DPH Keeping Connecticut Healthy

CONNECTICUT
State Health Information Technology Plan

Credits and Acknowledgments
Connecticut State Health Information Technology Plan

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Prepared by JSI Research & Training Institute, Inc.

We gratefully acknowledge the Steering Committee who provided critical input and guidance to the development of the Connecticut State Health Information Technology Plan.

Thomas Agresta, MD
Asylum Hill Family Practice Center

Marybeth Bonadies
Office of Healthcare Access

Jessica Cabanillas
Connecticut Office of Policy and
Management

Steven Casey
Connecticut Department of Information
Technology

Dan Clemons
Community Health Center Association
of Connecticut, Inc.

John Gadea
Connecticut Department of Consumer
Protection

Meg Hooper, Chair
Connecticut Department of Public Health

Marianne Horn
Connecticut Department of Public Health

Jennifer Jackson
Connecticut Hospital Association

Julianne Konopka
Connecticut Department of Public Health

Robert Mitchell
Connecticut Department of Social Services

Gregory Sullivan
Connecticut Office of Policy and Management

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Executive Summary

The Federal Administration and United States Congress have put health information technology (health IT) front and center in the healthcare reform debate, by providing billions of dollars for states to support local health IT efforts. Health IT provides opportunities to reduce costs, increase the quality of care and patient safety, improve access to care and improve the coordination of care. The adoption of health IT has been limited in Connecticut due a range of challenges, including high capital and maintenance costs, uncertainty about return on investment and lack of a sustainable business model, privacy and confidentially issues, inconsistent use of health IT standards, perceived interference with doctor–patient relationships, concern that systems will become obsolete and lack of available staff with adequate expertise in health IT.

Through the phased implementation of the Connecticut State Health Information Technology Plan (The Plan), the state intends to implement solutions to many of these challenges. The Plan builds on the significant progress made towards establishing national technical and policy standards by the federal government and the best practices demonstrated by health IT and health information exchange (HIE) projects in Connecticut and across the nation. Lessons learned from these projects provide valuable guidance on the role of state government, governance structures, funding and finance models, phased approaches to implementation, value propositions and interoperability.

Over the next five years, The Plan aims for the transformation of the Connecticut healthcare system through health IT and health information exchange projects, as shown in Figure 1 below.

FIGURE 1
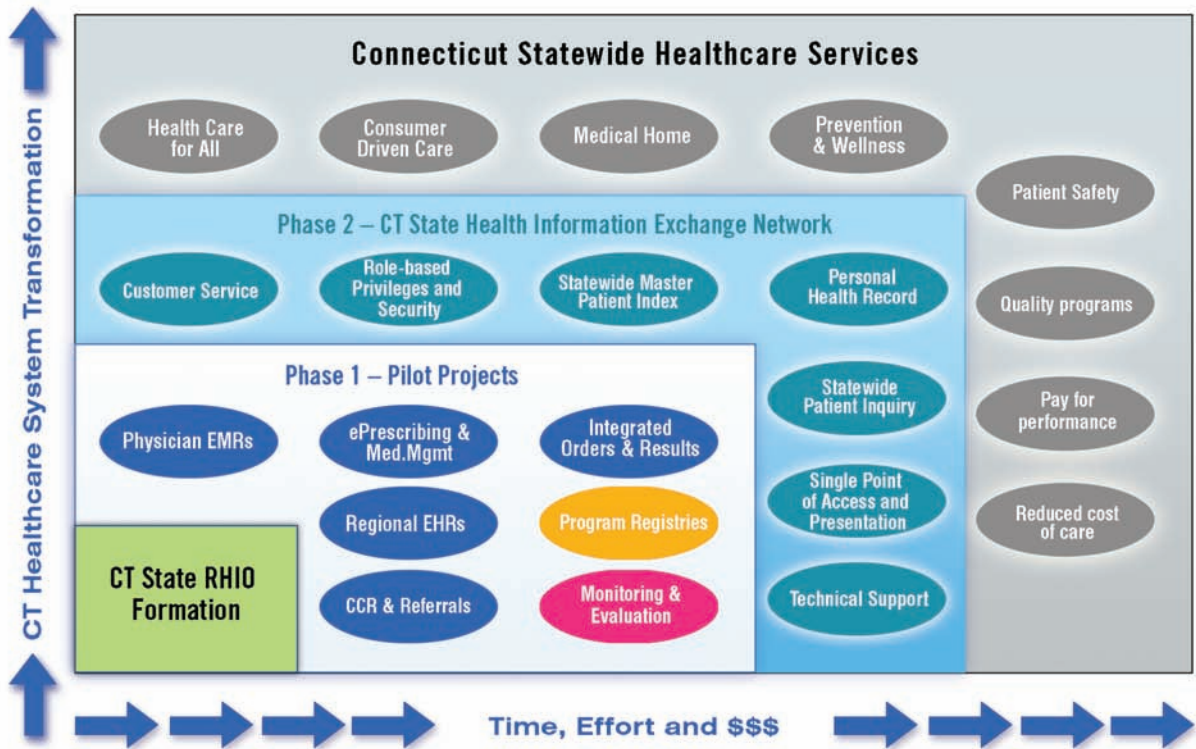
The steps proposed in The Plan include:

1. formation of the Connecticut State Regional Health Information Organization (CT State RHIO) as the governing body whose role is to convene and coordinate health information exchange efforts across the state, supported by a state legislative mandate;

2. implementation of pilot projects that build on existing Connecticut health IT and HIE efforts to demonstrate the viability of policies, procedures, best practices and technical infrastructure that can subsequently form the basis of broader activity and integration throughout the state; these pilot projects will be structured to show value in the domains of Direct Patient Care, Healthcare System Monitoring and Evaluation, State Health Agencies and for a Connecticut Statewide Health Information Exchange Network; and

3. development of a comprehensive health IT education and outreach program to promote open and consistent communications among consumers and healthcare professionals; to maximize development and use of HIE capacity across the state; to ensure participation in the on-going decision making process for the management of personal health information; and to ensure that privacy and security concerns are continually addressed, which is critical to building and maintaining stakeholder support for a Connecticut Statewide Health Information Exchange Network.

Implementation and support of The Plan will require the provision of significant financial and human capital to sustain it at a time when Connecticut's state government is experiencing declining revenue. The passage of the Health Information Technology for Economic Development Act (HITECH) within the American Recovery and Reinvestment Act of 2009 (ARRA) appropriates a minimum of $20 billion to be used over the next six years to encourage health IT and HIE adoption.

The Plan was developed through an extensive information gathering process involving many of the key stakeholders in Connecticut and provides a roadmap to transform the state healthcare system at a time of tremendous opportunity.

The sections of the Connecticut State Health IT Plan are as follows:

CHAPTER I describes the role of health IT and health information exchange in the transformation of the healthcare system as well as the methodology for the development of this document.

CHAPTER II reviews the work to date by the federal government on the national initiatives establishing broad-based standards and strategic direction for the essential components of a nation-wide health information network, as well as lessons learned and best practices from other state experiences in health IT and health information exchange initiatives. In addition, initiatives currently underway in Connecticut are described.

CHAPTER III describes the framework for the execution of the Connecticut Health IT Strategic Plan, including the vision, goals, and resources required.

CHAPTER IV describes the critical factors that must be addressed to ensure the successful transformation of the Connecticut healthcare system through health IT and health information exchange.

CHAPTER V describes the critical next steps for Connecticut to take over the next five years to promote and enable the transformation of the Connecticut healthcare system through health IT and health information exchange.

Connecticut is well positioned to maximize federal funding opportunities and to take advantage of the lessons learned from the many health IT and health information exchange efforts across the country. The Plan will incrementally move Connecticut towards private and secure electronic health information exchange throughout the state. The Plan provides the necessary steps to implement this vision.

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Introduction

A. Healthcare System Reform and the Role of Health IT/HIE

Among citizens, policy makers, economists and health professionals, there is a broad consensus that the system of delivering and financing healthcare in the United States is in desperate need of reform (Iglehart, 2009; Schoen, Davis, & Collins, 2008; Kenen, 2009). An estimated $2.2 trillion was spent on healthcare in the United States in 2007, 16.3 percent of the Gross Domestic Product (Keehan, et al. 2008); however we trail behind other developed countries in many indicators of healthcare quality (Schoen, et al. 2007; Schoen, et al. 2009). Reducing healthcare costs is identified as fundamental to alleviating the economic crisis facing the country (Congressional Budget Office, 2008); the current administration and the United States Congress have made healthcare reform a priority for 2009. As healthcare costs rise, Americans have found it increasingly difficult to remain covered by insurance. Unemployment numbers are increasing, reducing the number of individuals covered by employer sponsored insurance, while those still employed have seen scaled back coverage and increased cost sharing for coverage. As a result, an estimated 45 million Americans lack insurance, with many more underinsured (Kaiser Family Foundation, 2008).

While there is universal consensus that the healthcare system must be fixed, there is little consensus about how to do it, with proposals ranging from a reliance on market forces to a single payer system run by the federal government (Congressional Budget Office, 2008). Yet, every credible proposal for healthcare reform, regardless of its underlying philosophy, cites the use of health information technol‑ ogy (health IT) as a fundamental tool for successfully improving quality and efficiency of the health‑ care system, as well reducing costs (HIMSS, 2008).

In response, several trends in healthcare delivery and financing are gaining momentum, with the potential to transform how medicine is practiced and financed.

- Basing reimbursement rates on the quality of care being delivered (e.g. pay for performance), rather than on quantify of care, is increasing among both private and public payers.

- Growing support for strengthening the role of prevention and primary care through medical homes and telehealth technology to provide a range of wrap around services, coordinated care and disease management.

- Increasing roles for consumers as active participants in their care, driven by information accessible on the Internet, provider report cards, personal health records, and consumer driven health plans.

- National campaigns to identify and address root causes of medical errors (e.g. Institute for Healthcare Improvement; The Leapfrog Group for Patient Safety).

- Increasing emphasis on the practice of evidence-based medicine.

Common to each of these trends is their reliance on the ability to collect, analyze and use electronic data to improve direct patient care and to stimulate more systemic reform through improved health information technology. The potential for technology to support a larger transformation in healthcare is increasingly apparent as research demonstrates that health IT can improve medication safety (Bates, et al. 1999; Kaushal, et al. 2003; Teich, et al. 2000; Gandhi, et al. 2005), quality of care (Dexter, et al. 2004; Chertow, et al. 2001; Peterson, et al. 2005) a compliance with treatment guidelines (Overhage, et al. 1997; Dexter, et al. 2001), improve the efficiency of hospital workflow (Taylor, et al. 2002) and reduce cost of care (Tierney, et al. 1993).

FIGURE 2

Healthcare Reform	Requires	HIE
• Healthcare for all	• Consistent workflow	• National strategy
• Consumer driven care	• Data accessibility	• Certified use cases
• Cost of care	• Accuracy	• Policies & procedures
• Medical home	• Accountability	• Technical standards
• Prevention & wellness	• Timeliness	• Certified systems
• Quality	• Efficiency	• Interoperability
• P4P	• Commitment	
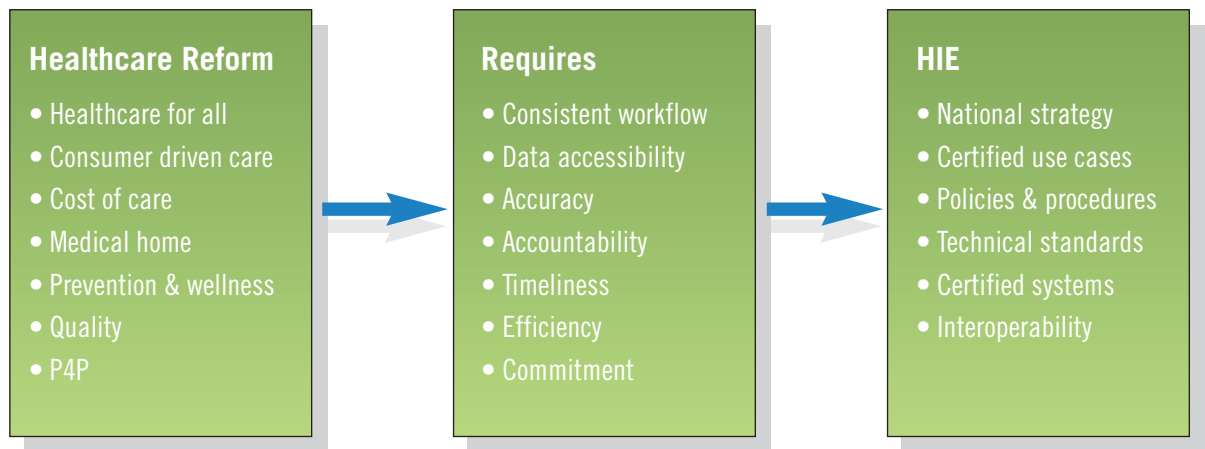
True transformation of our healthcare system will depend on the conversion of a traditional, disparate, paper-based system into a national health information network based on the electronic exchange of data serving the needs of patients, providers, and healthcare decision makers. For example:

- Instead of primary care providers using limited time in a patient visit searching for laboratory results and patient histories in a paper chart or ordering duplicate or unnecessary tests, providers will have this data easily accessible, and presented in formats that are useful for healthcare decision making and patient education. Graphs of a diabetic's hemoglobin levels over time can become tools for patient and provider to review and discuss. Electronic reminders to both provider and patient that recommended tests and procedures are due, coupled with automated test ordering at the point of care allow for more meaningful patient and provider interaction.

- Specialists who now rely on little or no written information in a referral can access the data they need to assess patients, and review tests and procedures that have already been conducted, rather than reordering these same tests. This reduces cost to the system as well as time and stress on the patient. Subsequently, primary care providers will be able to easily access the results of specialist visits rather than the imperfect system of written dictated feedback.

- The elderly or ill who are moving from hospital, to rehabilitation center, to home or long-term care facility, can be assured that providers at each step of this complex process of discharge and transfer have current and complete medical records, rather than relying on incomplete paper charts that follow them through these steps.

- Quality improvement teams, rather than relying on anecdotal evidence, can accurately evaluate progress in chronic disease management programs or patient safety initiatives, and better understand what elements of their efforts are succeeding and which are not.

- Epidemiologists searching for trends in chronic diseases can use aggregated data to identify risk factors. For example, the identification of geographic clusters of asthma among young people suggests potential environmental factors.

- Providers caring for injured or critically ill patients can quickly access key medical histories, allergies, and medications that are critical to appropriate and timely decision-making in trauma and emergency settings.

Virtually all other major fields have successfully managed technological revolutions. A decade ago it would have been hard to imagine a bank card issued in Salisbury, Connecticut could be easily used to withdraw money in Milan or that a ten-year old, using their home computer, would be able to track the shipping status of the package that contains their new iPod from Amazon.

Yet, with all these technological innovations, it is estimated that 8 to 12 percent of hospitals and 4 percent of ambulatory care providers in the U.S. have adopted comprehensive electronic medical records (Jha, et al. 2009; DesRoches, et al. 2008). The reasons for the relatively slow rate of adoption of technology in the healthcare field are complex, but increasingly well understood: high capital and maintenance costs; uncertainty about return on investment; lack of a sustainable business model; security or confidentially issues; not finding a system that meets practice or department needs; perceived interference with doctor-patient relationship; concern that system will become obsolete; and lack of available staff with adequate expertise in IT (Ash & Bates 2005; Jha, et al. 2009; DesRoches, et al. 2008).

Policy makers and academics have been promoting the vision of transformative health IT adoption for nearly a decade, but have been unable to leverage the financial resources to implement the vision. With $20 billion pledged to encourage health IT and HIE adoption through the Health Information Technology for Economic Development Act (HITECH) within the American Recovery and Reinvestment Act of 2009 (ARRA), the vision is now being financially supported. These elements appear to be aligning to support more rapid and dramatic improvements in health information technology and health information exchange.

Although the complexities of technology in healthcare can easily become overwhelming, the critical elements are relatively straightforward:

- Health data throughout the healthcare system that is now available only on paper must be automated. The main focus in this arena is for providers and hospitals to automate their data in electronic medical/health records. Improvements in care, reductions of errors, strengthened chronic disease management, and improvements in efficiency can stem from this automation.

- While care at the individual provider level improves with the implementation of electronic health records, creating the capacity for providers to access medical data on their patients across providers and settings through electronic health information exchanges is the larger, long-term goal.

- Successful EHR implementations and regional data exchange efforts require establishing significant levels of collaboration and trust among providers, agreements on standards for data to be exchanged, availability of the technical capacity to build the network, and the funding to finance the effort. Those efforts require the oversight of an empowered and capable regional health information organization, namely the CT State Regional Health Information Organization (CT State RHIO).

Success of these apparently straightforward innovations in health information exchange represents a microcosm of how data exchange networks are built. They require that several systems are able to communicate with each other, that professionals have agreed on what data are important to transmit, that patients feel secure that their data are safe and their privacy is not being compromised, and that the technical systems are able to carry out these exchanges of data.

Local and regional data exchange efforts are critical initial steps towards broader statewide and national data exchange. Because patients get most of their care within a defined geographic region the large majority of times, these emerging organizations will provide data exchange where it is most critically needed. These organizations need support, both financial and technical in order to succeed. The challenges to building the necessary collaboration, often among competitors, the need to appropriately address consumer and patient concerns about privacy and confidentiality, and the technical challenges all can slow down or derail these efforts. Expert and sustained assistance at the state level can improve the chances these efforts will succeed.

The CT State RHIO is a critical resource to ensure that multiple concurrent health information exchange initiatives across the state are developing HIE capabilities that will eventually align to provide a statewide HIE capability. The Plan includes recommendations for how the organization should be structured and governed, as well as its responsibilities, building on the success factors emerging from federal guidance, other state efforts, and from the current Connecticut healthcare system and political environment.

The Connecticut State Legislature took the initial steps to establish the CT State RHIO with its adoption in 2007 of Public Act 07-2 which supported the development of The Plan.

B. Connecticut Legislative Mandate

To promote the development of health information exchange capacity in the state, the Connecticut General Assembly passed Public Act No. 07-2 in the 2007 legislative session. ***"An Act Implementing the Provisions of the Budget Concerning Human Services and Public Health"***, authorized the Department of Public Health, in consultation with the Office of Health Care Access to contract through a competitive bidding process for the development of a Statewide Health Information Technology Plan. The legislation specified that the health information technology plan at a minimum would include:

- General standards and protocols for health information exchange.

- Electronic standards to facilitate the development of a statewide integrated health information system for use by healthcare providers and institutions that are funded by the state. These standards were to: (a) include provisions relating to security, privacy, data content, structures and format, vocabulary and transmission protocols; (b) be compatible with any national standards in order to allow for interstate interoperability; (c) permit the collection of health information in a standard electronic format and; (d) be compatible with the requirements for an electronic health information system.

- Pilot programs for health information exchange, projected costs and sources of funding for such pilot programs.

Pursuant to this legislation, in December 2007, the Connecticut Department of Public Health issued request for proposal (RFP) number 2008 – 2037 entitled, *"Development of a Statewide Health Information Technology Plan."* The RFP stated that "The purpose of this Request for Proposal (RFP) is for the Connecticut Department of Public Health (DPH), in consultation with the Office of Health Care Access, to contract with an organization to develop a Statewide Health Information Technology Plan (Connecticut Health IT Plan)."

The RFP further stated that "The Connecticut Health IT Plan must address all of the following items:

1. Assessment of the status of current HIE technologies and practices operating in Connecticut.

2. General standards and protocols for health information exchange.

3. Electronic data standards to facilitate the development of a statewide, integrated electronic health information system in Connecticut for use by healthcare providers and institutions that are funded by the state including hospitals, community healthcare centers, physician groups, and other providers receiving funds from the state. Such electronic data standards shall:

   3.1. include provisions relating to security, privacy, data content, structures and format, vocabulary, maintenance and transmission protocols,

   3.2. be compatible with any national data standards in order to allow for interstate interoperability,

      3.3.   permit the collection, sharing, and access of health information in a standard electronic format,

      3.4.   be compatible with the requirements for an electronic health information system, and,

      3.5.   include rules and standards for the sharing, aggregation and storage of person–specific and aggregated health data.

4. Functional characteristics of an Electronic Health Information System as defined in Section 68(a)(1) of PA 07–2.

5. Implementation strategies, including, but not limited to a plan for pilot programs for health information exchange, and projected costs and sources of funding for such pilot programs. Pilot programs may be used as a mechanism to assess different business models, e.g. storage and recovery of federated vs. centralized health data.

6. Consumer education and outreach about the HIEN to healthcare providers.

7. Coordination with state government agencies, public and private health systems, and healthcare providers to link HIE activities to support quality improvement initiatives.

8. Coordination with other HIE organizations, states, and the federal government.

9. Survey of each provider group (including private practitioners) to determine their current infrastructure (i.e., staffing, hardware, software, training needs, etc.)

10. Risk–benefit analysis of the secondary uses of healthcare data (i.e., how it will be used and how it will be protected.)

11. Assessment and analysis of federated versus centralized data systems.

12. Projected timeline and detailed budget estimates for development of a fully functional statewide, integrated electronic health information system, including the infrastructure needs of each provider group. Include a phased–in timeline, incentives to get providers involved and estimated costs for each provider group that will participate in the HIE System.

13. How Connecticut will transition to the National Health Network once it is available.

14. Identified barriers to implementation of the Connecticut Health IT Plan and proposed actions to address each barrier."

The contract for the development of the Connecticut Statewide Health Information Technology Plan was awarded to JSI Research and Training Institute, Inc. (JSI), based in Boston Massachusetts, for a contract period starting May 1, 2008 through June 30, 2009. Under the provisions of the authorizing legislation, JSI was designated as the lead health information exchange organization for the State of Connecticut for the period of the contract.

C. Developing the Connecticut State Health IT Plan (The Plan)

The development of The Plan was overseen by a twelve member Steering Committee as shown in Appendix D. The Steering Committee convened on July 9, 2008 where an initial work plan was presented by JSI for feedback and comment. Subsequently, the Steering Committee met monthly to review project progress and provide feedback to JSI on major elements of the plan as they were developed.

A variety of efforts were conducted to review the entire Connecticut healthcare environment as well as to solicit feedback from diverse stakeholders across the state. Experience throughout the country has demonstrated that while developing the technical aspects of health information exchange are critical, ensuring that the strategy meets the needs and addresses the concerns of a spectrum of stakeholders is perhaps the most critical determinant of success, at least in the initial stages.

- **Stakeholder Identification** – At the project kick-off meeting in July 2008, JSI asked open forum attendees and Steering Committee members to assist with the recruitment of individuals representing diverse healthcare stakeholders throughout the state for the subsequent focus groups, surveys and interviews. Potential participants were sent a brief, web-based survey to solicit their participation, their key areas of interest or involvement in Connecticut health IT and HIE initiatives, and names and contact information of any other appropriate stakeholders for engagement inclusion. This provided JSI with over 200 potential stakeholders for the information gathering activities.

- **Healthcare Stakeholder Survey** – JSI conducted a 29-question survey of stakeholders from the Connecticut healthcare system including community health centers, physician groups, hospital leadership, and state agency staff. The survey's aim was to collect baseline information from a diverse set of healthcare stakeholders on their current and future IT infrastructure, current and future HIE capabilities, and their perspectives on opportunities and barriers to health IT and HIE adoption.

- **Hospital Survey** – In collaboration with the Connecticut Hospital Association, hospital technical leadership, primarily Chief Information Officers, were surveyed. This survey solicited input regarding current and future health IT and health information exchange capabilities, level of spending on health IT initiatives, perceptions regarding HIE oversight, potential state involvement and opportunities and barriers to health IT/HIE adoption. The summary results of the hospital survey are provided in Appendix H.

- **Stakeholder Interviews** – JSI developed an interview guide soliciting feedback on experiences with HIE, current HIE activity and capacity in Connecticut, perceptions of HIE's impact on cost, quality of care and efficiency, and issues associated with patient privacy and confidentiality. If interviewees were currently involved with an HIEN, questions regarding project background, governance, implementation, sustainability and financing were included. Using this guide, approximately thirty interviews were conducted with key leadership resources of hospitals, independent practice associations, community health centers, state health agencies, ancillary service providers, payers, professional organizations and non-profit organizations Please see Appendix E for the complete interview list.

■ **Focus Groups** – JSI convened eight focus groups with various Connecticut stakeholders to obtain their perspectives on health information exchange as well as to receive guidance to inform The Plan on specific domains from experts in the state. Focus groups included consumer advocacy, education and outreach, governance, quality improvement and population health management, legal and legislative, community health, finance, and functional requirements and technical standards. A list of these participants is provided in Appendix F.

■ **Federal and State Research** – JSI researched and synthesized federal and health industry accepted standards and protocols for HIE to help determine appropriate standards and protocols for a Connecticut statewide HIEN. In addition, the project team researched other state HIE efforts and compiled a set of lessons learned and best practices to inform the recommendations for Connecticut.

■ **Iterative Plan Development** – The Plan was developed in close collaboration with the project Steering Committee. An outline was presented to the Committee in October 2008 for approval, and a first draft on February 1, 2009. The final draft was submitted for approval on April 17, 2009 and final report on May 18, 2009. JSI also elicited feedback through monthly meetings with the Steering Committee and repeated engagements with key stakeholders across the state.

Health IT/HIE Background

While the potential for health IT/HIE to improve quality and reduce the cost of care was gaining recognition and system implementations were increasing at the beginning of this decade, there was little concerted activity at the federal government level. However, in 2004, the federal government laid the groundwork for such federal action, focusing both on EHR adoption and the need for a national system of health information exchange.

A. National Health IT/HIE Landscape

The Office of the National Coordinator for Health Information Technology

To lead this effort, the Executive Order established the Office of the National Coordinator for Health Information Technology (ONC) to provide counsel to the Secretary of Health and Human Services (HHS) and departmental leadership for the development and nationwide implementation of an inter–operable health information technology infrastructure (the Nationwide Health Information Network or NHIN).

The National Coordinator for Health Information Technology was tasked with:

- Serving as the Secretary's principal advisor on the development, application, and use of health information technology;
- Coordinating HHS health information technology policies and programs internally and with other relevant executive branch agencies;
- Developing, maintaining, and directing the implementation of HHS' strategic plan to guide the nationwide implementation of interoperable health information technology in both the public and private healthcare sectors, to the extent permitted by law; and
- Providing comments and advice at the request of the Office of Management and Budget (OMB) regarding specific Federal health information technology programs.

American Health Information Community

The ONC also provided management of and logistical support for the American Health Information Community (AHIC). The AHIC was a federally-chartered advisory committee tasked with making recommendations to the Secretary of HHS on how to make health records digital and interoperable, encourage market-led adoption and ensure that the privacy and security of those records are protected at all times. In the broadest sense, AHIC provided extensive guidance for the four key functional areas that enable interoperability within the United States healthcare system as represented in Figure 3 below.

FIGURE 3
What Enables HIE and Interoperability
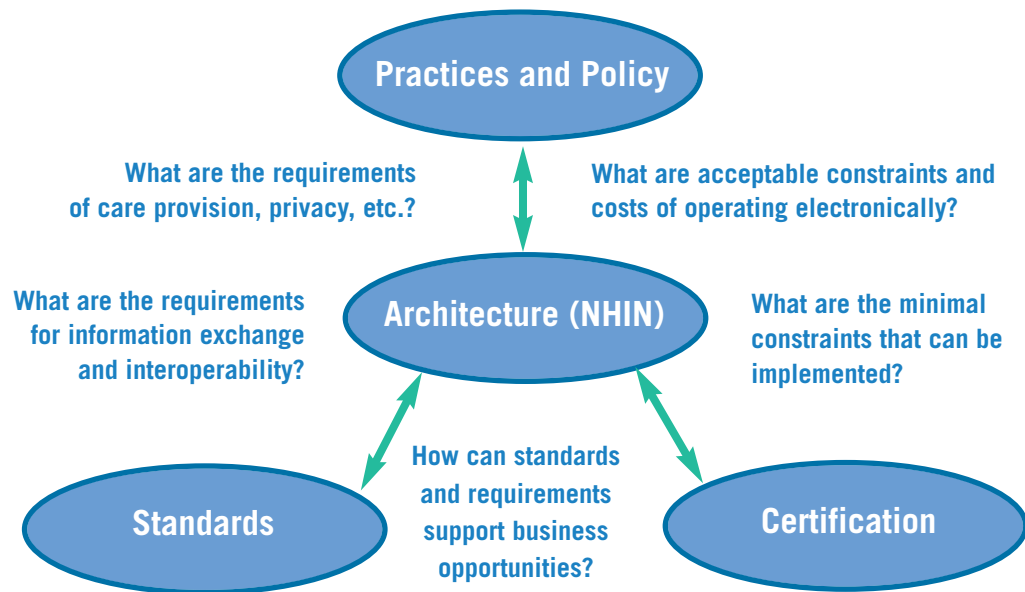
- • *AHIC Work Groups*

To carry out this mission, AHIC created seven workgroups:

- ■ 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

The efforts of the workgroups resulted in the creation of several use cases that represent standards for HIE enabled clinical practice. The AHIC priorities and use case road map which references existing and planned use cases is represented below.

FIGURE 4
AHIC Priorities and Use Case Road Map

Practices

AHIC Priorities & Use Case Roadmap

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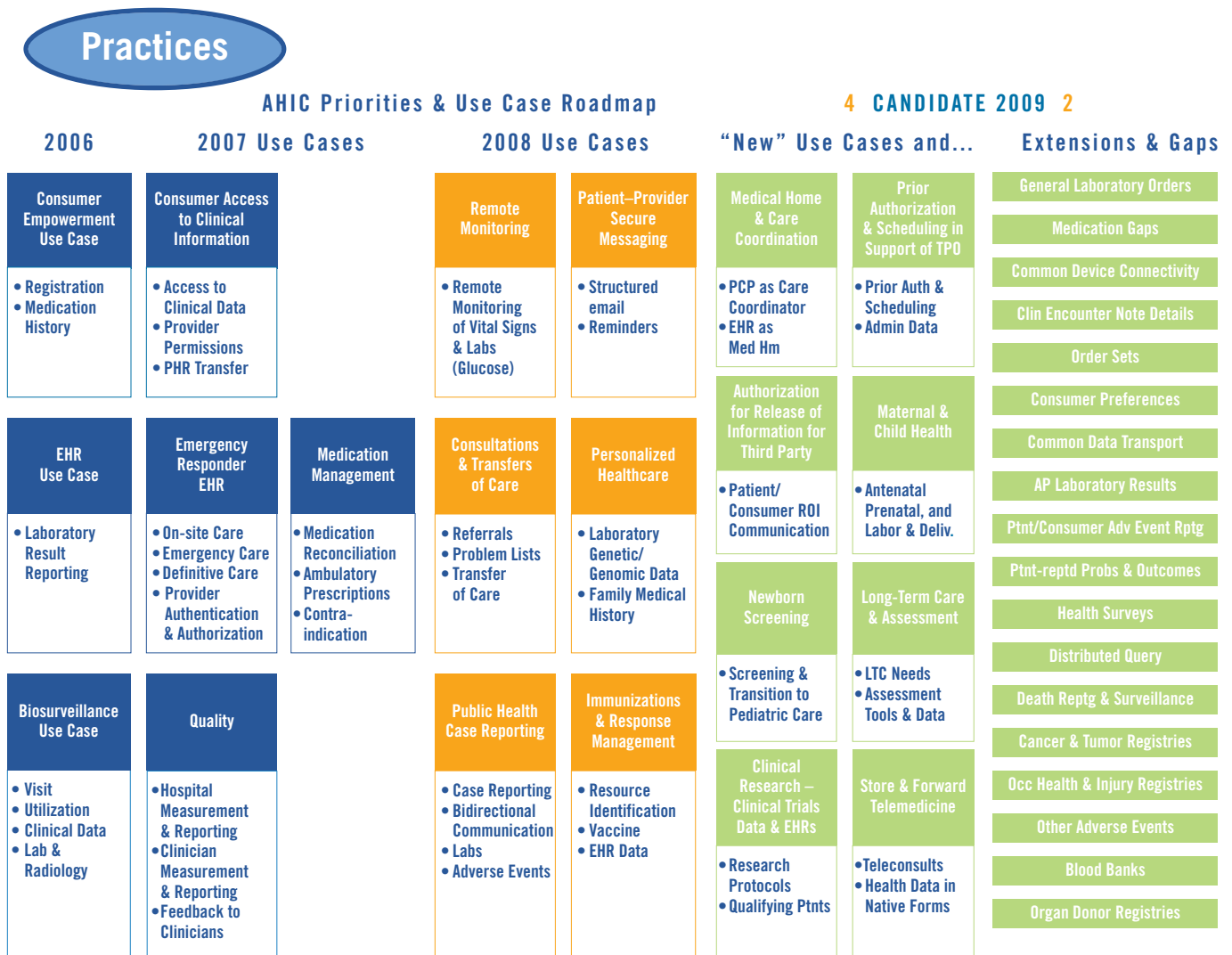| 2006	2007 Use Cases		2008 Use Cases		"New" Use Cases and...		Extensions & Gaps
Consumer Empowerment Use Case • Registration • Medication History	**Consumer Access to Clinical Information** • Access to Clinical Data • Provider Permissions • PHR Transfer		**Remote Monitoring** • Remote Monitoring of Vital Signs & Labs (Glucose)	**Patient–Provider Secure Messaging** • Structured email • Reminders	**Medical Home & Care Coordination** • PCP as Care Coordinator • EHR as Med Hm	**Prior Authorization & Scheduling in Support of TPO** • Prior Auth & Scheduling • Admin Data	**General Laboratory Orders** **Medication Gaps** **Common Device Connectivity** **Clin Encounter Note Details** **Order Sets**
EHR Use Case • Laboratory Result Reporting	**Emergency Responder EHR** • On-site Care • Emergency Care • Definitive Care • Provider Authentication & Authorization	**Medication Management** • Medication Reconciliation • Ambulatory Prescriptions • Contra-indication	**Consultations & Transfers of Care** • Referrals • Problem Lists • Transfer of Care	**Personalized Healthcare** • Laboratory Genetic/ Genomic Data • Family Medical History	**Authorization for Release of Information for Third Party** • Patient/ Consumer ROI Communication **Newborn Screening** • Screening & Transition to Pediatric Care	**Maternal & Child Health** • Antenatal Prenatal, and Labor & Deliv. **Long-Term Care & Assessment** • LTC Needs • Assessment Tools & Data	**Consumer Preferences** **Common Data Transport** **AP Laboratory Results** **Ptnt/Consumer Adv Event Rptg** **Ptnt-reptd Probs & Outcomes** **Health Surveys** **Distributed Query**
Biosurveillance Use Case • Visit • Utilization • Clinical Data • Lab & Radiology	**Quality** • Hospital Measurement & Reporting • Clinician Measurement & Reporting • Feedback to Clinicians		**Public Health Case Reporting** • Case Reporting • Bidirectional Communication • Labs • Adverse Events	**Immunizations & Response Management** • Resource Identification • Vaccine • EHR Data	**Clinical Research – Clinical Trials Data & EHRs** • Research Protocols • Qualifying Ptnts	**Store & Forward Telemedicine** • Teleconsults • Health Data in Native Forms	**Death Reptg & Surveillance** **Cancer & Tumor Registries** **Occ Health & Injury Registries** **Other Adverse Events** **Blood Banks** **Organ Donor Registries**

Concurrent with the AHIC work, the Office of the National Coordinator released requests for proposals 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." The report led to a new round of contracts focused on specific areas of health IT and HIE as represented in Figure 5 below and described in the following sections.

FIGURE 5
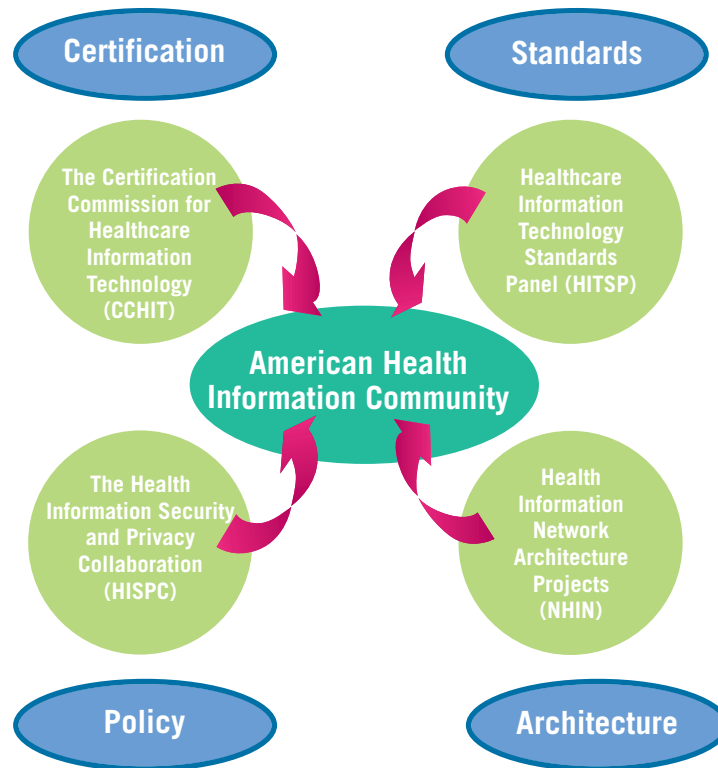
- *The Certification Commission for Healthcare Information Technology (CCHIT)*

CCHIT was formed to create a certification program to accelerate the adoption of health information technology. CCHIT serves a critical role for the nation's healthcare providers by establishing standards for healthcare technology vendors to demonstrate that their software applications are interoperable. By May 2007, CCHIT had certified nearly 90 ambulatory electronic health record products which meet baseline criteria for functionality, security, and interoperability. In 2007, CCHIT began testing of certification of hospital inpatient electronic health record products. (See *http://www.cchit.org/* for more details).

- *The Healthcare Information Technology Standards Panel (HITSP)*

The American National Standards Institute (ANSI) was selected to administer the standards harmonization initiative. The resulting collaborative, known as the Healthcare Information Technology Standards Panel (HITSP), brings together experts from across the healthcare community, including consumers, doctors, nurses, hospitals, those who develop healthcare IT products as well as individuals from government agencies and standards setting organizations.

The Panel's objectives are to:

- Establish a cooperative partnership between the public and private sectors to achieve a widely accepted, usable set of standards that enable and support widespread interoperability among healthcare software applications in a Nationwide Health Information Network.

- Harmonize relevant standards in the healthcare industry to enable and advance interoperability of healthcare applications, and the interchange of healthcare data, to ensure accurate use, access, privacy and security, both for supporting the delivery of care and public health.

In August 2006, the former DHHS Secretary accepted three sets of interoperability specifications approved by the HITSP that now form the basis for national interoperability. Also accepted was the AHIC's recommendation to develop an adoption plan to integrate these standards into software for healthcare 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.

- *The Health Information Security and Privacy Collaboration (HISPC)*

Differing interpretations of the Health Insurance Portability and Accountability Act (HIPAA) Privacy Rule among states and businesses create disparate organization-level business practices across the nation. HISPC was formed to identify and address these differences. RTI International, under contract to AHRQ, established HISPC to partner with 33 states (including Connecticut) to study these issues. Each member of the collaboration investigated and reported on barriers, solutions, and implementation plans related to privacy and security. In 2007, HISPC published a national report providing a summary of state privacy and security assessments, solutions, and implementation plans to help shape national public policies for health IT and HIE (RTI International, 2007). In the current phase, which began in April 2008, HISPC now comprises 42 states and territories, and aims to address the privacy and security challenges presented by electronic health information exchange through multistate collaboration (*http://privacysecurity.rti.org/*).

