH Vermont Department of Health

A state agency that oversees numerous public health programs.

VHITP Vermont Health Information Technology Plan

The plan for establishing a statewide, integrated electronic health information infrastructure in Vermont.

VITL Vermont Information Technology Leaders

VITL is a multi-stakeholder non-profit corporation formed by a broad base of providers, payers, employers, patients, state agencies, and information technology vendors. VITL's vision is that the Vermont health information exchange will share real-time clinical information among health care providers across the state to improve patient outcomes while reducing service duplication and decreasing the rate at which healthcare spending occurs.

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[110] Definition provided by The American Health Information Management Association e-HIM Personal Health Record Work Group, "The Role of the Personal Health Record in the EHR," Journal of AHIMA 76:7 (Jul.-Aug. 2005): 64A-D.

APPENDIX C:
USE NARRATIVES

The following use narratives cover a wide, representative range of medical practice and participant experience. **Projects** identified below each narrative refer to current or emerging initiatives described in Section 1.3. **Phase** is reflected as "early, middle or late" in the state's deployment over the next five to ten years. **Key infrastructure** refers to typical HIEN components described in Section 1.2, Figure 2.

Hospital-related

1. A patient who has recently visited an ER or been an inpatient at a hospital goes for a follow-up visit to her primary care physician

Today	VHITP Vision
The doctor requests copies of paper records and hopes they arrive complete and in time for the patient visit. Expense is incurred in receiving, tracking, and filing these paper records.	With the patient's consent, the primary care physician's EMR requests updated patient records from the hospital's EMR. The patient is registered with the Statewide MPI and records are available from both the primary care physician and the hospital. A timely transfer of information is automated with little marginal expense on the part of the hospital or the practice. Care decisions are made with complete information.

Stakeholders: Patient, hospital, private practice
Project: HIEN
Phase: Middle
Key Infrastructure: Integration Engine, MPI, Patient Locator Service, Document Locator Service/ Data Service, Security Service, Provider EMR, Hospital EMR

2. During a hospitalization the attending physician modifies the patient's blood-pressure prescription regimen. The primary care physician (PCP) is notified of the change, but the patient does not realize that a change has occurred. After discharge, the patient continues on the original regimen. Not feeling well, the patient visits the PCP, and the PCP finds higher than normal blood pressure. The physician asks the patient about the regimen and is told that is has not changed. *(Delaware Use Narrative, modified)*

Today	VHITP Vision
The patient has incurred the cost (copayment) and inconvenience of a visit to his primary care physician (PCP) which could have been avoided. Assuming the patient means nothing has changed from the new regimen, additional, more costly medications are prescribed by the PCP, potentially putting the patient at risk.	With the patient's consent, the PCP searches for the patient in the statewide health information exchange and accesses prescription data from the hospital visit which is transmitted to the provider's EMR or viewed on a web browser through a dedicated application. The physician can now review the drug regimen before, during, and after the hospitalization and instruct the patient as to the proper course.

Stakeholders: Patient, hospital, private practice, ancillary services (pharmacy), payer
Project: Medication Pilot
Phase: Early
Key Infrastructure: Integration Engine, Medication Search Service, Provider Portal or EMR, Hospital CPOE or EMR

3. A patient who had visited his primary care physician as an outpatient during the week arrives unconscious at the ER on a weekend. *(Delaware Use Narrative, modified)*

Today	VHITP Vision
A summary of recent care, allergies, and medication data are unavailable. X-ray images taken elsewhere during the past week are unavailable. The doctor orders duplicative tests. A lack of information delays diagnosis and medications administered may put the patient at risk.	Because the patient is unconscious the nurse invokes the statute that allows action without the patient's consent. An ID card in the patient's wallet provides information that the ER nurse uses to get information from the statewide health information exchange through the hospital's EMR or via a dedicated web browser application. Current medication data, recent care summary, lab results, and x-ray images are accessed. Only necessary tests are ordered. The diagnosis is determined more quickly and with greater confidence.

Stakeholders: Patient, hospital, private practice, ancillary services (pharmacy, labs), payer
Project: Medication Pilot, HIEN
Phase: Late
Key Infrastructure: Integration Engine, MPI, Patient Locator Service, Document Locator Service/Data Service, Medication Search Service, Provider Portal or Hospital EMR, Security Service

4. A small commuter jet has crashed into the forest in a rural area of the state. There are many injured and emergency care is provided on the scene before injured patients are transported to the closest trauma center or hospital ER.

Today	VHITP Vision
Alert patients are questioned about their condition and relevant past medical history. First responders do their best to assess unconscious patients. Field medical cards are prepared for each patient with brief identification, diagnosis, and treatment data. Some are supplemented by ambulance run reports. Patient charts are initiated when patients reach the trauma center or hospital. If a patient needs a quick transfer to a specialized facility (e.g, regional burn unit) the staff tries to pull together all paper records from the field and hospital admission so they can be sent with the patient. Some patients are transferred with incomplete records, putting them at risk.	As patients are positively identified on-site, medical personnel, with patient consent or by invoking the "break the glass" provision, access personal health records from a portable storage device or through the statewide health information exchange's provider portal. On-site testing, diagnosis, and treatment information is entered into the provider portal by field emergency medical personnel and is available to the trauma center or ER as the patient arrives. If a patient is transferred to another facility, records are accessible on-line from that new location. Timely treatment improves health outcomes and lowers cost through treating before patient condition worsens.

Stakeholders: Patient, emergency medical personnel, hospital
Project: Medication Pilot, HIEN
Phase: Late
Key Infrastructure: Integration Engine, MPI, Patient Locator Service, Document Locator Service/Data Service, Medication Search Service, Provider Portal, Security Service

Private Practice Related

5. A 67-year-old man with diabetes and coronary artery disease is insured through the Medicaid program. He has targeted chronic conditions so his case is selected for disease management services. Claim and eligibility data is analyzed and he is referred for completion of a health risk assessment.

Today	VHITP Vision
When the state's vendor calls to complete the assessment he decides not to participate so his name is not put on the list of people who receive phone calls or face-to-face visits from a nurse. He gets educational mailings but he usually throws them away. He regularly visits his local general practitioner and is sometimes referred for lab tests. He doesn't always go, but when he does, the results show that his health is declining. He doesn't always take his medication and he doesn't make recommended lifestyle changes. The cardiologist that he visits for his heart condition a couple of times a year doesn't know which tests he has taken or the results, so tests are sometimes duplicated. This man's health is out of control and it is likely that he will end up in the emergency room.	The patient is referred to the Care Coordination Program (CC) for special attention, and the regional nurse and social worker get in touch with him. Because they know his doctor and community he agrees to participate in the program. They work with the patient and both his doctors to develop a collaborative plan for managing his conditions. Because lab data is available electronically through the statewide health information exchange, with the patient's consent they can easily follow up to ensure that the patient has taken tests when they were ordered, and they can monitor the results. Both doctors get the results so there is no duplication and they can make better care decisions. The CC employees refer the patient to the local Healthy Living Workshop where he improves his self-management skills. Information about the patient's health status and education are available to the patient on-line. A health crisis is avoided and health dollars were spent appropriately.

Stakeholders: Patient, private practice, ancillary services (labs), government, payer
Project: Medication Pilot, CCIS, HIEN
Phase: Early
Key Infrastructure: Integration Engine, MPI, Patient Locator Service, Document Locator Service/Data Service, Medication Search Service, Terminology Service, Provider Portal, Patient Portal, CCIS DMS, Security Service

6. A woman with dementia is confined to an assisted living facility. Because she also suffers from a variety of other ailments, she requires frequent tests and treatment from a variety of providers and facilities. The facility's care coordinator is responsible for managing her access to care and ensuring that her treatment plans are followed.

Today	VHITP Vision
The care coordinator, who is responsible for twenty to thirty residents, maintains extensive paper files which include documentation of legal authority to speak on behalf of the patient and information about diagnoses and care plans. Most of the day is spent on the telephone juggling appointments, permissions, and transportation. Appointments are often missed through miscommunication or confusion among the care coordinator, the transportation service, and the providers. An already disoriented patient is away from familiar surroundings for hours. Costly staff time is wasted waiting for arrangements to be made.	The care coordinator is given proxy access to the resident's electronic Personal Health Record where a consolidated medical record can be viewed. Alerts and triggers are set up for future events, conditions, or activities. The Personal Health Record documents the patient's set of providers and the consent profile associated with each, making it easy for the care coordinator to e-mail the right provider, or to initiate a request for an appointment and get an electronic response. The coordinator can also access the facility's transportation schedule to ensure appropriate transportation for each resident. The care coordinator's activities are more streamlined and efficient, allowing the management of more client needs in the same amount of time and ensuring a more comforting experience for the residents.

Stakeholders: Patient, private practice, ancillary services (labs), government, payer
Project: Medication Pilot, CCIS, HIEN
Phase: Middle
Key Infrastructure: Integration Engine, MPI, Patient Locator Service, Document Locator Service/Data Service, Medication Search Service, Terminology Service, Patient Portal, CCIS DMS, Security Service

7. A new combination childhood vaccine is introduced and the previous vaccines are no longer provided by the statewide Vaccines for Children program. A four-year old child who began her series with the older vaccines has come in for a well child visit and the nurse must assess whether the child's immunizations are up-to-date.

Today	VHITP Vision
The nurse looks at the chart and consults an American Academy of Pediatrics "cheat sheet" to see if the child is up-to-date. The "cheat sheet" only covers the old vaccines, however, meaning that the nurse must individually evaluate the antigens in the new vaccine to be sure that each series is up to date. Risk is real that the child will be either over-immunized, resulting in unnecessary cost and risk of an adverse event, or under-immunized and at risk for an infectious disease.	Before the child's visit, the nurse uses the practice's EMR to determine which immunizations are needed. The EMR provides accurate information each time because it consults electronically with the statewide immunization information system (IIS) to access its forecast algorithm and to update the EMR database with any new immunization information. The EMR's automated inventory system manages the vaccine lots in-hand to ensure that the most appropriate lot (e.g., closest to expiration) is used, and supplies are ordered based on projected need. Vaccine inventory is fresh, waste is minimized, and the child is properly immunized.

Stakeholders: Patient, private practice, government, payer
Project: VIR
Phase: Middle
Key Infrastructure: Integration Engine, MPI, Immunization Information System, Immunization Forecast Service, Provider EMR

8. An otherwise healthy patient has blood drawn and sent to the lab for routine work-up during an annual physical.

Today	VHITP Vision
The results of the blood work-up are mailed or faxed back to the primary care physician along with many other lab reports for other patients. Some miscommunication may occur. There may be a delay in notifying patients of lab test results, values out of normal ranges may not be flagged, or some results may be misplaced, requiring tests to be done again. A patient may seek care from another physician or at another hospital, and if the initial lab test results are not readily available, the work may have to be redone.	With the patient's consent, the results from the lab are electronically sent back to the physician's EMR through the statewide health information exchange. The physician's EMR screens the incoming lab test and determines that the patient's cholesterol level is indeed too high. Past lab test results are also available in the EMR for comparison and trend analysis. The physician and nurse receive an alert in the EMR's messaging sub-system which indicates that follow-up with the patient is necessary. An e-mail message is also sent to the patient instructing him to contact the physician. Unnecessary repeat tests are avoided, and the quality of the patient's care is improved.

Stakeholders: Patient, private practice, ancillary services (labs), payer
Project:
Phase: Middle
Key Infrastructure: Integration Engine, MPI, Patient Locator Service, Document Locator Service/Data Service, Terminology Service, Security Service, Provider EMR

9. An adult patient visits his primary care physician complaining of flu-like symptoms. It's a busy day, so the physician performs a "brief" visit which entails administering a quick strep test, listening to the patient's lungs, and discussing other symptoms.

Today	VHITP Vision
Progress notes are recorded on the paper chart to indicate what was said by the patient, the physician's diagnosis, and the treatment plan. The patient brings the chart to the front desk where it is examined briefly by the nurse who collects the co-payment and places everything in a pile to be processed by the billing clerk. The billing clerk uses the practice management system to determine the appropriate ICD-9 and CPT codes and adds this claim to the batch to be sent electronically to the patient's insurance company. The claim is rejected because the insurance company determines there was an error in the ICD-9 code. The notice of rejection is received on paper five weeks after the claim was submitted. The billing clerk tries to find the right code but can't figure out what is wrong. The claim is put aside until a nurse has a spare moment to help. Revenue is delayed. Medical personnel are diverted from patient care to administration.	The patient's chief complaint is entered in the EMR before being taken to the examination room. As the doctor is meeting with the patient, the nurse is accessing the patient's EMR record from the examination room. Based on initial information entered, pick lists within the EMR application put relevant diagnosis and treatment choices towards the top. During the examination the nurse chooses the appropriate elements from the prepared lists. The EMR automatically assigns the right ICD-9 and CPT codes to the encounter record. The EMR also completes a real-time check for insurance eligibility. Overnight, the EMR will assemble this record with others destined for the patient's insurance company, and submit the claims electronically for processing. The risk of rejection is lower since the EMR knows precisely what combination of codes is necessary.

Stakeholders: Patient, private practice, payer
Project:

Phase: Middle
Key Infrastructure: Integration Engine, MPI, Patient Locator Service, Document Locator Service, Terminology Service, Security Service, Provider EMR

10. An older patient with coronary disease is prescribed several medications which work together to keep the individual's condition under control. The elderly patient finds it difficult to understand and stick to the prescription regimen.

Today	VHITP Vision
The physician provides a paper prescription to the patient and hopes they will get it filled and take the medication as prescribed. When the patient returns for a periodic check-up, the physician asks whether the patient has been diligent about filling the prescriptions and taking the medicine. The patient may not accurately remember or report what has been happening.	The physician uses the EMR's ePrescribing capability to send electronic prescriptions directly to the patient's pharmacy, and receives electronic confirmation as prescriptions (and refills) are filled. The EMR tickler system warns the physician if a prescription refill is due but not completed and the physician sends reminders (electronic, paper, or automated telephone) to the patient. The patient completes a periodic survey on their electronic Personal Health Record which reinforces proper compliance habits. Survey data is sent to the physician so they can determine whether further follow-up is needed. Electronic monitoring mitigates the risk of incorrect dosage, and results in a higher level of compliance, fewer unnecessary prescriptions, and less patient confusion.

Stakeholders: Patient, hospital, private practice, ancillary services (pharmacy, labs), payer
Project: Medication Pilot, CCIS
Phase: Middle to Late
Key Infrastructure: Integration Engine, MPI, Patient Locator Service, Document Locator Service/Data Service, Medication Search Service, CCIS DMS, Security Service, Provider EMR, Patient Portal

11. The primary care physician refers a patient to a urologist for care of a persistent infection. The patient wants to be sure that no references to past substance abuse or mental health services are included in the referral documentation.

Today	VHITP Vision
The nurse in the primary care physician's office provides the patient with contact information for the specialist and a paper insurance referral form. The patient is instructed to contact the specialist for an appointment within a proscribed time period. The patient's paper medical record is photocopied - including free-text progress notes and lab tests. Redacting or excluding information is a manual process and time consuming. Once ready, the record is given to the patient in a sealed envelope to bring to the specialist. The nurse hopes the patient will schedule the appointment and that the results of the specialist visit will be FAXed to the PCP or hand delivered by the patient. Follow-up by the PCP is not likely to occur unless the patient takes the initiative.	While on the phone with the patient, the nurse in the primary care physician's office uses the EMR to electronically request an appointment with the specialist. The appointment is scheduled in real time and entered in the "tickler" file of the EMR. Required insurance authorization is electronically requested and received. The nurse asks the patient whether any information should be withheld from the specialist and sets EMR privacy flags accordingly. Appropriate pieces of the patient's medical records are assembled into a composite record and sent electronically to the specialist's EMR through the statewide health information exchange. The patient is sent reminders (electronic, paper, or automated telephone) about the scheduled appointment. After the visit with the specialist, an update is electronically returned to the primary care physician. The nurse is prompted by the EMR to schedule a follow-up visit with the patient. Electronic processing and tracking of appointments and associated records results in fewer missed referrals and better follow-up by the PCP.

Stakeholders: Patient, private practice, payer
Project:
Phase: Late
Key Infrastructure: Integration Engine, MPI, Patient Locator Service, Document Locator Service/ Data Service, Terminology Service, Security Service, Provider EMR

12. A diabetic patient visits his or her primary care physician complaining of weakness in arms and legs.

Today	VHITP Vision
The patient enters the practice and is given a clip board with forms to fill out. Much of the requested information is already known by the practice because the patient has filled out the same forms on prior visits. The patient can't recall all the medications prescribed and being taken. During the examination, the patient remembers that two months ago s/he visited an outpatient clinic unaffiliated with this practice, but does not remember the exact diagnosis or treatment plan. The physician has no knowledge of tests that were completed at the clinic and the patient is uncertain. The physician has no choice but to order additional, possibly duplicative, tests so that the patient's condition can be determined.	With the patient's consent, the primary care physician's EMR requests updated patient records from the Statewide health information exchange before the scheduled visit. The patient is asked to validate information printed from the EMR, including medication information from the pharmacy clearinghouse and lab results. In addition, the patient's Statewide Personal Health Record contains blood sugar level readings uploaded automatically from a household device used by the patient. Duplicate tests are avoided and the PCP has additional information.

Stakeholders: Patient, private practice, payer
Project:
Phase: Late
Key Infrastructure: Integration Engine, MPI, Patient Locator Service, Document Locator Service/ Data Service, Terminology Service, Security Service, Provider EMR

13. A patient moves to a neighboring state and needs to get her medical records from her prior primary care physician and other medical providers.