- *Nationwide Health Information Network (NHIN) Architecture Projects*

In July 2004, ONC published "The Decade of Health Information Technology: Delivering Consumer-Centric and Information Rich Health Care" (DHHS, 2004). The report was subtitled "Framework for Strategic Action," and set in motion a series of funding opportunities from founda-

tions, government agencies, and the private sector. ONC sponsored four consortia to design and evaluate standards–based prototype architectures for the NHIN. These prototypes demonstrated the advancement of:
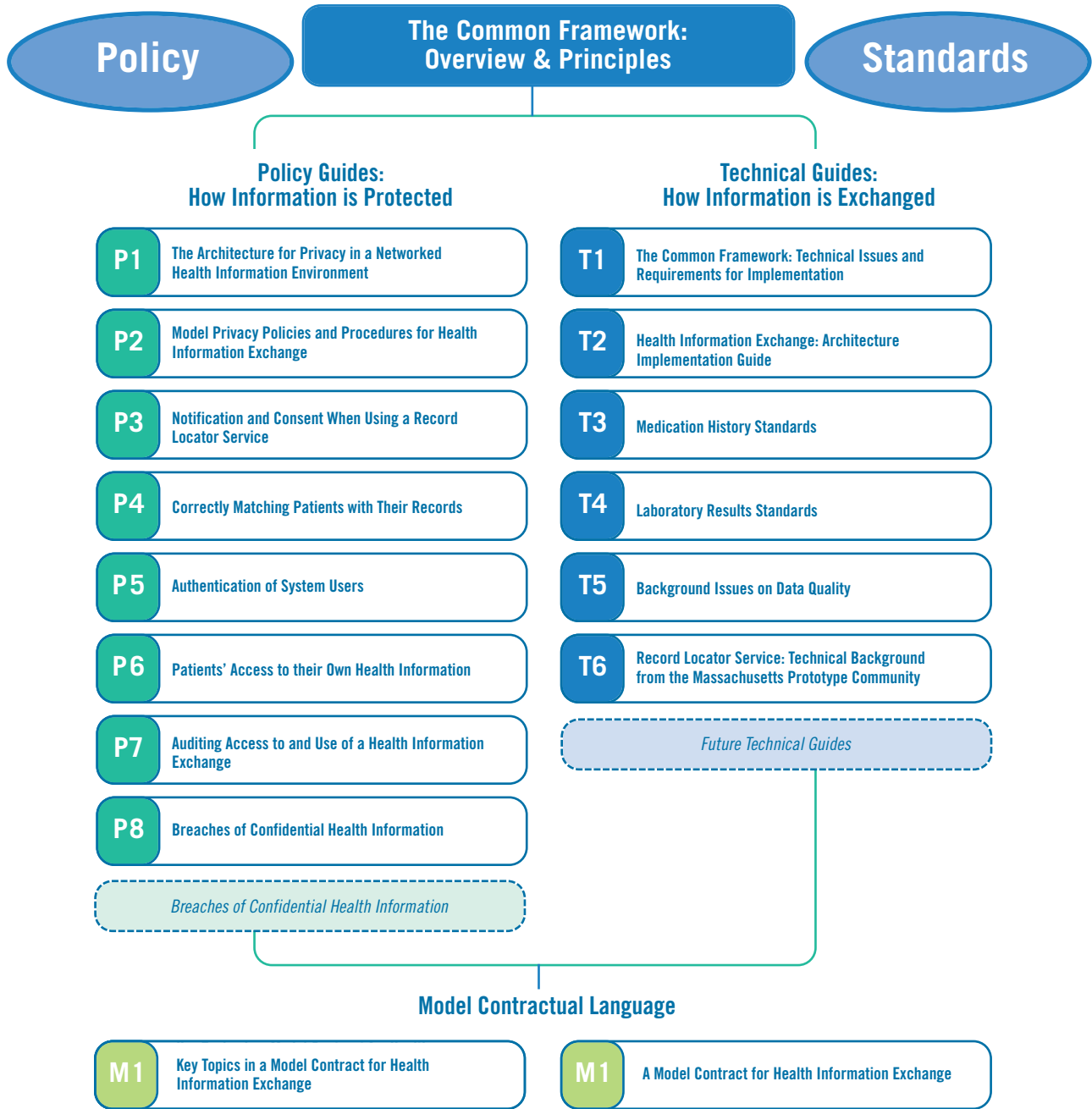
- Capabilities to find and retrieve healthcare information inside of health information exchanges and between health information exchanges;

- The delivery of new data to appropriate recipients;

- Key consumer services such as control over who can access a personal health record, data searching, ability to choose not to use a network service;

- User identity proofing, authentication and authorization;

- Methods for match patients to their data without a national patient identifier;

- Access control and other security protections;

- Specialized network functions; and

- The feasibility of large-scale deployment.

Connecting for Health

Connecting for Health is a public-private collaborative sponsored by the Markle Foundation with representatives from more than 100 organizations across the spectrum of healthcare stakeholders. Its purpose is to catalyze the widespread changes necessary to realize the full benefits of health IT, while protecting patient privacy and the security of personal health information. The collaborative is addressing the key challenges to creating a networked health information environment that enables secure and private information sharing when and where it is needed to improve health and health–care. A key output of the collaborative is the Common Framework, which is represented in summary in Figure 6 below and can be reviewed in detail at: *http://www.connectingforhealth.org/commonframe-work/*.

FIGURE 6
Connecting for Health Common Framework

Policy

**The Common Framework:
Overview & Principles**

Standards

**Policy Guides:
How Information is Protected**

P1	The Architecture for Privacy in a Networked Health Information Environment
P2	Model Privacy Policies and Procedures for Health Information Exchange
P3	Notification and Consent When Using a Record Locator Service
P4	Correctly Matching Patients with Their Records
P5	Authentication of System Users
P6	Patients' Access to their Own Health Information
P7	Auditing Access to and Use of a Health Information Exchange
P8	Breaches of Confidential Health Information

Breaches of Confidential Health Information

**Technical Guides:
How Information is Exchanged**

T1	The Common Framework: Technical Issues and Requirements for Implementation
T2	Health Information Exchange: Architecture Implementation Guide
T3	Medication History Standards
T4	Laboratory Results Standards
T5	Background Issues on Data Quality
T6	Record Locator Service: Technical Background from the Massachusetts Prototype Community

Future Technical Guides

Model Contractual Language

M1	Key Topics in a Model Contract for Health Information Exchange

M1	A Model Contract for Health Information Exchange

The Common Framework provides a set of policy and technical guidance that promotes the consistent development of HIENs to support interoperability and health information exchange on a national level while protecting privacy and allowing for local autonomy and innovation. It consists of a set of 17 mutually-reinforcing technical documents and specifications, testing interfaces, code, privacy and security policies, and model contract language. It was developed by experts in information technology, health privacy law, and policy, and has been tested as one of the prototype architectures sponsored through the ONC sponsored NHIN prototype project.

Impact of American Recovery and Reinvestment Act of 2009

Under the American Recovery and Reinvestment Act of 2009, the Office of the National Coordinator for Health Information Technology (ONC) is given permanent status within the Department of HHS. The ONC, to be directed by a National Coordinator, is given a revised mandate and a new structure.

The National Coordinator for Health Information Technology is tasked with:

- Updating the federal HIT Strategic Plan to contain specific objectives, milestones, and metrics for the adoption of HIT, including the utilization of an electronic health record for each person in the United States by 2014.

- Providing oversight and coordination of both the HIT Policy and HIT Standards Committees (see description below).

- Appointing a Chief Privacy Officer by February 2010 to advise on privacy, security and data stewardship and to coordinate with states and other agencies regarding these issues.

- Reviewing and reporting to the Secretary of HHS on standards for the electronic exchange of health information and recommending to the Secretary by December 31, 2009 an initial set of standards, implementation specification and certification criteria for adoption.

The ARRA establishes within the ONC a Policy Committee to make policy recommendations to the national coordinator and a Standards Committee to recommend standards, implementation specifications and certification criteria.

- The HIT Policy Committee will make recommendations to the national coordinator with respect to a policy framework for the development of nationwide HIT infrastructure. These recommendations will include technologies that protect privacy, the order of priority for the development of standards as well as implementation specifications and certification criteria for the electronic exchange and use of HIT and HIE.

- The HIT Standards Committee will recommend which standards are to be adopted, along with implementation specifications and certification criteria for the electronic exchange and use of health information. Although the ARRA does not specify whether or how existing organizations that have already made significant progress on these issues will be integrated into the new structure, it is widely expected that the work of these bodies will form the foundation for future efforts.

In addition, the AHIC will no longer exist under the new mandate. However, the work of the certification and standards organizations that supported the AHIC decision making will continue either through these existing organizations or successor organizations developed through the HIT Policy Committee or the HIT Standards Committee.

Conclusion

The efforts of the national initiatives outlined above have established broad-based standards and strategic direction for the essential components of the Nationwide Health Information Network. Collectively, this guidance establishes a consistent and comprehensive approach to planning and development of health information exchange capacity at the state, regional and local levels. The Plan strongly recommends a full commitment to the federal guidance outlined above.
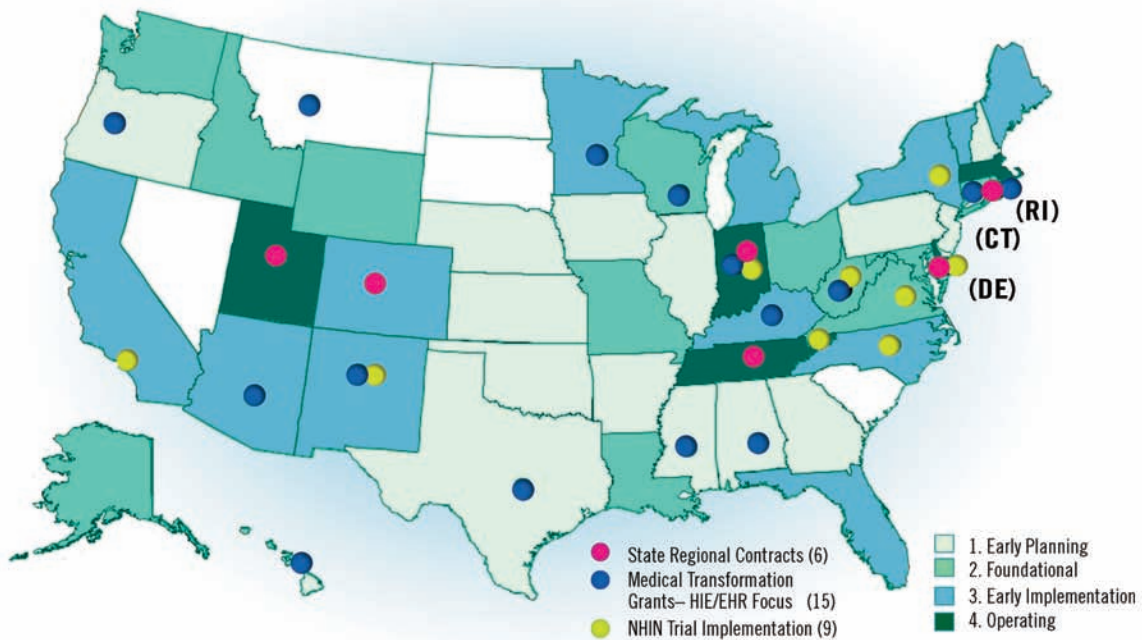
B. Other State Health IT/HIE Initiatives – Lessons Learned

Introduction

Health IT and HIE efforts across the nation continue to grow. A 2006 AHRQ survey identified 101 state-based HIE projects in 35 different states (AHRQ, 2006). In 2008, eHealth Initiative's annual survey of health information exchanges had 130 responses, with 42 HIENs identified as operational, a 31% increase over the previous year's survey (eHealth Initiative, 2008). Many more are still in the initiation or planning stages. This national progress is illustrated in the map below, from the State Level Health Information Exchange Consensus Project.

FIGURE 7
State Level Health Information Exchange Consensus Project

State Regional Contracts (6)
Medical Transformation Grants– HIE/EHR Focus (15)
NHIN Trial Implementation (9)

1. Early Planning
2. Foundational
3. Early Implementation
4. Operating

The success of these initiatives depends on their ability to address several complex and interdependent problems concurrently, including establishing interoperability, building public trust, assuring stakeholder cooperation, and developing financial sustainability. There is a growing body of experience reflecting both successes and failures that can help guide initiatives and projects within the state of Connecticut. Lessons from unsuccessful efforts such as the Santa Barbara County Clinical Data Exchange in California and the Northeastern Pennsylvania Regional Health Information Organization, as well as best practices from successes such as in Utah Health Information Network (UHIN) and the Indiana Health Information Exchange (IHIE) can be utilized in Connecticut. A detailed review of the efforts of the Connecticut border states of Massachusetts, New York and Rhode Island is also included in Appendix L. These lessons learned are described below.

State Role

In successful projects, state government is seen as the catalyst for action, generating momentum, credibility, and stakeholder buy-in for HIE projects. States are generally the initial funder for HIE projects and may provide some of the initial administrative infrastructure. As projects develop, state departments or agencies shift toward a more shared leadership role (AHRQ, 2006). States' main roles are to:

- Provide leadership to help set the HIE agenda and direction for the state.
- Promote broad stakeholder involvement to facilitate communication, decision making, and shared learning across these stakeholders (e.g., infrastructure initiatives and addressing policy barriers).
- Actively participate in HIE initiatives as a data source (e.g., Medicaid, public health, registry data) and as a data partner (e.g., as large insurer or large employer) by exchanging patient/employee data.
- Facilitate collaboration and coordination across state HIE projects to promote communication, minimize project silos, and efficiently leverage state funding.
- Establish and maintain broad-based support for HIE through support of, and participation in, multi-stakeholder forums and through the development of a long-term vision and strategy.

Start up Funding and Long Term Financial Sustainability

Start-up funding and a model for long-term sustainable revenue represent two of the most significant barriers to existing and planned health IT and HIE projects (ehealth Initiative, 2008; AHRQ, 2006; Adler-Milstein, Bates, & Jha, 2009). Initial funding for projects most often comes from federal and state governments, followed by foundation grants and private sector financing (National Governors Association, 2009). However, when grants end, project momentum is often lost due to the inability to find a long-term revenue stream. This is a universal problem: over 80% of HIENs surveyed by the eHealth Initiative in 2008 reported that the development of a sustainable business model was a moderately difficult to difficult challenge (eHealth Initiative, 2008). For new HIE initiatives, the most commonly developed strategy is a data fee model where subscribers pay a fee to access data within

the HIEN. Similarly, most existing HIENs receive recurring subscription or transaction based fees as moderate or substantial sources of support (Adler-Milstein et al., 2008). Utah's financing model for administrative transactions may be the closest thing to a sustainable framework (AHRQ, 2006).

This universal challenge underscores the importance that Connecticut must place on the need for long-term sustainable funding in the earliest stages of the project.

Multi-Stakeholder Buy In and Governance

State and local health IT and HIE efforts view the engagement of a broad set of stakeholders who participate in governance efforts as fundamental to success (National Governors Association, 2009; State Level Health Information Exchange Consensus Project, 2008; AHRQ, 2006). These stakeholders include hospitals, primary care physicians, health plans, community health clinics, employers, patients and/or consumer groups, public health departments, and quality improvement organizations. Multi-stakeholder involvement and collaboration promotes credibility, facilitates engagement of stakeholders, and helps overcome resistance. Leaders from HIE projects stress the importance of early engagement of physicians to ensure their buy-in (AHRQ, 2006). In their planning, Connecticut has involved a broad set of stakeholders, including physicians, and should continue to do so to ensure pilot project and long-term success.

Pilot Projects/Incremental Approach

Although an interoperable health information exchange is ultimately the goal and many states have projects that are working towards this goal, successfully building a comprehensive electronic patient data exchange is proving more difficult than most originally imagined. Most successful HIENs have been adopted with an incremental approach, exchanging narrow types of data typically focusing on a targeted population or project (National Governors Association, 2009; AHRQ, 2006). For example, the Utah Health Information Network (UHIN) began exchanging claims based data before the exchange of clinical data.

Initial Value Proposition

Focusing on incremental phases and pilot projects has helped health IT/HIE projects demonstrate their value to stakeholders (AHRQ, 2006). The value proposition is generally based on a combination of factors associated with efficiency, patient safety and improved quality of care. As Connecticut works to identify and articulate their plans, develop strategies for implementing health IT and HIE, and promoting its use, it will be important to demonstrate concrete short-term successes to help build support and promote adoption.

Interoperability

While technology standards and best practices provide an important foundation, they need to be viewed in the context of several additional compelling considerations.

- First, a common technical architecture that is modular and meets the specific health information needs of diverse healthcare constituents must be developed.

- Second, a strategic decision that technological interoperability will be met through a series of incremental steps building on sponsored pilot projects must be accepted and promoted.

- Third, technological interoperability must be driven by clinical need and financial benefits.

- Fourth, the supporting infrastructure that promotes interoperability must be a shared resource for all stakeholders in the healthcare community.

C. Overview - The Connecticut Healthcare Environment and HIE Landscape

Introduction

Although federal guidance, best practices and health IT standards will be fundamental to the building of the Nationwide Health Information Network, the structure and function of its local, regional and statewide components will be shaped to a significant extent by the culture and priorities of local, regional and state health IT and HIE projects. Several initiatives underway in Connecticut have laid the groundwork for a state structure, and the priorities and concerns of the stakeholders involved will shape the CT State RHIO and state HIEN going forward.

Evaluation

There are many local and regional health information exchange efforts underway in Connecticut. While most are still in the early planning stages, a number of initiatives are well developed, building stakeholder support and developing business plans with the expectation that they will move to implementation in the near future. Several of these are collaborations between hospitals and their affiliated providers; the goal being to help providers implement a single EHR product that would provide data exchange between them, the hospital, and other connected providers. While this is viewed as a relatively straightforward and efficient model, concerns still exist. The single product model makes it potentially more difficult for providers who choose to use other systems to connect to the hospital and to other providers. Of greater concern is that the single product model will give the participating hospitals a competitive advantage over other hospitals in the region through its role in the development and ongoing management of the data exchange capacity. However, other Connecticut stakeholders see this model as a realistic and feasible approach to provide EHR capacity to small- and medium-sized practices that lack the financial and technical expertise to adopt on their own. Conversely, some raise concerns about limiting the options of these providers and tying them too closely to a single hospital system.

Currently, the perception in Connecticut is that while some of the regional efforts show promise, the majority lack the funding or vision required to successfully mount local HIE efforts that can ultimately integrate into a statewide HIEN. This concern stems from the lack of required financial

resources, a concern heightened as the state's economic situation has deteriorated. The recent passage of the American Recovery and Reinvestment Act and the substantial funding that will be available for health IT and HIE initiatives, brings renewed optimism about the future of HIE in Connecticut.

In addition to financial concerns, competition among organizations, the lack of a collaborative history among providers, and parochialism that weds organizations to established ways of doing business all represent significant barriers to statewide activity and collaboration. Due to the competitive nature of healthcare, many of the healthcare providers in the state are reluctant to share patient data. In Connecticut, this is more of an issue for the private practice organizations than for hospitals. One example of this involves clinical laboratory orders, where an integrated environment would allow providers to order laboratory tests from the laboratories of their choosing. The incentive to participate in an exchange network is diminished if a hospital laboratory fears being put at a competitive disadvantage.

Amidst these concerns, there is evidence to suggest that the situation may be more positive. There are several existing collaborating groups of healthcare organizations that are pursuing health IT/HIE opportunities to improve the state's healthcare system. While there are one or two examples of formally organized RHIOs, the majority of these may only be loosely characterized as RHIOs.

Electronic medical record adoption by Connecticut providers mirrors the national trends of 10 – 15% (DesRoches et al., 2008; Jha et al., 2006; Jha, et al. 2009). A larger majority of the provider community is exposed to electronic data exchange through their relationships with hospitals as well as laboratory, radiology and pharmacy vendors. Because many of these relationships rely on proprietary systems, the benefits of these systems are offset by the disparate sources of data being managed by their administrative staffs. In addition, several independent physician associations (IPAs) are supporting the development of EHR and registry systems and providing technical assistance for health IT adoption to their members.

Many of the state's thirteen community health centers have adopted electronic health records, and are beginning to use these systems not only for patient care, but for reporting to funders and state and federal agencies, and for quality improvement efforts. While there is support among the leadership of the community health centers for increased health information exchange, concerns about confidentiality and access to records is heightened. Protection of immigration status and data about substance abuse and mental health issues from payers and public agencies is a key concern of these organizations.

Both within state agencies and externally, the challenge of integrating the state's diverse databases is viewed as nearly impossible. Limitations of outdated systems, regulatory and legal barriers, and other bureaucratic barriers are viewed by many as insurmountable. However, there is a desire amongst leaders in the state agencies for better integration and collaboration. The primary concern is how to change the existing culture to support change.

eHealthConnecticut, Inc. is perceived by some to be an important organization that is representative of the full spectrum of the Connecticut healthcare system. This optimistic view is coupled with frustration at the undercapitalization of the organization and its lack of accomplishment and progress to date. Currently, the organization is developing the Connecticut Health Quality Cooperative, a payer driven program to collect, analyze and report healthcare data across the state to encourage physicians to improve the quality of care they provide. While this project is gaining recognition, there is concern that the project will lead to an overreliance on payers and move the organization into a vendor role, making it more difficult to carry out a more neutral role of setting standards, providing technical assistance, and promoting advocacy and education.

Payers play a more important role in Connecticut than in other states because of the large historic presence of the insurance industry in the state, and their influence in setting the state's healthcare agenda. Acknowledgement of the role that payers can play in building increased health information exchange is tempered with privacy concerns about increased payer access to data.

Finally, there is a lack of shared understanding, priorities, and language to promote communications and collaboration across the state relative to HIE strategy. This is a common problem shared by every state across the country. Without a shared understanding of where Connecticut is headed relative to HIE, healthcare constituents cannot work together effectively. This challenge is even more daunting given the scope and complexity of The Plan. To address this issue, The Plan offers a vision, principles, goals, and a common business model. Just as importantly, it presents a common language to promote a shared understanding of the impact of the plan on Connecticut's healthcare professionals and leaders in the coming years. These critical elements represent the foundation of sustainable commitment to The Plan for all stakeholders in Connecticut. Collectively, they are presented as a framework for developing health IT/HIE in Connecticut in the following chapter.

III

A Framework for Developing Health IT/HIE in Connecticut

The Plan must meet the unique and disparate needs of a broad range of clients, patients, providers, office staff, administrators, researchers, public health professionals and other healthcare constituents in Connecticut. Clients and patients must understand and appreciate that the increased electronic accessibility of their healthcare data will result in better care, and be satisfied that their privacy will not be compromised in the process. Providers must be confident that the information made available through HIE is complete and accurate and will improve the quality of care they provide. Office staff must be convinced that HIE will be worth the time and effort. Administrators must be convinced that the substantial costs and effort associated with HIE will ultimately result in real benefits to their organizations. Researchers and public health professionals must be convinced that new opportunities for providing healthcare monitoring, evaluation and oversight through HIE are worthwhile and sustainable.

To meet the needs of this diverse group of healthcare professionals, extensive and sustained communication and collaboration will be required. Also, a shared commitment to a comprehensive and sound business plan is needed. Finally, fully qualified and sustained leadership is needed to sustain the commitment and manage the implementation of the strategy over time. This section provides the framework to ensure that these requirements will be met.

A. Key Inputs for the Development of the Plan

In order to transform the Connecticut healthcare system through health IT and health information exchange, The Plan must take into account: the national and state policy context for health system reform and for health IT/HIE guidance; the current Connecticut healthcare system; and the level of interest and commitment of a broad group of constituencies whose support and participation is necessary if the network is to succeed (Figure 8).

FIGURE 8

Federal Guidance for HIE	Current CT Healthcare System	Stakeholder Commitment

Federal Guidance for the development of RHIOs and HIENs, as well as the experiences of other RHIOs and HIENs, provides a standards-based foundation and a wealth of experience to build upon in the development and implementation of The Plan.
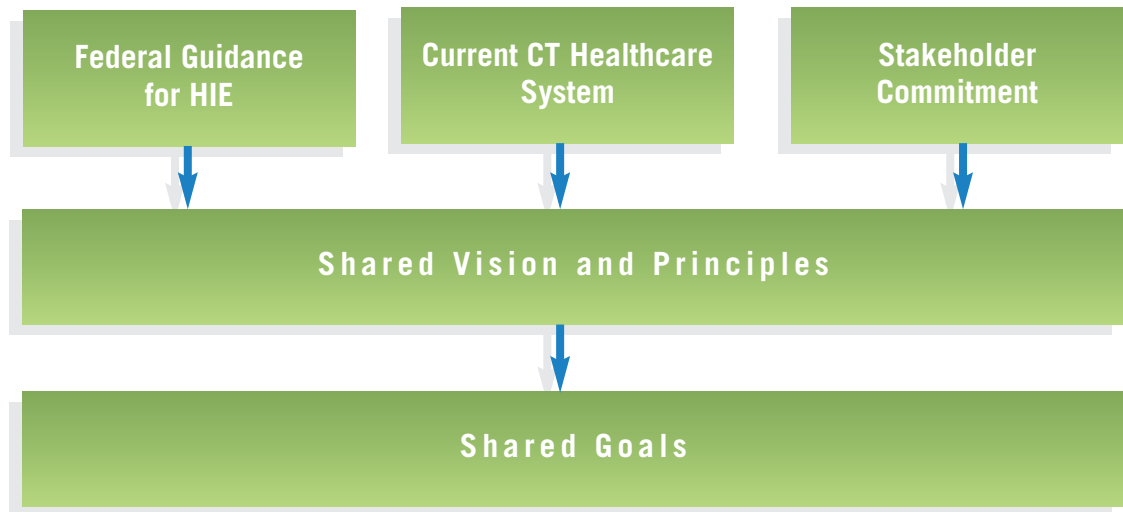
The Current Connecticut Healthcare Environment guides how The Plan is structured. The current Connecticut healthcare environment is fragmented and does not have a standard framework within which stakeholders can effectively communicate, collaborate and pursue shared interoperability goals. This represents a significant challenge; the development of a shared framework and language that all stakeholders can use to communicate is fundamental to success.

Stakeholder Involvement and Commitment is critical to the successful development and implementation of The Plan. The current commitment level of Connecticut stakeholders to transforming the healthcare system through health information exchange must be strengthened and coordinated. Given the complexity of the healthcare environment and the varying perspectives and priorities of the healthcare stakeholders throughout the state, The Plan must promote stronger participation, communications and collaboration.

B. Vision, Guiding Principles and Goals

It is widely accepted that there are tremendous opportunities for improving the state's healthcare system through health IT/HIE. Stakeholders across Connecticut recognize this opportunity and offered significant insight regarding what it will take to make The Plan successful. Through input garnered from the stakeholder interview process, The Plan provides a shared vision, principles and goals as represented below.

FIGURE 9

| Federal Guidance for HIE | Current CT Healthcare System | Stakeholder Commitment |

Shared Vision and Principles

Shared Goals

Vision

The vision statement developed by the project team and approved by the Steering Committee is provided below.

> **The Connecticut State Health IT Plan will transform the Connecticut healthcare system by enabling substantial and measurable improvements in the quality of patient care, patient safety, and the overall efficiency and effectiveness of the healthcare system through health information technology and health information exchange.**

Principles

To implement this vision, it must be translated into a shared set of principles and goals, and a consensus on the strategy for realizing the vision. Through the stakeholder interview process, review of federal guidance and other state experiences, as well as ongoing collaboration with the Steering Committee, the project team developed a set of principles that provides the foundation of the goals and strategy that follow.

- **Principle 1 – Health IT is a tool for improving the Connecticut healthcare system.**

  However, health IT is not a panacea, it does not by itself "fix" the system. It is a necessary foundation for a wide range of efforts to transform the healthcare system.

- **Principle 2 – Connecticut healthcare consumers must be confident that their personal health information is secure and used appropriately.**

  Among consumers and their advocates, the privacy and security of personal health information is paramount; the inability to ensure data security and prevent inappropriate use has been a major obstacle and cause of failure for many data exchange efforts. However, it is not enough that the network protects the privacy of consumers. A broad based education and outreach effort directed at providers and consumers to convince them about privacy, security and value of health information exchange is needed to build confidence and trust.

- **Principle 3 – The future development of health IT and HIE in the state will support the entire healthcare community.**

  Although the implementation of the network may be incremental, The Plan must be inclusive of the full range of healthcare providers, settings and services. This includes safety net providers, nursing homes and rehabilitation centers, and ultimately, mental health and substance abuse providers.

- **Principle 4 – The Connecticut Health Information Exchange Network and its associated governance structure will maintain complete transparency and openness.**

Trust and awareness among healthcare consumers, healthcare professionals and policy makers are key requirements of The Plan. For the CT State RHIO to successfully operate within a complex and competitive healthcare system, there must be confidence that it is working for the benefit of the overall system and its patients, and not uniquely benefiting particular organizations or constituencies.

■ **Principle 5 – The Connecticut State RHIO will maintain representative, qualified and stable leadership across the full spectrum of healthcare stakeholders in the state.**

Broad representation has been demonstrated as integral to HIEN success and is key to ensuring ongoing participation and collaboration as the health information exchange network evolves.

■ **Principle 6 – The Connecticut Health Information Exchange Network and its associated governance structure will provide guidance and support to local and regional health information exchange initiatives.**

While statewide data exchange capacity is the ultimate goal, it depends on the successful development of regional efforts to connect and exchange data. Initially, statewide effort will focus on providing standard setting, guidance and technical support for the regional HIE projects.

Goals

These goals describe what will be accomplished through the implementation of The Plan.

■ **Goal 1 – Develop Organizational Structure to Support the Implementation of the Connecticut State Health IT Plan.**

The Connecticut State Regional Health Information Organization will be the entity responsible for the implementation and overall success of The Plan.

■ **Goal 2 – Provide a Framework to Promote Effective Communications and Management.**

The Connecticut Health IT Plan Framework will provide a resource to promote shared understanding of The Plan, the shared language that will improve the ability of constituents to communicate and collaborate, and the management and accountability that is required to ensure the effective development of the network.

■ **Goal 3 – Recruit and Sustain Qualified, Effective, and Diverse Leadership.**

A leadership structure comprised of individuals with a commitment to statewide health information exchange, representing a diverse set of stakeholders and a range of expertise is instrumental at the outset of this effort and must be sustained on a permanent basis.

■ **Goal 4 – Demonstrate Sustained Commitment to All Healthcare Constituents.**

Broad representation of stakeholders on the CT State RHIO governing body, education and outreach, consumer advocacy, and openness and transparency of activities will encourage commitment by all healthcare constituents across the state.

■ **Goal 5 – Maximize Investment through Strategic Planning and Phased Implementation of the Health Information Exchange Network.**
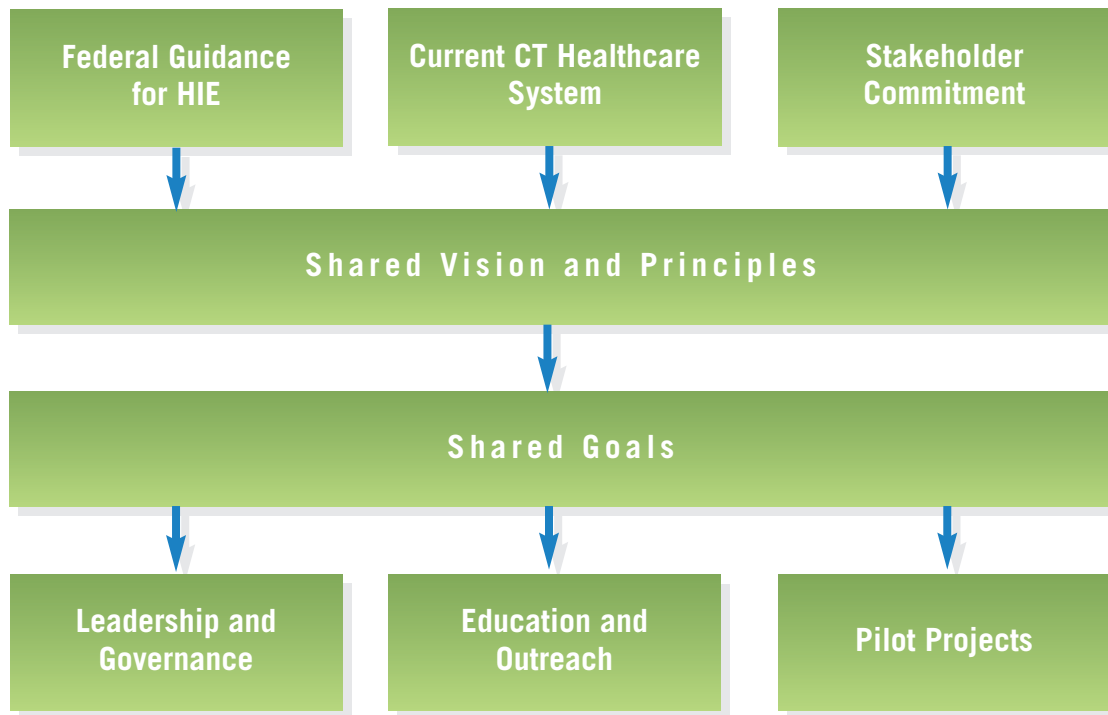
The Plan acknowledges that there are a wide variety of healthcare constituents with varying HIE needs and resources. While there are significant differences among constituents, there are many elements of The Plan that are consistent across these groups. Through careful planning and modular design, the health information exchange network will evolve through an incremental process that builds capacity over time while maintaining investments.

■ **Goal 6 – Promote Effective Utilization of Resources.**

The Plan leverages existing health IT projects and resources, promotes local and regional health information organizations and their health IT/HIE projects and collaboration across participating healthcare organizations.

C. Key Resources

FIGURE 10

Federal Guidance for HIE → Shared Vision and Principles
Current CT Healthcare System → Shared Vision and Principles
Stakeholder Commitment → Shared Vision and Principles

Shared Vision and Principles → Shared Goals

Shared Goals → Leadership and Governance
Shared Goals → Education and Outreach
Shared Goals → Pilot Projects

Although there are many critical components to the success of The Plan, three are integral to short- and long-term success: Leadership and Governance; Education and Outreach; and Pilot Projects that will support the phased development and implementation of the HIEN.

Leadership and Governance

The Plan recommends the formation of the CT State RHIO which includes a diverse governing body representative of its key constituencies. This organization, described in detail in subsequent sections, will be responsible for the implementation of the recommendations in The Plan. Initially, the CT State RHIO will primarily provide support to local and regional health information organizations across the state that sponsor their own initiatives.

Education and Outreach

Transforming the healthcare system through the use of health IT/HIE will impact all organizations, healthcare providers, and healthcare consumers. Training programs for clinical, operational and technical staffs will be required as The Plan is implemented. An education and outreach subcommittee is recommended to promote training and communications programs. Ongoing communications by all parties, particularly with leadership and technical resources will be critical. Structured communications protocols will be developed to ensure ongoing communications between state government, the CT State RHIO, and local and regional health information organizations.
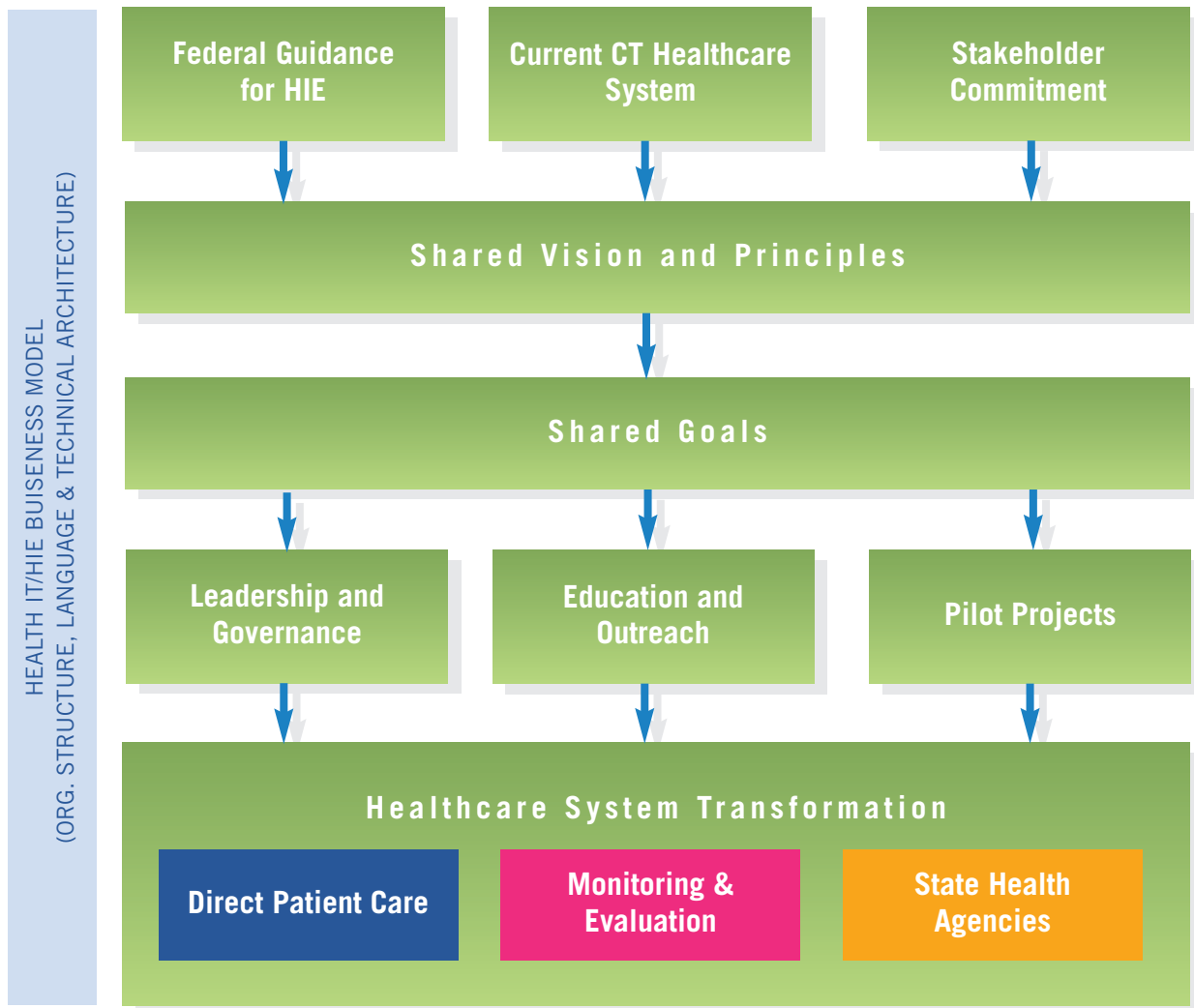
Pilot Projects

The State Health Information Exchange Network will not be created through a single comprehensive project. The complexity and cost of a project with this scope requires significant human and financial resources, and consequentially, a significant amount of risk. The Plan recommends a phased approach with a series of pilot projects to support the incremental development of the Connecticut Health Information Exchange Network as well as the CT State RHIO's capacity to support it. A "project certification process" will be developed through the initial pilot projects which will subsequently support expansion of the HIEN across the state. As proposals for subsequent health IT/HIE projects are developed and submitted by local and regional health information organizations, the CT State RHIO will use the certification process to verify that those health IT/HIE projects meet the organizational, operational, and technical requirements of the broader state strategy.

D. Healthcare System Transformation

The vision of improving the quality and safety of patient care and the overall efficiency and effectiveness of the Connecticut healthcare system cannot be achieved by health information exchange alone. While the widespread and timely availability of data through HIE will enable and support improvements in the healthcare system, much broader change is required. Healthcare professionals in all fields will be required to assess and modify clinical practice, adapt roles and responsibilities, and create an environment that encourages innovation in practice through health IT/HIE.

FIGURE 11

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HEALTH IT/HIE BUISENESS MODEL
(ORG. STRUCTURE, LANGUAGE & TECHNICAL ARCHITECTURE)
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| Federal Guidance for HIE | Current CT Healthcare System | Stakeholder Commitment |

Shared Vision and Principles

Shared Goals

| Leadership and Governance | Education and Outreach | Pilot Projects |

Healthcare System Transformation

| Direct Patient Care | Monitoring & Evaluation | State Health Agencies |

Given the complexities implied by the idea of healthcare system transformation, the project team has structured the Connecticut healthcare system into three distinct domains as represented in Figure 11 above. Consider the following examples of how the healthcare system currently works and how it will be improved through HIE.

Direct Patient Care

In the last several decades, consumers in the United States have grown accustomed to the benefits of sophisticated technology and information systems in many aspects of their daily lives and have accepted that their privacy will be protected when they use these systems. Their bank cards give them

easy access to funds virtually anywhere in the world; they transfer money; check their balance status; pay bills; and file their taxes electronically. They get reminders by email when their car needs service or when their pets are due for a veterinary visit. They order, pay for, and check the delivery status of books, electronics, and groceries on line. They find out about their children's homework and keep in touch with their teachers on-line.

And yet, when they go to their doctor they still fill out forms, repeatedly by hand, they wait while their providers pore through paper records to find laboratory results, hand carry records and x-rays to specialists, and when they get there, provide basic medical information that they have already given to other providers. If they go to the hospital, their own memory or their own paper records are often relied upon for basic information such as medications they are taking, allergies and key aspects of their medical history.

> **Direct Patient Care Example:** A 40 year old man is brought by ambulance to an emergency department after passing out while driving his car. His injuries are relatively minor, but require antibiotics, his blood pressure is elevated and his breathing is irregular. His verbal reports on his medical history are inconsistent.
>
> **Now:** The hospital has no medical record on the patient; the emergency department physician makes a decision based on the patient's self report to administer antibiotics, which then results in an allergic reaction.
>
> **Future:** The staff at the emergency department is able to electronically obtain basic medical information on the patient detailing care provided by a number of Connecticut hospitals and other healthcare settings, alerting them not only to the antibiotic allergy, but also to relevant information about his cardiac history.

Direct patient care organizations such as hospitals, community clinics and private practices represent key settings for transforming the way health information is used to support improvements in the quality of care and efficiency of the Connecticut healthcare system. It is within these settings that most patients will first become aware of health IT and how it can benefit them. The direct patient care environment is where most of the transactions between primary care providers, specialists, laboratories, pharmacies, hospitals, nursing homes, and ancillary care providers that rely on the exchange of health data will occur.

In comparison to the current system illustrated above, in the transformed system, primary care providers will have patient information stored and retrievable in electronic health records. These records will allow providers to easily access their patient's health information, alert them when tests or procedures are due, warn of possible drug-drug or drug-allergy interactions, and support improved provider-patient communication. Quicker, more efficient access to information will extend beyond the provider's office. Laboratory tests and x-ray images will be ordered electronically, and results automatically returned to physicians and included in patient records. Medications will be ordered electronically and physicians notified whether prescriptions have been filled. Specialists will be able

to access relevant patient records, medication histories and test results, and primary care physicians will be able to easily access the results of specialty visits. Physicians in hospitals will have electronic access to patient's primary care histories. Consumers will be able to make appointments and view test results on-line as well as communicate with their physicians by email. Emergency department physicians will not have to rely on critically ill or trauma patients and their families to provide essential health information, but will be able to access records from a range of providers the patient may have seen.

Healthcare System Monitoring and Evaluation

Organizations that engage in healthcare system monitoring and evaluation typically do not provide direct patient care and for that reason, require access to data that may originate at the point of care but has undergone some transformation to de-identify the data and protect the privacy of the patient. Data are typically aggregated and transformed to meet the requirements of specific quality or health-care system management responsibilities. Examples include: hospital admission, discharge and transfer (ADT) information for tracking hospital inpatient activity; lab results for supporting chronic disease management activities; Healthcare Effectiveness Data and Information Set (HEDIS) data for tracking physician performance; and claims data used for pay-for-performance programs.

> **Healthcare System Monitoring and Evaluation Example:** Access to behavioral health services in Connecticut has been an ongoing concern for state government and providers of care. Over time, treatment patterns for patients with behavioral health needs have shifted away from providing care in traditional inpatient settings towards less restrictive care settings in the community. It is hoped that this shift may help alleviate hospital emergency department overcrowding, reduce unnecessary admissions and long stays in hospitals and ultimately lead to better outcomes for patients and their families. The Connecticut Department of Mental Health and Addiction Services (DMHAS), in particular, is interested in the continuum of care for behavioral health services and in ensuring that clients receive care in the most appropriate and cost-effective setting.

> **Now:** The DMHAS currently receives statewide data on inpatient and emergency department behavioral health utilization trends, however, little is known about statewide utilization by patients treated on an outpatient basis in community settings.

> **Future:** A health information exchange enabled environment would facilitate access to non-confidential data on care provided in community based/outpatient care settings that would provide the DMHAS with more meaningful data analyses and produce relevant studies on behavioral health utilization and access across the full spectrum of care settings.

Currently, hospitals and other healthcare providers are collecting and providing healthcare data to quality organizations in a variety of forms. These efforts are typically supported by participating organizations on a best effort basis, using the most readily available technical and organizational means. While this approach was generally required in the legacy healthcare environment, federal guidance suggests that a "standards-based approach" to the development of health IT and HIE in support of quality and population health monitoring will provide many opportunities and benefits. One of the significant reasons why the data are not available is the difficulty in compiling and analyz-

ing this information; it must be collected by reviewing charts and records by hand and there may be no consistency on how the data are reported. With electronic health records and improved data exchange, the potential to automate and standardize the measurement, feedback and reporting of healthcare data increases significantly. In this vision, a basic set of quality measures would be established for hospitals and for clinicians and this data could be easily gathered and reported to external quality organizations. With this data, clinicians and hospitals could receive timely reports on their own performance compared to their local peers and to state and national levels. For example, physicians could learn whether their diabetic patients are faring as well, better or worse than those of their peers, and learn what specific practices are being followed that may be different from their own practice, or different from national standards and guidelines. Payers can use this data to reward physicians that are delivering the highest quality of care, while policy makers can use it to identify trends in healthcare delivery. Consumers can use the data through report cards and other reporting mechanisms to help them choose health plans, primary care providers, specialists and hospitals.

State Health Agencies

State health agencies require access to program related health information that is specific to their ongoing responsibilities for state-level healthcare oversight and state and federal program management responsibilities. These organizations typically do not have direct patient care relationships and for that reason, require access to data that may originate at the point of care but is needed for program specific purposes for them to meet their responsibilities. A noteworthy example is the ability to manage childhood immunizations. In this example, the data are most effective when used bi-directionally —not only must the state have this information for monitoring and compliance purposes, but the data are useful to providers in obtaining a complete picture of a child's health history and can prevent duplicate immunizations when parents cannot recall, or cannot document, prior immunizations. De-identified data can also be more effectively used if other state departments can access the data to support their own analysis and evaluation efforts.

> **State Health Agencies Example:** Qualification for federal funds to combat childhood obesity requires data collection, analysis and reporting of data that is housed in multiple state healthcare agencies.
>
> **Now:** A complex set of agency regulations, distinct datasets, and obstacles to communication among agencies makes accurate and complete compilation of data difficult, resulting in datasets that fail to present a compelling case for the funding.
>
> **Future:** With standardized rules for data exchange and legislative and regulatory attention to promoting this type of exchange, data held in the different departments are compiled to present a more complete picture of childhood obesity in the state, permitting application for the federal funds.

Currently, healthcare providers are required to report to various public agencies on a wide range of both infectious (e.g. sexually transmitted diseases) and non-infectious (e.g. cancers) illnesses and health conditions. In addition, they are required to report to various agencies when patients respond

adversely to medications or vaccinations. Today this reporting is burdensome, and because of the myriad of reporting requirements at local, state and federal levels, reporting is often inconsistent, incomplete, inaccurate and untimely. This results in public health data that may not truly reflect the health situation in particular communities or may delay the identification of emerging health crises or harmful medications. Emerging flu epidemics, food-borne disease, or adverse events to medications can be quickly spotted when reporting is close to real-time.

This type of reporting is an ideal use for electronic health records and electronic data exchange. When appropriately supported, these systems can automatically collect and distribute data to a range of public agencies using the required formats and within required timelines. EHRs and HIE capacity strengthen the likelihood that public health data can move in two directions, as providers can quickly benefit from receiving feedback and analysis of the data they have reported to identify public health trends within their own patient population.

From a public health perspective, maternal and child health involves a range of programs and agencies that are meant to improve the health and well-being of pregnant women and their children from pregnancy through early childhood. Many public agencies at the local, state, and federal level have a role in maternal and child health and there are a myriad of programs available to women who qualify. The complexity and quantity of these programs affects patients, providers and public agencies.

Electronic systems at the provider and public agency level can help in the assessment of patient eligibility for maternal and child health programs, facilitate their enrollment, and facilitate reimbursement to providers. These systems can link women to programs that provide not only direct medical care, but support for basic services such as housing and nutrition, social workers and case managers. As with public health reporting described above, these systems will also remind providers of the range of required screening exams and will facilitate reporting to various public agencies that collect information on these screening activities. Ultimately, a more concerted and holistic approach to the care of the pregnant woman and her child are made more feasible through the use of these electronic systems, resulting in better health outcomes for both the women and their newborns.

E. Consumers and Their Role in HIE

Ultimately, the vision for improved quality of care, patient safety, efficiency and effectiveness of the Connecticut health system through health IT/HIE is to create a healthcare system where patients and their families are better informed and in control of their own healthcare decisions. Many of the improvements described previously will lead to this transformed system.

Consumer access through a patient portal to their provider's system or use of personal health records will allow them to schedule appointments, request referrals, send medication refill requests, review their test results and communicate with their providers electronically. Information on their insurers' web sites or web sites of public agencies will allow patients to select providers based on the quality of care they provide.

Consumer access to clinical information in a personal health record supported through health information exchange could significantly transform consumers' participation in their care. Today consumers and patients have limited access to their own health information. Information housed at their primary care provider is likely to be in paper format and generally not accessible to the patient. When a lab result is returned, patients must generally request a copy from their provider, and they must do so each time there is a lab result. If they want a record of their medication allergies, they must create and retain it themselves. When they move or change providers, their record often stays with their previous physician, with only basic medical information transmitted to the new provider.

With a personal health record, consumers will have the ability to maintain a readily accessible record of key medical information and history for themselves. Ideally, this record will be "fed" not only by the consumer but also with data that are automatically transferred from a provider's record to the consumer's personal health record. The consumer will have the ability to control which providers can access their records and what part of the record each can access. The consumer will be able to grant access to the record to other individuals such as family and healthcare proxies.

In addition, as part of the consumer's growing responsibility for their own healthcare, consumers may have the ability to report adverse events through their personal health records to providers, public agencies and manufacturers. This direct reporting will augment provider reporting and has the potential to improve the speed and timeliness in which events such as epidemics, food borne illness and medication complications are identified. Personal health records can be equipped with the same type of reporting functions as in provider health records so that reporting can be automatically triggered by data in the personal health record. Consumers would also then receive notification of adverse events concerning their own conditions, public health events, and problems with medications they are taking directly into their personal health records rather than relying on their providers to convey this information.

Improvements in care delivery will supplement this growing level of consumer empowerment over their own care. Technology will provide the opportunity for better monitoring of chronic conditions such as diabetes, hypertension, depression, and asthma through home equipment tied into providers and case managers who are in frequent email and phone contact with patients. An improved and expanded model of primary care known as the medical home will provide a more comprehensive approach to managing all aspects of a patient's healthcare through all phases of a person's life.

Together, these changes in the healthcare system supported by the improved availability and quality of data through electronic health records and health information exchange, will lead to improved consumer control over their healthcare, and ultimately to improved health for the over three million citizens of Connecticut.

IV

Critical Success Factors

This chapter of The Plan reviews the critical success factors that must be addressed as Connecticut develops health information exchange capacity in the coming years. To fully inform those charged with implementing The Plan, each section of this chapter reviews the Connecticut healthcare system as it relates to the critical success factor and also reviews federal guidance and lessons learned from other states' related initiatives. Recommendations are aggregated and synthesized in the "Recommendations and Next Steps" chapter of The Plan. Where appropriate, an analysis of the impact or role of the American Recovery and Reinvestment Act is included.

A. Establishing the Connecticut State Regional Health Information Organization (CT State RHIO)

Introduction

One of the key recommendations is the establishment of a new organization: the Connecticut State Regional Health Information Organization (CT State RHIO). The CT State RHIO will be responsible for coordinating health IT/HIE activity across the state. Identifying the appropriate vision, mission, scope of authority, and governance structure of the CT State RHIO is essential to the short- and long-term success of the organization.

- The vision and mission must be meaningful and relevant to the lives and work of the RHIO's constituents.

- Leadership must successfully support the direction of the organization at all times, from day-to-day operations to strategic planning as well as during crises.

- Constituents must develop a sense of trust in the ability of the organization's board to represent their best interests and/or the public's interests.

The primary function of the RHIO is to ensure that the organization serves effectively in providing a "public" service to its members and stakeholders. The RHIO accomplishes this oversight and evaluation function through its governing body. The governing body keeps well informed about the activities of the organization and communicates appropriate information to the public and constituents within the Connecticut healthcare system. The second function of the RHIO is to facilitate the creation of an HIE infrastructure. To achieve these goals, the RHIO must serve as a catalyst to promote collaboration and policy change among stakeholders; promote interoperability and national standards;

advance the adoption of health information exchange; promote sustainability of the infrastructure and systems; and ensure effective and ethical use of personal health information.

Connecticut Environment and Stakeholder Perspective

To date, the Governor's office and the Connecticut State Legislature have taken preliminary steps to formalize a strategy for the development of health information exchange capacity at the state level. The passage in 2007 of legislation authorizing and funding the development of The Plan was an important first step.

While there is consensus among Connecticut stakeholders of the importance of the statewide RHIO to coordinate governance functions, there is concern about the RHIO having a technical operations role. Many stakeholders perceive that if the RHIO is placed in the role of a vendor, competition with other vendors will diminish its capacity to provide effective governance, thus distorting the RHIO's capacity to be neutral and unbiased in its decision-making.

However, this concern must be balanced with the need for the RHIO to set and promote a specific technical architecture and infrastructure that will drive statewide HIE capabilities. To resolve this potential conflict, the RHIO must act as communicator, facilitator and technical resource to the local and regional health information exchange efforts across Connecticut. By setting the state strategy and developing policies, technical guidance and a resource pool, the RHIO will support local and regional efforts. This approach will promote consistency and build trust that will ultimately increase the chances of the successful development of statewide HIE capacity.

In Connecticut, there are several existing collaborating groups of healthcare organizations that are developing approaches to utilize health IT/HIE to improve the state's healthcare system. Examples include but are not limited to:

- **Connecticut Health Information Network (CHIN)** - In 2007, the State Legislature passed a law to create the CHIN, a research-based health information exchange to link diverse databases across state health agencies. Collaborators include the University of Connecticut Center for Public Health Policy, the Office of Health Care Access, Developmental Services, Child Welfare, and the Department of Public Health. The system is currently in limited pilot release.

- **Connecticut Hospital Association (CHA)** – CHA is a membership-based organization that represents over 140 healthcare organizations across the state. Health information exchange related services include: CHIMENET, a private data network serving hospitals statewide; CHIMEDATA, a data collection and analysis service that analyzes hospital data and produces utilization, financial, management and other types of reports; and the Toward Excellence in Care (TEIC) program, which provides acute care hospitals with quality improvement services.

■ **Department of Information Technology (DOIT)** – DOIT administers the HIPAA Program for the State of Connecticut, issuing formal statewide policy for patient privacy and confidentiality within state health agencies. DOIT has also formed the eHealth workgroup consisting of interested parties from a variety of state health agencies.

■ **eHealthConnecticut** – eHealthConnecticut is the most developed RHIO in the state and consists of a group of senior-level healthcare professionals from multiple disciplines that meet on a monthly basis to promote collaboration and health information exchange. The organization has a Board of Directors that represents virtually all healthcare constituencies across the state. The organization has several standing and ad-hoc subcommittees that meet on an ongoing basis to support the organization. Currently, the organization is developing the Connecticut Health Quality Cooperative, a quality-based initiative that will collect, analyze and report healthcare data across the state to assist physicians to improve the quality of care they provide.

■ **Greater Bridgeport Primary Care Action Group (BPCAG)** – This collaborative of Bridgeport Hospital, St. Vincent's Medical Center, and three federally quality health centers (FQHCs) in the New Haven area received a $250,000 grant to develop a registry for tracking patient activity across providers. The collaborative is currently in the vendor engagement process.

■ **Safety.net** – A group of safety net providers are discussing ways to implement electronic health records across a network of community health centers.

■ **Other collaborating groups** – There are several collaborations among Connecticut healthcare providers within specific markets. Hospitals have made good progress in developing capacity within their organizations and to a limited degree, with networks of hospitals such as the Greater Hartford Coalition, the Eastern Connecticut Health Network and the Middlesex Health Information Exchange. In addition, ProHealth, a primary care physician organization, has an ongoing focus of using health IT/HIE to improve quality of care and patient safety while minimizing health IT related costs for their physician members.

While the collection of embryonic RHIOs and their associated health IT/HIE development efforts described throughout this document reflect a solid commitment by Connecticut's healthcare community, there are many barriers to the successful development of a statewide governing RHIO and statewide HIE capacity. These barriers, as listed below, are addressed through the recommendations of The Plan.

1. Lack of Legislative Authority

Currently, no existing Connecticut entity has the authority or standing to establish, promote and manage a statewide strategy for health information exchange.

2. Lack of Momentum and Consistency

In Connecticut, there are a limited number of successful health information exchange initiatives, but there are also a number of struggling and failed attempts at improving healthcare through the use of health IT/HIE.

3. Lack of Funding

Each existing local organization lacks adequate funding to sustain its activities. None of these organizations are in a position to address statewide health information exchange without substantial and ongoing funding. The current fiscal crisis in Connecticut makes significant funding from the state unlikely in the near future.

4. Lack of Organizational Capacity

None of the existing health IT/HIE efforts are adequately staffed to support necessary statewide governance functions, nor are they adequately supported through standing and ad-hoc subcommittees. These limitations prevent the development of a comprehensive strategy across the wide range of content areas that must be addressed such as the critical success factors presented in this chapter.

5. Lack of Broad-Based Strategy, Technical Vision or Planning for HIE Development

Current strategy and business plans typically are tied to specific projects that lack a broad strategic focus and scalability to other areas and organizations. Investments, technical infrastructure and resource development for the use of technology are also tied to specific projects.

6. Lack of Leadership

Although there has been interest in statewide health information exchange expressed by the Governor's office and by the Connecticut State Legislature, there has not been the type of fully informed and sustained leadership necessary to formalize statewide strategy. At the same time, no highly visible, well respected health IT/HIE champion has emerged, suggesting an absence of the type of fully informed leadership necessary to formalize and sustain statewide HIE strategy.

7. Lack of Broad Commitment and Support

Awareness and support for existing health information exchange projects are very fragmented. There is currently no firm commitment to a specific strategy for how HIE capacity will develop over time. The current budget crisis poses additional challenges: funding for RHIO startup programs will be modest, and state funding will not be sufficient to support an aggressive development schedule of HIE infrastructure.

Guidance and Lessons Learned

Through input from stakeholders across Connecticut, and existing federal guidance and lessons learned from other state experiences, several steps were identified as critical to the development of the proposed CT State RHIO. These include:

- Establishing the legal authority and structure for the RHIO

- Defining the mission of the RHIO

- Articulating the purpose and function of the RHIO

- Developing a structure for governance and oversight

- Hiring strong and experienced senior staff members

- Identifying and obtaining financial resources necessary for the RHIO and HIEN development and operations

1. Establishing the Legal Authority and Structure for the RHIO

How the CT State RHIO is established has considerable bearing on the perception of the organization by stakeholders and shapes decisions by these stakeholders concerning whether, and in what manner, they choose to participate in RHIO initiatives. As a result, the "source of authority" for the CT State RHIO is a critical factor for success.

The majority of existing statewide RHIOs are established by state governments, through statute, executive order, sole source contracting or memoranda of understanding between state health agencies and non-profit organizations. States may also mandate that a state agency be created to serve as the RHIO, or designate an existing state agency to be the RHIO. In other cases, RHIOS have been started by collaborations of stakeholders without an official role by the state. In these instances, the source of authority of the state-level RHIO comes from the community's acceptance of its role.

The preferred source of authority for a state RHIO is a **legislative mandate**. This approach has the benefit of requiring the involvement of all branches of government, often bringing broad bipartisan political support. It helps to avoid unilateral decision-making regarding RHIO functions or funding, creates a shared vision and ownership of the resulting work of the RHIO, and promotes public perception of neutrality in its decision-making.

2. Defining the Mission of the RHIO

Generally, state RHIOs are established to represent the public's interest through the provision of a public service. RHIOs are charged with providing leadership, fostering collaboration, and facilitating activity throughout the state. Their responsibility is to communicate, educate, convene and coordinate necessary stakeholders in order to promote interoperability and national standards; advance the use of HIE; promote sustainability of infrastructure and systems; and ensure effective and ethical use of personal health information.

3. Articulating the Purpose and Function of the RHIO

The two main responsibilities of a RHIO include a convening role that brings constituencies together for information sharing, advocacy, and organizational policy setting and a coordinating role that helps shape HIE activities throughout the state through consistent standards and practices. Virtually all state RHIOs have these convening and coordinating functions as part of their roles. The goals of these activities are to:

- Set participatory guidelines of its members;
- Seek funding;
- Identify and promote standards and best practices;
- Support HIEN initiatives;
- Update, revise and promote the state health IT plan;
- Assess and monitor progress towards the goals of the state health IT plan;
- Establish statewide HIEN capabilities;
- Ensure sustainability.

Technical operations responsibilities are often part of a RHIO's responsibility and include building and marketing infrastructure, applications and services. While all existing state RHIO models engage in governance functions, not all have adopted the technical role. The inclusion of the technical operations role is influenced by many factors, including the particular market environment and the size of the state. The role of the state RHIO may adapt and adjust over time, conforming to the changing environment within the state or the needs of the stakeholders.

The following table represents the governance and technical operation roles respectively.

TABLE 1

GOVERNANCE		TECHNICAL OPERATIONS (OPTIONAL)
Convening	**Coordinating**	**Operating**
• Establish a trusted platform for education, negotiation and decision-making • Advocate on behalf of local stakeholders to advance statewide HIE • Inform policy development to advance statewide HIE • Facilitate consumer input • Track, assess & distribute information on HIE efforts	• Establish and maintain technical roadmap • Facilitate alignment with local, interstate, regional, & national strategies • Promote consistent application of effective statewide HIE policies & practices • Facilitate collaborative development of public policy options & ongoing healthcare reform efforts	• Own or manage contracts for hardware, software, & technical capacity to facilitate statewide HIE: infrastructural components (e.g., MPI, RLS), applications (e.g., clinical messaging, eRx, EHR), and services (e.g., implementation guides, standards, workflow optimization)

⋆ *From AHIC State Level HIE Consensus Project*

4. **Developing a Structure for Governance and Oversight**

Meeting the challenge of establishing a workable governance structure that truly represents the broad constituencies affected by health information exchange is critical to the success of the state RHIO. State RHIOs are generally governed by a board of directors or other governing body charged with overseeing and maintaining the coherent vision and strategy of the RHIO, setting policy, raising and managing funds, and evaluating the RHIO's strategies and activities. The governing body accomplishes this oversight and evaluation function by keeping well informed about the activities of the RHIO, making decisions that are in the best interests of the RHIO and the healthcare system that it supports, and by communicating appropriate information to stakeholders on a regular basis.

The governing body has formal responsibilities for ensuring the RHIO adheres to all legal requirements and bylaw stipulations including, but not limited to: hiring and firing of the top executive; delegating management functions (e.g., planning, staffing, etc) to the top executive; developing and approving strategic plans (including financial plans); and maintaining the effectiveness of the governing body. In addition, the governing body has informal or supporting responsibilities which may include community engagement, fundraising, and others related to the nature of the RHIO. Figure 12 details the recommended Organizational Chart.

a. **Governing Body Size** – State RHIO experiences reveal that the governing body should be comprehensive in its membership yet small enough to fulfill the necessary activities to support the RHIO. In an effort to be inclusive, many RHIOs choose to convene a large governing body. However, this approach can become unwieldy, creating an environment where conducting the RHIO's business becomes difficult. Too large a governing body can result in delays in decision-making, while too small a governing body creates an environment where decisions are made without all the necessary perspectives. The average governing body size is 12 to 15 individuals, with additional formal input from stakeholders obtained through subcommittees and workgroups.

b. **Stakeholder Representation** – The governing body and its subcommittees must represent a broad range of constituencies that are representative of the overall healthcare system in Connecticut. Below is a list of organizations and stakeholders which may be considered for board and subcommittee positions:

   ■ Hospitals, integrated delivery networks or hospital associations;

   ■ Medical research organizations;

   ■ Physicians, medical practices, or state medical society;

   ■ Consumers (patients);

   ■ Healthcare safety net providers;

   ■ Pharmacists and other healthcare professionals;

   ■ Employers or business groups;

   ■ Health plans;

- Medicaid agencies;
- Department of Health;
- Other state agencies with health-related missions; and
- Health technology leaders.

Because RHIO authority and funding generally comes from the state, the governor and state legislators are usually not given seats on the board; other mechanisms need to be developed to make sure these key stakeholders are involved in decision making and kept informed on the organization and its progress. Associations may appoint a representative, while in some cases the governor or government agencies will select or nominate individual board members to represent specific stakeholder groups.

Having senior leadership is critical since people who are able to make decisions on behalf of their organizations are going to be the most effective members of the governing body. These leaders should be well regarded in their respective communities and provide support for engaging additional supporters. Organizational representation and individual skills should be taken into account as members are selected.

c. **Standing and Ad-Hoc Subcommittees** - The formal and informal responsibilities identified above shape the nature of governing body business and the subcommittee structure. Standing subcommittees should be established in the bylaws of the state RHIO. They are typically permanent and are integral to fulfilling the RHIO's legal responsibilities. Ad-hoc subcommittees, which fulfill informal responsibilities, are formed to address a time-limited issue and generally do not appear in the bylaws. For both standing and ad-hoc subcommittees, it is important to include both members of the governing body as well as other important stakeholders.

5. **Hiring Strong and Experienced Senior Staff Members**

Given that the state RHIO will serve as the coordinator and facilitator of health IT/HIE efforts across the state on both organizational and technical levels, it is imperative that the state RHIO have senior level, fully qualified staff. The complexity and volume of activities needed to successfully establish and carry out the mission of the organization cannot be met by volunteer efforts alone, no matter how committed volunteers are. The RHIO staff must include full-time resources to sustain the level and quality of commitment necessary to be successful.

Initially, state RHIO staff should include an executive director and a technical director. The executive director serves as the senior level manager for the RHIO and will work with the governing body to develop the logistics for implementation of health information exchange in the state. He or she will have an in-depth understanding of all RHIO activities and will serve in a leadership role regarding communications with all external organizations that have business with the RHIO. The executive director will have formal responsibility for some subcommittees and will ensure that all subcommittee activities are aligned with the overall strategy of the RHIO. In concert with the technical director, the executive director will meet with constituents across the state and help build and sustain ongoing support for the RHIO.
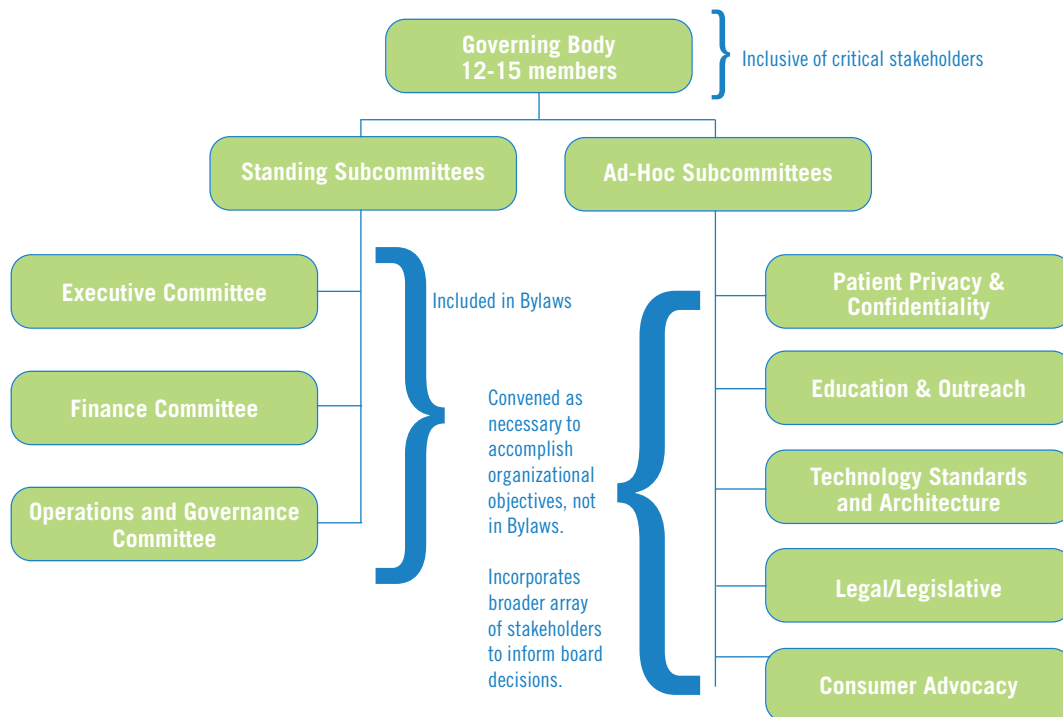
The technical director serves as the senior level manager for the phased development and implementation of the health information exchange network infrastructure at the state level. The technical director will organize the technical subcommittee and will be responsible for technical policy, standards, functional requirements, and technical architecture as well as prioritization, monitoring and evaluation of HIEN infrastructure projects. The technical director will collaborate with other technology leaders across the state to ensure that local and regional HIE efforts are aligned with the overall state strategy.

6. **Identifying and Obtaining Financial Resources Necessary for the Proper RHIO/ HIEN Development and Operations**

The RHIO cannot function without base-level funding that allows for the hiring of key staff, establishing the governing body and subcommittees, and establishing ongoing RHIO operations. Initial capital funding for RHIO formation and HIEN development are typically obtained through federal, state and private grant funding sources. Other sources of funding support ongoing operations and are typically in the form of membership, usage, or transactions fees. Funding issues are described in more detail in section G of this chapter (Funding and Financial Sustainability).

Federal funding through the ARRA will be available to support the planning and implementation of health information exchange at the state level. This funding requires states to designate one entity that has the authority to develop statewide HIE capacity. If Connecticut is granted funding under this program, it can help support the costs of the initial years of HIEN development and operation.

FIGURE 12
Recommended Organizational Chart

Governing Body
12-15 members
Inclusive of critical stakeholders

Standing Subcommittees
Ad-Hoc Subcommittees

Executive Committee
Included in Bylaws

Finance Committee

Operations and Governance Committee

Convened as necessary to accomplish organizational objectives, not in Bylaws.

Incorporates broader array of stakeholders to inform board decisions.

Patient Privacy & Confidentiality

Education & Outreach

Technology Standards and Architecture

Legal/Legislative

Consumer Advocacy

B. Patient Privacy and Confidentiality

Introduction

Addressing privacy and confidentiality issues are critical to the success of the Connecticut State Health IT Plan since healthcare consumers will only support health information exchange if they trust that their personal health information is kept private and confidential. While electronic health information offers substantial benefits to patients and healthcare organizations, and is much easier to search, share and transmit than paper-based data, it also introduces new and complex risks to the privacy and confidentiality of patients. If patients and consumer advocates do not trust electronic health information exchange, they may take steps to opt-out or otherwise limit the development of the HIEN and thereby limit the benefits of health information exchange. Of greater concern is if mistrust leads patients to avoid seeking care. Given these concerns, rigorous protection of health information is essential to the long-term success of the Connecticut State Health IT Plan.

In order for organizations to exchange health information effectively, and in a manner that is trusted, laws, policies and business practices must be in place to establish acceptable uses of personal health information, recognize who is authorized to access personal health information, and define the extent to which patients can give or withhold access to their personal health information. In addition, the design of privacy and confidentiality safeguards must be technically feasible and practically sustainable from an operational perspective. In developing a strategy to address the laws, policies and business practices to enable private and confidential electronic health information exchange, the project team reviewed the specific healthcare and legal environment in Connecticut; results from the Connecticut Health Information Security & Privacy Initiative (CT-HISPI); national policy principles from the Common Framework developed by Connecting for Health; and the potential impact of the ARRA on the Health Insurance Portability and Accountability Act (HIPAA).

Connecticut Environment and Stakeholder Perspective

Interviews and focus groups with Connecticut stakeholders indicate that while they support the purpose of HIE and believe that it will improve quality of care, patient safety and the overall efficiency of the healthcare system, issues of privacy and confidentiality must be fully addressed. The issues raised by Connecticut stakeholders include:

1. **Need for Consistent Understanding of the Legal Status and Role of the RHIO**

    Connecticut stakeholders question the legal ramifications of creating a CT State RHIO and its authority for managing personal health information in support of HIE. As specified by HIPAA, the CT State RHIO and HIEN will be positioned as a business associate of healthcare providers as well as other covered entities with which they exchange data.

    Healthcare providers regulated by HIPAA must have clear information use agreements in place with those to whom they disclose personal health information. While this may be attained through business associate agreements (BAAs), some stakeholders also expressed concern that

the CT State RHIO should be regulated and that its members be accountable to some government body or agency.

2. Authority for Secondary Uses of Data is Inadequate

Several organizations across the state have existing programs that require secondary uses of data. When and where legally permitted, health information exchange provides opportunities for population-based healthcare initiatives and public health entities to more readily access personal health information for secondary use purposes. Currently, Connecticut state law does not fully support secondary uses of data. While there is evidence that existing RHIOs have addressed this issue for their specific purposes, the issue has to be addressed in the context of statewide HIE to enable population-based health management, quality initiatives and public health oversight.

3. Need for Proactive Engagement with Consumers and Developing Trust

The large majority of consumers in Connecticut are supportive of their personal health information being part of a health information exchange network. However, for the remaining consumers who continue to be resistant to the idea of health information exchange, there is the possibility that they will attempt to derail the development of health IT/HIE in the state if their concerns are not proactively and completely addressed. Therefore, a comprehensive position statement on health information exchange, with a clear message to consumers and their advocates about how their information will be used, managed and protected, will be a fundamental step in developing consumer trust and commitment.

There are generally three options for the inclusion of patient data in the HIEN. One option should be chosen for all non-sensitive personal health information exchange to ensure consistency.

- **Opt–In:** Data are not exchanged by default until the patient provides consent.
  - Lengthy and time consuming process.
  - Less data available, more incomplete data.
  - Potential duplication of services.
  - Provides high level of consumer control but may be administratively burdensome for consumers and healthcare organizations.
- **Opt–Out:** Data are exchanged by default unless restricted by the patient.
  - Perceived value by consumers.
  - Less costly and lower administrative burden than opt–in.
  - More sustainable.
  - All or nothing opt–out is reasonable but selective opt–out may be unmanageable.
  - Increases likelihood data will be available when needed, thus potentially improving quality of care.
  - Provides high level of consumer control with lower administrative burden.

■ **Notification of use:** Under state and federal law, appropriate information can be shared as long as HIPAA rules are followed which requires that covered entities notify consumers that their personal health information is shared over the HIEN.

◗ Maintains status quo of current practices.

◗ High level of data available.

◗ Administrative burden is low and/or eliminated.

◗ Adheres to current standards of privacy and confidentiality.

◗ Sharing of patient data through HIE is potentially more secure than current practices.

4. Federal and Connecticut State Privacy Law

Existing state and federal laws must be reviewed and thoroughly understood. State laws may need to be modified to promote health information exchange and new laws may need to be introduced. The health information exchange network must be structured to ensure adherence to patient privacy laws at both state and federal levels. A list of relevant federal and Connecticut statutes is provided in Appendix K.

5. Lack of Consistent Role–Based Privileges and Accountabilities

There are several health information exchange initiatives in Connecticut that are developing role-based privileges and accountabilities to promote patient privacy and confidentiality. However, these efforts are not aligned across initiatives and may potentially conflict with each other as health information exchange efforts become more integrated. The CT State RHIO must develop comprehensive guidance relative to user identification, authentication, and role-based authorization of HIEN users to ensure that privacy and confidentiality of a statewide system can be implemented and sustained.

6. Connecticut Health Information Security & Privacy Initiative (CT-HISPI)

Connecticut has already done a tremendous amount of work towards addressing privacy and confidentiality issues through CT-HISPI, a collaborative project that assessed how Connecticut's privacy and security business practices and policies will influence the exchange of electronic health information. The initiative was a three-phase project, headed by the Public Health Foundation of Connecticut, that documented the current health information security and privacy environment in Connecticut, assessed variations across business entities, identified barriers to legitimate flow of electronic health information, proposed solutions, and developed a proposed plan of action.

The CT-HISPI group identified the following major categories of issues to be addressed in Connecticut to ensure a secure and private HIE in Connecticut[1] and helped inform our recommendations.

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[1] *Please see Connecticut HISPI original documentation for more detail: Privacy and Security Solutions for Interoperable Health Information Exchange, Connecticut Health Information Security and Privacy Initiative, Deliverable #6: Implementation Plan Report developed by the Public Health Foundation of Connecticut, Inc. and the Connecticut Center for Primary Care.*

■ **Identity:** the lack of provider and patient identity management.

■ **Authentication:** the lack of trust mechanisms in digital transactions.

■ **Authorization**: lack of uniform authorization to release PHI, and an inability to verify digital authorization across enterprises.

■ **Access Control**: the lack of uniformity of local access control decisions.

■ **Physical Security**: the lack of standards for sharing data.

■ **Exchange Protocols and Standards**: the lack of guidelines for secondary uses of data, an inconsistent definition of HIPAA's "minimum necessary" disclosure requirement, lack of standards for interoperability, and inconsistent information exchange policies.

■ **Data Integrity/Authentication**: the lack of trust mechanisms for accuracy of data.

■ **Audit, Digital Signature**: the inconsistent policies for breaches of Personal Health Information (PHI).

■ **Corporate Policies and Practices**: the longitudinal view is not available and the current paper culture is widespread.

■ **State and Federal Laws, Regulations, and Practices**: the legal status of a RHIO, and current federal and state laws.

Guidance and Lessons Learned

1. Connecting for Health's Common Framework

Connecting for Health's Common Framework is a set of seventeen mutually-reinforcing technical documents and specifications, testing interfaces, privacy and security policies, and model contract language (*http://www.connectingforhealth.org/commonframework/ index.html*). The Common Framework outlines nine core principles that organizations wanting to participate in health information exchange should adopt to ensure private and secure information exchange. These nine principles include:

■ **Openness and Transparency** – There should be a general policy of openness about developments, practices, and policies with respect to personal data. Individuals should be able to know what information exists about them, the purpose of its use, who can access and use it, and where it resides.

■ **Purpose Specification and Minimization** – The purposes for which personal data are collected should be specified at the time of collection, and the subsequent use should be limited to those purposes or others that are specified on each occasion of change of purpose.

■ **Collection Limitation** – Personal health information should only be collected for specified purposes, should be obtained by lawful and fair means and, where possible, with the knowledge or consent of the data subject.

- **Use Limitation** – Personal data should not be disclosed, made available, or otherwise used for purposes other than those specified.

- **Individual Participation and Control** – Individuals should control access to their personal information.

- **Data Integrity and Quality** – All personal data collected should be relevant to the purposes for which they are to be used and should be accurate, complete, and current.

- **Security Safeguards and Control** – Personal data should be protected by reasonable security safeguards against such risks as loss or unauthorized access, destruction, use, modification, or disclosure.

- **Accountability and Oversight** – Entities in control of personal health data must be held accountable for implementing these information practices.

- **Remedies** – Legal and financial remedies must exist to address any security breaches or privacy violations.

2. HIPAA and the Role of the American Recovery and Reinvestment Act

Federal law recognizes the importance of maintaining the privacy and security of health information, as evidenced by the Health Insurance Portability and Accountability Act (HIPAA) enacted in 1996. This Act directed the U.S. Department of Health and Human Services (DHHS) to develop federal privacy and security regulations related to health information. DHHS issued the HIPAA Privacy Rule in 2000, regulating how covered entities use and disclose protected health information, and the Security Rule in 2003, requiring that covered entities safeguard electronic forms of protected health information against any reasonably anticipated risks.

The American Recovery and Reinvestment Act (ARRA) of 2009 maintains and expands the current HIPAA patient health information privacy and security protections, especially as patient health information is electronically transferred through health IT systems. The ARRA amends HIPAA to protect patient health information with the following key provisions:

- applies the HIPAA rules directly to business associates and other non-HIPAA covered entities for the electronic exchange of patient health information;

- non-covered entities, such as RHIOs are now required to have business associate agreements with covered entities;

- allows patients to pay out-of-pocket for a healthcare service and request non-disclosure of the rendered service;

- authorizes increased civil monetary penalties for HIPAA violations;

- defines which actions constitute a breach (including some inadvertent disclosures);

- requires an accounting of disclosures to a patient upon request;

- imposes restrictions on certain sales and marketing of protected health information;

- grants authority to state attorneys general to enforce HIPAA.

The Secretary of the DHHS, as well as other relevant agencies, will be providing details through the regulatory rule-making process on the expanded privacy and security requirements. Unless otherwise specified, the privacy provisions become effective on February 17, 2010.

C. Consumer Advocacy

Introduction

Given the potential for consumer support or consumer fear and mistrust, the CT State RHIO needs to place high priority on engaging people early and often in planning the development of the CT State RHIO and the CT State HIEN. Consumers and consumer advocacy organizations will provide input and advice on the development of the products affecting their healthcare and personal health information. The potential for opposition and failure is greatly reduced if an environment of trust and collaboration is created by the CT State RHIO leadership and staff.

Consumers will similarly be important facilitators in promoting the CT State RHIO and HIEN as integral to the Connecticut healthcare system. Policymakers and the state legislature will expect that CT State RHIO leadership, healthcare stakeholders and consumers are in concert regarding the value of health IT/HIE. Policy changes and financing will only be successful and ensure the longevity of state RHIO activities with this coordinated and cohesive approach.

Connecticut Environment and Stakeholder Perspective

Connecticut has a broad network of organizations working to improve the health and socioeconomic status of populations, many of which have a history as being disenfranchised or vulnerable. Some of the organizations have a primary focus on consumer advocacy – for example, the Connecticut Centers for Independent Living has consumer advocacy as a core function of the organization. Other organizations have a secondary focus on consumer advocacy, such as Connecticut's network of federally qualified health centers (FQHCs) which includes the provision of quality healthcare to the underserved and uninsured. While advocacy may not be a primary function of these organizations, they often engage in advocacy as a means to accomplish their primary goal.