Today	VHITP Vision
The patient telephones the former primary care provider and requests a copy of all medical records. The medical records assistant insists on seeing a signed, written release before records are photocopied and held for pick-up or mailed to the patient's new address. The patient goes through the same process with each medical provider. Navigating complex systems, like hospitals, to gather records is difficult and confusing. The patient is so overwhelmed that she decides not to bother getting her hospital records.	Through the patient portal, the patient authorizes a new physician to request and receive records for the patient. The new provider's EMR requests records from the provider's local health information exchange but specifies that the records are found at a remote health information exchange network. The new provider's health information exchange network routes a request to the patient's old health information exchange network and, because the patient has authorized it in advance, collects and sends any medical records found to the new provider.

Stakeholders: Patient, hospital, private practice, ancillary services (pharmacy, labs), payer
Project: Medication Pilot
Phase: Late
Key Infrastructure: Integration Engine, MPI, Patient Locator Service, Document Locator Service/ Data Service, Medication Search Service, Patient Portal, Security Service, Provider EMR, RHIO in neighboring state

14. A patient is concerned about how her medical records might have been disclosed to others by her care providers and asks for an accounting of all such record transfers.

Today	VHITP Vision
A medical records specialist picks through the patient's paper medical record for documentation about disclosure of medical records to a third party, and compiles a report for the patient. Similar research must be done at each and every care setting. Costly staff time is diverted from other tasks. The patient must personally track each request and endeavor to understand the resulting reports which will be in different forms and formats.	Through the patient portal, the patient queries her Personal Health Record and views an electronic audit trail of all system users who accessed the data through the HIEN. She can quickly focus on suspected inappropriate access and contact those users directly. Provider's save the time and expense of compiling reports and can focus on exceptions when alerted by the patient.

Stakeholders: Patient, hospital, private practice, ancillary services (pharmacy, labs), payer
Project: Medication Pilot, HIEN
Phase: Late
Key Infrastructure: Integration Engine, MPI, Patient Locator Service, Document Locator Service/Data Service, Medication Search Service, Patient Portal, Security Service

15. Twenty individuals who live over a fairly wide geographic area have reported serious stomach ailments to their family physicians, health clinics, and pediatricians. Three individuals have presented at hospital emergency rooms in serious pain. Blood tests performed at the hospital labs confirm the presence of E. Coli.

Today	VHITP Vision
The hospitals report the lab results via FAX to the health department in their jurisdiction. In the next few days, five more people are tested by physicians and lab results confirm reports of E. Coli. By the end of the following week these reports are FAXed to local health departments. After two weeks, the State health department has received most of the reports via FAX and can begin to piece together what has happened. Investigation indicates that several shipments from an out-of-state produce grower were tainted with E. Coli bacteria. These shipments were sent to more than a dozen grocery stores in the metropolitan area. By this time, most of the produce has been sold or discarded.	As soon as lab tests show positive results for E. Coli, the test and patient information is simultaneously forwarded to the submitting hospital or physician, the case management system of the appropriate local health department, and the case management system of the State health department. The investigation begins immediately. Alerts are sent by e-mail to state epidemiologists who plot cases by the location of the healthcare provider and the patient's home address. A cluster of cases is quickly identified and additional data is solicited from healthcare providers in the area. Within a short period of time it is discovered that tainted produce is the cause and it can be removed from stores in time to keep other people from getting sick.

Stakeholders: Government, patient, hospital, private practice, ancillary services (labs)
Project: Public Health Surveillance/PHIN/NEDSS
Phase: Middle
Key Infrastructure: Integration Engine, MPI, Patient Locator Service, Document Locator Service/Data Service, Medication Search Service, Terminology Service, Provider Portal, Patient Portal, Security Service, State Disease Surveillance System

16. Workers in a suburban office building have complained of chronic headaches and the flu for months. An astute supervisor mentions this to the human resources manager who alerts the local health department. There is no readily apparent cause for the symptoms or a good understanding of who is affected. An investigation begins.

Today	VHITP Vision
Health department epidemiologists begin to interview workers and collect data about symptoms and treatments. It is difficult to assemble medical records related to this situation because it is an extra step for the patients. Over a long period of time the health department builds a comprehensive picture of the symptoms and investigates several possible causes related to the building's infrastructure.	With the workers' permission, health department epidemiologists assemble available medical data for the affected (and unaffected) workers through the statewide health information exchange. They quickly observe patterns in the data, develop working hypotheses about the cause of the symptoms, and implement action plans to rectify the situation. Availability of this electronic information in a timely manner reduces the financial impact on the businesses in the building and allows epidemiologists to focus on possible causes and solutions with less staff time.

Stakeholders: Government, patient, hospital, private practice, ancillary services (labs, pharmacies)
Project: Public Health Surveillance/PHIN/NEDSS, HIEN
Phase: Middle
Key Infrastructure: Integration Engine, MPI, Patient Locator Service, Document Locator Service/Data Service, Medication Search Service, Terminology Service, Security Service, State Disease Surveillance System

17. Rising flood waters cause residents and businesses to quickly leave their present premises and relocate to temporary or shared quarters, some of which are out of state. Because of the speed with which events unfold there is little time to pack and remove medical records which are critical to ongoing and future patient care.

Today	VHITP Vision
Some paper-based provider records are temporarily inaccessible. Many are severely damaged or destroyed. Patients and providers must attempt to reconstruct events from records held at ancillary facilities (e.g., labs, pharmacies) or larger facilities that were better protected (e.g., hospitals). This takes a lot of time and results in inaccurate conclusions based on incomplete data, or costly retesting and re-examination.	Almost all patient records captured in EMRs at provider sites survive the flood. They were less susceptible to loss or damage from natural disaster because their physical container is more durable (electronic storage versus paper) and records are typically backed up at another location or in an easily portable format (disk or tape image is compact and portable versus photocopy of paper records). Electronic records stored at an alternate location are available for redeployment. In this case, the HIEN gave providers (large and small) a place to send medical records electronically for back-up storage even if they are not shared with other providers. Personal health records stored centrally by the HIEN and available on-line to patients also helped speed up access to records. The quality of patient care is maintained because data is complete and unnecessary re-testing and re-examination is avoided.

Stakeholders: Patient, hospital, private practice, ancillary services (labs, pharmacies), payers
Project: HIEN
Phase: Middle
Key Infrastructure: Integration Engine, MPI, Patient Locator Service, Document Locator Service/ Data Service, Provider Portal, Patient Portal, Security Service

APPENDIX D:
VERMONT TITLE 3, CHAPTER 45, 3 V.S.A § 2222A

Title 3: Executive
Chapter 45: ADMINISTRATION
3 V.S.A. § 2222a. Health care system reform;
improving quality and affordability

TITLE 3
Executive
PART II
Executive Reorganization
CHAPTER 45. ADMINISTRATION

Subchapter II. Secretary

§ 2222a. Health care system reform; improving quality and affordability

(a) The secretary of administration shall be responsible for the coordination of health care system reform initiatives among executive branch agencies, departments, and offices.

(b) The secretary shall ensure that those executive branch agencies, departments, and offices responsible for the development, improvement, and implementation of Vermont's health care system reform do so in a manner that is timely, patient-centered, and seeks to improve the quality and affordability of patient care.

(c) Vermont's health care system reform initiatives include:

(1) The state's chronic care infrastructure, disease prevention, and management program contained in the blueprint for health established by chapter 13 of Title 18, the goal of which is to achieve a unified, comprehensive, statewide system of care that improves the lives of Vermonters with or at risk for a chronic condition or disease.

(2) The Vermont health information technology project pursuant to section 903 of Title 22.

(3) The multi-payer data collection project pursuant to section 9410 of Title 18.

(4) The common claims administration project pursuant to section 9408 of Title 18.

(5) The consumer price and quality information system pursuant to section 9410 of Title 18.

(6) Any information technology work done by the quality assurance system pursuant to section 9416 of Title 18.

(7) The public health promotion programs of the agency of human services.

(8) Medicaid, the Vermont health access plan, Dr. Dynasaur, premium assistance programs for employer-sponsored insurance, VPharm, and Vermont Rx, which are established in chapter 19 of Title 33 and provide health care coverage to elderly, disabled, and low to middle income Vermonters.

(9) Catamount Health, established in section 4080f of Title 8, which provides a

comprehensive benefit plan with a sliding-scale premium based to uninsured Vermonters.

(10) The uniform hospital uncompensated car policies.

(d) The secretary shall report to the commission on health care reform, the health access oversight committee, the house committee on health care, the senate committee on health and welfare, and the governor on or before December 1, 2006 with a five-year strategic plan for implementing Vermont's health care system reform initiatives, together with any recommendations for administration or legislation. Annually, beginning January 15, 2007, the secretary shall report to the general assembly on the progress of the reform initiatives.

(e) The secretary of administration or designee shall provide information and testimony on the activities included in this section to the health access oversight committee, the commission on health care reform, and to any legislative committee upon request. (Added 2005, No. 191 (Adj. Sess.), § 3; No. 215 (Adj. Sess.), § 342a.)