In addition, significant efforts in both the non-profit and state government sectors have been made to address the advocacy needs of the broader consumer population. For example, the Connecticut Health Policy Project Consumer Health Action Network and the Connecticut Department of Consumer Protection both focus on empowering consumers through advocacy and education. There is a varied history of collaboration between state government and not-for-profit consumer organizations which can be strengthened to ensure the success of the CT State RHIO and HIEN.

In Connecticut today, there are no organizations which specifically focus on engaging consumers regarding health IT/HIE. However, given the spectrum of governmental and not-for-profit organizations with advocacy as their primary or secondary function, there are ample opportunities for the CT State RHIO to act as a convener and organizer of these consumer "experts" to ensure adequate consumer involvement and buy-in.

Guidance and Lessons Learned

1. Consumer Input

Consumers and consumer representation organizations are as eager to discuss their desire for health IT/HIE to make improvements in quality of care and overall health as they are to reveal their fears and concerns. Consumers should be consistently and proactively engaged relative to their perspectives on health IT/HIE. Their concerns should be addressed and the perceived benefits of health IT/HIE should be promoted. Patient concerns include:

■ Privacy and confidentiality of personal health information;

■ Lack of understanding of how health IT/HIE works;

■ Incomplete or inaccurate personal health information;

■ Overall protection and safety of personal health information;

■ Access to information by unauthorized users (such as payers or employers).

While privacy and confidentiality issues are still major concerns, there is substantial awareness of the potential benefits of health IT/HIE. Perceived benefits of health IT/HIE by consumers include:

■ Readily available healthcare information for consumers and their providers;

■ More complete and accurate healthcare information;

■ Availability of complex information that the consumer might not otherwise be able to understand;

■ Easier access to healthcare through e-visits, telehealth and telemedicine;

■ Streamlined patient visits by automating data collection and eligibility screening.

All of these issues suggest that consumers and/or consumer advocacy groups should represent the needs of the consumers and special interest groups as the CT State HIEN is developed.

2. Consumer Access to Their Personal Health Information

Patient access to their health information is a key consumer value for health IT/HIE. The ability of consumers to view their health records and add appropriate content is an important service offering of the HIEN. Beyond personal health records, other online content can be made available to educate and inform consumers. Finally, the HIEN may support direct patient communication with their physicians or other healthcare professionals.

3. Information Dissemination

The CT State RHIO must ensure that relevant information is consistently made available to consumers and consumer advocacy groups in order to promote trust and understanding relative to RHIO activities. This can be accomplished by developing tools and approaches for sharing information and by developing appropriate messaging content. Examples include:

■ Presenting information at consumer organization annual meetings;

■ Holding open forums for consumers or their representative organizations;

■ Developing print materials for distribution;

■ Working closely with consumer organizations to integrate messages into their ongoing communication with consumers; and

■ Develop broad based public relations campaigns laying the foundation of what this work is and why it is important.

D. Education and Outreach

Introduction

Patients are increasingly seen as active participants in their own healthcare, and health information exchange acceptance will be an important component of consumer-directed care and self-management of chronic diseases. For patients, education and awareness of how HIE will help improve their healthcare and quality of life are key considerations for their support of health IT/HIE and The Plan.

With healthcare professionals, there is significant apprehension associated with the impact health IT/HIE will have on job responsibilities, clinical workflow, costs, and return on investment. Given that the knowledge base of stakeholders will change over time, a staged and incremental approach will need to be developed which addresses basic information needs, immediate concerns, pilot HIE project implementation and more sophisticated information as the CT State HIEN matures.

Connecticut Environment

Specific education and outreach programs are occurring across Connecticut. Hospitals, community clinics and health systems implementing health IT/HIE have developed venues for increasing the understanding of their initiatives, training of staff and the likelihood of acceptance and adoption. Below are examples of the many projects currently underway within Connecticut:

■ Safety.Net is a grant supported group of Community Health Centers, FQHCs and Academic Medical Practice Centers as well as the Ethel Donaghue Translating Research into Practice Center at the University of Connecticut Health Center who are focusing on developing a Health Information Technology Implementation plan. A large part of this effort revolves around education of the various stakeholders regarding the benefits of health IT and HIE and developing a common framework and pathway to success.

■ The Connecticut Institute for Clinical and Translational Science (CICATS) is a consortium of the University of Connecticut Health Center, UConn Storrs, Hartford Hospital, St. Francis Hospital, Hospital for Special Care, Hospital of Central Connecticut, Connecticut Children's Medical Center and several community research organizations such as the Hispanic Health Council and BEACON. CICATS is focused on translating research into practice and has a goal of effective implementation of health IT/HIE within the partnering organizations for the

purpose of improving the quality and efficiency of healthcare. There is a dedicated biomedical informatics group that supports these efforts.

- The University of Connecticut Medical and Dental Schools teach the use of health IT in a number of ways ranging from the use of handheld computers for information retrieval at the point-of-care, to the use of a mock electronic medical record in the third year of the family medicine rotation to simulate the benefits and issues that one faces when using health IT in the care of patients.

- UConnect (*http://trippcenter.uchc.edu/uconnect/index.html*) is a newly formed process designed to engage a wide range of stakeholders (legislators, patient advocates, insurers, business, academic and clinical leaders) in ongoing conversations and debate regarding important healthcare related issues. A key effort is their discussion regarding the merits of establishing a regional public utility model for chronic care coordination. This model would rely heavily on the use of health IT/HIE by clinicians in private practices, insurers, patients and state health agencies. The inaugural event at the end of March 2009 drew an audience of more than fifty leaders to an interactive webcast event.

- The University of Connecticut Department of Computer Science and Engineering currently offers a new elective in biomedical informatics to its undergraduate students. In addition several graduate students have chosen to focus their thesis and study on topics of interest in clinical informatics.

- There are numerous continuing medical, nursing and professional education training events within the state throughout the year, many of them focusing on the adoption of electronic medical records. Many of these events have openings for invited expert speakers and would be interested in having a forum on health IT/HIE. There are online teaching opportunities through academic health centers or their affiliated hospitals via CME courses and certificates.

- Yale Medical School has a Department of Biomedical Informatics with a well developed training program for clinicians and researchers supported by a National Library of Medicine grant. The department has several faculty in biomedical informatics with expertise in the effective development of clinical decision support tools, a critical factor for effective use of health IT/HIE.

- There are nursing schools at regional UConn campuses and community colleges that have some training in the use of health IT/HIE for clinical care, but would be open to adopting standardized curricular offerings if made available to them with regards to health IT/HIE adoption and effective use in the home, hospital or office based settings.

- The University of Connecticut School of Pharmacy, as part of the PharmD curriculum, provides e-health/health IT training courses. The UConn School of Pharmacy conducts numerous continuing education courses each year that include e-health and health IT topics for licensed practicing pharmacists. Most recently, the CT Pharmacists Association has offered continuing education meetings in collaboration with the CT Medical Society.

Guidance and Lessons Learned

1. Messaging for Clinical and Non-Clinical Healthcare Professionals

While adoption of health IT and HIE capacity is generally supported, factors such as return on investment prevail and continue to be barriers in Connecticut. Messaging should include both basic education as well as a focus on issues related to return on investment. Other messages may include:

- Basic health IT/HIE concepts and language;
- How health IT/HIE will support a more efficient system of care;
- How health IT/HIE will support better patient care; and
- The types of support necessary to aid the transition to an HIE enabled healthcare system.

More sophisticated messaging may include:

- Technical descriptions of how the system works;
- Appropriate application of state and national privacy and security laws, guidelines or standards;
- Methods of evaluating efficacy of the system and continuous quality improvement;
- Patient access to information;
- Anticipated impact on professional liability; and
- Evidence-based research regarding the impact on patient care.

2. Training and Education for Healthcare Professionals

In addition to general messaging which increases awareness and acceptance, clinical and non–clinical healthcare professionals working throughout Connecticut will require varying levels of technical knowledge to accomplish their work in an HIE enabled environment. In order to accomplish this, Connecticut will need to develop, through partnerships and alliances with educators and employers, an education and training infrastructure. Such an infrastructure should be developed with sensitivity to the types of professionals working in the health system and their role in supporting health IT/HIE. For example:

Computer literacy – Working in a health IT/HIE environment will require that staff supporting health IT/HIE work are proficient with basic computer skills. Only with this baseline computer literacy will staff be successful in adapting to the necessary administrative requirements and changes in work responsibilities.

Technical training – Users will require basic knowledge of the system and an understanding of how to maximize the utility of health IT and HIE in their day–to–day work. This technical training will not be a one size fits all model. Some professionals will require training to accomplish basic tasks – such as data input and viewing – while others will require more sophisticated training – such as for complex queries, evaluation and monitoring.

■ **HIE Certificate Courses** – Higher level administrators, both clinical and non-clinical, may require a more in-depth understanding of health IT/HIE in order to accomplish their functions and support their professional level staff in their organizations.

■ **HIE Research Methodologies** – The use of health IT/HIE to advance clinical and other research will expand greatly as the statewide health IT/HIE capacity develops. Researchers will need to adapt their current research methods to more effectively use the HIEN to advance their work.

■ **Advanced Degrees** – As the HIEN infrastructure continues to mature there may be an increasing need for advanced degrees in the health IT/HIE professions such as health informatics. The development or expansion of baccalaureate, masters and PhD degree programs should be considered.

3. Messaging for Patients and General Public

Patients and the general public have a heightened awareness and concern regarding security and privacy issues. These types of issues are exacerbated within populations that have traditionally been marginalized and should explicitly be addressed. Basic messaging should include:

■ Basic health IT/HIE concepts and language;

■ Understanding and support for participation in a health IT/HIE enabled healthcare system (i.e., system is same as current paper system, yet more secure and efficient);

■ Targeted or tailored messages for specific audiences or purposes. For example: secondary use of data, mental health data, children with special health needs, and HIE Pilot projects.

More sophisticated messaging may include:

■ Patient access to information;

■ Security features;

■ Potential risks and benefits;

■ Quality control/audit functions;

■ Protections and limits of national and state laws.

In addition, patients should be explicitly involved in the development of the education materials as this has been shown to support the development of the most compelling messaging content.

4. Partnerships and Facilitators

Many stakeholders are working in a variety of ways to provide training, education and capacity building to healthcare professionals and consumers. While they may not be working in a coordinated fashion, nor focusing on health IT/HIE content, they do provide the foundation for the type of educational and training infrastructure necessary to increase awareness and acceptance of health IT/HIE. These stakeholders and organizations are very adept at creating messages and curriculum aimed at reaching their target audiences. It will be integral to the success of any education and outreach initiatives to coordinate and engage existing educational and capacity building activities.

5. ARRA Influence

While questions still remain regarding the intent, timing and mechanisms for the distribution of funds through the American Recovery and Reinvestment Act (ARRA), there is language regarding education and training. Specifically, funding will be made available to higher education institutions to integrate health IT/HIE content into curricula of healthcare professionals; to develop or expand curricula for health informatics degree programs; and to develop regional "extension centers" to provide training and technical assistance. While these resources will not be enough to address all the education and outreach needs of Connecticut, they are important components of an overall strategy.

E. Quality Improvement and Population Health Management

Introduction

Healthcare costs continue to increase more rapidly than the rate of improvement in quality of care. In response, there has been a shift in thinking and practice that healthcare reimbursement should reward high-quality, high-value care rather than just quantity of care. With this increased emphasis on transparency in quality, health IT/HIE applications can be powerful tools. Quality-based activities utilizing health IT/HIE applications include: collecting and reporting data on standardized quality indicators; embedding relevant expert knowledge into decision support systems and other tools to improve practice around those indicators; and providing healthcare consumers with needed information to aid them in choosing healthcare providers and services based on value. An essential requirement underlying this approach is the measurement of quality in an accurate, efficient and consistent manner all while minimizing reporting burden. Health IT/HIE can support these efforts by providing improvements in accessibility, collection, measurement, and reporting of healthcare data.

In this section, quality improvement and population health management initiatives underway in Connecticut are reviewed and federal guidance using health IT and health information exchange for improving quality, population health management and public health oversight activities is described.

Connecticut Environment and Stakeholder Perspective

There are several quality and population health management initiatives currently underway in Connecticut aimed at driving higher quality of care through more comprehensive clinical information at the point of care, measuring and reporting quality with a minimum of burden on providers, and the aggregation of health information for the purpose of public reporting of quality. These include:

1. Bridges to Excellence

Bridges to Excellence (BTE) is a non-profit organization whose purpose is to design and offer incentives to physicians and hospitals for demonstrating that they have implemented comprehensive solutions in the management of patients and the delivery of safe, timely, effective, efficient, equitable and patient-centered care. The incentives promote the adoption of health IT and delivery system reengineering as key means to improving the quality of patient care as well as its efficiency and effectiveness.

2. The Connecticut Health Quality Cooperative

The Connecticut Health Quality Cooperative (CHQC) is a collaborative effort between eHealthConnecticut and Qualidigm to collect, analyze and report healthcare quality data to assist Connecticut physicians to continuously improve the quality of care they provide. Under the governance of eHealthConnecticut, this multi-year project brings together providers, Connecticut health plans, Qualidigm, and Bridges to Excellence to collaborate on program design, development and implementation.

3. The Equity and Quality Project (EQUAL)

The Connecticut Health Foundation recently awarded a two year grant to Qualidigm to improve the management of patients with diabetes. The project funds the introduction of health IT to select physician practices that care for a culturally diverse patient population. The physicians and their staff will be trained in the techniques of teaching patient self management to strengthen the physician/patient partnership to promote improved diabetes management.

4. Medicaid Transformation Grant

In 2007, the Connecticut Department of Social Services was awarded a Medicaid Transformation Grant (MTG) from the federal government to design and pilot test a program to implement a statewide health information exchange and e-Prescribing system for the state's Medicaid recipients. The Connecticut Pharmacists Association and the University of Connecticut School of Pharmacy are developing a subproject to improve Medicaid recipients' medication profiles, called the Comprehensive Active Medication Profile (CAMP).

5. Middlesex Professional Services

In 2007, Middlesex Professional Services (MPS), an independent practice association, received a $1 million grant from the Physicians' Foundation to design and implement a Clinical Integration Project (CIP). The goal of the CIP is to improve care for patients with selected diseases by supporting physician adherence to clinical guidelines and physician performance feedback with the implementation of health IT/HIE. Physicians are recognized for improved patient care through pay-for-performance (P4P) programs.

Guidance and Lessons Learned

1. AHIC Quality Workgroup – Quality Vision Roadmap

The American Health Information Community (AHIC) Quality Workgroup has put forth a roadmap for the United States to move toward the goal of re-aligning healthcare around value by using health IT/HIE. This includes aligning incentives with patient centric quality improvement over time and across care settings, creating policies for data stewardship (e.g. the managing and storing of aggregated patient data), addressing privacy and security concerns for data exchange, and determining data collection and aggregation strategies to support public reporting of clinical

care. In addition, there are several infrastructure components that need to be addressed including standardization of data elements, consensus around a set of quality metrics, improving coding sets, the ability to match patient records and providers, and the use of clinical decision support capabilities.

2. AHIC Population Health and Clinical Care Connections Workgroup

The AHIC Population Health and Clinical Care Connections (PHCCC) workgroup has put forth recommendations to facilitate the flow of reliable health information among population health and clinical care systems necessary to protect and improve the public's health. The document describes a working division of population health into five categories: 1) Public Health Surveillance and Response, 2) Health Status and Disease Monitoring, 3) Health Communications and Education, 4) Population-based Clinical Care, and 5) Population-based Research. Accepted recommendations cover the areas of bi-directional communication, a business case for including public health as an integral partner in health information technology activities, an authoritative website for standards, public health support for HITSP, public health system certification, and integration with HIEs. In addition, the AHIC PHCCC recommended building infrastructure for public health agencies and laboratories and the development of program metrics to assess the ability of public health information systems to interoperate and support public health investigation and response.

3. American Medical Informatics Association (AMIA)

AMIA identified the secondary use of personal health information as a critical issue for the continued widespread adoption of health information technology. They are currently developing a national framework for the secondary use of health data that includes a robust infrastructure of policies, standards, and best practices needed to facilitate the broad and repeated collection, storage, aggregation, linkage, and transmission of health data with appropriate protections for legitimate secondary use.

F. Functional Requirements, Technology Standards and Technical Architecture

Introduction

One of the most compelling justifications for the formation of the Office of the National Coordinator and the various health IT/HIE projects that have been initiated at the federal level is the need to develop a comprehensive and consistent technical strategy for promoting interoperability. The Office of the National Coordinator, the AHIC, and the AHRQ National Resource Center for Health IT are positioned as key resources to support state health IT/HIE efforts. Guidance developed by these organizations and initiatives will continue the substantial momentum that is underway and will support the eventual realization of the goals of the Nationwide Health Information Network.

However, even with a sound strategy for health IT/HIE on a national level and the widespread proliferation of certified health IT systems, the realization of a CT State HIEN is a long way from being realized. The complexity of the healthcare system and just as importantly, the legacy of the healthcare system's use of proprietary health IT systems and strategies suggests that a phased and deliberate approach over a number of years will be required.

One of the most critical requirements recommended is that the state adopt and promote a single, comprehensive technical architecture and phased implementation strategy of that technical architecture. Coupled with this requirement is the understanding that it is unrealistic to expect that the existing health IT/HIE infrastructure will be replaced by new, standardized systems. The cost and resource requirements to support such a transformation are prohibitive.

The Plan provides the level of technical guidance, technical architecture and strategy that is necessary to enable interoperability within the existing technical infrastructure of the Connecticut healthcare system. The Plan provides for a phased approach to implementation over its five year duration which utilizes existing technical infrastructure and human resources while providing the incremental technology to integrate that infrastructure, train and educate existing resources, and provide additional resources as required to develop a fully interoperable statewide health information exchange network.

Connecticut Environment and Stakeholder Perspective

Like all states, Connecticut healthcare providers and supporting organizations are not prepared to support health information exchange without significant investment and upgrades to existing infrastructure. The existing healthcare technology infrastructure consists of outdated or proprietary legacy systems that do not meet the functional requirements and technology standards necessary to support interoperability. Specific challenges for Connecticut healthcare system stakeholders identified through the course of this project include:

- Approximately 10 to 15% of Connecticut physician practices have EMR systems, which severely limits the ability to implement a statewide health IT/HIE strategy.

- Public health systems have been developed for specific programs without consideration for interoperability or reusable modules.

- Existing HIE systems have been developed for specific projects and do not have the capacity or technical capabilities for broader application or scalability.

- While hospitals have undertaken the development of EHR systems, these efforts have been conducted in relative isolation, without consideration for broader, intra-hospital health information exchange requirements.

- Inconsistent data quality, particularly with patient demographics, will limit the ability to ensure timely and accurate patient identification and correlation of patient data.

- Inconsistent use of standard code sets and use of proprietary code sets will limit consistent and accurate use of clinical data.

- Inconsistent use of messaging standards will limit the ability of health IT systems to share data.

While the challenges to developing health information exchange capacity across the state are substantial, there are initiatives underway that may be leveraged. Qualified projects will be integrated into the broader HIEN strategy described in this chapter. Examples of existing technical infrastructure development projects include:

1. **ChimeNET**

   ChimeNet provides end-to-end managed solutions for network infrastructures focusing on wide area networks and data network security. ChimeNet provides network infrastructure, email services, network monitoring and technical support, web hosting, project management and disaster recovery services.

2. **Connecticut Health Information Network (CHIN)**

   CHIN is a partnership between the University of Connecticut, Akaza Research, Inc., and Connecticut's state agencies to develop a federated computer network linking diverse databases across agencies. CHIN collects and manages clinical data for healthcare research and oversight purposes.

3. **Department of Information Technology (DOIT)**

   DOIT provides information technology IT services and solutions to various Connecticut state agencies, effectively aligning business and technology objectives through collaboration, in order to provide the most cost-effective network and systems infrastructure and technical support.

4. **EMR Adoption Projects**

   There are a number of organizations such as independent physician associations that are purchasing, implementing and managing certified electronic medical records systems for their member physicians.

5. **Hospital-based EHR projects**

   Many hospitals across the state have developed electronic health records systems that aggregate data from legacy clinical systems such as lab, radiology, pathology, patient registration, admission/discharge/transfer (ADT), and other clinical systems. Most hospitals make this data available to a network of physicians through a portal gateway, while others have projects underway that will integrate their EHR systems with certified EMR systems that are implemented within the hospital's affiliate physician offices.

6. **Office of Health Care Access (OHCA)**

   Through its Discharge Database, OHCA collects hospital utilization data on all discharges from the acute care hospitals within Connecticut. This database includes demographic, utilization, clinical, charge, payer and provider information.

Guidance and Lessons Learned

The key components that support the definition of a comprehensive health information exchange technical architecture are listed below. Brief summaries are provided in the following sections with a more detailed review in Appendix G.

- Detailed specifications for **use cases** enabled by health information exchange which demonstrate the potential of HIE to clinicians and other healthcare professionals.

- Functional requirements of the HIEN that represent the modular building blocks of the network and how it will support the use cases.

- Technology standards to promote data security, accountability and interoperability.

- Certification standards for health IT systems to promote consistent workflow, accountability and interoperability.

- Statewide technical architecture which demonstrates a comprehensive technical framework and strategy for the phased development and implementation of the Statewide Health Information Exchange Network.
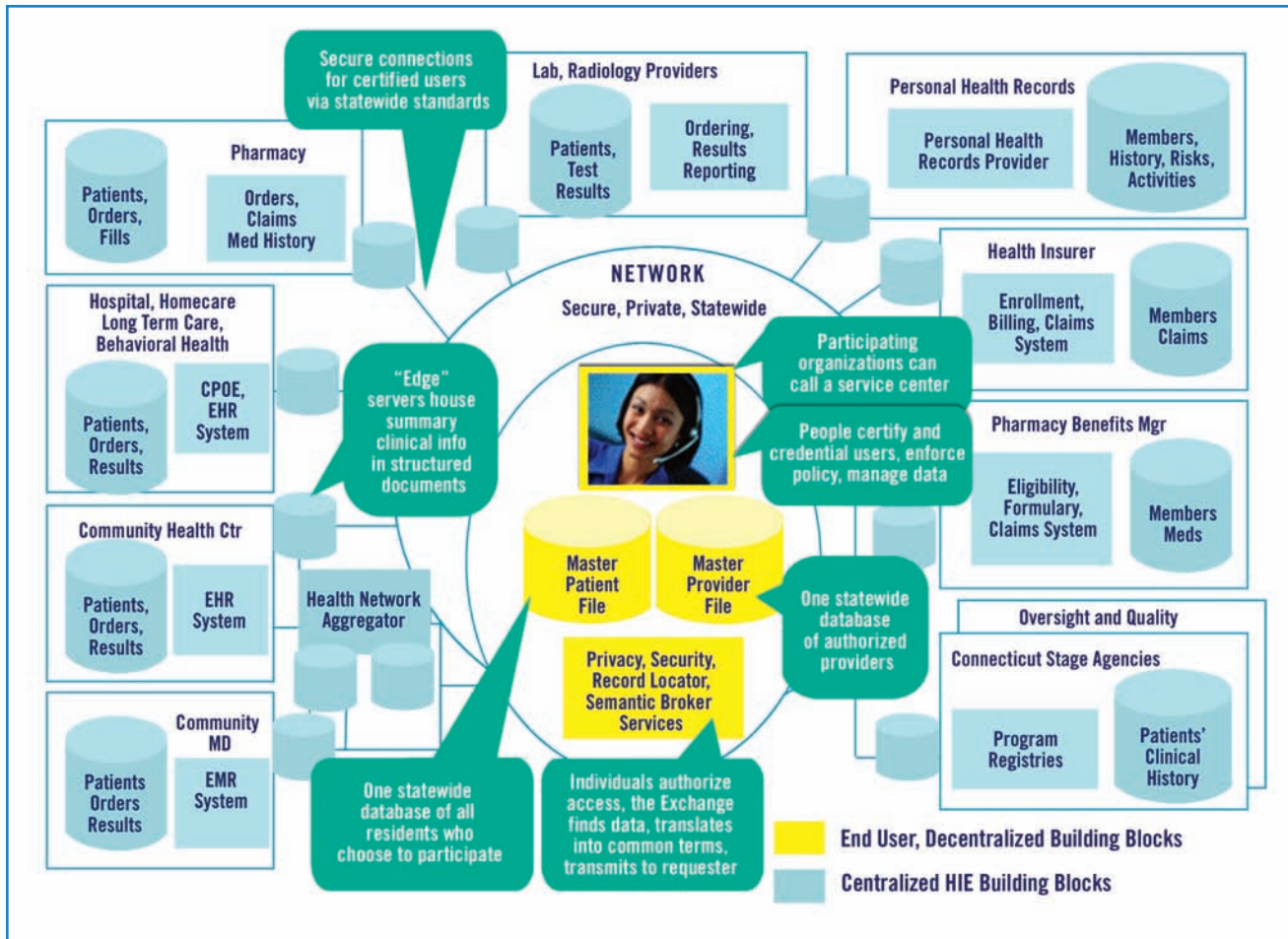
1. Use Cases

Like any system development effort, the customer's expectations for how they will use the system and how the system will provide value must be defined before systems, databases, networks and software applications are developed. In order to harmonize recommendations with national efforts and to reuse the work done by others, The Plan will adopt and promote the "use cases" defined by the American Health Information Community (AHIC). These use cases describe HIE enabled clinical practices and their associated benefits. The AHIC use cases are reviewed in more detail in Appendix J.

2. Functional Requirements

The health information exchange components required to enable the use cases of the HIE can be viewed as a series of interoperable, modular building blocks or functional requirements. These building blocks include those that are implemented and controlled by end users, and those that are implemented and controlled by the HIEN. They can be incrementally developed (or procured), implemented and maintained to support the ongoing and evolving information exchange needs of the Connecticut healthcare community. The building blocks will be used by multiple use cases. The use case priorities reflect the strategy to implement the most needed, and most reused building blocks in initial projects. Functional requirements are described in more detail in Appendix G. The following diagram (Figure 13) provides a visual representation of the functional model of the CT State health information exchange network.

FIGURE 13
Statewide Health Information Exchange Network

Secure connections for certified users via statewide standards

Pharmacy
Patients, Orders, Fills
Orders, Claims Med History

Lab, Radiology Providers
Patients, Test Results
Ordering, Results Reporting

Personal Health Records
Personal Health Records Provider
Members, History, Risks, Activities

Hospital, Homecare Long Term Care, Behavioral Health
Patients, Orders, Results
CPOE, EHR System

Community Health Ctr
Patients, Orders, Results
EHR System

Community MD
Patients Orders Results
EMR System

NETWORK
Secure, Private, Statewide

"Edge" servers house summary clinical info in structured documents

Health Network Aggregator

Participating organizations can call a service center

People certify and credential users, enforce policy, manage data

Master Patient File
Master Provider File
Privacy, Security, Record Locator, Semantic Broker Services

One statewide database of authorized providers

Health Insurer
Enrollment, Billing, Claims System
Members Claims

Pharmacy Benefits Mgr
Eligibility, Formulary, Claims System
Members Meds

Oversight and Quality
Connecticut Stage Agencies
Program Registries
Patients' Clinical History

One statewide database of all residents who choose to participate

Individuals authorize access, the Exchange finds data, translates into common terms, transmits to requester

☐ End User, Decentralized Building Blocks
☐ Centralized HIE Building Blocks

3. Technology Standards

Widely accepted health information technology and health information exchange standards and protocols serve as key enablers of health information exchange as envisioned by the Office of the National Coordinator for Health Information Technology. The Plan groups the identified standards into the following broad categories in order to promote understanding of key concepts. A more detailed review of technology standards is provided in Appendix G.
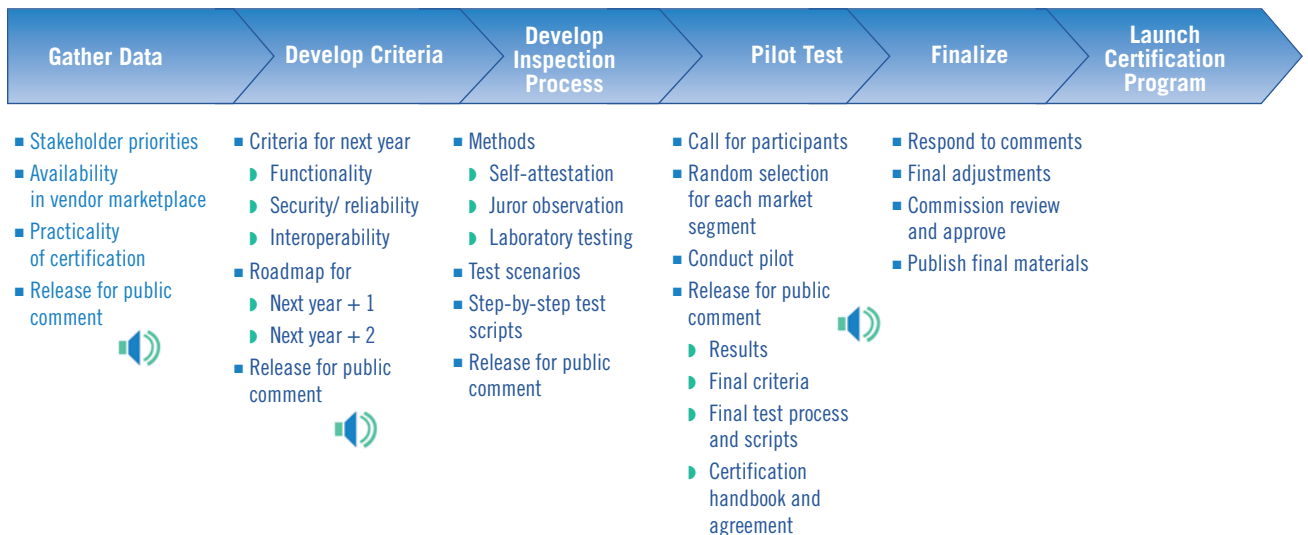
■ **Policy Principles** are intended to guide organizations with the high level concepts regarding how, when and why patient data is shared across the health information exchange network. These principles suggest an overarching framework for data sharing that must be agreed to by all participating organizations.

- **Technology Principles** are intended to provide guidance to optimize the development of the HIE and maximize the potential uses of the HIE for the broad healthcare community. The technology principles take into consideration the limitations and capabilities of the existing health IT environment and support a phased development of HIE related capabilities.

- **Technical Standards** focus on the physical transmission and receipt of health data and its transport between participating systems. This includes message formats and reliable, secure message transport.

- **Semantic Standards** focus on ensuring shared meaning between sending and receiving partners – i.e. ensuring that the meaning of what was sent is consistent with the understanding of what was received. Semantic standards focus on medical terminology that can be referenced consistently by all parties.

- **Process Standards** focus 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.

4. Certification Standards

The potential for interoperability across the nation's healthcare system will not be possible without the standardization of clinical applications across all healthcare settings that will eventually share data. The Certification Commission for Healthcare Information Technology (CCHIT) was formed in 2004 with the sole mission of accelerating the adoption of robust, interoperable health information technology by creating a credible, efficient certification process. The goals of product certification are to reduce the risks of investing in health IT, to facilitate interoperability of health IT products, to enhance the availability of adoption incentives and to ensure the privacy and security of personal health information. The certification process provided by CCHIT is outlined in Figure 14 below.

FIGURE 14

Gather Data	Develop Criteria	Develop Inspection Process	Pilot Test	Finalize	Launch Certification Program
■ Stakeholder priorities ■ Availability in vendor marketplace ■ Practicality of certification ■ Release for public comment	■ Criteria for next year ▸ Functionality ▸ Security/ reliability ▸ Interoperability ■ Roadmap for ▸ Next year + 1 ▸ Next year + 2 ■ Release for public comment	■ Methods ▸ Self-attestation ▸ Juror observation ▸ Laboratory testing ■ Test scenarios ■ Step-by-step test scripts ■ Release for public comment	■ Call for participants ■ Random selection for each market segment ■ Conduct pilot ■ Release for public comment ▸ Results ▸ Final criteria ▸ Final test process and scripts ▸ Certification handbook and agreement	■ Respond to comments ■ Final adjustments ■ Commission review and approve ■ Publish final materials	

Currently, the CCHIT has certification programs established for ambulatory EHR systems and inpatient EHR systems. Future plans call for certification programs for emergency department systems, health information exchange networks, personal health records, and standalone e-prescribing (see *http://www.cchit.org/* for more details).

5. Technical Architecture

The Plan recognizes the need for Connecticut to commit to a specific technical architecture to ensure that technology based strategy and decision making are in alignment with the long-term goals of the plan. The Plan follows federal guidance as outlined in Appendix G that suggests that the technical architecture must provide a pathway for the existing technical infrastructure (networks, databases, systems and software applications) to evolve to a standards–based infrastructure. A key consideration for this approach is the notion of "modularity". The following sections describe the modular approach to the development of the HIEN from the perspectives of each of the three domains. Finally, the technical architecture of the Statewide HIEN is presented.

a. Federated versus Centralized Data Repositories

Direct patient care providers such as hospitals generally favor a "federated" model of health information exchange, where data remains within the originating provider's environment and is "pulled" as required when a query on a patient's information is initiated from the HIEN. In contrast, the "centralized" model is when patient data are "pushed" from a healthcare provider system to a central repository where it is stored until needed. The centralized model is more typical of quality–based initiatives as well as state health agency systems where cost concerns outweigh less stringent patient privacy and confidentiality requirements that are more relevant in the direct patient care environment. The pros and cons of each model are detailed below:

■ Federated model

◗ Pros

- Ownership of data is retained by originating provider.
- Originating provider retains control over data access and data quality.
- Provides a comprehensive dataset more closely resembling data from originating systems.
- Provides real-time or near real-time access to patient data.
- Appropriate for larger healthcare providers (hospitals).

◗ Cons

- Requires an elaborate patient locator service.
- Requires more complex integration with source systems.
- Requires a robust network and software application architecture that can retrieve and present patient records in a timely manner.
- Requires a highly available network to ensure consistent access to remote data.
- Increased operations and maintenance costs.
- Not appropriate for smaller providers, due to cost and complexity.

- Centralized model
  - Pros
    - Less costly infrastructure compared to federated model.
    - Less costly management, operations, and technical support.
    - Faster response times for patient queries.
    - More appropriate for healthcare oversight activities.
  - Cons
    - Commingling of data may compromise accountability.
    - May raise concerns of patient privacy advocates.
    - Updated records at point of care may not be captured by the centralized system on a timely basis.

The technical architecture described below recommends a "federated" model for the Direct Patient Care domain and a "centralized" model for the State Health Agencies and Healthcare System Monitoring and Evaluation domains.

b. **Modular Framework**

The following three sections (c, d and e) describe the technical architectures that are appropriate for the three domains described in The Plan (Direct Patient Care, State Health Agencies and Healthcare System Monitoring and Evaluation). While the technical architectures of each domain merit specific consideration given the varying health information exchange requirements of each domain, there are modules that are consistent across domains. As various HIEN projects begin to evolve across the state, the leadership of these projects must realize that the more these projects develop technical architectures that are consistent with that of other HIENs, the stronger the ability of existing and subsequent HIEN projects to interface with their HIEN and ultimately develop a statewide health information exchange capability. Common modules of the HIENs that The Plan will promote include:

- **Auditing and Accountability (all domains)** – Provides structure and resources to ensure privacy, confidentiality, security and overall accountability of patient data.

- **Data Analysis and Reporting (State Health Agencies and Healthcare System Monitoring and Evaluation)** – The value of the State Health Agencies HIEN and the Healthcare System Monitoring and Evaluation HIEN will be directly tied to the amount, quality and timeliness of information that is made available to participating healthcare providers, oversight agencies, and state health agency staff.

- **Data Translation Service (all domains)** – Provides data validation and normalization services. Specific functions may include:
  - Message validation – performing preliminary verification that an inbound message meets baseline requirements.
  - Message format translation – translating messages from the format of the sending entity to the required format of the receiving entity.

◗ De-identification – removing personal identifiers to eliminate the possibility of uniquely identifying a patient.

◗ Pseudonymization – concealing a patient's identity while still tracking specific activity.

◗ Code set translation – translating code sets from a source format to the format required by the receiving entity.

■ **Data Transmission Service (all domains)** – Manages the transmission and receipt of transactions between integrated systems.

■ **Meta-Data Management Service (State Health Agencies and Healthcare System Monitoring and Evaluation)** – The State Health Agencies HIEN and the Healthcare System Monitoring and Evaluation HIEN will contain a meta-data management service that will provide summary data for identifiable (State Health Agencies domain) and de-identified (Healthcare System Monitoring and Evaluation HIEN) patient populations relative to quality, program management, client management, healthcare research, and monitoring and evaluation needs.

■ **Organization and User Profiles (all domains)** – Provides organizational and user hierarchy and accountability structure for the system. Specific functions may include:

◗ Access privileges.

◗ Role-based security structure.

◗ Provider credentialing and authentication.

■ **System Management (all domains)** – Provides functions for system administrators to maintain the consistent operation, availability and integrity of the system. These functions may include:

◗ Organization and user enrollment.

◗ Access privileges management.

◗ Interface management.

◗ Operations monitoring and control.

◗ Master patient index management.

◗ Patient matching management.

c. Direct Patient Care Domain Technical Architecture

The Direct Patient Care domain health information exchange network, as shown in Figure 15, contains a comprehensive electronic health record system at its core. The electronic health record contains complete longitudinal health information for the patients that are stored within that HIEN. The HIEN contains complex system interfaces that interconnect legacy clinical systems, ancillary service providers, provider EMR systems, and other HIENs. Given the comprehensiveness of the data managed by this HIEN, security and accountability requirements to ensure patient privacy and confidentiality are paramount.

FIGURE 15
Direct Patient Care EHR and HIE
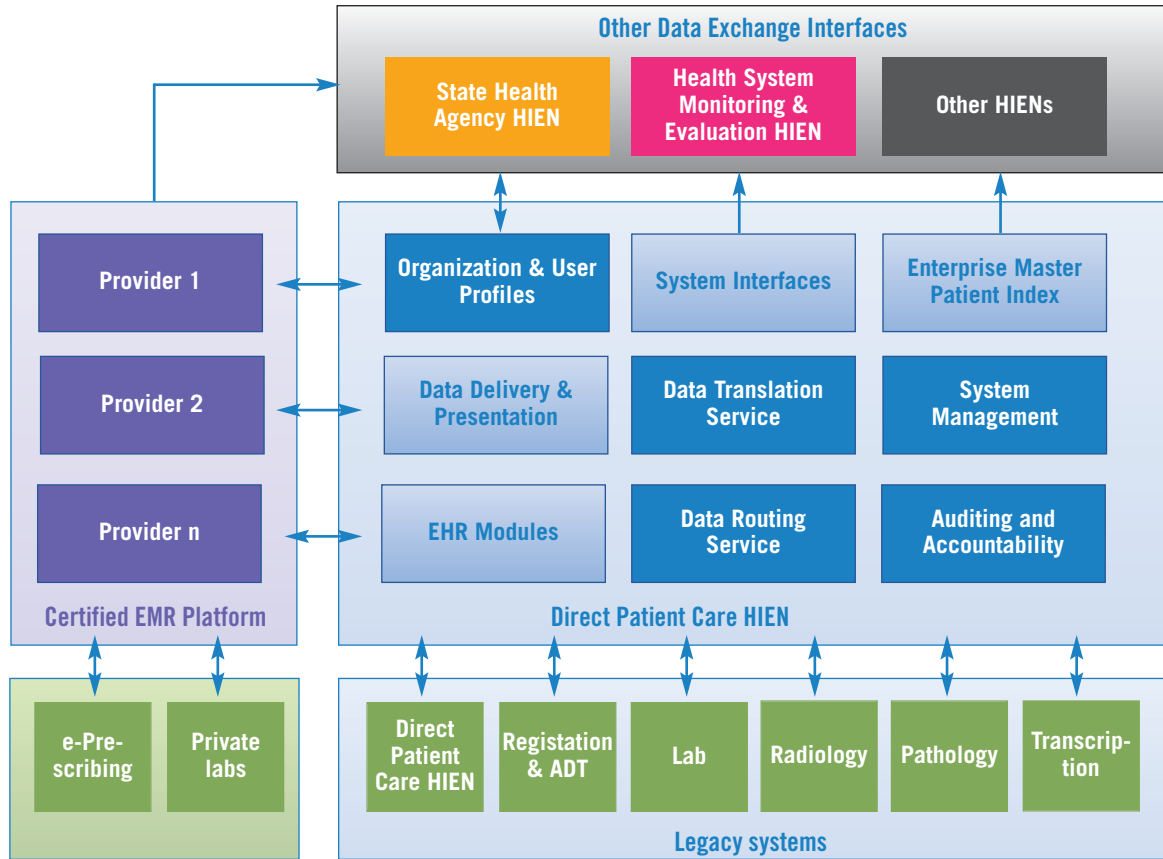
Descriptions of the various modules contained within the Direct Patient Care domain Technical Architecture as illustrated in Figure 15 are provided below.

- **Data Delivery & Presentation** – Organizes data received from multiple sources to a consistent unified view and delivers the data to the receiving entity based on delivery specifications provided by the receiving entity.

- **EHR Modules** – Provide structured access to clinical information for clinical system users. Modules may include:

  - Clinical documentation.
  - Clinical guidelines.
  - Continuity of care record.
  - Discharge summaries.
  - Lab/Radiology/pathology orders and results.
  - Radiology images.

  - Medication history.
  - Patient demographics.
  - Patient flow sheets.
  - Patient inquiry.
  - Pharmacy orders.
  - Medical history.

■ **System Interfaces** – Supports data exchange from clinical legacy systems that may not meet standards-based data exchange requirements.

■ **Enterprise Master Patient Index** – Provides a single patient identifier for each participating patient within the regional HIEN.

■ **Certified EMR Platform** – The direct patient care HIEN will support standards-based integration with one or more certified EMR platforms. EMR functionality may include:

◗ Clinical documentation.
◗ Charge capture.
◗ Decision support.
◗ Dictation and transcription.
◗ ePrescribing.
◗ Paper document scanning and storage.

◗ Interfaces to ancillary services providers.
  • ePrescribing interface.
  • Private lab interface.
◗ Order entry and delivery.
◗ Results capture and reporting.

■ **Common modules** – The technical architecture described in this section uses a modular approach to systems development. Modules that are common to multiple HIEN domains are represented collectively in section b above. Common modules that are part of the Direct Patient Care HIEN include:

◗ Organization and user profiles.

◗ Data translation service.

◗ Data transmission service.

◗ System management.

◗ Auditing and accountability.

d. State Health Agencies Domain Technical Architecture

The State Health Agencies HIEN, as shown in Figure 16, contains a program profile and meta-data management service at its core. The program profile module provides reference information of the program registry systems that are supported by the HIEN. This module ensures that the HIEN can exchange data with each integrated program registry. The meta-data management service manages data stored in the program registries and provides an integrated view of the data for public health oversight and program management functions. Data stored in the State Health Agencies domain typically originates at the point-of-care by healthcare providers within the Direct Patient Care domain. Data are sent to the State Health Agencies HIEN and routed to the appropriate program registries as required. Personal health information managed by the State Health Agencies HIEN is typically less comprehensive than data managed by the direct patient care domain HIEN and is generally program specific. Personal health information stored in this domain may be made available to other domains as required.

FIGURE 16

State Health Agencies' Program Registries and HIEN
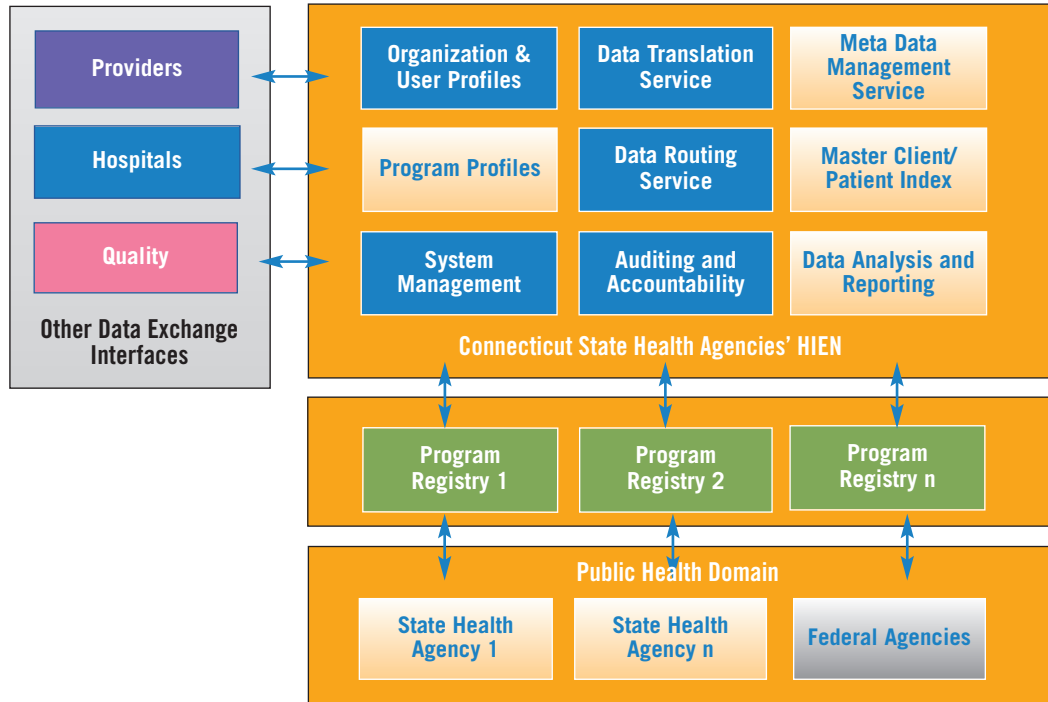
Descriptions of the various modules contained within the State Health Agencies domain Technical Architecture as illustrated in figure 16 are provided below.
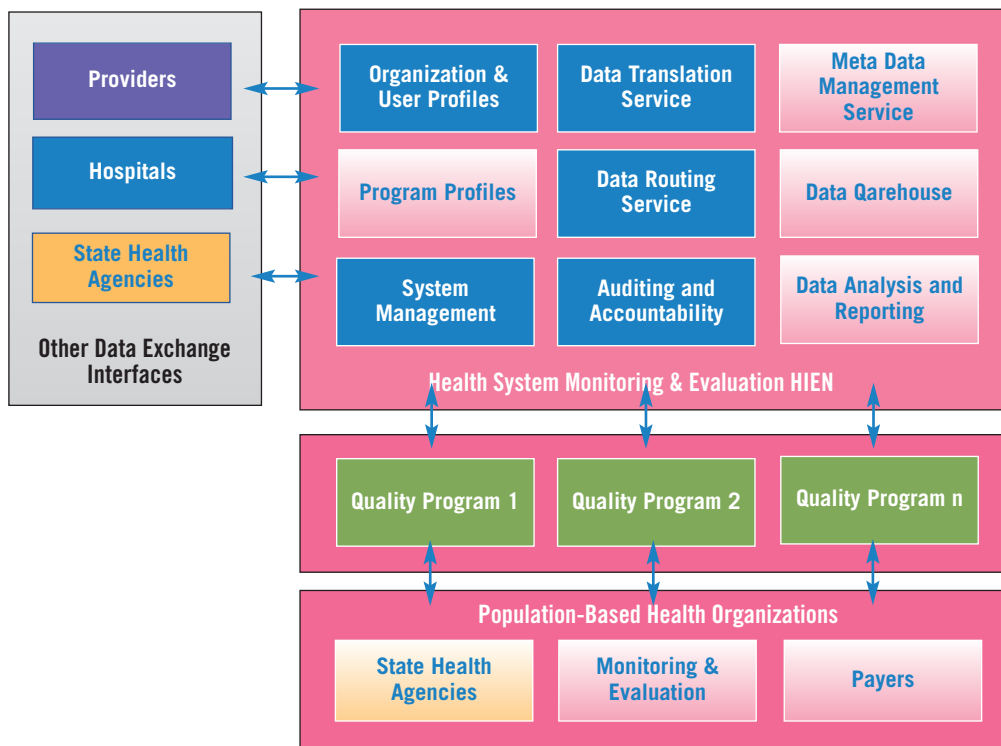
- **Program Profile** – All integrated program registries will be represented in the program registry profile. This profile will specify the level of integration including data exchange technical specifications.

- **Master Client/Patient Index** – Clients/patients will be defined in the state health agencies HIEN with a predetermined set of demographic data elements that will be used for consistent identification as needed for program management purposes. De-identified client/patient identifiers will be used for population-based data analysis and reporting.

- **Common modules** – The technical architecture described in this section uses a modular approach to systems development. Modules that are common to multiple HIEN domains are represented collectively in section b above. Common modules include:

  ◗ Auditing and accountability.

  ◗ Data analysis and reporting (State Health Agencies HIEN and Monitoring & Evaluation HIEN).

  ◗ Data translation service.

◗ Data transmission service.

◗ Meta data management service (State Health Agencies HIEN and Monitoring & Evaluation HIEN).

◗ Organization and user profiles.

◗ System management.

e. **Healthcare System Monitoring & Evaluation Domain Technical Architecture**

The Healthcare System Monitoring & Evaluation domain HIEN, as shown in Figure 17, contains a program profile, meta-data management service and data warehouse at its core. The program profile module provides reference information of the monitoring and evaluation programs that are supported by the HIEN. This module ensures that the HIEN can effectively manage data for each integrated monitoring and evaluation program. The data warehouse contains de-identified client/patient data that have been collected from the other domains. The meta-data management service manages data stored in the data warehouse and provides an integrated view of the data for monitoring and evaluation functions. Data stored in the monitoring and evaluation domain typically originates at the point-of-care by healthcare providers within the Direct Patient Care domain or within program registries in the State Health Agencies domain. Data are sent to the monitoring and evaluation HIEN from the other domain HIENs and stored in the data warehouse as required.

FIGURE 17
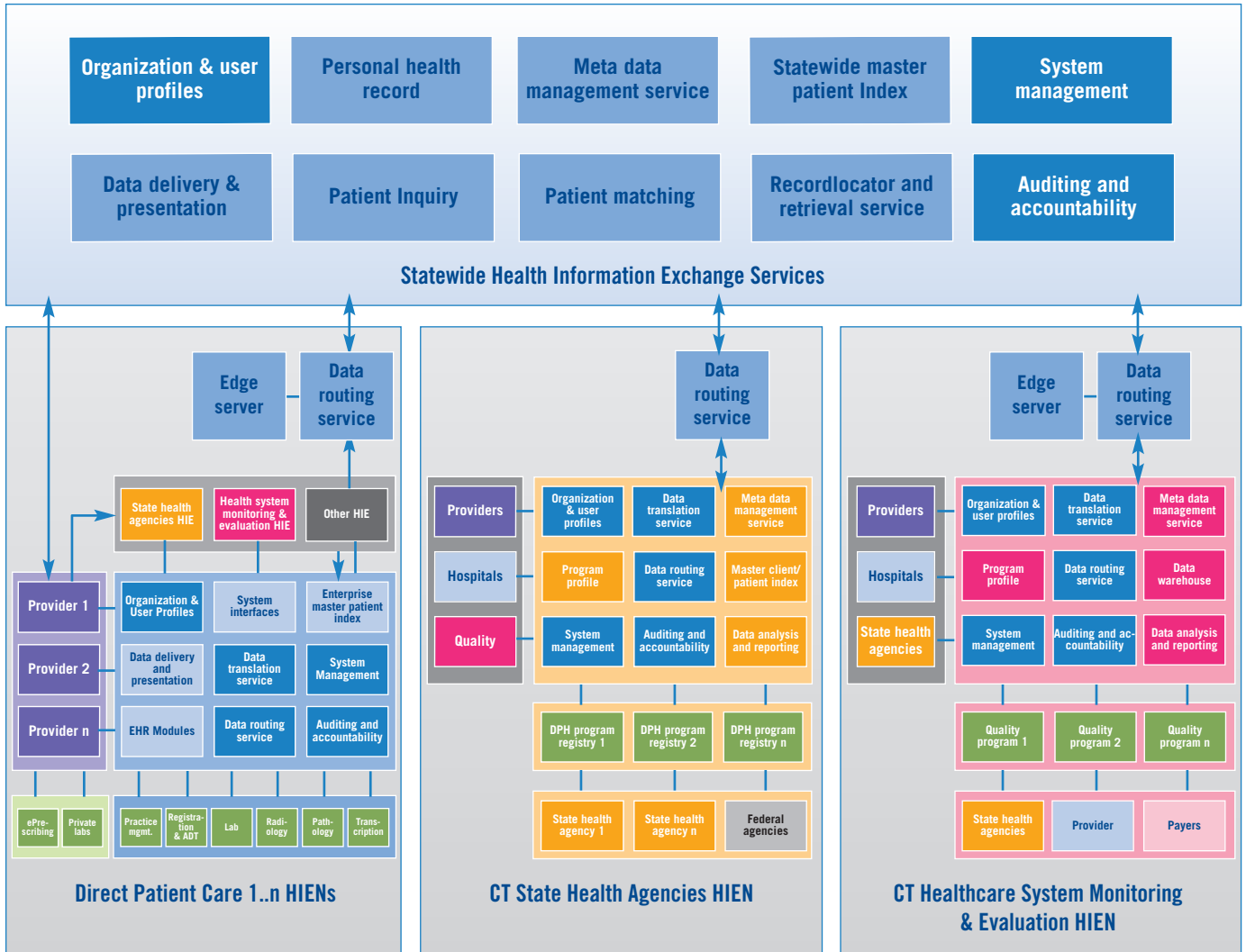## Health System Monitoring & Evaluation HIEN

Descriptions of the various modules contained within the Monitoring & Evaluation domain Technical Architecture as illustrated in Figure 17 are provided below.

■ **Program Profiles** – All integrated monitoring and evaluation programs will be represented in the program profiles module. This profile will specify the level of integration including data exchange technical specifications.

■ **Data Warehouse** – All data received and managed by the Monitoring and Evaluation HIEN will be stored within the data warehouse. The data warehouse is a highly sophisticated database engine that provides long-term access to a large amount of de-identified health information collected from healthcare providers across the state.

■ **Common modules** – The technical architecture described in this section uses a modular approach to systems development. Modules that are common to multiple HIEN domains are represented collectively in section b above. Common modules include:

◗ Auditing and accountability.

◗ Data analysis and reporting (State Health Agencies HIEN and Monitoring and Evaluation HIEN).

◗ Data translation service.

◗ Data transmission service

◗ Meta data management service (State Health Agencies HIEN and Monitoring and Evaluation HIEN).

◗ Organization and user profiles.

◗ System management.

f. **Connecticut State Health Information Exchange Technical Architecture**

The Plan recommends that for statewide health information exchange to be possible, a statewide HEIN is required. The complexities of data exchange and management of the required function-ality at a state-level suggests the need for a statewide health information exchange "utility" that will manage these capabilities in an ongoing manner. Core features of the CT State HIEN, as shown in Figure 18, include a statewide master patient index, meta-data management, patient inquiry, record locator and retrieval, data delivery and presentation and personal health record. The statewide HIEN will include edge servers and data routing services that will integrate each participating regional HIEN with the CT State HIEN.

FIGURE 18
CT State Health Information Exchange Network

Descriptions of the various modules contained within the CT State HIEN Technical Architecture as illustrated in Figure 18 are provided below.

- **Data Delivery and Presentation** – Organizes data received from multiple sources to a consistent unified view and delivers the data to the receiving entity based on delivery specifications provided by the receiving entity.

- **Meta–data Management Service** – Organizes and manages references to clinical data stored at direct patient care domain and state health agencies domain edge servers.

- **Patient Inquiry** – Provides healthcare providers the ability to search for patient information from across the integrated healthcare system.

■ **Patient Matching Service** – Ensures that patients are consistently and accurately identified as healthcare transactions are received from multiple healthcare providers. This service typically uses demographic data and complex matching algorithms.

■ **Personal Health Records** – Provides direct access for consumers to a summary representation of their personal health information gathered across multiple points of care. Consumers may also have the ability to enter information into their PHR and communicate with healthcare providers.

■ **Record Locator and Retrieval Service** – In conjunction with the patient inquiry and meta-data management services, this module identifies the location of patient records and retrieves them for presentation to the user.

■ **Statewide Master Patient Index** – Provides a single patient identifier for each participating patient within the statewide HIE.

■ **Common modules** – The technical architecture described in this section uses a modular approach to systems development. Modules that are common to multiple HIEN domains are represented collectively in section b above. Common modules include:

   ◗ Auditing and accountability.

   ◗ Organization and user profiles.

   ◗ System management.

G. Funding and Financial Sustainability

Introduction

Start-up funding and a model for long-term sustainable revenue represent two of most significant barriers to HIEN development (AHRQ, 2006; eHealth Initiative, 2008; Adler-Milstein et al., 2008). Capital funding requirements include obtaining resources to develop a governing body (a RHIO) for the oversight and coordination of HIE activities, as well as the development of technical infrastructure supporting data exchange. The most viable approach to assuring successful start-up and sustainability is to maximize the funding resources available and to match funding sources to the organizational needs. Typically, initial funding largely comes from federal and state governments, as well as foundation grants and private sector financing (National Governors Association, 2009).

However, when grants end, project momentum is often lost as funding streams evaporate. This underscores the importance that long-term sustainable funding be addressed early in the project lifecycle. A variety of methods are used to finance the ongoing operations of health IT/HIE initiatives. Financing models in support of ongoing operations include membership, transaction and usage fees as examples. Most stakeholders and experts have noted that health IT/HIE costs vary tremendously and depend on a number of factors, such as the types of transactions supported by the exchange, the willingness of stakeholders to provide in-kind contributions, and the availability of state, federal, or foundation grants to accomplish specific scopes of work related to establishing health IT/HIE capacity.

Connecticut Environment and Stakeholder Perspective

The current perspective of Connecticut stakeholders is that while health IT/HIE infrastructure must be funded by state and federal funding streams, there is no expectation that the Connecticut State Legislature will direct any significant amount of funding to health IT/HIE initiatives given the state's fiscal crisis. Recent events at the federal level, however, with the passage of the American Recovery and Reinvestment Act, indicate that significant funding will be available in the near-term. While the state may not fund substantial health IT/HIE development efforts, there is a strong expectation that the state should demonstrate a strong commitment to the project by funding the operations of the CT State RHIO (i.e. staffing).

In Connecticut there are several early stage activities underway to fund health information exchange projects. For example, several hospitals are developing EHR capacity by subsidizing the cost of EMR adoption for local physicians in their area. Similarly, some larger IPAs have plans to fund and develop hosted EMR applications in support of their member physicians. In addition, several payers in the state are currently paying an annual fee to participate in the eHealthConnecticut Heath Quality Cooperative. These activities demonstrate at least preliminary financial commitments by Connecticut stakeholders to health IT/HIE.

Guidance and lessons learned

1. Financial Models to Support Governance and Infrastructure Development

There are numerous funding options available to states and regional health information organizations in their efforts to develop governance/oversight capacity as well as technical infrastructure to support HIE. While fee structures are significantly important strategies for the ongoing sustainability of HIENs, very different approaches must be taken to develop the network and provide adequate governance and guidance. These typically take the form of grants from federal, state and private institutions. More recently, as health IT/HIE projects have gained momentum and viability on a national level, states have developed financing models to support health IT/HIE adoption.

a. **Federal Funding** – The United States Department of HHS is driving the development of HIE on a national level to improve patient care and increase efficiency across the healthcare system. Through several of its agencies, HHS is also providing funding to organizations engaged in building and testing health IT systems and health information exchange networks. These federal funding sources include:

- The Office of the National Coordinator for Health Information Technology (ONC).
- Agency for Healthcare Research and Quality (AHRQ).
- Centers for Medicaid and Medicare Services (CMS).
- Health Resources and Services Administration (HRSA).
- The Office of Rural Health Policy (ORHP).

The American Recovery and Reinvestment Act includes significant funding for promoting EHR adoption and accelerating construction of the NHIN. These funds will be funneled through the aforementioned federal agencies and a significant amount will be distributed at the state level. These opportunities will be discussed in more detail at the end of this section.

b. **State Funding** – The following table describes the start-up and operational financing of several operational RHIOs (from the National Governors Association 2009 *Report to the State Alliance for e-Health: Public Governance Models for a Sustainable Health Information Exchange Industry*).

Organization	Start-Up Financing	Ongoing Revenue Source
Delaware Health Information Network (DHIN)	$5M: State of DE ($2M in year one, $3M year two) $2M: Match from private sector (year one) $4.7M: AHRQ SRD grant	• Private stakeholders/data providers charged on volume of transactions. Costs are allocated as a percentage of total costs to the state authority. • Per-member per-month (PMPM) fee for health plans. • Subscription fee for value-added services to be implemented.
HealthBridge (Ohio)	$1.75M: Loans from community stakeholders	• 85 percent from hospitals/health systems as monthly subscription fees. • 15 percent from premium services (transcription and billing). • Total: $3.7M per year.
Inland Northwest Health Services (INHS) (Washington)	Initial investments from two hospital systems (integrated with hospital information systems)	• Implementation contracts. • Service fees.
Indiana Health Information Exchange (IHIE)	Investments from federal and state governments, Regenstrief Institute, eHealth Initiative, and Anthem BCBS $1.8M: Biocrossroads $2M: Fairbanks Foundation	• 17¢–37¢ per transaction fee for distribution of results by labs (clinical messaging, volume-based sliding scale). • 30¢ PMPM by insurance companies for quality reports. • No fees for clinician access to data.
MedAllies/ Hudson Valley HIE (HVHIE) (New York)	$1M: Stakeholder investments (2001) $100K: eHealth Initiative, Connecting Communities for Better Health $235K: IBM/ONC grant (2005) $5M: HealNY (state grant) $12.1M: HealNY for PH reporting (2008)	• Taconic IPA contracts with MedAllies for operations of the HVHIE. • $400/month subscription fee for EMR implementation, support, and access to electronic orders (lab order entry; half offset by grants until pay for performance incentives begin). • $72K per hospital interface maintenance.
Vermont Information Technology Leaders (VITL)	$2.1M: VT Legislature $2M: VT Department of Health $1M: Community stakeholders	• Legislatively mandated funding from VT businesses and members of the public at 0.199 percent of medical claims. Projected to raise $32M over seven years.

There are numerous examples and a wide variety of models of state promoted and sponsored health IT adoption across the country. States have commissioned studies to support the development of strategic plans to implement and sustain statewide electronic health information exchange (e.g., Wyoming, Delaware and Connecticut), issued executive orders supporting technology adoption and/or endorsing specific technology initiatives (e.g., Wisconsin and Arizona) and directly funded health IT adoption programs through the disbursement of grants and loans within their states (e.g., New York). Minnesota has gone so far as to mandate the adoption of electronic health records by all healthcare providers in the state by 2015.

Summaries of many of the state-based efforts are being compiled and tracked by a variety of organizations across the country. One example of the summaries is the HIMSS State Dashboard being maintained by the Health Information and Management Systems Society (HIMSS) (see *http://www.himss.org/StateDashboard/* for updates). A second example is the State-level Health Information Exchange Consensus Project, which is working to identify the emerging characteristics and distinct roles and contributions of state-level HIEs under the auspices of the Foundation of Research and Education within the American Health Information Management Association (AHIMA – see *http://www.slhie.org/index.asp* for further details).

c. **Private Funding** – Private funding of statewide health IT/HIE efforts have been successful in certain markets where economies of scale are dominant. Private health plans have shown a keen interest in funding start-up costs of HIEs and the adoption of EHRs across multiple communities. Private foundations serve as an additional funding stream for start-up operations or the development of pilot programs. Several foundations exist within Connecticut that could be instrumental in supporting the start-up operations or development of pilot programs. The most likely of these foundations would be the grouping of insurance "conversion" foundations and the Connecticut Health Foundation.

Examples of funding efforts by private health plans and foundations include:

- CalRHIO: California's statewide RHIO was initially capitalized by six of the state's largest health plans; each contributed $1 million. CalRHIO has subsequently received funds from federal agencies and California-based private foundations.

- Blue Cross/Blue Shield:

  ◗ Arkansas Blue Cross and Blue Shield has spearheaded the Advanced Health Information Network, an online system giving physicians and hospitals access to e-medical records and claims databases, while piloting low-cost wireless EHRs for small practices.

  ◗ Blue Cross and Blue Shield of Massachusetts has provided $50 million to fund the Massachusetts eHealth Collaborative for 3 years (*http://www.maehc.org/*). This pilot project is providing EHRs – software, hardware, installation, training, support – to virtually all physicians in three Massachusetts communities.

◗ Blue Cross and Blue Shield of Nebraska is the main payer leading the Nebraska Health Information Initiative (NeHII), a statewide system that will serve virtually every Nebraskan by building on the existing telemedicine network. (*http://www.nitc.state.ne.us/eHc/Clearing/NeHII.html*).

d. **Stark and Anti–Kickback Exemptions** – In August 2006, the DHHS published rules that provide an exception under the physician self-referral prohibition law (Stark), as well as safe harbor under the anti-kickback act (AKA), for the donation of interoperable EHR technology to physicians and other health care practitioners or entities. There are several examples of this practice today, particularly where hospitals are promoting specific EHR platforms to their affiliated practitioners. To qualify, EHR software is deemed to be interoperable if CCHIT has certified the software no more than 12 months prior to the date it is provided to the physician organization. Understanding that the 12 month restriction may be prohibitive, CCHIT has modified their certification practices to ensure that vendors with certified systems can maintain the "less than 12 month" certification requirements of the HHS rules.

2. **Revenue Models Supporting Sustainability**

Funding to support the CT State RHIO and its services on an ongoing basis can be obtained through a variety of membership and/or usage fees. While not necessarily a viable option in the near-term, as the network-based infrastructure matures and service offerings expand, a membership fee structure by organization type may be a practical consideration. Below are several of the models that can be evaluated to support this effort.

a. **Maintenance Fees for Hosted Services** – Certain standardized services may ultimately be hosted and supported by a centralized health information exchange infrastructure. Hosted services may be of value to certain users if they do not have to maintain support staff in-house. In this model, stakeholders may pay to support shared services for all users of the HIEN. Membership fees may be equal or tiered on the basis of some factor, such as size of population or use.

b. **Transaction Based Fees** – An administrative transaction processing project is the most likely candidate for this type of model in the short-term; however, this model may be considered for other large volume value-based services. Unlike the membership fee model, dependence on this revenue source requires initial capital investments to build the infrastructure and capabilities for calculating transaction fees.

c. **Service Fees** - Access fees may be considered for services that are not transaction–based, particularly if their value is evident to users.

d. **Training Fees** - Assuming that a core team with a broad technical knowledge base of health IT/HIE is developed over the initiative's first couple of years, packaging that knowledge into a set of program offerings may provide a revenue opportunity. For example, the Massachusetts eHealth Collaborative has recently spun off a for-profit subsidiary, the MAeHC Professional Services Corp., to provide services across the country as a way of raising capital to expand its pilot program across Massachusetts.

e. **Secondary Data Use** – Some proponents of HIE have promoted the de-identification and repackaging of large health datasets as a revenue source. Options may exist to evaluate the value of such data to large pharmaceutical companies, medical device makers and academic or clinical research institutions. Given the sometimes controversial and sensitive nature of using secondary data and the need for maintaining confidentiality of an individual's health information, the governance body of the RHIO should hold ongoing reviews and discussions before incorporating this service as part of the HIEN functions.

3. **Role of ARRA**

The funding for health IT/HIE included in the American Recovery and Reinvestment Act (ARRA) presents an opportunity to jump start an ambitious effort in Connecticut to implement the recommendations in The Plan. The Health Information Technology for Economic Development Act (HITECH) within the ARRA appropriates a minimum of $20 billion to be used over the next six years to encourage health IT and HIE adoption. Within the legislation, Congress acknowledges the likely need for additional funding and requires HHS through the Office of the National Coordinator to report annually on the level of resources that are needed.

In order for Connecticut to take full advantage of the opportunities in HITECH and a number of other sources of funding for health IT within the ARRA, there is a need for coordinated activity among a broad range of stakeholders, the formation and state designation of an entity to take the lead on health information exchange, and an active role by the State of Connecticut to provide leadership and matching funds that may be required to bring the maximum level of funding to Connecticut.

While the vast majority of the funding available will be directed towards qualified providers who are "meaningful" users of EHRs, the requirements of these programs are designed to advance a broader strategy to strengthen health information exchange at the state level and to improve the quality of care. In order to meet the definition of "meaningful use", providers must adopt certified EHR systems that include electronic prescribing functionality and the capacity to exchange electronic health information; in addition, they must submit information on clinical quality on measures selected by the Secretary of HHS.

The requirement that these EHRs can exchange data implies the existence of an infrastructure that facilitates this exchange. It appears that the success of Connecticut providers in successfully obtaining ARRA/HITECH funding will be tied to the availability of a health IT/HIE infrastructure that, as documented in The Plan, currently does not exist beyond a small number programs of limited capacity.

Connecticut is not alone in this situation. To facilitate the development of this HIE capacity, the ARRA encourages a strong role for the state and the development of statewide entities similar to the one proposed in The Plan. Within the $2 billion of infrastructure funding available through ONC, a significant portion, estimated at a minimum of $300 million, is likely to be allocated
to support health IT/HIE projects designed and operated in accordance with emerging federal

standards and policies. The ARRA outlines a clear role for states and state designated entities to receive and manage these funds. Since these HIE dollars in the form of *HIE Planning and Implementation Grants* are expected to be among the funds most quickly made available, it is important for the state, in coordination with interested stakeholders, to be vigilant in tracking the development of this funding program and in being prepared to meet the organizational requirements that will be necessary to obtain these funds.

Within HITECH, in addition to the *HIE Planning and Implementation Grants*, there are additional sources of funding that will be made available through ONC and other agencies primarily within HHS. These programs are outlined in detail in Appendix M, and fall into the following categories:

a. **Grants to States to Establish EHR Loan Funds to Facilitate EHR Adoption** – These funds and others the state may develop through bonds and collaborations with private parties under the HITECH umbrella are designed to provide up-front funds for the capital funding needed for EHR implementation prior to the availability of the funding through Medicare and Medicaid (see below). The commitment of the Medicare and Medicaid funding may make EHR projects better prospects for private capital funding as increased Medicaid/Medicare reimbursements to physicians will support repayment of capital loans. The loan fund required to be established through HITECH can be a vehicle for this funding to physicians to promote EHR adoption. The state should begin planning for or identifying existing mechanisms that will meet the requirements to obtain federal loan funding and pursue these funding opportunities when they become available.

b. **Regional Extension Centers** – Technical assistance to healthcare providers will be provided through regional extension centers which are designated through ARRA as non-profit organizations and will be established through a federal grant program. Unified proposals coordinated among interested organizations to meet the needs of the broadest range of providers will have a stronger chance for success than many individual proposals that will compete for these limited funds. The state or the CT State RHIO can play a role in encouraging this type of coordination.

c. **Workforce Training Grants** – There are two types of workforce training grants available in the ARRA through the ONC: one to improve the teaching of health IT/HIE within medical schools and a second to train a larger health informatics workforce. State universities will be eligible, in addition to private institutions, to apply for these funds. Again, coordination among likely applicants for this funding may be useful in strengthening the potential for this funding to come to Connecticut.

d. **Medicaid and Medicaid Incentive Payments** – While the Medicare portion of the EHR funding in the ARRA does not require significant state activity, the Medicaid dollars will be administered through state's Medicaid programs. States will be required to provide 10 percent of the costs of administering the program; 100 percent of the dollars expended to providers will be paid by the federal Medicaid program.

As detailed in Appendix M, Medicare funding will be made available to providers and hospitals for five years beginning in 2011 to encourage the "meaningful use" of electronic health records

(see above for discussion of meaningful use). Up to a total of $44,000 per physician and funding allocated on a formula for hospitals beginning with a base of $2 million will be available. There is a 10 percent bonus for physicians who practice in health professional shortage areas (HPSAs) and there are additional incentives for critical access hospitals. Disincentives for those not complying begin in 2015.

In addition, there are payments to state Medicaid plans that implement programs to encourage the adoption and use of certified EHRs. States receive 100 percent of payment outlays and 90 percent of administration costs. The programs may make payments to providers up to $63,750 towards adoption, implementation, upgrades, maintenance, and operation of certified EHRs. Payments to hospitals are similar to those under Medicare. The Medicaid program expands funding to pediatricians, FQHCs, rural health clinics and physician assistants practicing in rural health clinics. States are required to make the assessments of compliance. Providers must choose between health IT funding through Medicare or Medicaid.

e. **Other Funding Sources for Health IT and HIE within ARRA:** Outside HITECH funding, the State of Connecticut may receive significant amounts of discretionary funding to meet the requirements of the broader stimulus package. However, it is likely that the availability of the designated funding through HITECH will make it more difficult to obtain the highly competitive discretionary dollars.

As the ARRA legislation is interpreted through the agency rule making process, other opportunities for health IT and HIE funding will emerge. One exists within the Commerce Department, which is charged with working with the Federal Communications Commission (FCC) to allocate at least $250 million in grants to states, non-profits or other organizations including broadband providers to implement the Broadband Technology Opportunities program to enhance existing programs designed to develop and expand national broadband service. This money must be distributed by the end of fiscal year 2010. Within the ARRA's broader health funding program, there is $1.5 billion in designated funds, to be disbursed through HRSA, for federally qualified health centers (FQHCs) to improve their infrastructure. These funds can be used for construction, renovation, equipment and acquisition of health IT, in addition to the funding available in HITECH. Details on funding levels and how the money will be distributed are pending from HRSA; a report to Congress is required by mid-May.

The next steps of The Plan have been defined within the context of the critical success factors, the current Connecticut healthcare health IT/HIE environment, federal funding opportunities that are anticipated in the coming years through the ARRA and other funding sources, and the economic and political climate of the State of Connecticut. In this section, the next steps are structured so that they can be accelerated or decelerated as opportunities are realized or roadblocks are encountered.

V

## Recommendations and Next Steps

A. Overview

Figure 19 below provides a high level overview of how the transformation of the Connecticut healthcare system will be supported by The Plan. The potential for the availability of statewide services, improved clinical care models, and overall improvements to the efficiency and effectiveness of the healthcare system as represented in the top and right section of the diagram will only be possible if the other activities (CT State RHIO formation, pilot projects and the CT State HIEN) are completed and sustained. However, it is also important to understand that incremental benefits will be realized as the various pilot projects and associated initiatives are completed.

FIGURE 19
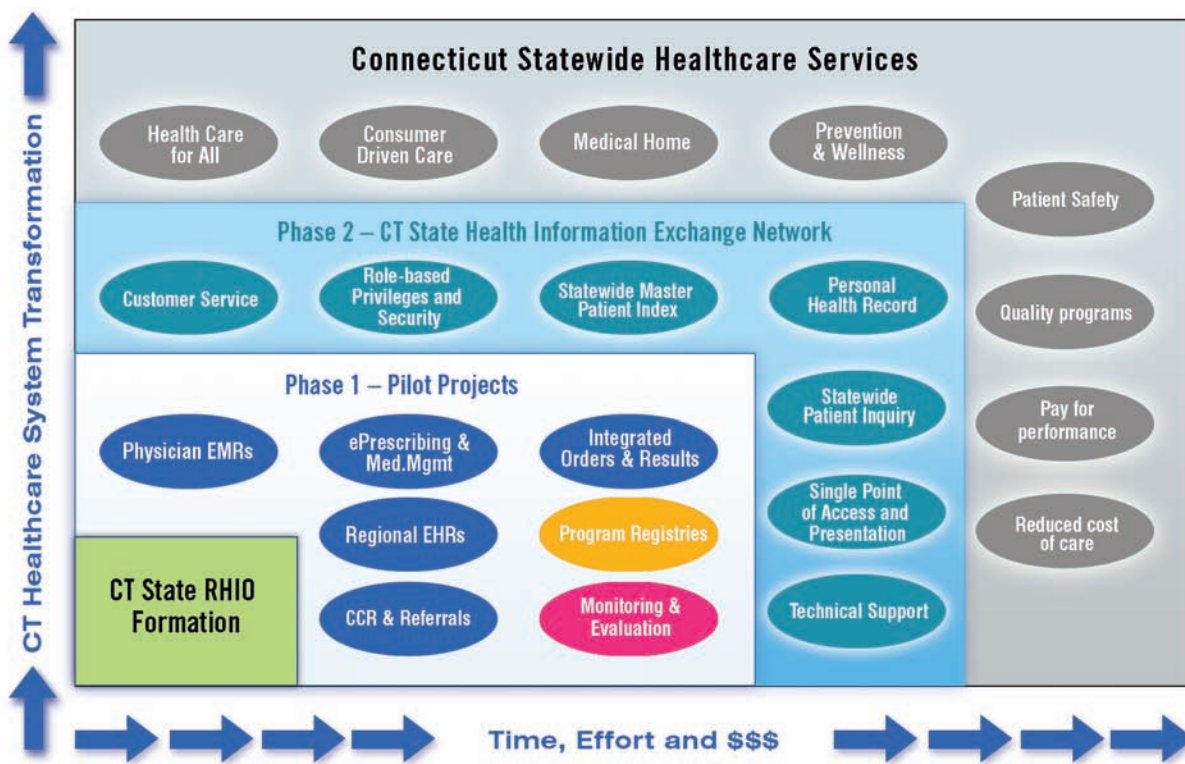
The timeline in Figure 20 below represents key activities over the five year duration of the plan. Note the color codes that are used to correlate the capabilities described in Figure 19 with the associated activities represented in the timeline in figure 20. These activities will be described in more detail in the subsequent sections.

FIGURE 20
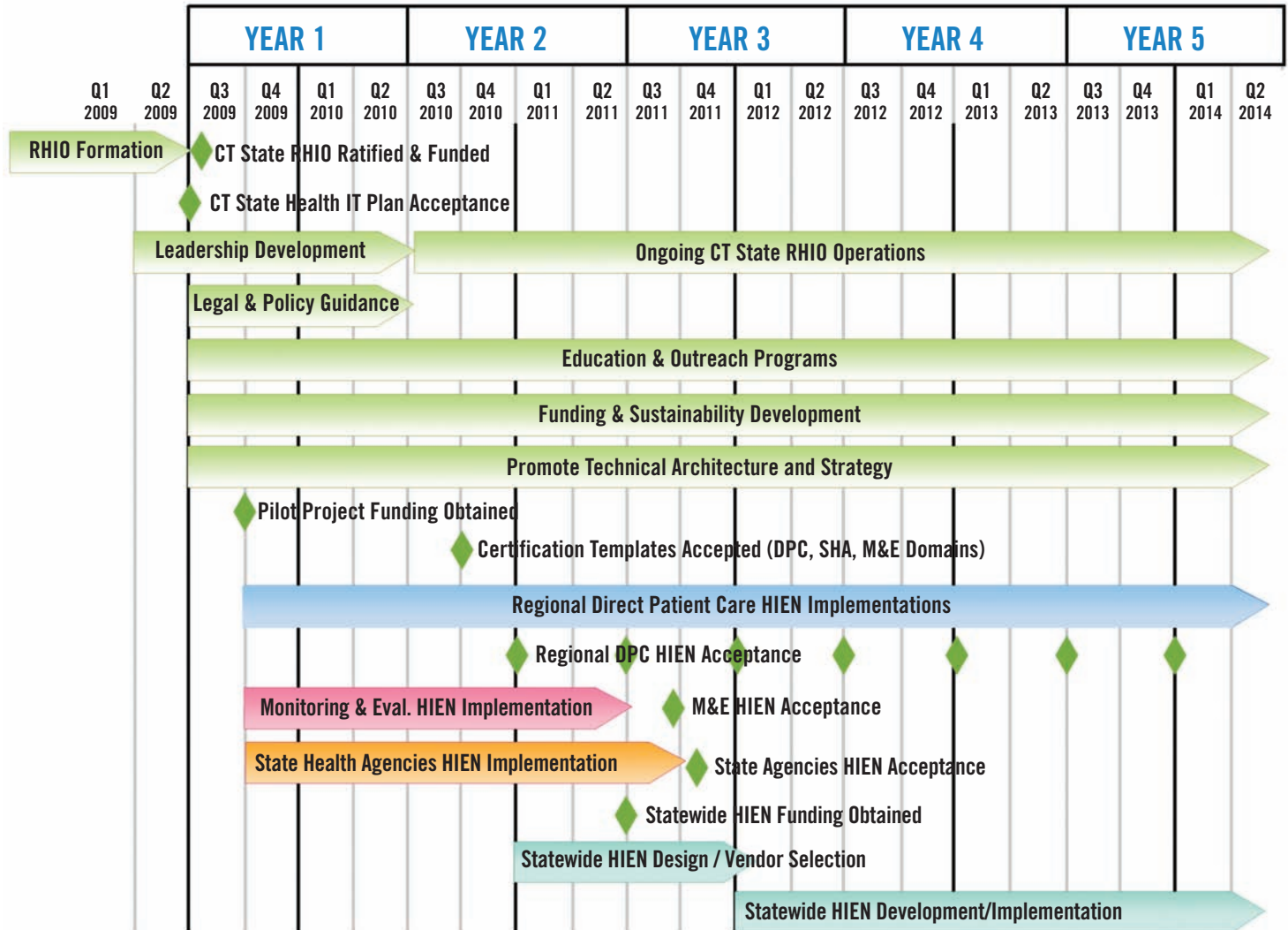
B. CT State RHIO Development and Ongoing Responsibilities

As previously discussed, the CT State RHIO represents the key leadership, management and technical resource for The Plan. The CT State RHIO will be responsible for substantial ongoing responsibilities that promote and support the development of statewide HIE capabilities and the transformation of the Connecticut healthcare system.