APPENDIX E:
REGIONAL AND LOCAL HEALTH INFORMATION ORGANIZATIONS

HIT and RHIO activity in surrounding states will impact Vermont at the border points where patients and services may overlap. Some RHIO initiatives envision plans to deploy across multiple states or conduct business regionally. VITL members have been participating in HIT conferences in NH and recently in Boston to promote information sharing and lessons learned. The following is a review of RHIO/HIE activities in states neighboring or bordering Vermont:

Massachusetts, an early entrant into RHIO activity with multiple sources of foundation, health plan and government funding may be farthest ahead in infrastructure and governance. It already had the Massachusetts Health Data Consortium which collaborated in the first Markle Foundation report on Connecting Communities for Better Health. The leaders of its pre-eminent health institutions serve on national committees such as the Healthcare Information Technology Standards Panel (HITSP). Its MedsInfo-ED patient safety initiative to automate the transmission and communication of medication history to emergency departments is instructive to the VITL pilot. In all, the state has 11 AHRQ-funded projects; two projects funded by Bridges to Excellence, a non-profit quality organization; one project sponsored by the Doctor's Office Quality - Information Technology (DOQ-IT) program, a national initiative promoting EHRs, six HIEs, two RHIOs, and nine state funded initiatives.[111] In MA, the management of patient consent has been the overriding issue, even more challenging than the technology.[112] While MA has a mature governance structure, they have not started to exchange information, and they warn that even when the EHR software and services are given to providers, deployment schedules are often vastly underestimated.

During the past two years, **New Hampshire** has established a number of forums and organizations to promote health IT and HIE around the state including the New Hampshire Health Information Center,[113] a collaboration which includes the NH Medicaid program and which performed an EMR survey and prepared a NH Connects for Health briefing paper.

"New Hampshire and the eHealth initiative are working on the New Hampshire Health Care Interconnectivity Project to create a road map for a statewide health information sharing network leading toward a safer, higher quality health care system. The primary deliverables for this work are shared vision for health information exchange in New Hampshire, an assessment of the current HIT adoption and capabilities in the state by all stakeholders, identification of barriers and opportunities specific to New Hampshire, and an examination of the cost/benefit from HIE and potential sustainable model for HIE in New Hampshire."[114]

The Governors Citizen's Health Initiative at the University of New Hampshire received a $350,000 grant from the U.S. Department of Health and Human Services to assist with the effort to create statewide electronic medical record system. New Hampshire held a second summit for NH Connects for Health in June, 2006[115] which centered on HIE and the potential for New Hampshire's health community to link together to realize system savings and enhanced quality of care for all NH residents of NH. Attendees learned about the local initiatives in NH promoting health information exchange and also heard from initiatives currently underway throughout the other New England states. Like Vermont and other states, Governor John Lynch announced that New Hampshire has entered into a subcontract through the U.S. Department of Health and Human Services to address privacy and security policy questions affecting electronic clinical information-sharing. Their final assessment and solutions are posted in the NHHIC website along with the other products and projects. Governor Lynch also highlighted the NH Interconnectivity Project objectives, activities and measures for improving health care through information and information technology. New Hampshire has formed the NH Citizens Health Initiative to work on policy initiatives and provide a citizen information site.[116]

At the end of 2006, Dartmouth Hitchcock Medical Center in Hanover, N.H. joined with athenahealth Inc. (Watertown, MA), and tested the Web-based athenaNet platform for tracking and monitoring of 100 patients over a wide geographic area in the event of pandemic or natural emergency.[117] The November 15, 2006 disaster exercise was staged to make sure that real patients could be identified, treated and tracked during an area emergency—and even that the cost of care rendered could be captured for later reimbursement purposes—via a centralized database available to first responders. The test used the vendor's new Web-based EMR service athenaClinicals, and depending on assessment of its success, it could become the foundation for a new emergency medical response platform for Maine, Vermont and New Hampshire. NH also has, "'a good shot' at becoming the first state with all of its physicians, clinics and hospitals using electronic prescription systems."[118] It is interesting that both in Massachusetts and New Hampshire where EMR software is supplied and/or widely adopted, its use does not automatically interoperate or provide the required features to function in the HIE.

New Hampshire residents beginning March 1, 2007 will be able to access online cost estimates, based on insurance claims data, for common procedures and tests at facilities across the state, the New Hampshire Union Leader reports. New Hampshire's HealthCost Web site was jointly created by the state's health and insurance departments. The state since 2005 has required insurance carriers and third-party administrators to submit claims data for all members covered by policies issued in New Hampshire. Maine and New Hampshire are the only two states to require such information, and New Hampshire will be the first to make the data available to the public. Uninsured residents also will be able to use the site to compare out-of-pocket costs for medical services. The HealthCost Web site will be updated quarterly.

New York State has also collaborated with the eHealth Initiative to assist in the development of HIE/HIT strategies in collaboration with a number of ongoing projects in the state, via a summit series and direct engagement of eHi staff:

"The overarching goal of the work of the New York State HIT Summit series has been to engage New York State public policy officials and key stakeholders in the healthcare and business communities in the development of strategies to improve healthcare through health information technology and health information exchange. Other New York regional health information exchange projects have also engaged eHi to assist in their journey of planning for health information exchange and helping them in developing a vision for health information exchange and facilitating the development of an organizational governance model and task group structures."[119]

Key to the New York activities is the establishment of a capitalized technology fund, NY HEAL, which has awarded and continues to award competitive grants to local initiatives in New York City and throughout the state ensuring a geographic mix and giving special status to projects which include safety net providers. NY HEAL funding phases are for expansion and deployment of current projects not to new ones. New York has a mature private initiative; the Taconic Independent Practice Association (IPA) in Fishkill which was initially AHRQ funded which provides a model for physician management of a shared EHR enterprise. HIMSS reports that NY has four AHRQ-funded initiatives, one Bridges to Excellence project, one DOQ-IT, twenty-four HIEs, eight private HIT initiatives, four RHIOs and eleven state initiatives, of which the capitalized fund is the major one. Like Vermont, and New Hampshire, New York enjoys leadership from the new governor, and legislature and has significant department of health and Medicaid Program collaboration. NY Medicaid participates in eRX which provides data to providers, plans, and RHIOs.[120]

Other non-bordering New England states such as Maine, Connecticut and Rhode Island have varying degrees of RHIO and HIEN activity. **Rhode Island** has an AHRQ grant for a statewide RHIO, and two HIEs. The Rhode Island legislature has authorized a $20 million bond to establish a statewide repository of electronic health records and is developing a Master Patient Index (MPI) to facilitate interoperability and sharing patient data between public and private health care sectors. This RFP is in the process of being awarded. Rhode Island leads all states in e-prescribing, but has not yet exchanged any data.[121]

Like Vermont, **Maine** has a Chronic Care Technology Planning Project. It has a grant for improving care in a rural region with consolidated imaging records is funded by AHRQ. Maine has five state initiatives including MHINT, which seeks to establish a statewide electronic health record sharing system to begin implementation in 2007 with a 2010 completion date. Maine's *HealthInfoNet* delivery model is based on a clinical data repository (CDR) with the continuity of care record (CCR) data standard as the foundation for the EHR. Its financial model is based on initial user contributions for the demonstration model but is expected to change to a revenue model based on a set of services: prescription medication management, e-prescribing and medication reconciliation; clinical messaging/secure messaging; Maine CDC&P mandated surveillance reporting; statewide, standardized disease management system and registry (new function); and clinical quality and performance reporting (new function).[122]

For Vermont, the concurrent statewide activities in ME, NH, RI and MA can serve as models or learn from Vermont as they have similar challenges, whereas the activities in NH and NY can inform specific types of deployments as well as conduct HIE across state boundaries for patients and services as well as for disease surveillance and preparedness activities that are interstate. Different areas of health focus such as patient safety, cost and quality data, or "low hanging fruit" such as e-prescribing or clearing house services are of particular interest. The heavy role of Medicaid programs in New York and New Hampshire, the use of the state university as convener, the methods of engaging and informing the public and the solutions to privacy and consent challenges and provider adoption and use of EHR technology provide useful models.

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[111] Project statistics on state initiatives based on: Healthcare Information and Management Systems Society (HIMSS), "HIT Dashboard," accessed 18 Dec. 2006, <http://www.hitdashboard.com>.

[112] See John Hamalka and Micky Tripathi, "The School of Hard Knocks: Lessons from the Field," HIMSS/eHealth Initiative Connections Communities Regional Forum, Boston, MA, May 10, 2007. <http://www.himss.org/HIEForums/agenda_boston.asp>

[113] See http://www.nhhic.org/index.html

[114] eHealth Initiative, "Programs: eHealth Initiative's Technical Assistance to States and Regions: New Hampshire," accessed 18 Dec. 2006 <http://www.ehealthinitiative.org/initiatives/programs/aboutstatesummit.mspx>.

[115] See http://www.nhhic.org/conference.html

[116] See http://www.steppingupnh.org/

[117] "Industry Watch," Health Management Technology, Dec. 2006, p. 6.