1. RHIO Formation

a. Bridge activity leading to CT State RHIO Legislative Mandate

An interim governance structure is needed to act on behalf of the state during the transition from the acting RHIO (JSI) to the legislatively authorized CT State RHIO. This interim authority will complete key activities to ensure that momentum gained over the past year is not lost. Key activities will include:

■ Implementing legislation supporting the formation of the CT State RHIO and its governing body.

■ Formalizing the mission and role of the RHIO.

■ Formalizing a process for the creation and staffing of the various subcommittees that will support the CT State RHIO as described below.

■ Hiring an executive director and a technical director as full-time CT State RHIO employees or contracted third party vendors.

■ Coordinating HIE activity at a state level to take full advantage of the ARRA funding opportunities.

b. CT State RHIO Legislative Mandate

The legislative mandate forming the CT State RHIO is the key activity to move The Plan forward. The legislative authority and funding to support RHIO staff and other resources must be approved for The Plan to have legitimacy and support. Key recommendations:

■ Include a broad definition of the organization's role in the legislation; require the convening and coordinating roles; do not prohibit the technical operations role.

■ If a public-private collaborative is created as the CT State RHIO, establish the Department of Public Health as the liaison/oversight agency for that organization.

■ Obtain funding to support a full-time executive director and a full-time technical director of the CT State RHIO for 5 years.

■ Form the governing body (board of directors or advisory committee), limiting membership to between 12 and 15 members while ensuring all healthcare constituents are adequately represented.

2. Leadership Development

a. Create CT State RHIO subcommittees as required to support The Plan including:

■ **Standing Subcommittees**

◗ **Executive and Operations & Governance Subcommittees** as required to support the ongoing operations of the CT State RHIO (see chapter III, A).

◗ A **Finance Subcommittee** to pursue and obtain capital funding and to develop and implement financial sustainability models to support ongoing RHIO operations (see section 3.f below).

■ **Ad-hoc Subcommittees**

◗ A **Patient Privacy and Confidentiality Subcommittee** to formalize patient privacy and confidentiality recommendations (see section 3.a below).

◗ A **Legal Subcommittee** that will review The Plan and relevant state and federal law, and make recommendations to ensure that the CT State RHIO and HIEN are properly aligned with state and federal law (see section 3.a below).

◗ A **Consumer Advocacy Subcommittee** that will represent consumer best interests and ensure that communications channels between the CT State RHIO and Connecticut consumers are established and maintained (see section 3.b below).

◗ An **Education and Outreach Subcommittee** that will develop and implement a campaign to publicize the CT State RHIO and The Plan, and develop an ongoing program to educate stakeholders across the state (see section 3.c below).

◗ A **Quality Subcommittee** that will to ensure a sustained commitment to quality from strategic, policy and project perspectives (see section 3.d below).

◗ A **Technical Subcommittee** that will review and approve the functional requirements, technology standards and technical architecture recommendations of The Plan (see section 3.e below).

b. Promote the development regional RHIO leadership across the state within Direct Patient Care, Monitoring and Evaluation, and State Health Agencies domains.

■ Consistently share The Plan with all stakeholders across the state.

■ Provide Education and Outreach resources for regional RHIO leadership development.

■ Promote the involvement of regional RHIO leadership with CT State RHIO activities.

■ Provide regional RHIOs access to CT State RHIO resources in support of the development of policies, business practices and technical infrastructure.

■ Promote alignment of The Plan and regional RHIO efforts through project certification and sponsorship (see Section C, Pilot Projects, below).

■ Provide financial assistance where practical through the coordinated pursuit of federal, state and private funding sources.

3. Ongoing RHIO Operations

The CT State RHIO governing body and the various subcommittees will meet on a consistent basis to manage The Plan and all associated activities. Key activities include:

a. Formalize Legal and Policy Guidance for Statewide HIEN

In concert with the patient privacy and confidentiality and legal subcommittees, the CT State RHIO executive director and technical director will propose to the governing body, comprehensive legal and policy guidance to set the foundation for health information exchange on a state level:

- Support health information exchange for treatment, payment and operations purposes for HIPAA covered entities (notification of use model described in Chapter 4, Section B).

- Support health information exchange for authorized secondary data uses as authorized by HIPAA (notification of use model described in Chapter 4, Section B).

- Establish a uniform statewide electronic patient consent/authorization process for the exchange of highly sensitive personal health information.

- Establish uniform RHIO-wide information exchange policies and business agreements including but not limited to business associate agreements (BAA).

- Establish a healthcare workforce identify management and authentication system to ensure accountability and appropriate use of the CT State HIEN.

b. Consumer Advocacy

Healthcare consumers will play a critical role in the development of, and more importantly, the acceptance of the Connecticut HIEN. The CT State RHIO will develop a program for engaging consumers, educating them on state plans for health IT/HIE, soliciting their input, and providing ongoing education and training to consumers as required. Key aspects of the consumer advocacy program include:

- Promote consumer access to personal health information and communicate information access controls and accountabilities.

- Communicate CT State RHIO and HIEN policies and functionality to promote understanding and acceptance.

- Involve consumers in education and outreach activities as required.

c. Education & Outreach

The CT State RHIO must take immediate and sustained steps to communicate the state's commitment to health IT/HIE. It is imperative that the CT State RHIO convey its legitimacy, capabilities and plans to the healthcare community and consumers in a substantial and sustained manner. In concert with the Education and Outreach subcommittee, the CT State RHIO Executive Director will:

■ Initiate broad-based messages to the general community through all media channels and consumer advocacy organizations regarding plans, progress, value and overall strategy.

■ Formalize the CT State RHIO's relationship with professional organizations including the Connecticut Hospital Association, the Connecticut State Medical Society, Independent Physician Associations and state health agencies to establish channels for communications and for submitting articles for publication.

■ Develop communications tools such as email distribution lists, web sites and newsletters for issuing periodic communications from the CT State RHIO to the healthcare community.

■ As The Plan is finalized and approved, schedule and convene open forum discussions in various healthcare settings to review The Plan and progress to date, and to provide opportunity for input and discussion.

■ As HIEN services evolve, formalize a program for CMEs, CEUs, administrator and management training, and other structured educational programs.

■ Develop partnerships and alliances between health IT/HIE professionals, employers, educators, consumer organizations and others to further the development of education and training programs.

d. Quality Improvement and Population Health Management

The CT State RHIO should keep informed of emerging federal guidance regarding the use of health IT/HIE for quality improvement initiatives and population health management. Because improving the quality of care of Connecticut's three million residents is of the highest priority, quality improvement and population health management recommendations are made in the context of the other critical success factors. Recommended next steps include:

■ Ensure that proper legal and administrative guidance is developed and implemented to enable the use of data to improve quality of care and public health oversight.

■ Education and outreach programs must be developed to educate healthcare professionals, the public and other stakeholders on the benefits of using data for improving quality.

■ Look for specific opportunities to fund healthcare quality, population health management and public health oversight projects through state, federal and private grants.

■ Ensure that the data collection, translation, management and reporting capabilities of the HIEN are defined within the context of quality.

■ Promote a quality-based project in the Healthcare System Monitoring and Evaluation domain to ensure that quality and the associated support mechanisms are put in place from the outset.

e. Promote Technical Architecture and Strategy

A key enabler for health information exchange is the consistent use of technology and a comprehensive strategy for improving the technical infrastructure of the Connecticut healthcare system. The complexity of the healthcare system and just as importantly, the legacy of the healthcare system's use of proprietary health IT systems suggests that a phased and deliberate approach over a number of years will be required. Key recommendations include:

- Establish fully qualified and sustained technical leadership by hiring a technical director and forming the technical subcommittee to serve as key resources for the CT State RHIO.

- Adopt and promote a statewide technical architecture for health information exchange.

- Promote adoption of standards for interoperable systems in all engagements with regional, other state, and federal HIE projects.

- Do not mandate adoption of specific technology or 3rd party vendor solutions. The cost associated with replacing or updating technical infrastructure to support a single solution is cost prohibitive and impractical. Healthcare providers across the state have made significant investments in existing infrastructure and will not support such a strategy. The technical architecture described in The Plan contains the required modules that support interfacing with existing systems.

- Promote and leverage regional HIEN projects. The Plan recommends the creation of multiple concurrent HIEN projects – one for each of the Monitoring & Evaluation and State Health Agencies domains, and one or more concurrent projects within the Direct Patient Care domain (see chapter V, C below).

- Provide ongoing technical support and training resources that will establish the CT State RHIO as a leader and key resource for the development of health information exchange capacity across the state.

- Monitor 3rd party vendor activities. Several vendors are very aggressively developing technology and technical support capacity for health information exchange. Their technical architectures and services vary significantly and ultimately, their success in the marketplace will impact key technology-based decisions of the CT State RHIO.

f. Funding and Financial Sustainability Development

Funding and financial sustainability will be a critical ongoing concern for the CT State RHIO. Highly aggressive and sustained programs for obtaining grant funding and developing revenue streams must be pursued and implemented. In close collaboration with the Finance Subcommittee, the Executive Director will:

- Obtain funding to support the CT State RHIO for the five year duration of The Plan.

- Leverage existing EHR development projects in direct patient care settings.

- Closely monitor federal funding channels, particularly those that will receive the ARRA funding.

- Engage with state resources to identify opportunities for obtaining discretionary ARRA funds.

- Develop detailed financial models that align with HIEN development over the life of The Plan.

C. Pilot Projects

1. Introduction

The pilot projects sponsored by The CT State RHIO will be specifically structured to establish policies, procedures, best practices and technical infrastructure that can subsequently be used by other similar projects. *A key consideration is that recommended pilot projects will leverage existing Connecticut HIE projects in order to minimize financial burden and maximize the involvement of HIE leaders in the state.* This approach is a key factor for the strategy and supports phased development and implementation of the HIEN over time.

Pilot projects will be selected for CT State RHIO sponsorship through an open and competitive process whereby local or regional health information organizations will submit proposals for development of regional health information exchange networks. The Plan provides a structured set of objectives through *project certification templates* that will ensure that pilot projects are aligned with the broader goals of The Plan. Please refer to Appendix N for a preliminary pilot project certification template and evaluation criteria.

This approach will provide the following benefits:

■ Promote the efforts of regional RHIO and HIEN initiatives;

■ Promote the development of leadership and technical infrastructure within specific healthcare domains;

■ Promote collaboration across the state toward the common principles, goals and strategy articulated in The Plan;

■ Maximize the use of limited human, technical and financial resources;

■ Minimize the risk and financial burden incurred by the state in the early phases of The Plan;

■ Promote the incremental development of statewide health information exchange capacity.

2. Direct Patient Care EHR and HIEN(s)

A collaborating group of providers in the Direct Patient Care domain will develop an EHR system and HIEN capability with integration to certified EMR systems supporting their local community providers. The project will support the development of a project certification template that will be used by subsequent Direct Patient Care projects across the state. There is every expectation that multiple Direct Patient Care domain regional initiatives will be operating concurrently over the course of The Plan. The expectation is that the CT State RHIO will engage and collaborate with these organizations and, through the project certification template, promote compliance with the technical, operational, policy and clinical use case guidelines specified in The Plan.

3. Healthcare System Monitoring and Evaluation Data Warehouse and HIEN

A collaborating group of stakeholders in the Monitoring & Evaluation (M & E) domain will develop a centralized data warehouse and HIEN infrastructure supporting one or more clinical quality initiatives. The project will support the development of technical infrastructure and a M & E domain project certification template that will be used by subsequent M & E projects across the state. The Plan recommends that a single HIEN is developed for all existing M&E projects that require migration to an interoperable environment as well as serving as the statewide HIEN for all future M & E domain projects.
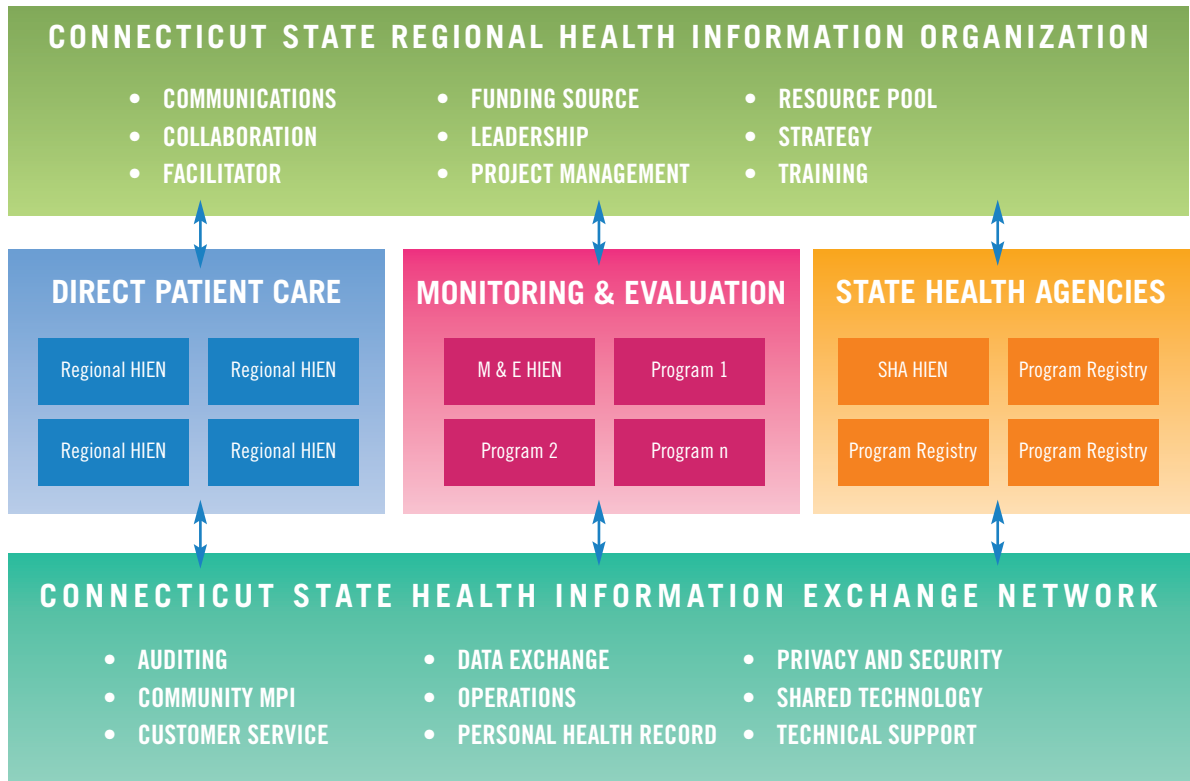
4. State Health Agencies Program Registry and HIEN

A collaborating group of stakeholders will develop a program registry platform and HIEN infrastructure supporting one or more state health agencies programs. The project will support the development of a technical infrastructure and a State Health Agencies domain project certification template that will be used by subsequent state health agencies projects. The Plan recommends that a single HIEN is developed for all existing state health agencies program registries that require migration to an interoperable environment as well as serving as the statewide HIEN for all future State Health Agencies domain projects.

5. Connecticut State Health Information Exchange Network Development

The technical subcommittee of the CT State RHIO will review the strategic plan and the Connecticut healthcare environment from a technical infrastructure perspective and begin planning for development of the Connecticut State HIEN. A key element of this approach will be the ongoing collaboration with regional HIEN projects as described above. Use of technical infrastructure and resources developed through the pilot project phase of The Plan as well as the ability to integrate those projects into the broader CT State HIEN will be a critical to the overall success of The Plan. Ultimately, the CT State HIEN will evolve to the functional "network of networks" as depicted in Figure 21.

FIGURE 21

CONNECTICUT STATE REGIONAL HEALTH INFORMATION ORGANIZATION

- COMMUNICATIONS
- COLLABORATION
- FACILITATOR
- FUNDING SOURCE
- LEADERSHIP
- PROJECT MANAGEMENT
- RESOURCE POOL
- STRATEGY
- TRAINING

DIRECT PATIENT CARE

Regional HIEN	Regional HIEN
Regional HIEN	Regional HIEN

MONITORING & EVALUATION

M & E HIEN	Program 1
Program 2	Program n

STATE HEALTH AGENCIES

SHA HIEN	Program Registry
Program Registry	Program Registry

CONNECTICUT STATE HEALTH INFORMATION EXCHANGE NETWORK

- AUDITING
- COMMUNITY MPI
- CUSTOMER SERVICE
- DATA EXCHANGE
- OPERATIONS
- PERSONAL HEALTH RECORD
- PRIVACY AND SECURITY
- SHARED TECHNOLOGY
- TECHNICAL SUPPORT

D. Closing

Through the phased implementation of the Connecticut State Health Information Technology Plan, Connecticut will lead the way towards healthcare reform in the state, rather than waiting for answers. The Plan builds on the significant progress made towards establishing national technical and policy standards by the federal government and the best practices demonstrated by health IT/HIE projects in Connecticut and across the nation. The Plan also considers the current funding environment as a key opportunity to demonstrate and build the necessary technical infrastructure to support a state-wide health information network for Connecticut's future. Key to The Plan's success will be the ability of the CT State RHIO to ensure a transparent process in the selection of pilot projects, in the distribution of funds, and in the development of comprehensive and inclusive process that informs and educates the state's healthcare professionals and consumers.

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VI

APPENDICES

A. Glossary of Terms

ADT (Admission/Discharge/Transfer): A hospital-based computer application used to track patient activity within the hospital.

AHIC (American Health Information Community): Also known as "the Community") formed to help advance efforts to reach the president's call for most Americans to have electronic health records by 2014. See *www.hhs.gov/healthit/ahic.html*

AHIMA (American Health Information Management System): A community of professionals engaged in health information management, providing support to members and strengthening the industry and profession. See *www.ahima.org*

AMIA (American Medical Informatics Association): AMIA is the professional home for bio-medical and health informatics. AMIA is dedicated to promoting the effective organization, analysis, management, and use of information in healthcare in support of patient care, public health, teaching, research, administration, and related policy.

ANSI (American National Standards Institute): The U.S. standards organization that establishes procedures for the development and coordination of voluntary American National Standards.

Architecture: This term refers to the structure of an information system and how its pieces communicate and work together.

ARRA: The American Recovery and Reinvestment Act of 2009.

BAA (Business Associate Agreement): A contract between a covered entity and a business associate that establishes the permitted and required uses and disclosures of personal health information (protected health information) by the business associate.

CCHIT (Certification Commission for Healthcare Information Technology): A voluntary, private-sector organization launched in 2004 to certify health information technology (health IT) products such as electronic health records and the networks over which they interoperate. See *www.cchit.org*

CCR (Continuity of Care Record): A standard specification intended to foster and improve continuity of patient care, to reduce medical errors, and to assure at least a minimum standard of health information transportability when a patient is referred or transferred to, or is otherwise seen by, another provider.

CDS (Clinical Decision Support): Clinical decision support systems (CDSS) assist the physician in applying new information to patient care and help to prevent medical errors and improve patient safety. Many of these systems include computer-based programs that analyze information entered by the physician.

CEUs: Continuing Education Units that are recognized internationally as a measure of professional education and training.

CHIMEnet: A statewide network and database established by the Connecticut Hospital Association, has the participation of 28 of the state's 29 non-profit hospitals.

CLIA (Clinical Laboratory Improvement Amendments): Federal regulatory standards that apply to all clinical laboratory testing performed on humans in the United States, except clinical trials and basic research.

CME: Continuing medical educational that assists physicians in carrying out their professional responsibilities more effectively and efficiently.

CPOE (Computerized Provider Order Entry): A computer application that allows a physician's orders for diagnostic and treatment services (such as medications, laboratory, and other tests) to be entered electronically instead of being recorded on order sheets or prescription pads. The computer compares the order against standards for dosing, checks for allergies or interactions with other medications, and warns the physician about potential problems.

CT-HISPI (Connecticut Health Information Security & Privacy Initiative): A collaborative project designed to assess how Connecticut's privacy and security business practices and policies influence the exchange of electronic health information.

CQI (Continuous Quality Improvement): An approach to quality management that builds upon traditional quality assurance methods by emphasizing the organization of systems, and promotes the need for objective data to analyze and improve processes.

Data Warehouse: A large database that stores information like a data repository but goes a step further, allowing users to access data to perform research-oriented analysis.

Database: An aggregation of records or other data that is updateable. Databases are used to manage and archive large amounts of information. Also see relational database.

Digital Certificate: An electronic "certificate" (actually a unique number) that establishes a user's identity when conducting business or other "secure" transactions on a network such as the Internet. See also electronic certificate.

Disease Management: A coordinated and proactive approach to managing care and support for patients with chronic illnesses such as diabetes, congestive heart failure, asthma, HIV/AIDS, and cancer. See also e-disease management.

EHR (Electronic Health Record): A real time patient health record with access to evidence-based decision support tools that can be used to aid clinicians in decision making. An EHR is a medical record or any other information relating to the past, present or future physical and mental health, or condition of a patient which resides in computers which capture, transmit, receive, store, retrieve, link, and manipulate multimedia data for the primary purpose of providing healthcare and health-related services. The EHR can also support the collection of data for uses other than clinical care, such as billing, quality management, outcome reporting, and public health disease surveillance and reporting. EHR records include patient demographics, progress notes, SOAP notes, problems, medications, vital signs, past medical history, immunizations, laboratory data and radiology reports.

EMR (Electronic Medical Record): A computer-based patient medical record. An EMR facilitates access of patient data by clinical staff at any given location; accurate and complete claims processing by insurance companies; building automated checks for drug and allergy interactions; clinical notes; prescriptions; scheduling; sending to and viewing by labs; The term has become expanded to include systems which keep track of other relevant medical information. The practice management system is the medical office functions which support and surround the electronic medical record.

Encryption: Translation of data into a code in order to keep the information secure from anyone but the intended recipient.

ePrescribing / eRx: Computer technology in which physicians use handheld or personal computer devices to review drug and formulary coverage and transmit prescriptions to a printer, EMR or pharmacy. ePrescribing software can be integrated with existing clinical information systems to allow access to patient-specific information to screen for drug interactions and allergies.

FQHC (Federally Qualified Health Center): A federal designation from the Bureau of Primary Health Care (BPHC) and the Center for Medicare and Medicaid Services (CMS) that is assigned to private non-profit or public healthcare organizations that serve predominantly uninsured or medically underserved populations.

Formulary: A list of medications (both generic and brand names) that are covered by a specific health insurance plan or pharmacy benefit manager (PBM), used to encourage utilization of more cost-effective drugs. Hospitals sometimes use formularies of their own, for the same reason.

HEDIS (Healthcare Effectiveness Data and Information Set): A set of health plan performance measures (e.g., preventative medicine, prenatal care, acute and chronic disease and member satisfaction with health plans and doctors) that look at a plan's quality of care and services.

HAN (Health Action Network): Communication system used by the CDC to exchange disease information with state and local health departments.

HIE (Health Information Exchange): The movement of healthcare information electronically across organizations within a region or community. The goal of HIE is to facilitate access to and retrieval of clinical data to provide safe, timely, efficient, effective, equitable, patient-centered care.

HIEN (Health Information Exchange Network): The collection of networks, databases, systems and software applications that provides the capability to electronically move clinical information between disparate healthcare information systems while maintaining the meaning of the information being exchanged.

HIPAA (Health Insurance Portability and Accountability Act of 1996): A federal law intended to improve the portability of health insurance and simplify healthcare administration. HIPAA sets standards for electronic transmission of claims-related information and for ensuring the security and privacy of all individually identifiable health information.

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

HIT (Health Information Technology): The application of information processing involving both computer hardware and software that deals with the storage, retrieval, sharing, and use of healthcare information, data, and knowledge for communication and decision making.

HITECH (Health Information Technology for Economic and Clinical Health Act): An Act that as part of The American Recovery and Reinvestment Act of 2009 (ARRA) appropriates a minimum of 20 billion dollars to be used over the next six years to encourage health IT and HIE adoption.

HITSP (Health Information Technology Standards Panel): With the American National Standards Institute (ANSI), 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 specifically to enable and support widespread interoperability among healthcare software applications, as they will interact in a local, regional and national health information network for the United States. See *www.ansi.org/standards_activities/standards_boards_panels/hisb/hitsp.aspx*

HL7 (Health Level Seven): One of several accredited standards (specifications or protocols) established by ANSI (American National Standards Institute) for clinical and administrative data. Systems which are HL7 'compliant' improve the ability for interoperability and exchange of electronic data.

HTML (Hypertext Markup Language): The basic programming language for sites on the World Wide Web. This "skeleton" of code surrounds blocks of text and/or images and contains all the necessary commands and display instructions. A Web browser program is needed to interpret HTML and depict it as a graphical display on a computer screen.

HTTP (Hypertext Transfer Protocol): A language protocol used in communication among Web sites. When http appears as part of a Web site URL, it indicates to Web browsers, "HTML spoken here."

ICD-10 (International Classification of Disease– 10th Revision): International disease classification system developed by the World Health Organization (WHO) that provides a detailed description of known diseases and injuries. The classification system is used worldwide for morbidity and mortality statistics, reimbursement systems and automated decision support in medicine.

Internet: A publicly accessible, global network connecting millions of computers. The Internet carries data for applications such as e-mail, instant messaging and teleconferencing, in addition to the billions of documents and images that make up the World Wide Web. Although the terms Internet and Web are often used interchangeably, they are not synonymous. See also World Wide Web.

Interoperability – Compatibility: The ability of software and hardware on multiple pieces of equipment made by different companies or manufacturers to communicate and work together.

IPA (Independent Practice Association): An association of independent physicians, or other organization that contracts with independent physicians, and provides services to managed care organizations on a negotiated per capita rate, flat retainer fee, or negotiated fee-for-service basis.

ISP (Internet Service Provider): A company that provides users with access to the Internet and the World Wide Web. Users connect to the ISP through ordinary telephone lines (dial-up connections) or through faster connections such as DSL, cable or fiber-optic lines. Although some ISPs charge by the hour, most offer monthly or yearly rates.

Laboratory Information System: Electronic Medical Records are repositories of patient data either entered directly or interfaced from external applications. One such application is a Laboratory Information System (LIS) that is typically used by hospital pathology departments to record activity in the department.

Legacy System: An existing IT system or application, often built around a mainframe computer, which generally has been in place for a long time and represents a significant investment. Compatibility with legacy systems is often a major issue when considering new applications.

Meta data – Metadata (meta data, or sometimes metainformation) is "data about other data", of any sort in any media. In data processing, metadata is definitional data that provides information about or documentation of other data managed within an application or environment. The term should be used with caution as all data is about something, and is therefore metadata.

MPI (Master Patient Index): A database program that collects a patient's various hospital identification numbers, e.g. from the blood lab, radiology department, and admissions, and keeps them under a single, enterprise-wide identification number.

MRI: Magnetic resonance imaging.

NHIN (Nationwide Health Information Network): Describes the technologies, standards, laws, policies, programs and practices that enable health information to be shared among health decision makers, including consumers and patients, to promote improvements in health and healthcare. The

development of a vision for the NHIN began more than a decade ago with publication of an Institute of Medicine report, "The Computer-Based Patient Record." The path to a national network of healthcare information is through the successful establishment of RHIO.

NIST (National Institute of Standards and Technology): Founded in 1901, NIST is a non-regulatory federal agency within the U.S. Commerce Department's Technology Administration, promoting U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology. See *www.nist.gov*

NPI (National Provider Identifier): The Health Insurance Portability and Accountability Act (HIPAA) of 1996 requires the adoption of a standard unique identifier for healthcare providers. The NPI Final Rule issued January 23, 2004 adopted the NPI as this standard. The NPI is a 10-digit, intelligence free numeric identifier (10 digit number). Intelligence free means that the numbers do not carry information about healthcare providers, such as the state in which they practice or their provider type or specialization. The NPI will replace healthcare provider identifiers in use today in HIPAA standard transactions. Those numbers include Medicare legacy IDs (UPIN, OSCAR, PIN, and National Supplier Clearinghouse or NSC). The provider's NPI will not change and will remain with the provider regardless of job or location changes. See: *http://aspe.hhs.gov/admnsimp/faqnpi.htm*

ONC (Office of the National Coordinator): 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 healthcare. See *www.hhs.gov/healthit/*

ONCHIT (Office of the National Coordinator for Health Information Technology): see ONC.

Open source: Software in which the source code is available to users, who can read and modify the code.

PAS: A patient administration systems used for recording and reporting administrative details of a patients encounter in a hospital. An Electronic Medical Record may include a PAS or be interfaced to a PAS via HL7. Episode details generated from the PAS may be initially stored in an intermediate EMR and then sent to an EHR as part of an EHR extract such as a discharge summary.

Patient Record Locator: The electronic means by which patient files are located to assist patients and clinicians to find test results, medical history, prescription data, and other health information. A record locator would act as a secure health information search tool.

PHI (Personal Health Information): Individually identifiable health information.

PHR (Personal Health Record): An electronic application through which individuals can maintain and manage their health information (and that of others for whom they are authorized) in a private, secure, and confidential environment.

Pharmacy Information Management System: Electronic Medical Records are repositories of patient data either entered directly or interfaced from external applications. One such application is a Pharmacy Information Management System (PIMS) that is typically used by hospital pharmacy departments to record activity in the department.

PKI (Public Key Infrastructure): A system that uses electronic certificates and various authorities (servers that validate certificates, registrations, etc.) to authenticate each entity in an online transaction.

Portal: A Web site that offers a range of resources, such as e-mail, chat boards, search engines, content and online shopping.

Practice Management System: An electronic data system typically found in clinical settings that is typically used for financial management, patient scheduling and other associated office management functions.

Pseudonymization: The process of removing or disguising identifying demographic information from a clinical transaction in order to prevent the specific identification of a person, while still maintaining the ability to match transactions from multiple sources to a single person.

QDS (Quality Data Set): A minimum set of data elements or types of data elements that can be used as the basis for developing harmonized and machine computable quality measures.

RHIO (Regional Health Information Organization): A multi-stakeholder organization that enables the exchange and use of health information, in a secure manner, for the purpose of promoting the improvement of health quality, safety and efficiency. Officials from the U.S. Department of Health and Human Services (HHS) see RHIOs as the building blocks for the National Health Information Network (NHIN). When complete the NHIN will provide universal access to electronic health records.

Relational Database: A database in which all information is arranged in tables containing predefined fields. Changing a field in one record automatically changes the same field in all related records, allowing for easy global database management. Using SQL, reports and comparisons can be generated by selecting fields of interest from the original database.

RLS (Record Locator Service): An infrastructure component to support the ability to determine the location of patient data across multiple participating organizations and their clinical data systems.

Scalability: The ability to add users and increase the capabilities of an application without having to making significant changes to the application software or the system on which it runs.

SQL (Structured Query Language): A standard command language used to interact with a database.

Telehealth: The use of telecommunications and information technology to deliver health services and transmit health information over distance. Sometimes called telemedicine.

Telemedicine: The use of telecommunications and information technology to deliver health services and transmit health information over distance. Sometimes called telehealth.

The Plan: The Connecticut State Health Information Technology Plan (this document).

Transaction-Based Model: A business model based on service fees charged for each transaction conducted using the vendor's equipment, software, services or network. Used by some e-health vendors, including providers of e-prescribing systems. See also subscription-based model.

UI (User Interface): The part of an application that allows the user to access the application and manipulate its functionality. It can include menus, forms, command buttons, etc.

URL (Uniform Resource Locator): A Web address. Each Web page has a unique URL.

VPN (Virtual Private Network): A network that uses public connections, such as the Internet, to link users but relies on encryption and other security measures to ensure that only authorized users can access the network.

WAN (Wide Area Network): A computer network that covers a large physical area. A WAN usually consists of multiple local area networks (LANs).

Web Server: A networked computer that stores and transmits documents and other data to Web browsers via HTTP, an Internet data transfer protocol.

Web Site: A group of related files, including text, graphics, and hypertext links, on the World Wide Web. Accessed by typing its URL, a site usually includes layers of supporting pages as well as a home page.

Web-Enabled: Refers to software applications that can be used directly through the Web. Web-enabled applications are often used to collect information from, or make functionality available to, geographically dispersed users (e.g. disease surveillance systems).

Wireless Internet: Wireless mobile computing that uses the Internet as part of the underlying network communication infrastructure. Sometimes called wireless Web.

Wireless LAN Adapter: Component attached to or integrated into a handheld device that transmits data wirelessly between the device and a local area network (LAN) access point.

WLAN (Wireless Local Area Network): A LAN that uses radio frequency technology to transmit data over relatively short distances. It can replace or extend a wired LAN.

World Wide Web: An international group of databases within the Internet containing billions of documents that are formatted in HTML and link to other documents and files. Although the terms Internet and Web are often used interchangeably, they are not synonymous. See also Internet.

B. Legislative Act Authorizing the Plan

Sec. 19a-25d. State-wide health information technology plan. Designation of lead health information exchange organization. (a) As used in this section:

(1)   "Electronic health information system" means an information processing system, involving both computer hardware and software that deals with the storage, retrieval, sharing and use of health care information, data and knowledge for communication and decision making, and includes: (A) An electronic health record that provides access in real-time to a patient's complete medical record; (B) a personal health record through which an individual, and anyone authorized by such individual, can maintain and manage such individual's health information; (C) computerized order entry technology that permits a health care provider to order diagnostic and treatment services, including prescription drugs electronically; (D) electronic alerts and reminders to health care providers to improve compliance with best practices, promote regular screenings and other preventive practices, and facilitate diagnoses and treatments; (E) error notification procedures that generate a warning if an order is entered that is likely to lead to a significant adverse outcome for a patient; and (F) tools to allow for the collection, analysis and reporting of data on adverse events, near misses, the quality and efficiency of care, patient satisfaction and other healthcare-related performance measures.

(2)   "Interoperability" means the ability of two or more systems or components to exchange information and to use the information that has been exchanged and includes: (A) The capacity to physically connect to a network for the purpose of exchanging data with other users; (B) the ability of a connected user to demonstrate appropriate permissions to participate in the instant transaction over the network; and (C) the capacity of a connected user with such permissions to access, transmit, receive and exchange usable information with other users.

(3)   "Standard electronic format" means a format using open electronic standards that: (A) Enable health information technology to be used for the collection of clinically specific data; (B) promote the interoperability of health care information across health care settings, including reporting to local, state and federal agencies; and (C) facilitate clinical decision support.

(b) On or before November 30, 2007, the Department of Public Health, in consultation with the Office of Health Care Access and within available appropriations, shall contract, through a competitive bidding process, for the development of a statewide health information technology plan. The entity awarded such contract shall be designated the lead health information exchange organization for the state of Connecticut for the period commencing December 1, 2007, and ending June 30, 2009. The statewide health information technology plan shall include, but not be limited to:

(1) General standards and protocols for health information exchange.

(2) Electronic data standards to facilitate the development of a statewide, integrated electronic health information system for use by health care providers and institutions that

are funded by the state. Such electronic data standards shall (A) include provisions relating to se-curity, privacy, data content, structures and format, vocabulary and transmission protocols, (B) be compatible with any national data standards in order to allow for interstate interoperability, (C) permit the collection of health information in a standard electronic format, and (D) be compat-ible with the requirements for an electronic health information system.

> (3) Pilot programs for health information exchange, and projected costs and sources of funding for such pilot programs.

(c) Not later than December 1, 2008, and annually thereafter, the Department of Public Health, in consultation with Office of Health Care Access, shall report, in accordance with section 11-4a, to the joint standing committees of the General Assembly having cognizance of matters relating to public health, human services, government administration and appropriations and the budgets of state agencies on the status of the statewide health information technology plan.

(June Sp. Sess. P.A. 07-2, S. 68.)
History: June Sp. Sess. P.A. 07-2 effective July 1, 2007.

C. Project Work Plan and Key Activities

ID	Task/Activity	Duration	Start Date	End Date
1	**Task A - Administrative Activities**	**241 days**	**7/9/2008**	**6/10/2009**
2	Project start - Kickoff Meeting	1 day	7/9/2008	7/9/2008
3	Define constituent groups	1 day	7/9/2008	7/9/2008
16	JSI DELIVERABLE - Submit Preliminary Work Plan	1 day	7/9/2008	7/9/2008
17	Steering Committee reviews preliminary work plan	7 days	7/10/2008	7/18/2008
18	CT MILESTONE - Preliminary Work Plan Approval	1 day	7/21/2008	7/21/2008
19	JSI Project Team weekly meetings	236 days	7/10/2008	6/4/2009
69	Project management monthly meeting	241 days	7/9/2008	6/10/2009
82	Submit monthly work plan updates	241 days	7/9/2008	6/10/2009
95	Steering Committee monthly meetings	221 days	7/16/2008	5/20/2009
107	JSI DELIVERABLE - Submit the CT Health IT Plan Outline	1 day	11/19/2008	11/19/2008
108	Steering Committee reviews plan outline	8 days	11/20/2008	12/1/2008
109	CT MILESTONE - Plan outline approval	1 day	12/3/2008	12/3/2008
110	JSI DELIVERABLE - Submit the CT Health IT Plan First Draft	1 day	1/30/2009	1/30/2009
111	Steering Committee reviews plan first draft	5 days	2/2/2009	2/6/2009
112	CT MILETONE - Plan first draft approval	1 day	2/9/2009	2/9/2009

113	JSI DELIVERABLE - Submit the CT Health IT Plan Final Draft	1 day	4/17/2009	4/17/2009
114	Steering Committee reviews final draft	10 days	4/17/2009	4/24/2009
115	JSI MILETONE - Final draft presentation	1 day	4/27/2009	4/27/2009
116	CT MILESTONE - Plan final draft approval	1 day	5/15/2009	5/15/2009
117	JSI DELIVERABLE - Deliver 100 bound copies of the Final CT Health IT Plan	1 day	6/15/2009	6/15/2009
118	JSI MILESTONE - Final plan presentation	1 day	6/3/2009	6/3/2009
119	JSI DELIVERABLE - Transition of HIE database to implementation vendor at contract close	1 day	6/4/2009	6/4/2009
121	**Task B - Research existing HIEN technologies and practices in CT**	**78 days**	**7/9/2008**	**10/24/2008**
130	**Task C - Research general standards and protocols for HIE**	**58 days**	**7/9/2008**	**9/26/2008**
135	**Task D - Conduct a survey of healthcare constituent's health IT/HIE capabilities**	**111 days**	**8/4/2008**	**1/5/2009**
150	**Task E - Formalize electronic data standards for a CT HIEN**	**45 days**	**10/27/2008**	**12/26/2008**
158	**Task F - Document the functional requirements of a CT HIEN**	**50 days**	**10/27/2008**	**1/2/2009**
166	**Task G - Develop implementation strategies for pilot programs**	**33 days**	**1/5/2009**	**2/18/2009**
167	Small projects	32 days	1/5/2009	2/17/2009
177	Large projects	33 days	1/5/2009	2/18/2009
188	**Task H - Develop a plan for constituent education and outreach**	**85 days**	**11/3/2008**	**2/27/2009**
199	**Task I - Link HIE activities to support quality improvement initiatives**	**75 days**	**11/3/2008**	**2/13/2009**
200	Identify stakeholders to be interviewed	5 days	11/3/2008	11/7/2008
201	Develop stakeholder interview guide	9 days	11/3/2008	11/13/2008
202	JSI DELIVERABLE - Review preliminary approach with MH and JK	1 day	11/14/2008	11/14/2008
203	Recruit interviewees	10 days	11/17/2008	11/28/2008
204	Conduct interviews	15 days	1/5/2009	1/23/2009
205	Develop at a glance matrix of activities	5 days	1/26/2009	1/30/2009
206	Document analysis of findings	9 days	2/2/2009	2/12/2009
207	JSI INTERNAL DELIVERABLE - Provide preliminary report for inclusion in CT Health IT Plan	1 day	2/13/2009	2/13/2009

ID	Task/Activity	Duration	Start Date	End Date
208	Task J - Cross reference health IT activities within CT and neighboring states	40 days	1/5/2009	2/27/2009
217	Task K - Coordinate with other HIE organizations, states and the federal government	20 days	1/5/2009	1/30/2009
224	Task L - Conduct risk benefit analysis of secondary uses of healthcare data	14 days	2/16/2009	3/5/2009
229	Task M - Analyze and assess Federated vs. Centralized HIE systems	43 days	1/6/2009	3/5/2009
236	Task N - Project a timeline and budget for statewide HIE	45 days	2/19/2009	4/22/2009
244	Task O - Propose plans for transition to Nationwide Health Information Network	20 days	3/2/2009	3/27/2009
251	Task P - Identify barriers to Implementation of CT health IT Plan	29 days	3/6/2009	4/15/2009
262	Task Q - Develop CT Health IT Plan	153 days	10/30/2008	6/1/2009

Project Key Activities

- **Kickoff Meeting** – July 9, 2008.