[118] See Marianne Kolbasuk McGee, "BRIEF: NEW HAMPSHIRE AIMS FOR PERFECTION ON E-PRESCRIPTIONS," InformationWeek, October 30, 2006. <http://www.informationweek.com/news/showArticle.jhtml?articleID=193500056>

[119] eHealth Initiative, "Programs: eHealth Initiative's Technical Assistance to States and Regions: New York," accessed 18 Dec. 2006 <http://www.ehealthinitiative.org/initiatives/programs/aboutstatesummit.mspx>.

[120] See Rachel Block, Comprehensive Models Required for Sustainable HIT and HIE Models- a New York State Study, HIMSS/eHealth Initiative Connections Communities Regional Forum, Boston, MA, May 10, 2007.

[121] See Laura Adams, "The School of Hard Knocks: Lessons from the Field," HIMSS/eHealth Initiative Connections Communities Regional Forum, Boston, MA, May 10, 2007.

[122] See Dev Culver, "Roadmap for Sustainability," HIMSS/eHealth Initiative Connections Communities Regional Forum, Boston, MA, May 10, 2007.

APPENDIX F:
RESULTS FROM CONSUMER SURVEY

Conducted by Market Decisions (Portland, Maine), April 2007.

Q1 What is your opinion about putting all health care information into an electronic form? Would you say…

Choice	Responses	Percentage
It is a good idea, and I see no problems with it	163	33%
It might be a good idea, but I have some concerns	294	59%
It is a bad idea & should not be done	32	6%
Don't Know	11	2%
Total	**500**	**100%**

Q2 What are the main reasons you feel that storing health information in electronic form on computers is a good idea?

Choice	Responses	Percentage
Easier to retrieve data, easier to access data	119	73%
More secure than paper records, easier to protect information	22	14%
Results in better care, doctor have better or more up to date information	47	29%
Environmental, less paperwork	11	7%
Save on storage space	4	2%
Cost savings	3	2%
Easier for doctors, hospitals to share information	9	6%
Modern, up to date technology	4	3%
Other reason	11	7%
No reason in particular	3	2%
Total	**163**	**100%**

Q3 What are your main concerns about storing health information in electronic form on computers?

Choice	Responses	Percentage
Not as secure as paper records, harder to protect data	134	46%
Data could be lost, computer problems, electronic records not permanent like paper	84	28%
Data could be more easily misused, unauthorized people may get access	159	54%
Privacy, confidentiality	45	15%
Cost, expense	1	0%
Need backup, paper or other	11	4%
Human error, wrong data entered	5	2%
Other reason	15	5%
Don't Know	1	0%
No reason in particular	5	2%
Total	**294**	**100%**

Q4 What are the main reasons you feel that storing health information in electronic form on computers is a bad idea?

Choice	Responses	Percentage
Not as secure as paper records, harder to protect data	10	31%
Data could be lost, computer problems, electronic records not permanent like paper	7	21%
Data could be more easily misused, unauthorized people may get access	24	75%
Privacy, confidentiality	3	10%
Need backup, paper or other	1	2%
Other reason	3	10%
Total	**32**	**100%**

Q5 What is your opinion about the EXCHANGE of health information by health care providers in a form that is stored electronically on computers?

Choice	Responses	Percentage
It is a good idea, and I see no problems with it	236	47%
It might be a good idea, but I have some concerns	222	44%
It is a bad idea and should not be done	29	6%
Don't Know	13	3%
Total	**500**	**100%**

Q6 What are the main reasons you feel that exchanging electronic health information on computers is a good idea?

Choice	Responses	Percentage
Doctors will have more data, more up to date information	103	43%
Easier to move info around, easier to transfer between health care providers	111	47%
More secure than other methods, passwords, prevent unauthorized access	11	4%
Saves time, quicker access to information, doctors can get information quicker	114	48%
Greater accuracy	11	5%
Environmental, less paperwork	2	1%
Cost Savings	1	1%
Modern, up to date technology	2	1%
Better care, benefits	14	6%
Other reason	7	3%
No reason in particular	4	2%
Total	**236**	**100%**

Q7 What are your main concerns about exchanging electronic health information on computers?

Choice	Responses	Percentage
Untrustworthy or unauthorized health care workers might have access	51	23%
Hackers might get access, despite security safeguards, data might be stolen	97	44%
Employers might use access to discriminate, use in hiring, firing	9	4%
Insurers might misuse access, discriminate against people, refuse to insure	22	10%
May not want doctors to see all information	34	15%
Better care, benefits	1	1%
Privacy, confidentiality	28	13%
Cost, expense	2	1%
Need backup, paper or other	1	0%
Human error, wrong data entered	2	1%
Authorization of patient a must	30	14%
Computer problems, glitches	8	3%
Do not like the sharing aspect of it	2	1%
Other concerns	2	1%
No reason in particular	6	3%
Don't Know	1	0%
Total	**222**	**100%**

Q8 What are the main reasons you feel that exchanging electronic health information on computers is a bad idea?

Choice	Responses	Percentage
Untrustworthy or unauthorized health care workers might have access	7	22%
Hackers might get access, despite security safeguards, data might be stolen	11	39%
Employers might use access to discriminate, use in hiring, firing	0	2%
Insurers might misuse access, discriminate against people, refuse to insure	1	5%
May not want doctors to see all information	11	36%
Privacy, confidentiality	3	9%
Cost, expense	1	2%
Authorization of patient a must	1	2%
Computer problems, glitches	2	6%
Do not like the sharing aspect of it	1	4%
Total	**29**	**100%**

Q9 What if the information was protected by password, the information was only accessible on a secure computer network, AND information could only be exchanged between health care providers and no one else. Then, what would be your opinion about the exchange of health information by health care providers in a form that is stored electronically on computers?

Choice	Responses	Percentage
Given these conditions, it is a good idea, and I see no problems with it	82	33%
It might be a good idea, but I have some concerns	139	55%
It is a bad idea and should not be done	28	11%
Don’t know	2	1%
Refused	1	0%
Total	**251**	**100%**

Q10 Which of the following statements BEST reflects your opinion about who should have access to your electronic medical records:

Choice	Responses	Percentage
It is important for all the doctors or nurses taking care of me to have full access to my records	155	31%
It is important FOR ME to decide which doctors or nurses can see my full medical information	71	14%
Critical information such as lists of my allergies, medications, and medical problems should be available to all doctors or nurses taking care of me, but I should decide who can see the rest of my medical records	256	51%
Don't Know	17	3%
Refused	1	0%
Total	**500**	**100%**

Q11 What about if you were unconscious or your life was in danger? Then, should physicians and nurses taking care of you be able to access ALL of your electronic medical records, even without your permission?

Choice	Responses	Percentage
Yes	197	57%
Yes, with qualifications	99	29%
No	38	11%
Don't Know	8	2%
Refused	2	1%
Total	**345**	**100%**

Q11a What qualifications would you have?

Choice	Responses	Percentage
Privacy, confidentiality	5	5%
Computer problems, glitches	1	1%
Do not like the sharing aspect of it	2	2%
Access should be limited	18	18%
Next of Kin, POA, HCP to decide	27	27%
Living will should be checked	10	10%
Other	33	33%
Don't Know	4	4%
Total	**99**	**100%**

Q12 How comfortable would you be participating in an electronic medical records system? Would you say…

Choice	Responses	Percentage
Very comfortable	144	29%
Somewhat comfortable	278	56%
Not very comfortable	42	8%
Not at all comfortable	28	6%
Don't Know	7	1%
Total	**500**	**100%**

Q13 How comfortable would you be participating in an electronic medical records system if it is run by an independent, non-profit organization that is accountable to Vermont residents? Would you say…

Choice	Responses	Percentage
Very comfortable	84	17%
Somewhat comfortable	242	48%
Not very comfortable	91	18%
Not at all comfortable	65	13%
Don't Know	16	3%
Refused	2	0%
Total	**500**	**100%**

Q14 How comfortable would you be participating in an electronic medical records system IF it allowed you to get a list of all the persons who looked at your records and what pieces of information they looked at? Would you say…

Choice	Responses	Percentage
Very comfortable	223	45%
Somewhat comfortable	200	40%
Not very comfortable	36	7%
Not at all comfortable	38	8%
Don't Know	3	1%
Refused	1	0%
Total	**500**	**100%**

Q15 How interested would you be in using the internet to review your own electronic medical records?

Choice	Responses	Percentage
Extremely interested	209	42%
Somewhat interested	121	24%
Not very interested	56	11%
Not AT ALL interested	107	21%
Don't Know	6	1%
Total	**500**	**100%**

Q16 How interested would you be in adding information to your electronic medical records through a personal health record you create?

Choice	Responses	Percentage
Extremely interested	121	24%
Somewhat interested	151	30%
Not very interested	96	19%
Not AT ALL interested	118	24%
Don't Know	14	3%
Total	500	100%

Q17 How concerned are you about the security of electronic medical records compared to the current paper records?

Choice	Responses	Percentage
Very concerned	172	34%
Somewhat concerned	209	42%
Not very concerned	65	13%
Not AT ALL concerned	50	10%
Don't Know	4	1%
Total	**500**	**100%**

Q18 Which of the following statements BEST reflects your opinion about whether patients should be able to block health care providers from accessing their health information?

Choice	Responses	Percentage
I believe that patients should have control over which health care providers can access their health information EVEN if it means that health care providers may NOT have information they need to treat their patients	66	13%
I believe that health care providers should have full access to patient health information EVEN if it means that health care providers would have access to information that some patients may want to keep private	93	19%
I believe there needs to be a balance between patient privacy and the degree to which health care providers have access to health information about their patients	333	67%
Don’t know	5	1%
Refused	2	0%
Total	**500**	**100%**

Q19 Even though electronic medical records may improve patient care, not many doctors in Vermont currently have them, mainly because they are expensive. As a consumer, how likely would you be to pay between one and three dollars a month more on your health insurance premiums, if the money is used to buy electronic medical records systems?

Choice	Responses	Percentage
Very likely	84	17%
Somewhat likely	193	39%
Not very likely	60	12%
Not at all likely	115	23%
Do not have health insurance	36	7%
Don’t know	11	2%
Refused	2	0%
Total	**500**	**100%**

Q20 How likely do you think it is that an electronic medical records system will lead to better health care for Vermont residents? Would you say…

Choice	Responses	Percentage
Very likely	156	31%
Somewhat likely	230	46%
Not very likely	69	14%
Not AT ALL likely	27	5%
Don't Know	16	3%
Refused	1	0%
Total	**500**	**100%**

APPENDIX G:
RESULTS FROM PROVIDER SURVEY

Conducted by Market Decisions (Portland, Maine), May 2007.

Q1 Does your practice use electronic medical records? Would you say…

Choice	Responses	Percentage
Yes, all of our records are electronic	46	13%
Yes, part of our records are electronic and part are paper	65	18%
No, none of our patient records are electronic	247	69%
Total	**358**	**100%**

Q2 I am going to read a list of common functions for electronic medical records systems. After each one, please tell me if your practice is currently using that function.

Q2a Patient demographic information

Choice	Responses	Percentage
Yes	103	94%
No	7	6%
Total	**110**	**100%**

Q2b Orders for prescriptions

Choice	Responses	Percentage
YES	65	59%
NO	43	39%
Don't Know	2	2%
Total	**110**	**100%**

Q2c Orders for tests

Choice	Responses	Percentage
Yes	78	71%
No	32	29%
Total	**110**	**100%**

Q2d Viewing lab results

Choice	Responses	Percentage
Yes	95	86%
No	15	14%
Total	**110**	**100%**

Q2e Viewing imaging results

Choice	Responses	Percentage
YES	82	75%
NO	23	21%
Don't Know	5	5%
Total	**110**	**100%**

Q2f Viewing lab results

Choice	Responses	Percentage
Yes	104	95%
No	6	5%
Total	**110**	**100%**

Q2g Disease management

Choice	Responses	Percentage
YES	66	60%
NO	35	32%
Don't Know	9	8%
Total	**110**	**100%**

nQ3 What are these features?

Choice	Responses	Percentage
Billing	4	19%
Voice Recognition	1	5%
Health care features, records, reminders	6	29%
Email	1	5%
Reporting	1	5%
Prescriptions	1	5%
DSM, medical drug book	1	5%
In progress of implementing	3	14%
Other	2	10%
Unsure	1	5%
Total	**21**	**100%**

Q3 Are there any features in your electronic medical record system that have not been implemented or are turned off?

Choice	Responses	Percentage
YES	24	22%
NO	73	66%
Don't Know	13	12%
Total	**110**	**100%**

Q3a Why are these not being used?

Choice	Responses	Percentage
Need for training	2	19%
Some notes, records are in paper form, need paper copy	2	5%
Too difficult, cumbersome, complex	3	29%
No need	3	5%
Funding, cost	1	5%
Upgrading	2	5%
In process of implementing	4	5%
Other	2	14%
No particular reason	4	10%
Unsure	1	5%
Total	**24**	**100%**

Q4 What is the brand name of the electronic medical record software that your practice is using?

Choice	Responses	Percentage
Allscripts (Healthmatics)	6	5%
CPSI	17	15%
GE	3	3%
Med Tech	6	5%
Soapware	5	5%
Amicore	3	3%
MediTech	4	4%
A-4	6	5%
Practice Partner	6	5%
E-Clinical	4	4%
Next Gen	3	3%
Other	29	26%
Don't Know	18	16%
Total	**110**	**100%**

Q5 How did your practice finance its acquisition of the EMR?

Choice	Responses	Percentage
We pay a monthly subscription fee	6	5%
We purchased the software upfront	22	20%
Lease	9	8%
Hospital purchased	10	9%
Capital Acquisitions	6	5%
Other	7	6%
Don't Know	50	45%
Total	**110**	**100%**

Q6 Do you have a SEPARATE practice management system for billing?

Choice	Responses	Percentage
YES	49	45%
NO	53	48%
Don't Know	7	6%
Refused	1	1%
Total	**110**	**100%**

nQ6 What is the brand name of your management system for billing?

Choice	Responses	Percentage
CPSI	5	10%
SSIMED	6	12%
MD Navigator	2	4%
Meditech	7	14%
Allscript	4	8%
Other	14	29%
Don't Know	11	22%
Total	**49**	**100%**

Q7 Which of the following types of information does your practice management system exchange with the EMR?

Choice	Responses	Percentage
Patient Demographics	35	71%
Billing	24	49%
Scheduling	31	63%
None of these	12	24%
Total	**49**	**100%**

Q8 Is your practice using its electronic medical record system to exchange data with other health care organizations?

Choice	Responses	Percentage
Yes	59	54%
No	50	45%
Refused	1	1%
Total	**110**	**100%**

Q9 Which organizations are you exchanging data with?

Choice	Responses	Percentage
Hospitals	49	83%
Reference labs	24	41%
Other physician practices	45	76%
Diagnostic imaging center	26	44%
Pharmacies	20	34%
Other	5	8%
Refused	1	2%
Total	**59**	**100%**

Q10 Does your practice plan to acquire an electronic medical record system in the next 12 months?

Choice	Responses	Percentage
Yes	74	30%
No	156	63%
Don’t know	17	17%
Total	**247**	**100%**

Q11 Has your practice selected the EMR software that it will acquire in the next 12 months?

Choice	Responses	Percentage
Yes	41	55%
No	31	42%
Don’t know	2	3%
Total	**74**	**100%**

nQ11 What is the brand name of the EMR software your practice has selected?

Choice	Responses	Percentage
E Clinical Works	10	24%
Allscripts	20	49%
Other	8	20%
Don’t Know	3	7%
Total	**41**	**100%**

Q12 Which of the following statements best describes the level of discussions in your practice about an EMR, and the readiness of the practice to implement one?

Choice	Responses	Percentage
We've discussed it extensively and all agree we're ready	73	30%
We've discussed it somewhat, not everyone agrees	61	25%
We haven't discussed it much, many staff currently satisfied	74	30%
Have not discussed it	8	3%
Cost issue	9	4%
Need to be compatible with Hospital	4	2%
Discussed but not ready	3	1%
Discussed but all agree not ready to do it	1	0%
Other	9	4%
Don't Know	3	1%
Refused	1	0%
Total	**246**	**100%**

Q13 What is your practice's likely timeframe for implementing an EMR?

Choice	Responses	Percentage
One to two years	65	27%
Two to three years	39	16%
Three years or more	19	8%
We're uncertain	1	0%
We don't plan to use an EMR at this time	71	29%
Never	5	2%
Cost Issue	5	2%
Compatibility with hospital	5	2%
Less than 1 year	5	2%
Other	9	4%
Don't Know	21	9%
Total	245	**100%**

Q14 How does your practice plan to finance its acquisition of an EMR or how would your practice finance its acquisition of an EMR?

Choice	Responses	Percentage
We'll pay a monthly subscription fee	3	1%
We'll purchase the software upfront	47	19%
Lease	6	2%
Help from hospital	7	3%
Other	14	6%
Do not plan on acquiring EMR	79	32%
Don't Know	88	36%
Refused	1	0%
Total	**245**	**100%**

Q15 If a low-cost financing program for EMRs was available, how interested would your practice be in using it?

Choice	Responses	Percentage
Extremely interested	41	17%
Somewhat interested	54	22%
Not very interested	29	12%
Not AT ALL interested	71	29%
Don't Know	49	20%
Refused	1	0%
Total	**245**	**100%**

APPENDIX H:

VERMONT HEALTH INFORMATION TECHNOLOGY PLAN WORKGROUP MEMBERS

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APPENDIX I:
ACT 70 OF THE 2007 VERMONT GENERAL ASSEMBLY

NO. 70. AN ACT RELATING TO CORRECTIONS AND CLARIFICATIONS TO THE HEALTH CARE AFFORDABILITY ACT OF 2006 AND RELATED LEGISLATION. (Approved: June 5, 2007)

(H.229)

It is hereby enacted by the General Assembly of the State of Vermont:

* * * **VITL** * * *

Sec. 24. 22 V.S.A. § 903 is added to read:

§ 903. HEALTH INFORMATION TECHNOLOGY

(a) The commissioner shall facilitate the development of a statewide health information technology plan that includes the implementation of an integrated electronic health information infrastructure for the sharing of electronic health information among health care facilities, health care professionals, public and private payers, and patients. The plan shall include standards and protocols designed to promote patient education, patient privacy, physician best practices, electronic connectivity to health care data, and, overall, a more efficient and less costly means of delivering quality health care in Vermont.