- **Multi-Dimensional Research**

  - **Federal Guidance** – Federal guidance was researched to understand and document the efforts of the various federal agencies that are promoting the development of the Nationwide Health Information Network.

  - *Other State Research* – Other state research was conducted to understand and document the experiences of other states' experiences relative to the development of health IT and HIE capabilities.

- **Connecticut Stakeholder Engagement**s

  - **Stakeholder Identification** – JSI used a brief web-based survey to identify stakeholders, their areas of interest, and their level of interest for participating in the project.

  - **Healthcare Provider Survey** – Used to perform a preliminary assessment of the Connecticut healthcare environment and stakeholder perspectives on current and planned health IT projects.

  - **Hospital Survey** – In collaboration with the Connecticut Hospital Association, hospital technical leadership was engaged to assess their current and planned health IT capabilities.

  - **Key Stakeholder Interviews** – JSI solicited feedback from stakeholders across the state on experiences with health IT and HIE, current health IT and HIE activity and capacity in Connecticut, perceptions of health IT and HIE's impact on cost, quality of care and efficiency, and issues associated with governance, education and outreach, patient privacy and confidentiality.

- **Focus Groups** – JSI convened eight focus groups to develop plan content in the areas of consumer advocacy, education and outreach, governance, quality improvement and population health management, legal and legislative, community health, finance, and functional requirements and technical standards.

● **Plan Development** – JSI met regularly with the Steering Committee to report on research and findings and to solicit feedback at critical issues in The Plan's development. Major milestones included:

- **First draft delivery on February 2, 2009;**

- **Final draft delivery on April 17, 2009; and**

- **Final Presentation on June 1, 2009.**

D. Steering Committee Members

Purpose: To oversee and provide input for the development of a statewide health information technology plan as directed by Public Act 07-2, Section 68. In addition, the Steering Committee will be responsible to direct the recommendations in the final Plan with comment to DPH Commissioner J. Robert Galvin for his submission to the Public Health Committee by June 30, 2009.

Thomas Agresta, MD
Asylum Hill Family Practice Center

Marybeth Bonadies
Office of Healthcare Access

Jessica Cabanillas
Connecticut Office of Policy and Management

Steven Casey
Connecticut Department of Information Technology

Dan Clemons
Community Health Center Association of Connecticut, Inc.

John Gadea
Connecticut Department of Consumer Protection

Marianne Horn
Connecticut Department of Public Health

Jennifer Jackson
Connecticut Hospital Association

Julianne Konopka
Connecticut Department of Public Health

Robert Mitchell
Connecticut Department of Social Services

Gregory Sullivan
Connecticut Office of Policy and Management

Meg Hooper, Chair
Connecticut Department of Public Health

E. Stakeholder Interview Participants

Thomas Agresta, M.D.
Associate Professor and Director of Medical Informatics, Department of Family Medicine, University of Connecticut School of Medicine
Physician, Asylum Hill Family Medicine

Doug Arnold
Executive Director, Middlesex Professional Services

Matt Borton
HIT Consultant

Richard Bailey
Deputy Chief Information Officer, Department of Information Technology

Leah Barry
eHealth CT

Marybeth Bonadies
Research and Planning Director, Office of Healthcare Access

John Brady
Chief Financial Officer and VP, Business Planning, Connecticut Hospital Association

Bruce Campbell
Chief Information Officer, Pro Health Systems

Shanti Carter
Health Information Applications Director, CHC Inc.

Hari Chandra
Technical Resource; Systems Development, Department of Public Health

Scott Cleary
Chief Executive Officer, SMC Partners
Director, eHealthConnecticut

Dan Clemons
Chief Financial Officer, Community Health Center Association of Connecticut, Inc.

Peter Courtway
Chief Information Officer
Danbury Hospital

Charles Covin
VP/Chief Information Office, Manchester Memorial Hospital and Rockville Hospital (Eastern Connecticut Healthcare Network)

Marquis Davis
Director of IT, CHC Association

Francois de Brantes
National Coordinator, Bridges to Excellence

David Fitzgerald
Enterprise Architect/Systems IT, Aetna - Northeast

John Gadea
Director of Drug Control Division, Department of Consumer Protection

Leonard Guercia
Director of Operations, Department of Public Health

Yvette Highsmith-Francis
Site Director, New Britain Health Center

Meg Hooper
Planning Branch Chief, CT Department of Public Health

Michael Hudson
President, Aetna – Northeast

Lud Johnson
Chief Information Officer, Middlesex Hospital

Vanessa Kapral
IT Section Chief, Department of Public Health

Kim Kalajainen
VP and Chief Information Officer, Lawrence and Memorial Hospital

Richard Kubica
Chief Technology Officer, Hartford Hospital

Matthew Katz
Executive Director, Connecticut Medical Society

Cheryl Lescareau
VP of Clinical Performance, Pro Health Systems

John T. Lynch
Director, Connecticut Center for Primary Care.

Richard Lynch
VP of Health Care Management for CT,
Anthem BCBS

James O'Connell
Chief Financial Officer, Department of Public Health

Stephan O'Neil
Vice President, Information Services
Hartford Hospital

Chere Parton
Head of Provider Services, Aetna-Northeast

Marcia Petrillo
Director of Health, Qualidigm

Jack Reed
CEO and President, Pro Health Systems

Art Schreier
Eastern Regional Director, Quest Diagnostics

Trinita Shade
Director of Health, CT Center for Primary Care

Betsy Thornquist
Chief Information Officer, St. Vincent's Medical
Center

Alan Treiber, PhD.
Department of Information Technology

John Vittner
Department of Information Technology

F. Focus Group Participants

GOVERNANCE:

Robert Mitchell
Project Manager, Connecticut Department of Social Services

Marie O'Brien

Meg Hooper
Planning Branch Chief, Connecticut Department of Public Health

Francois de Brantes
Chief Executive Officer, Bridges to Excellence

Kevin Carr
Project Director, Waterbury Health Access Program

LEGAL:

Patrick Monahan
Garfunkel Wild & Travis, P.C.

David Mack
Partner, Shipman and Goodwin, LLP.

Donna Brewer
Legal Director, HIPAA Privacy Officer, Connecticut Department of Public Health

John T. Lynch
Director, Connecticut Center for Primary Care

Marianne Horn
Director of Legal Services, Office of Research and Development, Connecticut Department of Public Health

CONSUMER ADVOCACY:

Gary E. Waterhouse
Executive Director, CT Association of Centers for Independent Living

Hilary Waldman, MPH
Director of Community Relations and Outreach, The Hispanic Health Council

Kevin Lembo
Director, Office of the Healthcare Advocate

Ellen Andrews, PhD
Executive Director, Connecticut Health Policy Project

Mary Alice Lee, Ph.D.
Senior Policy Fellow, Connecticut Voices for Children

Karen Kangas
Executive Director, Advocacy Unlimited, Inc.

EDUCATION AND OUTREACH:

Marie Smith, PharmD.
Department Head, Pharmacy Practice and Clinical Professor (E-Health), University of Connecticut School of Pharmacy

Judith Fifield
Professor in Family Medicine & Director of the Ethel Donaghue Translating Research into Practice and Policy Co-Director of the Connecticut Institute for Clinical & Translational Science (CICATS)

Rebecca Crowell
Fellow, TRIPP Center

Thomas Agresta, M.D.

Associate Professor and Director of Medical Informatics, Department of Family Medicine,
University of Connecticut School of Medicine
Physician, Asylum Hill Family Medicine

Steve Demurjian

Professor in Computer Science and Engineering & Director of the Graduate programs for CICATS
Associate Director for BioMedical Informatics for CICATS

Scott Wetstone

Associate professor in the Dept of Community Medicine and the Director of Health Affairs Policy
and Planning for the Health Center

QUALITY:

Andrea Gelzer, M.D.

Vice President and Chief Medical Officer, Gaylord Hospital

Betsy Thornquist

Chief Information Officer, St. Vincent's Medical Center

Ken Lalime

Executive Director, Connecticut State Medical Society, IPA, Inc.

Marcia Petrillo

Chief Executive Officer, Qualidigm

FUNCTIONAL REQUIREMENTS AND TECHNOLOGY STANDARDS:

Richard Kubica

Chief Technology Officer, Hartford Hospital

Scott Cleary

Chief Executive Officer, SMC Partners
Director, eHealthConnecticut

Robert Mitchell

Project Manager, CT Department of Social Services

FUNDING AND FINANCIAL:

Dan Clemons

Chief Financial Officer, Community Health Center Association of Connecticut, Inc.

John Brady

Chief Financial Officer and VP, Business Planning, Connecticut Hospital Association

Greg Sullivan
CT Office of Policy and Management, Budget and Financial Management Division

Jack Reed
President and Chief Executive Officer, ProHealth Physicians

Robert Mitchell
Project Manager, CT Department of Social Services

COMMUNITY HEALTH CENTERS:

Ivette Ortiz
Director of Operations, Fair Haven Community Health Center

Arvind Shaw
Executive Director, Generations Family Health Center

Kathy Yacavone
President/Chief Executive Officer, Southwest Community Health Center

Tom Krause
Chief Operations Officer, Southwest Community Health Center

Charlie Rose
Chief Financial Officer, Hill Health Center

Bill Manchida
IT Consultant, Hill Health Center

Sue Peters
Chief Operating Officer, United Community and Family Services

Shanti Carter
Health Information Applications Director, CHC, Inc.

Joe Parks
MIS Director, East Hartford Community HealthCare

Dan Clemons
Chief Financial Officer, Community Health Center Association of Connecticut, Inc.

Pat Moro
Chief Financial Officer, Community Health Center Association of CT

Evelyn Barnum
Chief Executive Officer, Community Health Center Association of CT

Tim Colby
Formerly of Community Health Center Association of CT

G. Detailed Functional Requirements and Technology Standards

Please refer to the figure just below the table when reviewing cross references in the second column of the table.

FUNCTIONAL REQUIREMENTS			
Category	**Component or Application/ Diagram Cross Reference**	**Requirement**	**Description**
End User Building Blocks	Electronic Medical Record (EMR) E1		An electronic record of health-related information on an individual that can be created, managed, gathered, and consulted by authorized clinicians **within one healthcare organization**. Advanced EMR systems enable clinicians to perform clinical functions without needing to access or create paper charts.
		Collect patient demographics, history and problems	
		Enter diagnoses and notes using standard templates, voice recognition or other techniques to capture input as data	
		Order medications, laboratory tests, medical procedures, and referrals to other providers	
		Communicate orders electronically via data interchange standards	Medication, laboratory, radiology and other orders are communicated via Health Level 7 (HL7) standards.
		ePrescribing: medication orders are entered electronically, the script is forwarded to the selected pharmacy	Full-function ePrescribing includes real time access to the patient's medication history, access to the patient's health plan formulary, potential drug-drug or drug-allergy reactions alerts, and bi-directional electronic communications between physicians EMRs and pharmacy systems supporting prescription ordering, medication fill confirmation and refill requests.
		Receive notification that medications and other tests or procedures were performed, and automatically store results in electronic databases	Medication, laboratory, radiology and other results are communicated via HL7 standards.

Category	Component or Application/ Diagram Cross Reference	Requirement	Description
		Provide alerts and suggested clinical actions based on adopted guidelines of care	Examples are reminders of appropriate testing for diabetic or hypertensive patients, reports of asthma patients non-compliant with medication prescriptions, reminders to order cancer screening tests for patients above a certain age or with certain risk factors.
	Electronic Health Record (EHR) E1		An electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards and that can be created, managed, and consulted by authorized clinicians and staff across more than one healthcare organization. It includes patient data gathered from entities outside the healthcare organization. Information received from other organizations on paper or via fax can be scanned, stored, and linked to the patient's EMR for online viewing. An EHR system includes the functions of an EMR system.
	Continuity of Care Record E2		The CCR standard is a patient health summary standard. It is a way to create flexible documents that contain the most relevant and timely core health information about a patient, and to send these electronically from one care giver to another. It contains various sections such as patient demographics, insurance information, diagnosis and problem list, medications, allergies and care plan. These represent a "snapshot" of a patient's health data that can be useful or possibly lifesaving, if available at the time of clinical encounter. The ASTM CCR standard is designed to permit easy creation by a physician using an electronic health record (EHR) system at the end of an encounter.
	Enterprise master patient index (EMPI) E3		The ability to consistently maintain patient identity across multiple systems and organizations within the domain of the individual entity. The enterprise master patient (or person) index is developed, operated and controlled by the end user entity. The HIE also maintains a statewide MPI that includes and cross references the person identification information supplied by each entity's EMPI.
	Medical Summary E2		See Continuity of Care Record. The Cross-Enterprise Sharing of Medical Summaries profile (IHE standard XDS-MS) provides a mechanism to automate the sharing process between care providers. The medical summary contains the most relevant portions of information about the patient intended for a specific provider or a broad range of potential providers in different settings. Patient transfers and, therefore, the summary documents that accompany these transfers, can be categorized into 3 primary types: Episodic, Collaborative, or Permanent. Medical Summaries are commonly created and consumed by electronic medical record systems at points in time of one of these types of transfers of care. For example, a referral note is a medical summary used for a collaborative transfer of care whereby a discharge summary is a medical summary reflecting an episodic transfer. XDS-MS uses HL7 Clinical Document Architecture (CDA) Release 2 and Care Record Summary as its base standard and constrains this to level 3 encoding for medications, allergies and problem lists.

Category	Component or Application/ Diagram Cross Reference	Requirement	Description
	Personal Health Record (PHR) E4		An electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards and that can be drawn from multiple sources while being **managed, shared and controlled by the individual**. Individuals typically enter and maintain their own information, in addition to viewing information created by others.
	Patient Summary Record E2		See Continuity of Care Record and Medical Summary
HIE Building Blocks	Data Transmission Service H1		The ability to support the unsolicited sending of information.
	Data Query Service H2		The ability to receive and respond to queries initiated by end users connected to the HIE.
	Patient Data Sharing Permission Service H3		Consumers use this service to opt in or out of the HIE and potentially specify what data they want shared with what providers
	Patient Identification and Indexing Service, or Master Patient (or Person) Index H4		This service provides a standard patient identity/ information correlation process to uniquely identify an individual. The service uses **a master patient index** (MPI), which is a database of all the unique identification numbers used by all the participating entities in the HIE. The database also has a unique index number, known only to the HIE, for every patient for whom data have been created. If policymakers decide to implement as medical identifier for each resident, this index number could be used to implement that. The patient identification service employs probabilistic matching algorithms using data such as name, date of birth, gender, SSN, address, and other person identifiers collected by source systems.
	Provider Master File and Authentication Service H5		The master file of all providers known to the HIE and authorized to interact with it. The file maintains a unique ID for each provider (and also stores the National Provider ID) and information about the provider's organization affiliation, role(s), privileges, and HIE certification and authority. The file is used to authenticate authorized users, as every provider who will be allowed to "plug into" the HIE will have been certified in advance as having an HIE certified, HIPAA compliant EHR, and being licensed by DPH as a known provider with no sanctions. The file also stores information about which providers have what rights to what information, in order to assure that the HIE has privacy and security safeguards in place in accordance with a privacy/security policy. The file also maintains demographic and other information such as email addresses so the HIE can send secure emails, provide technical support, and in general interact with all participating providers. The ultimate solution will include a real time interface with the DPH provider master file, which is the authoritative source of providers licensed to provide patient care in Connecticut.

| Category	Component or Application/ Diagram Cross Reference	Requirement	Description
	Pseudonymization Service H6		The ability to disguise protected health information. Required function for "secondary uses" (e.g., public health population studies, public quality reporting), where users of the information do not need to know the specific identity of people. A pseudonymization service employs an algorithm that can convert a person's identity into a meaningless code, and then convert the code back again to re-identify the person, when that is required.
	Record Locator Service H7		The ability to determine the location of patient data across multiple participating organizations and their clinical data systems.
	Semantic Broker, or Data Translation Service H8		A semantic broker service acts as a translator, mapping local or proprietary codes to standard code sets.
HIE People Functions	H9	Call Center/Customer Service	Entities participating with the HIE can call a person for problem solving, education, or any issue.
	H10	Certification	The ability to utilize a certification process that includes the requirements (standards and agreements) with which any entity's health information users must conform for exchange of data.
	H11	Credentialing	The ability to validate or confirm the qualifications of licensed professionals, e.g., clinical providers. These functional requirements are distinct from authentication and authorization.
	H12	Institutional Review Board	An institutional review board (IRB), also known as an independent ethics committee (IEC) or ethical review board (ERB) is a committee that has been formally designated to approve, monitor, and review biomedical and behavioral research involving humans with the aim to protect the rights and welfare of the research subjects. The IRB evaluates and approves or denies all requests for secondary uses of information.
HIE Technical Infrastructure		Auditing and logging	The ability to support the recording of transactions and associated security related data as well as the capability to review such recordings.
		Authentication	The ability to uniquely identify and validate (to a reasonable degree) the identity of an entity. These requirements are applicable to systems, services, and organizational actors.

Category	Component or Application/ Diagram Cross Reference	Requirement	Description
		Authorization/ permissions management	The ability to determine and grant access to systems, services and data based on prescribed parameters (instantiated authorization/ access policies). For example, the process of granting authority or delegation to specified actors
		Communications	The ability to communicate health information using standard content and message formats.
		Confidentiality	The ability to ensure that data are not disclosed (e.g., viewed, obtained or made known) to unauthorized individuals per organizational policies.
		Data Access and Update	The ability to retrieve, view, and modify data, within prescribed policies.
		Data De-identification	The ability to remove personal identifying information from transactions to an extent compatible with HIPAA privacy standards.
		Data filtering	The ability to support identifying and/or qualifying data that needs to be transmitted.
		Data mapping	The ability to support reformatting or expressing data in different formats for transmission.
		Data quality/integrity	The ability to ensure data is correct and complete, including the ability to verify that data were transferred.
		Data rendering/ user interface	The ability to present data via a user interface.
		Data retrieval (pull)	The ability to support the request/retrieval of data.
		Data routing	The ability to identify a receiving system and ensure the delivery of data.
		Data security	The ability to protect data from unauthorized access or harm.
		Data source	The ability to support the identification of the data/information point of origin.
		Data storage	The ability to aggregate data from disparate sources to facilitate communications. For example, temporarily hold information as it is being collected to communicate a concise summary of the information; or permanently store data from uncoordinated sources across time to support a data registry.

Category	Component or Application/ Diagram Cross Reference	Requirement	Description
		Data transactions	The ability to support the transfer of data transactions to occur among authorized entities and/or users upon specific trigger events, such as automatically sending final lab results for any previously sent preliminary results, sending any changes in medications prescribed, reporting medication errors, notifying public health about the occurrence of a bio-hazard event, informing individuals about the availability of a clinical trial, determining hospital census for disaster planning, etc
		Data usage	The ability to constrain the context and use of data exchanged.
		Edge Servers	See Patient Data Repositories
		Network security	The ability to ensure the safe and secure transport of data over a network
		Non-repudiation	The ability to ensure that senders/receivers of transactions cannot reasonably deny that they sent a transaction/received a transaction.
		Patient Data Repositories	See Edge Server
		Privacy	The HIE must ensure that patient and provider privacy is protected, in compliance with state and federal laws and the participant's granted information access permissions. The HIE maintains a table of access rights by person to enable the implementation of privacy policies.
		Public Key Infrastructure	Used to implement a high level of HIE security, Public Key Infrastructure (PKI) is an arrangement that binds public keys with respective user identities by means of a certificate authority (CA). The user identity must be unique for each CA. The binding is established through the registration and issuance process, which, depending on the level of assurance the binding has, may be carried out by software at a CA, or under human supervision. The PKI role that assures this binding is called the Registration Authority (RA). For each user, the user identity, the public key, their binding, validity conditions and other attributes are made unforgeable in public key certificates issued by the CA.

Category	Component or Application/ Diagram Cross Reference	Requirement	Description
		Secure transport	The ability to exchange messages across a network that ensures that transmissions between systems are delivered confidentially, reliably and intact.
		Security	The HIE must ensure that data are protected from unauthorized access. This is enabled by using modern techniques such as Public Key Infrastructure to authenticate users and a Virtual Private Network with encryption to enable the use of the Internet while providing necessary protection. Logging of all transactions is required, as is the capability to monitor activity with auditing programs to identify unusual or improper activities. An Institutional Review Board governs the use of all data, and sets policy such as requiring pseudonymization for all secondary uses of data.
		Time sensitive data access	The ability to provide time-sensitive data request/response interactions to specific target systems (e.g., query of immunization registry, request for current medication list).
		Transient data	The ability of a system to function as a data repository for a given entity for a given period of time or purpose.
		Transport and content standards	Transport requests for and responses regarding location of information, requests for data, data itself, and other types of messages (such as notifications of the availability of new data) to destinations using general industry recognized transport types.
HIE Business Requirements		Accuracy	A measure of the application service quality from the customer's perspective, the precision with which responses are provided to customer inquiries.
		Business Rules	Policy driven dynamic requirements that may change during the operation of the system, requiring that the system adapt to the change without major rework.
		Performance	A measure of the degree to which an entity satisfies its intended purpose.

Category	Component or Application/ Diagram Cross Reference	Requirement	Description
		Robustness	A measure of the ability of system to adjust to unanticipated conditions (i.e., the ability of a system to adjust to unanticipated conditions without losing its endurance and level of quality).
		Scalability	A measure of the ability of system to adjust or extend to hanging demands (user load, data load).
		Sustainability	A measure of the enterprise's ability to support itself over time with financial and human resources that enable services to be delivered and additional services to be developed.

Statewide Health Information Exchange Network
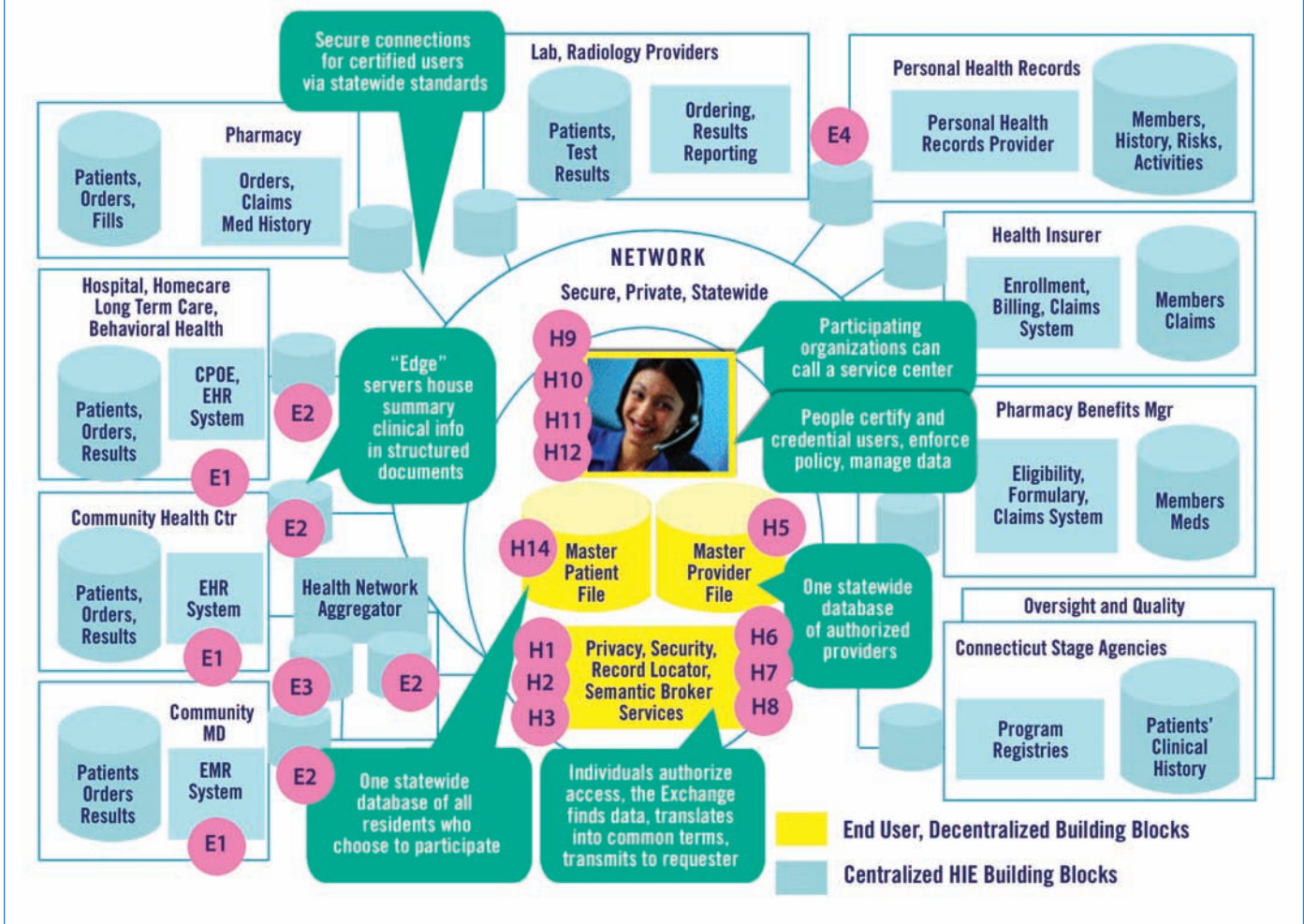
Technology Standards

This section describes technology standards that will be employed by the HIEN. These are basic, reusable functions or components that must be in place to support the building blocks and in turn the end user functionality.

Widely accepted health information technology (health IT) and health information exchange (HIE) standards and protocols serve as key enablers of health information exchange as envisioned by the Office of the National Coordinator for Health Information Technology (ONCHIT). The section first groups the identified standards into the following broad categories in order to promote understanding of key concepts and then outlines each category in more detail. For the technical, semantic, and process standards, JSI includes recommendations for specific standards for the CT State RHIO to consider when developing the health information exchange network.

- **Policy Principles** are intended to guide organizations with the high level concepts regarding how, when and why patient data is shared across the health information exchange network. These principles suggest an overarching framework for data sharing that must be agreed to by all participating organizations.

- **Technology Principles** are intended to both provide guidance to optimize the development of the HIE and maximize the potential uses of the HIE for the broad healthcare community. The technology principles take into consideration the limitations and capabilities of the existing health IT environment and support a phased development of HIE related capabilities.

- **Technical Standards** focus on the physical transmission and receipt of health data and its transport between participating systems. This includes message formats and reliable, secure message transport.

- **Semantic Standards** focus on ensuring shared meaning between sending and receiving partners – i.e. ensuring that the meaning of what was sent is consistent with the understanding of what was received. Semantic standards focus on medical terminology that can be referenced consistently by all parties.

- **Process Standards** focus 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.

Policy Principles

The following guiding policy principles are excerpted from "The Common Framework" developed by Connecting for Health which is supported by The Markle Foundation. The Common Framework outlines nine core policy principles that organizations wanting to participate in health information exchange should adhere to in order to ensure private and secure information exchange.

- **Openness and Transparency** – There should be a general policy of openness about developments, practices, and policies with respect to personal data. Individuals should be able to know what information exists about them, the purpose of its use, who can access and use it, and where it resides.

- **Purpose Specification and Minimization** – The purposes for which personal data are collected should be specified at the time of collection and the subsequent use should be limited to those purposes or others that are specified on each occasion of change of purpose.

- **Collection Limitation** – Personal health information should only be collected for specified purposes, should be obtained by lawful and fair means and, where possible, with the knowledge or consent of the data subject.

- **Use Limitation** – Personal data should not be disclosed, made available, or otherwise used for purposes other than those specified.

- **Individual Participation and Control** – Individuals should control access to their personal information:

  - Individuals should be able to obtain from each entity that controls personal health data, information about whether or not the entity has data relating to them;

  - Have personal data relating to them communicated within a reasonable time (at an affordable charge, if any), and in a form that is readily understandable;

  - Be given reasons if a request (as described above) is denied, and to be able to challenge such denial; and

  - Challenge data relating to them and have it rectified, completed, or amended.

- **Data Integrity and Quality** – All personal data collected should be relevant to the purposes for which they are to be used and should be accurate, complete, and current.

- **Security Safeguards and Controls** – Personal data should be protected by reasonable security safeguards against such risks as loss or unauthorized access, destruction, use, modification, or disclosure.

- **Accountability and Oversight** – Entities in control of personal health data must be held accountable for implementing these information practices.

- **Remedies** – Legal and financial remedies must exist to address any security breaches or privacy violations.

Technology Principles

The Common Framework outlines eight core technology principles to allow fragmented health information networks to connect to one another to ultimately form a nationwide health information network.

■ **Make it "Thin"** – Only the minimum number of rules and protocols essential to widespread exchange of health information should be specified as part of a Common Framework. It is desirable to leave to the local systems those things best handled locally, while specifying at a national level those things required as universal in order to allow for exchange among subordinate networks.

■ **Avoid "Rip and Replace"** – Any proposed model for health information exchange must take into account the current structure of the healthcare system. While some infrastructure may need to evolve, the system should take advantage of what has been deployed today. Similarly, it should build on existing Internet capabilities, using appropriate standards for ensuring secure transfer of information.

■ **Separate Applications from the Network** – The purpose of the network is to allow authorized persons to access data as needed. The purpose of applications is to display or otherwise use that data once received. The network should be designed to support any and all useful types of applications, and applications should be designed to take data in from the network in standard formats. This allows new applications to be created and existing ones upgraded without re-designing the network itself.

■ **Decentralization** – Data stay where they are. The decentralized approach leaves clinical data in the control of those providers with a direct relationship with the patient, and leaves judgments about who should and should not see patient data in the hands of the patient and the physicians and institutions that are directly involved with his or her care.

■ **Federation** – The participating members of a health network must belong to and comply with agreements of a federation. Federation, in this view, is a response to the organizational difficulties presented by the fact of decentralization. Formal federation with clear agreements builds trust that is essential to the exchange of health information.

■ **Flexibility** – Any hardware or software can be used for health information exchange as long as it conforms to a Common Framework of essential requirements. The network should support variation and innovation in response to local needs. The network must be able to scale and evolve over time.

■ **Privacy and Security** – All health information exchange, including in support of the delivery of care and the conduct of research and public health reporting, must be conducted in an environment of trust, based upon conformance with appropriate requirements for patient privacy, security, confidentiality, integrity, audit, and informed consent.

■ **Accuracy** – Accuracy in identifying both a patient and his or her records with little tolerance for error is an essential element of health information exchange. There must also be feedback mechanisms to help organizations to fix or "clean" their data in the event that errors are discovered.

Technical Standards

The following table outlines widely accepted technical standards used to support health information exchange and interoperability of Health IT systems.

TECHNICAL STANDARDS		
Category	**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.
Application Architecture	Multi-tier, with separation between presentation layer, business logic, and data Service-oriented Architecture (SOA).	A multi-tier architecture better ensures application scalability and security. SOA is especially useful for loosely coupled, network applications that are typical of many HIE implementations.
Clinical Context Management	HL7 CCOW	Enables visual integration of different healthcare 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	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.

Category	Standard	Description
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.
Transport	Centers for Disease Control and Prevention Public Health Information Network (PHIN)	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
Transport	SOAP, Web Services, ebXML	Various transport mechanisms may be employed by HIE applications to enable interoperability between systems.
Clinical Documents	Health Level 7 (HL7) Version 3.0 Clinical Document Architecture (CDA/CDA R2)	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.

Semantic Standards

The following table outlines widely accepted clinical naming and naming code set (semantic) standards used to support health information exchange and interoperability of Health IT systems.

SEMANTIC STANDARDS	
Standard	**Description**
Digital Imaging and Communications in Medicine (DICOM) PS 3 – 200752	Enables interoperability with medical images, especially with respect to imaging devices and other medical systems.
Health Level 7 (HL7) Version 2.n Messaging Standard	This is the message standard supporting clinical data exchange 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 some instances.
Health Level 7 (HL7) Version 3.0 Messaging Standard	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	These technical frameworks provide pre-developed profiles which serve as implementation guides for HL7 messages intended to specific purposes.
Accredited Standards Committee (ASC) X12 Standards Release 004010	Electronic data interchange standards most relevant to processing insurance claims and other business activities in healthcare.

SEMANTIC STANDARDS	
Standard	**Description**
National Council for Prescription Drug Programs (NCPDP) SCRIPT Standard Version 8.1	Developed for transmitting prescription information electronically between prescribers and providers — using standard EDIFACT 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.
CMS' Healthcare Common Procedure Code System (HCPCS)/American Medical Association (AMA) Current Procedural Terminology (CPT®) Fourth Edition (CPT-4)	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	These code sets are based on current federal standards.
College of American Pathologists Systematized Nomenclature of Medicine Clinical Terms (SNOMED CT®)	This is the standard coding used for a wide variety of medical and healthcare terms.
International Classification of Diseases, Ninth Edition, Clinical Modifications (ICD-9-CM)	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)	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®)	This is the standard coding for laboratory and clinical observations used by healthcare systems and messaging (like HL7).
National Library of Medicine (NLM) Unified Medical Language System (UMLS) RxNorm	This is the standard for coding the names of drugs and dose forms.
National Drug Code (NDC)	This is a universal product identifier for human drugs.

Process Standards

The following table outlines widely accepted process standards used to support consistent use of health IT in clinical settings.

PROCESS STANDARDS	
Standard	**Description**
Health Level 7 (HL7) EHR System Functional Model	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	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.
Health Level 7 (HL7) EHR Interoperability Model Draft Standard for Trial Use (DSTU)	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.
American Health Information Community Use Cases	Detailed specifications for use cases enabled by health information exchange which demonstrate the potential of HIE to clinicians and other healthcare professionals.

H. Hospital Survey Excerpts

Hospitals are critical to the success of health information exchange capacity in the state. Hospitals generate the largest volume of healthcare related transactions, have well established health IT infrastructures, have substantial technical and financial resources, and as HIPAA covered entities, have a deep understanding of the sensitivities and requirements associated with sharing personal health information.

In collaboration with the Connecticut Hospital Association, JSI conducted a survey of the hospitals in the state. Fourteen hospitals responded and key excerpts of the survey are referenced below. Color coding displayed in the tables represents the following:

- Green – well positioned to support health information exchange across most/all respondents.
- Yellow – marginally positioned to support health information exchange across some respondents.
- Red – limited capacity to support health information exchange across most respondents.

NOTE: Health information exchange capacity between hospitals is significantly dependent on the development of a regional or statewide health information exchange network.

Health IT Systems and Health Information Exchange Capabilities

Do you currently have IT applications in the following clinical areas and if so, do they have electronic data interfaces to other systems?

	IT Applications (Do you currently have IT applications in the following clinical areas?)	Interfaces (If yes, do they have electronic data interfaces to other systems?)
Acute Care	12 (85.7%)	9 (75%)
ADT	14 (100%)	14 (100%)
Emergency Department	13 (92.9%)	9 (69.2%)
Lab	14 (100%)	14 (100%)
Pathology	14 (100%)	13 (92.9%)
Pharmacy	14 (100%)	12 (85.7%)
Radiology	14 (100%)	13 (92.9%)
Transcription	14 (100%)	14 (100%)

★ *Not all respondents answered every question. Percentages include only those that responded.*

For the responding organizations, the survey shows a significant investment in health IT systems across all functional areas and also, a significant potential for data exchange and data integration through established interfaces.

Does your hospital have or are you planning to implement an Electronic Health Record system?

Thirteen (92.9%) of the 14 responding hospitals currently have EHR systems, with the final one in the planning process to implement one.

If yes, please specify the functions that your EHR system supports or will support in the near future

	Fully	Partially	Within next year	Next 2 - 3 Years	Not planned
Clinical documentation	3 (21.4)	8 (57.1)	2 (14.3)	1 (7.1)	0 (0)
Clinical guidelines	1 (7.1)	6 (42.9)	3 (21.4)	3 (21.4)	1 (7.1)
Discharge Summaries	4 (28.6)	4 (28.6)	3 (21.4)	2 (14.3)	1 (7.1)
Drug interaction alerts	8 (57.1)	3 (21.4)	2 (14.3)	1 (7.1)	0 (0)
Patient home monitoring	2 (14.3)	1 (7.1)	0 (0)	2 (14.3)	9 (64.3)
Lab orders	11 (78.6)	2 (14.3)	0 (0)	1 (7.1)	0 (0)
Lab results	11 (78.6)	2 (14.3)	0 (0)	1 (7.1)	0 (0)
Medication history	8 (57.1)	3 (21.4)	2 (14.3)	1 (7.1)	0 (0)
Pathology orders	10 (71.4)	3 (21.4)	0 (0)	1 (7.1)	0 (0)
Pathology results	11 (78.6)	2 (14.3)	0 (0)	1 (7.1)	0 (0)
Patient access to HER	1 (7.1)	0 (0)	0 (0)	3 (21.4)	10 (71.4)
Patient demographics	11 (78.6)	2 (14.3)	0 (0)	1 (7.1)	0 (0)
Patient flow sheets	4 (28.6)	4 (28.6)	5 (35.7)	1 (7.1)	0 (0)
Patient medical history	7 (50.0)	4 (28.6)	1 (7.1)	2 (14.3)	0 (0)
Pharmacy orders	11 (78.6)	1 (7.1)	1 (7.1)	1 (7.1)	0 (0)
Radiology images	10 (71.4)	2 (14.3)	0 (0)	1 (7.1)	1 (7.1)
Radiology orders	11 (78.6)	2 (14.3)	0 (0)	1 (7.1)	0 (0)
Radiology results	11 (78.6)	2 (14.3)	0 (0)	1 (7.1)	0 (0)

⋆ Not all respondents answered every question. Percentages include only those that responded.

This survey question shows a significant and consistent commitment to the development of EHR systems. Note that the large majority of respondents indicate full or partial functionality for each functional area within existing EHR systems.

Does your hospital provide or are you planning to provide access to hospital–based EHR data in any of the following clinical settings?

	Fully	Partially	Within next year	Next 2 - 3 Years	Not planned
Clinics – On Site	8 (57.1)	2 (14.3)	2 (14.3)	2 (14.3)	0 (0)
Clinics – Off Site	7 (50.0)	3 (21.4)	1 (7.1)	2 (14.3)	1 (7.1)
Emergency Department	8 (57.1)	3 (21.4)	2 (14.3)	1 (7.1)	0 (0)
Hospital inpatient departments	10 (71.4)	1 (7.1)	2 (14.3)	1 (7.1)	0 (0)
Long term care settings	4 (28.6)	3 (21.4)	1 (7.1)	0 (0)	6 (42.9)
MD Offices – On site	8 (57.1)	1 (7.1)	1 (7.1)	3 (21.4)	1 (7.1)
MD Offices – Off site	7 (50.0)	2 (14.3)	2 (14.3)	3 (21.4)	0 (0)
Post-Acute care settings	4 (28.6)	3 (21.4)	0 (0)	1 (7.1)	6 (42.9)

⋆ *Not all respondents answered every question. Percentages include only those that responded.*

The responses suggest a significant commitment to making EHR data accessible to a variety of clinical settings, particularly within the formal hospital environment. The results suggest a somewhat lower commitment to providing access to physician offices and by extension, direct integration and data sharing with physician EMR systems due to increased costs and extensive formal commitment on the part of all parties. Finally, EHR access in long–term and post–acute care settings is a significantly lower priority.

Does your hospital share clinical data electronically with other organizations? If yes, please check all that apply.

	TYPE OF DATA										
	Number of Hospitals that electronically share clinical data with other organizations	ADT Information	Claims data	Images	Lab Results	Lab Orders	Patient Demographics	Prescriptions	Radiology orders	Radiology Results	Transcription notes
Community Health Centers	2	2		2	2	1	2	1	1	2	2
Free standing imaging centers	3	3		3	2		3		2	3	3
Laboratories	6	4			4	4	1				
Long-term care facilities	1	1		1	1		1			1	1
CT state agencies	7	5	4		1	4					
Other hospitals	2	1		1							
Payers	8	4	8		1	1	3		1	1	1
Public health department	3	1	1		1		1				
Retail pharmacies	1							1			
School clinics	1	1		1	1		1	1	1	1	1

Based on interview results and general hospital business practices, we expected much higher partici-pation for clinical data sharing with laboratories, Connecticut state agencies, and payers.

Has your hospital implemented or are you planning to implement any of the following modules within your HIE related systems/applications?