(b) The health information technology plan shall:

(1) support the effective, efficient, statewide use of electronic health information in patient care, health care policymaking, clinical research, health care financing, and continuous quality improvements;

(2) educate the general public and health care professionals about the value of an electronic health infrastructure for improving patient care;

(3) promote the use of national standards for the development of an interoperable system, which shall include provisions relating to security, privacy, data content, structures and format, vocabulary, and transmission protocols;

(4) propose strategic investments in equipment and other infrastructure elements that will facilitate the ongoing development of a statewide infrastructure;

(5) recommend funding mechanisms for the ongoing development and maintenance costs of a statewide health information system, including funding options and an implementation strategy for a loan and grant program;

(6) incorporate the existing health care information technology initiatives in order to avoid incompatible systems and duplicative efforts;

(7) integrate the information technology components of the blueprint for health established in chapter 13 of Title 18, the global clinical record, and all other Medicaid management information systems being developed by the office of Vermont health access, information technology components of the quality assurance system, the program to capitalize with loans and grants electronic medical record systems in primary care practices, and any other information technology initiatives coordinated by the secretary of administration pursuant

to section 2222a of Title 3; and

(8) address issues related to data ownership, governance, and confidentiality and security of patient information.

(c)(1) The commissioner shall contract with the Vermont information technology leaders (VITL), a broad based health information technology advisory group that includes providers, payers, employers, patients, health care purchasers, information technology vendors, and other business leaders, to develop the health information technology plan, including applicable standards, protocols, and pilot programs. In carrying out their responsibilities under this section, members of VITL shall be subject to conflict of interest policies established by the commissioner to ensure that deliberations and decisions are fair and equitable.

(2) VITL shall be designated in the plan to operate the exclusive statewide health information exchange network for this state, notwithstanding the provisions of subsection (g) of this section requiring the recommendation of the commissioner and the approval of the general assembly before the plan can take effect. Nothing in this section shall impede local community providers from the exchange of electronic medical data.

(d) The following persons shall be members of VITL:

(1) the commissioner, who shall advise the group on technology best practices and the state's information technology policies and procedures, including the need for a functionality assessment and feasibility study related to establishing an electronic health information infrastructure under this section;

(2) the director of the office of Vermont health access or his or her designee;

(3) the commissioner of health or his or her designee; and

(4) the commissioner of banking, insurance, securities, and health care administration or his or her designee.

(e) On or before July 1, 2006, VITL shall initiate a pilot program involving at least two hospitals using existing sources of electronic health information to establish electronic data sharing for clinical decision support, pursuant to priorities and criteria established in conjunction with the health information technology advisory group.

(1) Objectives of the pilot program shall include:

(A) supporting patient care and improving quality of care;

(B) enhancing productivity of health care professionals and reducing administrative costs of health care delivery and financing;

(2) Objectives of the pilot program may include:

(A) determining whether and how best to expand the pilot program on a statewide basis;

(B) implementing strategies for future developments in health care technology, policy, management, governance, and finance; and

(C) ensuring patient data confidentiality at all times.

(f) The standards and protocols developed by VITL shall be no less stringent than the "Standards for Privacy of Individually Identifiable Health Information" established under the Health Insurance Portability and Accountability Act of 1996 and contained in 45 C.F.R., Parts 160 and 164, and any subsequent amendments. In addition, the standards and protocols shall ensure that there are clear prohibitions against the out of state release of individually identifiable health information for purposes unrelated to treatment, payment, and health care operations, and that such information shall under no circumstances be used for marketing purposes. The standards and protocols shall require that access to individually identifiable health information is secure and traceable by an electronic audit trail.

(g) On or before January 1, 2007, VITL shall submit to the commission on health care reform, the secretary of administration, the commissioner, the commissioner of banking, insurance, securities, and health care administration, the director of the office of Vermont health access, the senate committee on health and welfare, and the house committee on health care a preliminary health information technology plan for establishing a statewide, integrated electronic health information infrastructure in Vermont, including specific steps for achieving the goals and objectives of this section. A final plan shall be submitted July 1, 2007. The plan shall include also recommendations for self sustainable funding for the ongoing development, maintenance, and replacement of the health information technology system. Upon recommendation by the commissioner and approval by the general assembly, the plan shall serve as the framework within which certificate of need applications for information technology are reviewed under section 9440b of Title 18 by the commissioner.

(h) Beginning January 1, 2006, and annually thereafter, VITL shall file a report with the commission on health care reform, the secretary of administration, the commissioner, the commissioner of banking, insurance, securities, and health care administration, the director of the office of Vermont health access, the senate committee on health and welfare, and the house committee on health care. The report shall include an assessment of progress in implementing the provisions of this section, recommendations for additional funding and legislation required, and an analysis of the costs, benefits, and effectiveness of the pilot program authorized under subsection (e) of this section, including, to the extent these can be measured, reductions in tests needed to determine patient medications, improved patient outcomes, or reductions in administrative or other costs achieved as a result of the pilot program. In addition, VITL shall file quarterly progress reports with the secretary of administration and the health access oversight committee and shall publish minutes of VITL meetings and any other relevant information on a public website.

(i) VITL is authorized to seek matching funds to assist with carrying out the purposes of this section. In addition, it may accept any and all donations, gifts, and grants of money, equipment, supplies, materials, and services from the federal or any local government, or any agency thereof, and from any person, firm, or corporation for any of its purposes and functions under this section and may receive and use the same, subject to the terms, conditions, and regulations governing such donations, gifts, and grants.

(j) The commissioner, in consultation with VITL, may seek any waivers of federal law, of rule, or of regulation that might assist with implementation of this section.

(k) VITL, in collaboration with the commissioner, health insurers, the Vermont Association of Hospitals & Health Systems, Inc., and other departments and agencies of state government, shall establish a loan and grant program to provide for the capitalization of electronic health records systems in blueprint communities and at primary care practices serving low income Vermonters. Health information technology acquired under a grant or loan authorized by this section shall comply with data standards for interoperability adopted by VITL and the state health information technology plan. An implementation plan for this loan and grant program shall be incorporated into the state health information technology plan.

Sec. 24a. HEALTH INFORMATION TECHNOLOGY INTERIM FUND AND ELECTRONIC HEALTH RECORD PILOT PROGRAM

(a) Purpose. It is the intent of the general assembly that use of electronic health records for all Vermonters shall be promoted and encouraged. The general assembly recognizes that the use and sharing of electronic health records have the potential to improve the quality of care delivered to Vermonters and, in the long term, to help contain increases in the costs of medical care. Since many providers, especially primary care providers serving low income Vermonters, lack the capital to acquire the information technology necessary to implement electronic health records for their patients, a financing program is needed to facilitate the adoption of electronic health record use by providers.

(b) For the purposes of this section:
   (1) "Commissioner" shall mean the commissioner of the department of information and innovation.
   (2) "Department" shall mean the department of information and innovation.
   (3) "Pilot site" shall mean a blueprint community and primary care providers serving low income Vermonters in other communities.

(c) Vermont information technology leaders shall establish a health information technology fund which shall be used only during the duration of the electronic health record pilot program described in this section. The interim fund shall be used for the purposes of:
   (1) encouraging and facilitating the development and utilization of electronic health records by pilot sites; and
   (2) promoting the sharing of electronic health records using the Vermont health information infrastructure created and managed by the Vermont health information technology leaders.

(d) VITL and the secretary of administration shall engage in activities designed to achieve the goal of raising at least $1 million for the interim fund created by this section and shall seek to raise these funds from a broad range of stakeholders who would benefit from electronic health records, including commercial health insurers, in relation to the number of insured and self insured lives each services in Vermont, the Vermont Association of Hospitals & Health Systems, Inc., self insured employers, other payers, and other sources. On or before September 1, 2007, VITL and the secretary of administration shall report the results of the fundraising activities to the house committee on health care, the senate committee on health and welfare, and the commission on health care reform.

(e) On or before October 1, 2007, VITL shall issue a request for proposals:
   (1) to provide computer software or systems, or both, in connection with the development and implementation of a system to enable electronic health records use by pilot sites; and
   (2) for implementation consulting vendors to assist pilot sites with related training and system configuration support and upgrades to enable the implementation and use of electronic health record systems.

(f) On or before November 1, 2007, VITL shall establish criteria and award conditions for the selection of pilot sites.

(g) On or before January 1, 2008, VITL shall commence awarding pilot sites licenses to implement electronic health record systems, making use of the vendors selected in the process described in subsection (e) of this section.

(h) VITL shall include in the annual report required pursuant to section 9417 of Title 18 information concerning the interim fund and pilot program created pursuant to this section and shall additionally provide that report to the commissioner of health. Information in the report concerning this program shall include:
  (1) an assessment of progress in implementing the provisions of this section including the acceptance of electronic health record use by providers, patients, and payers;
  (2) recommendations for additional funding and legislation required; and
  (3) an analysis of the costs, benefits, and effectiveness of the health information technology fund.

(i) VITL may use a portion of the interim fund for its costs in implementing and managing the electronic health record pilot program.

★ ★ ★ Multi payer Database ★ ★ ★

Sec. 25. 18 V.S.A. § 9410(h)(3)(C) is amended to read:

(C) Consistent with the dictates of HIPAA, and subject to such terms and conditions as the commissioner may prescribe by regulation, the Vermont information technology leaders (VITL) shall have access to the database for use in the development of a statewide health information technology plan pursuant to section ~~9417 of this title~~ 903 of Title 22, and the Vermont program for quality in health care shall have access to the database for use in improving the quality of health care services in Vermont. The commissioner's rules may limit access to the database to limited use sets of data as necessary to carry out the purposes of this section.

Sec. 26. MULTI PAYER DATA COLLECTION PROGRAM FUNDING

On or before January 15, 2008, the commissioner of banking, insurance, securities, and health care administration shall report to the governor and the general assembly with recommendations for annual financial support for the multi payer health care data collection program authorized by section 9410 of Title 18.

Sec. 31. REPEAL

The following are repealed:
(1) Sec. 315 of No. 215 of the 2005 Adj. Sess. (2006).
(2) 18 V.S.A. § 9417 (health information technology).
Sec. 32. 3 V.S.A. § 2222a(c)(2) is amended to read:
(2) The Vermont health information technology project pursuant to section ~~9417 of Title 18~~ 903 of Title 22.

Sec. 33. 18 V.S.A. § 9416(a) is amended to read:

(a) The commissioner shall contract with the Vermont Program for Quality in Health Care, Inc. to implement and maintain a statewide quality assurance system to evaluate and improve the quality of health care services rendered by health care providers of health care facilities, including managed care organizations, to determine that health care services rendered were professionally indicated or were performed in compliance with the applicable standard of care, and that the cost of health care rendered was considered reasonable by the providers of professional health services in that area. The commissioner shall ensure that the information technology components of the quality assurance system are incorporated into and comply with the statewide health information technology plan developed under section ~~9417 of this title~~ 903 of Title 22 and any other information technology initiatives coordinated by the secretary of administration pursuant to section 2222a of Title 3.

Sec. 34. 18 V.S.A. § 9437 is amended to read:

§ 9437. CRITERIA

A certificate of need shall be granted if the applicant demonstrates and the commissioner finds that:

* * *

(7) if the application is for the purchase or lease of new health care information technology, it conforms with the health information technology plan established under section ~~9417 of this title~~ 903 of Title 22, upon approval of the plan by the general assembly.

Sec. 35. 18 V.S.A. § 9440b is amended to read:

§ 9440b. INFORMATION TECHNOLOGY; REVIEW PROCEDURES

Notwithstanding the procedures in section 9440 of this title, upon approval by the general assembly of the health information technology plan developed under section ~~9417 of this title~~ 903 of Title 22, the commissioner shall establish by rule standards and expedited procedures for reviewing applications for the purchase or lease of health care information technology that otherwise would be subject to review under this subchapter. Such applications may not be granted or approved unless they are consistent with the health information technology plan and the health resource allocation plan. The commissioner's rules may include a provision requiring that applications be reviewed by the health information advisory group authorized under ~~subsection 9417(c) of this title~~ section 903 of Title 22. The advisory group shall make written findings and a recommendation to the commissioner in favor of or against each application.

Approved: June 5, 2007

APPENDIX J:
VITL BOARD OF DIRECTORS

Officers

Dr. W. Cyrus Jordan, Chair
Medical Director, VT Program
for Quality in Health Care

Andrea Lott, Vice-chair
CIO, VP Information Services
Northeastern VT Regional Hospital

Dr. Lawrence D. Ramunno, Secretary
Chief Quality Officer, Northeast
Health Care Quality Foundation

Paul Harrington, Treasurer
Executive Vice President
Vermont Medical Society

Greg Farnum, President
Vermont Information
Technology Leaders, Inc

Statutory Members

Judy Higgins
Associate CIO, Office of
Vermont Health Access

Sharon Moffatt
Interim Commissioner,
Vermont Department of Health

Thomas Murray
Commissioner, Department of
Information and Innovation

Christine Oliver
Deputy Commissioner, Banking,
Insurance, Securities,
Health Care Administration

Members

Sandra Davidson
Veterans Hospital CIO
Veterans Administration

Don George
VP Managed Health Systems
Blue Cross Blue Shield Vermont

Marie Beatrice Grause
President, Vermont Association
of Hospitals & Health Systems

Chuck Groh
Clinical Applications Manager
Rutland Regional Medical Center

James Hester
Director
Health Care Reform Commission

Gertrude Hodge
Patient/Consumer Representative

Frank McDougall
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Dartmouth Hitchcock Medical Center

Angeline Marano
Chief Operating Officer,
Fletcher Allen Health Care

Paul Reiss, MD
Member, Academy of
Family Health

David Todd
Chief Information Officer
University of Vermont

Lisa Ventriss
President
Vermont Business Roundtable

APPENDIX K:
CCHIT INPATIENT EHR CERTIFICATION PRESS RELEASE

Certification Commission Approves Final Criteria for Hospital-based EHR Certification Program

CHICAGO — June 28, 2007 — The Certification Commission for Healthcare Information Technology announced today that it has published its approved criteria for certification of inpatient (hospital-based) electronic health record (EHR) products and will begin taking applications for certification Aug. 1. The final certification criteria, test scripts and associated program policy documents are posted on the Commission's Web site, www.cchit.org.
The application period for the first quarterly testing batch will be open until Aug. 14 and the first certified inpatient EHR products are expected to be announced in late October.
"Thanks to a year of intensive work by our volunteer workgroups and supporting staff, we are now ready to bring the benefits of certification to the inpatient domain," said Alisa Ray, executive director. "Besides covering foundation standards such as security, the inspection of inpatient EHR products will examine clinician electronic order writing (often called CPOE), electronic medication administration (often called eMAR), related clinical decision support, and medication reconciliation. Certified products will have demonstrated their ability to have a positive impact on the quality and safety of patient care."

A Town Call teleconference for vendors of inpatient EHR products is scheduled for July 12, at 11 a.m. Eastern Time to discuss the inpatient certification program and application process. Details on how to participate in the teleconference will be posted to www.cchit.org.
Source: Certification Commission for Healthcare Information Technology

Recognized Ambulatory Electronic Health Record (EHR) Certification Criteria

The Certification Commission for Healthcare Information Technology (CCHIT) criteria for ambulatory EHR functionality, interoperability, security and reliability standards that are listed below have been recognized by the Secretary.

The CCHIT was created in 2004 by an industry coalition of the American Health Information Management Association (AHIMA), the Health Information and Management Systems Society (HIMSS) and the National Alliance for Health Information Technology. CCHIT's mission is to accelerate the adoption of HIT by creating an efficient, credible and sustainable product certification program.

CCHIT accomplishes this mission through a broad consensus-based, public/private collaborative effort. They have generally adopted the stringent requirements for governmental activities with regard to openness and transparency.

The CCHIT process involves publication of interim and proposed final work products. At every step, public comment is invited.

During the three comment cycles that generated the ambulatory EHR criteria that the Secretary has recognized, CCHIT received over 1500 comments from a wide range of stakeholders. Further outreach was achieved through the establishment of several large Town Hall presentations with attendances in the range of 500-1000 at Healthcare Information Management Systems Society (HIMSS) conferences as well as at more than thirty smaller presentations to a variety of associations, organizations and the press gatherings.

CCHIT grouped its ambulatory EHR certification criteria recommendations into three groups, "functionality," "interoperability" and "security/reliability." For ease of understanding, the Secretary broke the security and reliability recommendations into separate categories.

At HHS' request, the CCHIT-recommended ambulatory EHR certification criteria were presented to the American Health Information Community (AHIC) on May 16, 2006. After consideration, the AHIC recommended that the Secretary recognize CCHIT identified ambulatory EHR certification criteria that CCHIT recommended for use in 2006. This recommendation informed the Secretary's decision to recognize these criteria.
A separate notice of availability has been published in the Federal Register to notify the public about the availability of a certification Guidance Document that provides interim guidance on the recognition of certification bodies. This document is also available at http://www.hhs.gov/healthit.

Source: U.S. Department of Health and Human Services
http://www.hhs.gov/healthit/documents/AEHRRecognizedCertCriteria.pdf

Photography: A. Blake Gardner
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VITL

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