	Fully	Partially	Within next year	Next 2 - 3 Years	Not planned	Missing
Data exchange interface engine	5 (35.7)	2 (14.3)	4 (28.6)	2 (14.3)	1 (7.1)	0 (0)
Data security framework	7 (50.0)	0 (0)	4 (28.6)	1 (7.1)	2 (14.3)	0 (0)
Data warehouse	3 (21.4)	2 (14.3)	2 (14.3)	6 (42.9)	1 (7.1)	0 (0)
Electronic health record	3 (21.4)	3 (21.4)	4 (28.6)	4 (28.6)	0 (0)	0 (0)
Master patient index	4 (28.6)	1 (7.1)	4 (28.6)	3 (21.4)	2 (14.3)	0 (0)
Patient locator service	1 (7.1)	0 (0)	0 (0)	3 (21.4)	8 (57.1)	2 (14.3)
Patient portal	0 (0)	1 (7.1)	2 (14.3)	2 (14.3)	8 (57.1)	1 (7.1)
Patient privacy framework	3 (21.4)	0 (0)	0 (0)	3 (21.4)	6 (42.9)	2 (14.3)
Personal health record	0 (0)	0 (0)	0 (0)	2 (14.3)	10 (71.4)	2 (14.3)
Physician portal	4 (28.6)	5 (35.7)	2 (14.3)	1 (7.1)	0 (0)	2 (14.3)
Program reµgistry	0 (0)	1 (7.1)	0 (0)	0 (0)	10 (71.4)	3 (21.4)
Provider locator service	1 (7.1)	1 (7.1)	0 (0)	2 (14.3)	7 (50.0)	3 (21.4)

★ *Not all respondents answered every question. Percentages include only those that responded.*

These results suggest a significant commitment by respondents to develop the infrastructure for an electronic health record and data exchange capability within their specific organizations, serving their immediate community of healthcare professionals. The results also show limited intentions and/or low priority for extending their HIE capabilities to the broader healthcare community or patient community.

Opportunities and Barriers to Adoption

Where do you think the greatest opportunities lie with electronic health records and health information exchange? Please check one for each.

	Fully	Low	Moderate	Strong
Access to current medical record	0 (0)	0 (0)	6 (42.9)	8 (57.1)
Access to patient history	0 (0)	0 (0)	4 (28.6)	10 (71.4)
Minimize adverse drug reactions	0 (0)	1 (7.1)	3 (21.4)	10 (71.4)
Minimize redundant tests	0 (0)	3 (21.4)	6 (42.9)	5 (35.7)
Enhance Quality of Care	0 (0)	0 (0)	4 (28.6)	10 (71.4)
Timely delivery of orders/results	0 (0)	1 (7.1)	8 (57.1)	5 (35.7)

These results show a strong and consistent perceived value for all suggested EHR and HIE opportunities.

What do you consider to be barriers to adoption of EHRs and HIE?

	Not a barrier	Somewhat of a barrier	Significant Barrier
Acceptance by clinical staff	3 (21.4)	8 (57.1)	3 (21.4)
Competitive climate with other hospitals	8 (57.1)	3 (21.4)	3 (21.4)
Fear that technology will change	7 (50.0)	6 (42.9)	1 (7.1)
HIPAA compliance/patient privacy	4 (28.6)	6 (42.9)	4 (28.6)
Impact on clinical process	1 (7.1)	8 (57.1)	5 (35.7)
Initial cost of investment	0 (0)	3 (21.4)	11 (78.6)
Interoperability with other systems	0 (0)	7 (50.0)	7 (50.0)
Lack of time or resources	0 (0)	5 (35.7)	9 (64.3)
Legal barriers	5 (35.7)	6 (42.9)	3 (21.4)
Ongoing cost to maintain	0 (0)	6 (42.9)	8 (57.1)
Technology doesn't meet needs	5 (35.7)	7 (50.0)	2 (14.3)
Unproven return on investment	6 (42.9)	3 (21.4)	5 (35.7)
Well trained IT staff	4 (28.6)	9 (64.3)	1 (7.1)

★ *Not all respondents answered every question. Percentages include only those that responded.*

These results indicate that the financial and other resources required to support EHRs and HIE capacity are the biggest concerns. However, it is also clear that all barriers to adoption must be specifically addressed given that a large number of respondents view each potential barrier as either "somewhat" or "significant" barriers.

HIE Oversight and State Involvement

Which of the following approaches have you found helpful to support your EHR/HIE re-lated projects?

	Not Helpful	Somewhat Helpful	Very Helpful	Mandatory	Missing	n/a
Ongoing collaboration with hospital senior management	0 (0)	2 (14.3)	2 (14.3)	9 (64.3)	1 (7.1)	0 (0)
Participation in a regional health information organization	3 (21.4)	8 (57.1)	0 (0)	1 (7.1)	2 (14.3)	0 (0)
Ongoing collaboration with clinical staff	0 (0)	0 (0)	5 (35.7)	8 (57.1)	1 (7.1)	0 (0)
Ongoing collaboration with other healthcare providers	0 (0)	3 (21.4)	6 (42.9)	4 (28.6)	1 (7.1)	0 (0)
Ongoing collaboration with 3rd party health IT vendors	1 (7.1)	1 (7.1)	6 (42.9)	4 (28.6)	2 (14.3)	0 (0)
Formalized education and training programs	1 (7.1)	4 (28.6)	2 (14.3)	5 (35.7)	2 (14.3)	0 (0)
Formalized HIE policies	1 (7.1)	5 (35.7)	2 (14.3)	4 (28.6)	2 (14.3)	0 (0)
Private grants	5 (35.7)	3 (21.4)	4 (28.6)	0 (0)	1 (7.1)	1 (7.1)
Federal grants	5 (35.7)	3 (21.4)	4 (28.6)	0 (0)	1 (7.1)	1 (7.1)
Compliance with federal HIE standards	1 (7.1)	5 (35.7)	1 (7.1)	4(28.6)	3 (21.4)	0 (0)

The results show a consistent understanding and awareness of the need for communication, collabora-tion, education and a commitment to standards and best practices to maximize the potential of suc-cessful EHR adoption and HIE related projects. The lack of involvement of RHIOs as well as grant financing suggests that these projects may be hospital-centric with limited involvement of the broader healthcare community.

Would you support the use of clinical data originating at your hospital for other purposes? If yes, please check all that apply.

	TYPE OF DATA										
	Check if Yes	ADT Information	Claims data	Images	Lab Results	Lab Orders	Patient Demographics	Prescriptions	Radiology orders	Radiology Results	Transcription notes
Public health programs	11/14 (78.6)	5/7 (71.4)	3/7 (42.9)	3/7 (42.9)	6/7 (85.7)	2/7 (28.6)	6/7 (85.7)	5/7 (71.4)	1/7 (14.3)	6/7 (85.7)	3/7 (42.9)
Quality programs	11/14 (78.6)	4/6 (66.7)	2/6 (33.3)	2/6 (33.3)	6/6 (100)	1/6 (16.7)	6/6 (100)	4/6 (66.7)	1/6 (16.7)	5/6 (83.3)	2/6 (33.3)

★ *Not all respondents answered every question. Percentages include only those that responded.*

Survey results show a fairly strong commitment to making clinical data available to public health and quality-based organizations for secondary uses.

What assistance might the State of Connecticut provide to support your EHR and HIE related efforts?

	Not helpful	Somewhat Helpful	Very Helpful	Mandatory
Provide education and training resources	3 (21.4)	4 (28.6)	6 (42.9)	1 (7.1)
Provide forums to promote communication/collaboration	1 (7.1)	5 (35.7)	7 (50.0)	1 (7.1)
Provide funding	0 (0)	0 (0)	11 (78.6)	3 (21.4)
Provide access to capital to fund health IT programs	1 (7.1)	1 (7.1)	8 (57.1)	4 (28.6)
Sponsor/fund HIE governance	1 (7.1)	5 (35.7)	6 (42.9)	2 (14.3)
Develop a statewide HIE infrastructure	0 (0)	6 (42.9)	7 (50.0)	1 (7.1)
Formalize policy and legal guidance to promote HIE	1 (7.1)	4 (28.6)	5 (35.7)	4 (28.6)
Provide technical support resources	3 (21.4)	4 (28.6)	7 (50.0)	0 (0)

★ *Not all respondents answered every question. Percentages include only those that responded.*

Survey results indicate a strong desire for the state to adopt a leadership role and provide significant resources to support EHR and HIE related projects.

I. Pilot Project Certification Template

The "project certification template" is a tool that will be used to verify that health information exchange projects meet the criteria necessary to ensure that they are supporting the state strategy for health information exchange and that the health information exchange capabilities they are developing will eventually be able to support information exchange at the state level and eventually integrate with the Nationwide Health Information Network (NHIN) as required. Project certification criteria include:

Eligibility – Any public or private healthcare organization or collaborating group of healthcare organizations in the State of Connecticut may apply. A healthcare organization is defined as any organization that is directly involved with the provision of patient care or any organization that is involved with the oversight or management of the Connecticut healthcare system.

Organizational preparedness – The sponsored organization must have active support from community stakeholders as well as structured and ongoing oversight from a well defined leadership group such as a regional health information organization (RHIO). For collaborating groups, a "lead organization" will be designated. The lead organization must have demonstrated experience in health IT/HIE.

Collaboration – The degree to which the organization demonstrates collaboration with an existing group of healthcare organizations as well as its willingness to serve as a health IT/HIE champion for the state by sharing relevant project information with the CT State RHIO and other collaborating organizations across the state.

Project impact – The proposal must clearly describe how the project will result in improvements in the overall healthcare system. Relevant criteria may include:

- Patient population served
- Healthcare professional population served
- Relevance to the broader healthcare community
- Cost of care reduction
- Healthcare system efficiency improvement
- Quality of care improvement
- Patient safety improvement

Business plan – The proposal must clearly describe the size of the patient and healthcare professional community impacted by the project, the revenue generating model that will sustain the project, the level of preparedness for the medical community to participate in the project, the approach to marketing offered services, and the required resources necessary to sustain the project following implementation.

Education and outreach – The proposal will contain plans for education and outreach for consumers, the healthcare professionals that will use the system, and the support staff that will operate and maintain the system.

Project plan – The proposal will contain a detailed project plan that provides a review of all key project activities and associated resource requirements. Key milestones and timeline will be included as part of the project plan.

Staffing – The proposal will demonstrate that the project has the required resources to support the project from inception through implementation as well as resource requirements to sustain ongoing operations following implementation.

Financial viability – The proposal will identify capital funding sources (federal, state and/or private grant funds) that are adequate to support the project from inception through implementation. Detailed budgets must be provided that link funding sources to capital expenditures. Project costs must be aligned with expected value and benefits. Revenue models will be defined and implemented to provide finances required to support long term sustainability.

Sustainability and expansion – The proposal will demonstrate that the project has potential for expansion to a broader healthcare community and/or potential for broadening the type of data exchanged over the network beyond the initial implementation.

Technical architecture – The proposal will demonstrate the degree to which the proposed technical architecture is consistent with the technical architecture promoted by the CT State RHIO. This may include the following:

- Ability to accommodate existing clinical systems;
- Compliance with health IT/HIE standards;
- Supports future health IT/HIE needs;
- Well defined technical support and maintenance requirements;
- Vendor financial stability/longevity;
- Technical sustainability;
- Vendor references

Standards compliance – The proposal will demonstrate the degree to which the proposed technical infrastructure is consistent with the technical standards promoted by the CT State RHIO. This may include:

- AHIC use cases;
- Messaging;

- Code sets;
- Security;
- Privacy and confidentiality;
- Auditing and control;
- Vendor certification

Evaluation – The proposal will describe successful outcomes of the project and the process for project evaluation by the CT State RHIO. Evaluations will be performed at specific key milestones during the project and at project completion. Evaluation criteria may include as appropriate:

- What is the impact the Connecticut healthcare system? Indicators may include:
  - number of organizations using the network;
  - the type of healthcare organizations using the network;
  - number of healthcare professionals using the network;
  - number of consumers potentially impacted;
  - the type of data exchanged over the network.
- What is the impact to patient care? Indicators may include:
- hospital length of stay;
  - adherence to clinical guidelines;
  - timeliness and accuracy of diagnosis;
  - improvements in patient satisfaction.
- What is the impact to healthcare costs? Indicators may include:
  - clinician prescribing and/or ordering behaviors;
  - avoided/redirected emergency services;
  - changes in claims volume/cost processed;
  - ability to provide information relative to pay for performance standards;
  - reduction in duplicative testing;
  - care decisions made on existing data versus additional testing.
- What is the impact to the overall efficiency of the healthcare system? Indicators may include:
  - staffing changes/redirection;
  - reduced paper processing;
  - increased patient visits per day.

- What is the quality of customer service offered to system users? Indicators may include:
  - system response times;
  - system availability;
  - quality/completeness of data;
  - effectiveness of training;
  - help desk responsiveness;
  - technical support.
- What is the investment required of a participating organization. Indicators may include:
  - financial capital;
  - ongoing fees such as membership fees;
  - human resource requirements;
  - technology requirements.

J. Overview of American Health Information Community Use Cases

American Health Information Community Use Cases

1. Patient–Provider Secure Messaging
2. Remote-Monitoring
3. Public Health Case Reporting
4. Consultations & Transfers of Care
5. Immunizations & Response Management
6. Personalized Healthcare
7. Consumer Empowerment: Consumer Access to Clinical Information
8. Medication Management
9. Quality

Use Case Descriptions

1. Patient–Provider Secure Messaging

Giving patients the ability to compose and send a secure communication to a clinician will give them access to their clinicians in a more timely and efficient manner than an office visit or a phone call. Similarly, clinicians will benefit from having the ability to respond to or initiate secure communications to facilitate the care process and promote better patient health. This communication will be done in a manner which provides appropriate information to the patient and meets existing needs for clinical documentation. Giving clinicians the ability to securely communicate reminders to patients and their family members will promote preventive healthcare. These reminders could include items such as annual check-ups, cancer screenings (e.g., mammograms and colonoscopies), and immunizations.

2. Remote-Monitoring

The Remote Monitoring use case focuses on the communication of interoperable ambulatory remote monitoring information to the EHR and the PHR. Patients and family caregivers may benefit from the ability for the patient to gather and communicate remote monitoring information electronically from measurement devices in a home or other non-clinical setting to a clinician's ambulatory EHR system and/or to the patient's PHR. Remote monitoring could include, but is not limited to, communication of: physiologic measurements (e.g., weight, blood pressure, heart rate and rhythm, pulse oximetry, glucose), diagnostic measurements (e.g., transthoracic impedance) medication tracking device information (e.g., medication pumps, infusion devices, electronic pillboxes), and activities of daily living measurements (e.g., ADL biosensors, pedometers, sleep actigraphy). Clinicians, care managers, and disease management programs can benefit by being able to better manage patients due to the ability to receive patient remote monitoring information within an EHR.

3. Public Health Case Reporting

This use case addresses population health relating to aspects of Public Health Case (PH Case) reporting and Adverse Event (AE) reporting. For the purposes of this use case, PH Case reporting may include the reporting of communicable/infectious and non-infectious diseases and conditions. AE reporting may include the reporting of AEs associated with post-market vaccines and medications. For both PH Case and AE reporting, this use case focuses on using data in EHRs and augmenting EHR data, to assist individuals or entities in reporting to public health organizations and manufacturers, etc.

This use case also discusses the incorporation of reporting criteria into EHRs to assist in the possible identification and reporting of PH Cases and AEs. Reporting criteria which are incorporated and utilized by EHRs may include: general and specific reporting considerations; the identification of data and events that may trigger a report; additional questions that may need to be asked of reporters; and the identification of specific data that may need to be reported.

4. Consultations & Transfers of Care

The Consultations & Transfers of Care Detailed Use Case is focused on the electronic exchange of information between clinicians, particularly between requesting and consulting clinicians, to support consultations such as specialty services and second opinions. This use case also focuses on the exchange of clinical information needed during transfers of care. Transfers of care occur when patients are discharged and transferred from one health setting to another, such as to or from an acute care hospital, skilled nursing or rehabilitation facility, or to home with or without home healthcare services. Patients participate in this electronic exchange of information as recipients of information exchange and may designate authorized recipients of healthcare information during consultations and transfers of care.

5. Immunizations & Response Management

The Immunizations and Response Management Detailed Use Case addresses the exchange of information supporting the distribution and administration of medications, vaccinations, and other specific medical prophylaxis and treatment methods. This use case focuses on the information needs of consumers, clinicians, registries, public health and inventory managers carrying out routine care activities

associated with immunizations. The use case recognizes that portions of the needs during non-routine or emergency situations, as well as those necessary to support public health outcomes, could be accomplished using the same infrastructure. This use case, however, does not address all capabilities required for public health response planning or response management in emergency situations.

The Immunizations and Response Management Detailed Use Case focuses on: access to information about individuals who need to receive specific vaccines, drugs, or other interventions; the ability to report, track, and manage administration of vaccines, drugs, isolation and quarantine; the ability to identify and electronically exchange information describing the treatment or prophylaxis status of populations; and the ability to exchange specific resource and supply chain data from public and private sectors.

6. Personalized Healthcare

Personalized healthcare describes processes by which healthcare providers can customize treatment and management plans for patients based on their unique genetic make-ups. The personalized healthcare use case focuses on the exchange of genetic/genomic test information, personal and family health history, and the use of analytical tools in electronic health records (EHRs) to support clinical decision-making. One of the goals of the AHIC is to establish a pathway, based on common data standards, to facilitate the incorporation of clinically useful genetic information, personal and family health history, and analytical tools into EHRs to support clinical decision-making. Family health history relies on gathering data from disparate sources, increasing the need for interoperability. Ideally, family health history would be gathered at the point of care rather than retrospectively by interviews during different encounters. Similarly, accurately recording the data from genetic/genomic tests, as well as having a complete record of all genetic/genomic tests performed for a consumer regardless of the ordering clinician, is important. Genetic/genomic information, unlike other laboratory test information, may have lifelong significance.

7. Consumer Empowerment: Consumer Access to Clinical Information

This use case describes capabilities that would enable consumers to access their clinical information via their Personal Health Records (PHRs). PHR concepts, capabilities and expectations are evolving rapidly as consumers gain experience with, and access to, PHRs. A number of business and technology models have emerged to provide PHR capabilities to the consumer including: web-based solutions provided by commercial vendors, payers, providers, HIEs; desktop solutions with or without networking capabilities; and PHR solutions where the data is integrated with EHR systems or HIE-provided systems. PHR capabilities needed by the consumer could include: data storage and stewardship – storing, protecting, securing and controlling access to the consumers' PHR information; ability to participate in information exchange activities with providers and others – retrieving and providing access to the consumer's health information to those individuals and organizations designated by the consumer; ability to define and manage the consumer's decisions about who can access his/her PHR information; and ability to manage information over time (e.g., weight, lab results, vital signs).

8. Medication Management

The Medication Management Use Case focuses on patient medication and allergies information exchange, and the sharing of that information between consumers, clinicians (in multiple sites and settings of care), pharmacists, and organizations that provide health insurance and provide pharmacy benefits. This use case describes medication management in two settings. First, the inpatient setting includes medication reconciliation and ordering along with other supporting interactions in the hospital. Second, the ambulatory setting addresses access to current medication and allergy information and support for electronic prescribing in this environment. Many needs within these two settings overlap, but the separation is useful in emphasizing some aspects that are particular to each. The use case is focused on information flows that can be most significantly improved in the near term by increased interoperability. This use case recognizes the uniqueness and complexity of medication management and other activities in the long-term care setting. While not all long-term care needs can be addressed explicitly in this use case, medication management areas are highlighted where the existing considerations may also be appropriate for long-term care.

This use case assumes the developing presence of electronic systems such as Electronic Health Records (EHRs), ePrescribing tools, Personal Health Records (PHRs), and other local or Web-based solutions supporting consumers and clinicians, while recognizing the issues and obstacles associated with these assumptions. This approach helps promote the development of longer-term efforts. A key component of this use case is its relation to an existing federal initiative on ePrescribing undertaken by the Centers for Medicare & Medicaid Services (CMS). Demonstration projects for this initiative have been undertaken in multiple environments, and they are governed by existing government regulations. The ePrescribing initiative requires that the following transactions conform to the foundation standards required for implementation by January 1, 2006 for all electronic prescribing under Part D of the Medicare Modernization Act (MMA): transactions between prescribers (who write prescriptions) and dispensers (who fill prescriptions) for new prescriptions; refill requests and responses; prescription change requests and responses; prescription cancellation, request and response; and related messaging and administrative transactions; eligibility and benefits queries and responses between prescribers and Part D sponsors; and eligibility queries between dispensers and Part D sponsors.

MMA required CMS to implement pilot projects to test additional standards. These additional standards apply to transactions involving: formulary and benefit information; medication history; fill status notification; structured and codified SIG; clinical drug terminology (RxNorm and other terminology systems); and prior authorization.

9. Quality

The AHIC Quality Use Case focuses on: 1) the impact that collection of electronic health information through an EHR has on driving quality of care through better, more comprehensive clinical information at the point of care; 2) measuring and reporting quality with a minimum of burden assessed on the provider; and 3) the aggregation of health information for the purpose of public reporting of quality. This use case depicts two scenarios related to quality measurement, feedback and reporting with respect to a patient's encounter with the healthcare delivery system: quality measurement of hospital-based care and of care provided by clinicians. This use case assumes the presence

of EHRs within the healthcare delivery system and promotes the development of longer–term efforts. The use case models the exchange of information between the EHR and the quality measurement, feedback and reporting systems. The use case allows for a hybrid model of data collection, where claims and or manual data collection will be required to support certain measures that are not supported through EHRs. This use case acknowledges the need to include a combination of claims and clinical (e.g., EHR) data. EHR data could be extracted for these patients to provide a richer measure set, with more automation. However, the use case acknowledges that manual review and processing will continue to be required in many contexts and settings. This use case does not attempt to prescribe a definitive approach to the location of data aggregation. The use case does describe roles for these processes which may be fulfilled in several different settings. The use case also does not describe harmonized quality measures. Separate AHIC processes will determine the initial and subsequent quality measures to be used.

K. Connecticut State and Federal Laws Relating to Health IT and HIE

State

Definition and Purpose of a Medical Record (CGS 19a 14-40)

■ Purpose of a Medical Records is to provide a vehicle for documenting actions in patient management and patient progress, providing meaningful medical information to other providers and new providers.

■ Shall include: information sufficient to justify any diagnosis and treatment rendered, dates of treatment, actions taken by non–licensed persons when working under authorization of providers, orders, notes and charts. All entries must be signed by person responsible.

Patient Access to Medical Records from Individual Providers (CGS 20-7)

■ CSG 20-7 is a longstanding piece of legislation that addresses issues related to patient access to their medical records from individual providers and hospitals, addresses issues of retention of medical records, and special circumstances relating to medical records. The law applies to a broad definition of providers including mental health, and natural medicine and other non-traditional providers.

■ Provider is required except in limited circumstances to supply patient complete and current information about diagnosis, treatment and prognosis. Must also notify of all test results in his possession or requested. Request from the patient must be in writing, attorney or authorized representative can also make request. Must be supplied within 30 days. (CGS 20-7c(b))

■ Provider can withhold information if he determines it would be detrimental to patient's physical or mental health or would cause patient to harm himself or others. In these cases, in-formation can be released to an appropriate third party or other provider who can release it to the patient. (CGS 20-7c(c))

■ Provisions for access to medical records do not apply to any information relative to any psy-chiatric, or psychological problems or conditions. (CGS 20-7c(e))

Patient Access to Medical Records from Hospitals (CGS 19-490)

■ The same as for individual providers described in CGS 20-7. However, the record is defined broadly to include history, bedside notes, and charts.

Electronic Health Records (CGS 19a-25 (b and c))

CGS 19a-25b and 25c allow licensed institutions to maintain records in electronic format and permits providers to use electronic prescribing systems.

■ Law allows healthcare institutions to "create, maintain or use medical records or medical record systems in electronic format, paper or both if the system can store medical records and patient healthcare information in a reproducible and secure manner.

■ Healthcare providers with prescriptive authority may use electronic prescribing systems. Department of Consumer Protection may advise and assist healthcare providers in this utilization.

■ Governmental agencies are not required to use or permit the use of electronic records or electronic signatures

■ Office of Health Care Access shall (in its discretion) except from certificate of need reviews in certain circumstances any healthcare facility or institution that proposes to purchase or operate an electronic medical records system.

Retention of Medical Records – Individual Healthcare Providers

■ Individual providers must retain a patient's medical records for seven years after the last treatment date, or three years from the patient's death. (DPH Regs § 19a–14–42).

■ Pathology slides, EEGs, and ECG tracings must be retained for seven years. However, as subsequent ECGs are taken, previous ones may be discarded if the results are unchanged. (DPH Regs. § 19a–14–42(a))

■ Lab reports and PKU reports must be kept for five years and X-ray film for three years. (DPH Regs. § 19a–14–42(b), (c)).

Retention of Medical Records – Hospitals

Medical records must be filed in an accessible manner in the hospital and kept a minimum of 25 years after the patient's discharge. Original records can be destined sooner if they are microfilmed by a process approved by DPH. (DPH REGS. § 19-13-D3(D)(6)).

Federal

Clinical Laboratory Improvement Amendments (CLIA, 42 U.S.C. 263a)

■ Laboratory with certificate of compliance under CLIA cannot release the results of its testing to anyone other than the healthcare institution or provider that requested the testing.

Family Educational Rights and Privacy Act (FERPA)

■   Family Educational Rights and Privacy Act (FERPA) 20 USC § 1232g, addresses parents' and students' privacy rights and protections with respect to education records. The regulations generally require that education records maintained on behalf of a student be kept confidential and only released to third parties with parental or adult student consent. FERPA also contains exceptions that address when parent consent is not required. FERPA is administered by the Family Policy Compliance Office in the US Department of Education.

Health Insurance Portability and Accountability Act of 1996 (HIPAA)

■   HIPAA Privacy Rule addresses how healthcare providers, health plans, and healthcare 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

■   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 ARRA of 2009 maintains and expands the current HIPAA patient health information privacy and security protections, especially as patient health information is electronically transferred through health IT systems. ARRA amends HIPAA to protect patient health information with the following key provisions: applies the HIPAA rules directly to business associates and other non-HIPAA covered entities (Non-covered HIPAA entities, such as RHIOs are now required to have business associate agreements with covered entities) for the electronic exchange of patient health information; allows patients to pay out of pocket for a healthcare service and request non-disclosure of the rendered service; authorizes increased civil monetary penalties for HIPAA violations; defines which actions constitute a breach (including some inadvertent disclosures); requires an accounting of disclosures to a patient upon request; imposes restrictions on certain sales and marketing of protected health information; and grants authority to state attorneys general to enforce HIPAA. The Secretary of the Department of Health and Human Services (HHS), as well as other relevant agencies, will be providing details through the regulatory rule-making process on the expanded privacy and security requirements. Unless otherwise specified, the privacy provisions become effective on February 17, 2010.

L. Border State Activities

1. Massachusetts HIE Activities

New England Healthcare EDI Network (NEHEN)
http://www.nehen.org/

NEHEN is a consortium of the eight largest regional payers and providers who have designed and implemented a secure electronic-commerce solution that transports HIPAA-compliant transactions between health plans and providers, including eligibility checking, referral requests, and claim status checking and submission. NEHEN is self-sustaining, supported 100% by member subscriptions.

Electronic data interchange is believed to have improved administrative processes while enabling its members to share costs, leverage experience gained by other participants, and accelerate the benefits of administrative simplification.

Massachusetts eHealth Collaborative
http://www.maehc.org/

The Massachusetts eHealth Collaborative (MAeHC) was formed to improve patient safety and quality of care by promoting the use of health information technology through community-based implementation of EHRs and health information exchange. The Collaborative has recently implemented EHRs in a diverse set of competitively selected communities, Greater Brockton, Greater Newburyport and Northern Berkshire, encompassing nearly 500 physicians serving over 500,000 patients. Blue Cross and Blue Shield of Massachusetts provided $50 million to deploy EHRs and HIE capacity to every provider in the three communities with the goal of developing a community repository for providers to access.

The Greater Brockton eCare Alliance (GBeCA) is comprised of Brockton Hospital, Caritas Good Samaritan Medical Center, Bridgewater Goddard Park Medical Associates, Brockton Physician Hospital Organization, Inc., Caritas Good Samaritan IPA, Inc., and Brockton Neighborhood Health Center. The Alliance includes both of the community's acute care hospitals who together constitute 486 beds. The community served by the Alliance encompasses the City of Brockton and nearly 20 surrounding towns that are homes to 350,000 residents. The Alliance includes nearly 400 physicians, representing 85% of the primary care physicians and 75% of the specialists in the community. These physicians provide an estimated one million patient encounters annually.

The Greater Newburyport communities of Newburyport, Newbury, Salisbury, Amesbury, West Newbury, Merrimac, and Georgetown are situated about 35 miles north of Boston and are socio-economically diverse cities. Most residents receive a majority of their healthcare locally. The community has grown rapidly over the last several years and the provider network covers close to 100,000 patients. There are 138 clinicians in 39 practices in the greater Newburyport community that have EHRs and are participating in the Wellport network. Independently

practicing physicians of Greater Newburyport who participate in the Wellport network and physicians at the Anna Jaques Hospital are now going to be linked together to create a more integrated healthcare community.

Northern Berkshire Community members receive the vast majority of their healthcare services from physicians and other healthcare professionals affiliated with Northern Berkshire Healthcare (NBH). NBH includes: The North Adams Regional Hospital (NARH), a 120 bed community hospital and the only acute care facility in the area; Visiting Nurses Association and Hospice of Northern Berkshire; Sweet Brook Transitional Care and Living Centers; Sweetwood Continuing Care Retirement Community and REACH Community Health Foundation. The hospital has 80 active medical staff including 32 primary care physicians and 48 specialists representing 31 specialties.

MA-SHARE
http://www.mahealthdata.org/ma-share/

MA-SHARE is a regional collaborative created and operated by the Massachusetts Health Data Consortium (MHDC) to oversee the implementation of community projects for both administrative simplification and clinical data exchange. MA-SHARE seeks to promote the inter-organizational exchange of healthcare data in an open technology model to connect payers, providers, and patients in order to improve patient safety, encourage integrated reporting of accurate clinical health information, and increase administrative efficiency using a sustainable economic model. MA-SHARE achieves its goals by facilitating and developing regional collaborative projects that pilot and demonstrate new technologies and platforms that can be used across communities and enterprises. Where they exist, projects are to adhere to national standards for data exchange. MA-SHARE receives funding by Blue Cross and Blue Shield of Massachusetts, other local health plans, provider organizations, the Massachusetts Medical Society, and an e-Health Initiative grant. The Consortium is now actively engaged in managing/monitoring the following MA-SHARE projects:

- **Bioterrorism Syndromic Surveillance (BSS)**: seeking to create better means of bringing disparate healthcare data together to permit more immediate and accurate assessment of public health risks and events.

- **Electronic Health Records:** seeking to facilitate the selection of standards and adoption of forms of electronic health records.

- **Electronic Patient-Centered Communication**: seeking to encourage and facilitate the greater use of electronic communications between patients and their caregivers and healthcare payers.

- **MedsInfo-ED:** seeking to make patients' prescription history data available to hospital emergency departments.

- **Pathology Database Query**: seeking to provide means of hospitals, agencies and researchers gaining immediate, real-time access to various institutions' pathology data.

2. Rhode Island HIE Activities

State and Regional HIE Demonstration Project (2004–2009)

In September 2004, the Rhode Island Department of Health (HEALTH) was one of six states nationally to receive a $5 million, 5-year demonstration grant from the Agency for Healthcare Research and Quality (AHRQ). This grant has supported the community-based effort to design and develop currentcare (see next).

current*care*: Rhode Island Statewide Health Information Exchange
http://currentcareri.com/matriarch/default.asp

The Rhode Island Health Information Exchange (HIE) Project, now known as current*care*, is working towards the goal of developing, implementing, and evaluating an interconnected statewide health information system that uses a Master Patient Index as a central component to put the right information into the hands of clinicians and their patients when and where it is needed. They are currently working towards three key milestones: enrollment, data flow to current*care*, and "go live" at provider pilot sites, targeted for early June 2009. Initial participants in the HIE include a large hospital network, a laboratory and the state's Department of Health.

The Rhode Island Quality Institute serves as a regional health information organization and plays a governance role.

The Rhode Island Health Information Exchange Act of 2008, which goes into effect in March 2009, provides additional structure for the HIE. The law mandates patient privacy safeguards and authorizes the Department of Health to regulate the HIE.

Consumer protections in the new law include: a specification that participation in the HIE is voluntary—both consumers and providers choose whether or not to participate; the ability to obtain a copy of confidential health information from the HIE; the ability to obtain a copy of a Disclosure Report relating to access of a patient's confidential health information through the HIE; notification of breach of security of the HIE consistent with the RI identity theft law; the right to terminate participation in the HIE; the right to request that inaccurate information provided to the HIE be corrected through a provider; oversight by the Department of Health; the creation of an HIE Advisory Commission to make recommendations to the Department of Health regarding the use of health information in the HIE; and civil and criminal penalties for violation of the Act.

3. New York HIE Activities

Healthcare Efficiency and Affordability Law for New Yorkers (HEAL NY) Capital Grant Program
http://www.health.state.ny.us/technology/

Passed in 2004, this program supports reorganization of hospitals in New York State and health IT/HIE initiatives of HEAL NY, run by the New York State Department of Health (NYS DOH). The Department has supported two competitive grant rounds for health IT. The first round of Health IT grants were awarded in 2006 to 26 projects totaling $52.9 million. These two year grants intended to support adoption of EHRs, electronic prescribing, and development and implementation of community-wide clinical data exchanges. Grantees, typically community hospitals and physician practices distributed across all six regions of New York State, received an average of $1.8 million each. In addition to requiring implementation of HIE and requiring matching funds, HEAL NY required that all projects involve multiple stakeholders of various types (e.g. hospitals, physicians, payers, etc.). The second round of grants were awarded in 2008 to 19 projects totaling $105.7 million. Grantees included RHIOs and Community Health Information Technology Adoption Collaborations. HEAL NY grants are funded in part by bonds sold to the investment community by DASNY (the Dormitory Authority).

HIXNY: A joint effort of the *Iroquois Healthcare Alliance* and the *New York Health Plan Association* to create a secure, electronic service for exchanging health information among hospitals and doctors in the Capital Region and Northern New York. HIXNY serves a 16-county area including: Albany, Clinton, Columbia, Essex, Franklin, Fulton, Greene, Hamilton, Montgomery, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, and Washington. Health data exchanged includes: medication history from RxHub, SureScripts and HIXNY member systems; patient demographic and allergy data; and New_York state Medicaid data. Future functionality will include the exchange of progress notes, laboratory results, eligibility\benefits information and discharge summaries.

Taconic Health Information Network and Community (THINC) RHIO: Serves the Hudson Valley region of New York State. The primary purpose of the THINC RHIO is to advance the use of health information technology through the sponsorship of a secure Health Information Exchange (HIE) network, the adoption and use of interoperable Electronic Health Records (EHRs) and the implementation of population health improvement activities, including public health surveillance and reporting, pay-for-performance, public reporting and other quality improvement initiatives.

The Bronx Regional Health Information Organization (Bronx RHIO): Participants include hospitals, health systems, ambulatory care centers, individual physician offices, long-term care and home care services. Collectively, these providers deliver the vast majority of the healthcare received by the borough's 1.36 million residents, including over 95% of the borough's annual hospital discharges, over 600,000 annual Emergency Department visits and 4.5 million

annual ambulatory care visits. The Bronx RHIO went "live" in June 2008 with data, excluding home care, from all Montefiore Medical Center, Bronx Community Health Network, Bronx Lebanon Hospital, Bronx Lebanon Special Care Center, Children's Hospital at Montefiore and Dr. Martin Luther King, Jr., Medical Center.

Brooklyn Health Information Exchange (BHIX): BHIX is a not-for-profit RHIO connecting healthcare providers, including hospitals, nursing homes, home health agencies, and payers throughout Brooklyn. Shared data currently includes: patient demographic information, advance directive information, physician and primary contact information, allergies, medications, problem lists and diagnoses, and procedures.

Greater Rochester RHIO: The Greater Rochester RHIO was created in 2006 with funding from the Phase 1 of the HEAL NY program, as well as from local hospitals, businesses and health insurers. Working with the State of New York Health Information Technology Evaluation Consortium and with a grant from the Greater Rochester Health Foundation, the Rochester RHIO is actively evaluating how health information exchange can provide value and improve the coordination of care across our region's healthcare delivery system.

Western New York Clinical Information Exchange (WYNCIE). The RHIO name for this exchange is HEALTHeLINK, and is a collaborative consortium that currently includes organizations and providers throughout the eight counties of Western New York. HEALTHeLINK was created through a $3.5 million grant from New York State's HealNY Initiative.

Southern Tier Health Link (STHL): The grant award from HEAL-NY went to a collaborative effort between Greater Binghamton-based STHL and Syracuse-based Health Care Advancement Collaborative of Central New York (HACCNY). STHL is a collaboration of nine health organizations in the Southern Tier and HACCNY is a public/private collaborative of decision-makers representing the hospital, physician, business, and insurance sectors focused on improving healthcare quality and reducing costs in Central New York.

Long Island Patient Information Exchange (LIPIX): Recipient of both Phase 1 and Phase 5 HEAL-NY grant awards, the plans for Phase 5 funding projects include the expansion of LIPIX functionality to 19 of 24 hospitals on Long Island and three in Queens and to several extended care and outpatient organizations. In addition, LIPIX will be expanding its functionality to address medication management, public health, and consumer (patient) empowerment capabilities.

M. Funding Opportunities through The American Recovery and Reinvestment Act

The following tables outline the six main sources of funding for health IT/HIE included in the American Recovery and Reinvestment Act (ARRA) and describe the potential implications for Connecticut.

What	HIE Planning and Implementation Grants
Description	Competitive Grant Program to support HIE Planning or Implementation. Implementation Grants require demonstration of operational governance, a technical plan, well defined clinical use cases, and statewide privacy and security guidance
Type of Program	Competitive Grant Program Details developed through rule making process at HHS
Amount	Statute dedicates at least $300 million; grant amounts to be determined
Timing	Upon delivery of the new ONC strategic plan to Congress, due 90 days after passage of the stimulus
Eligibility	State or state designated entities. State designated entity requires formal designation by the state, be non-profit, committed to improving quality and efficiency through HIE, and other requirements.
Funding Source	HHS through ONC (could delegate to AHRQ, HRSA, CDC, and other agencies)
CT State Involvement	Designate entity or entities State matching funds MAY be required in 2009 and 2010, will be required in 2011; matching funds may be "in-kind."
Implications for CT HIE Plan	Appears to be the most likely source of HIE money in the stimulus package. - If federal schedules are met, dollars should begin to flow this year, some for planning and some for implementation. - Requirements consistent with strategy of CT HIT Plan. - Best strategy seems to be for state to only designate one organization (the RHIO or the organization that will become the RHIO). - A significant amount of progress would need to occur quickly to meet the implementation grant requirements (see description under "what"). - Planning grant more likely for this year; amounts not yet set.

What	EHR Loan Fund
Description	A competitive grants process; states and Indian Tribes eligible to apply for funds (amounts to be determined) to provide loans to providers for EHR adoption. (Note the federal dollars to the states are grants not loans.)
Type of Program	Competitive grants from federal government to states. Loans from states to providers
Amount	To be determined
Timing	Not before January 1, 2010
Eligibility	To be eligible, states must submit an annual strategic plan (see below) Loans to providers for purchase of certified EHR, enhance existing EHR, training, or improving the secure exchange of electronic information.
Funding Source	HHS through ONC (may be delegated to another agency).
CT State Involvement	**Match:** cash match of $1 in state funds for every $5 in federal funds. States may raise money from private sources to increase size of loan pool. Submit annual strategic plan specifying the long and short term goals of fund, identifying the projects, describing selection criteria, current status of outstanding loans
Implications for CT HIE Plan	- Potential for HIE Pilot Projects - Depending on amount of $ available, and availability of state match, can provide the basis for capital loans for providers; possibility of partnering with banks to increase size of fund. - This type of loan funding is an identified need of CT providers most of whom lack access to capital. Medicare/Medicaid funding for HIT may make loan funds more attractive to private sources.

What	Workforce Training Grants
Description	Two separate grant programs • To colleges and institutions of higher education to expand medical health informatics programs • To medical schools to integrate EHR into curriculum
Type of Program	Competitive Grants
Amount	To be determined
Timing	To be determined
Eligibility	Institutions of higher education Graduate health professional schools including medicine, osteopathy, nursing, dentistry, pharmacy, behavioral health, physician assistant programs Priority to existing programs or those designed to be completed in six months
Funding Source	HHS in consultation with National Science Foundation; Distribution agency to be decided
CT State Involvement	Grant can only be up to 50% of cost of program; state match would be required for state schools Match can be reduced if cost sharing requirements are demonstrated to be "detrimental to the program"
Implications for CT HIE Plan	• Interest has been expressed in establishing/expanding medical informatics programs at universities; • Competition is likely • Need to determine if any existing programs are eligible and interested

What	HIT Regional Extension Centers
Description	Support for the creation of regional centers to provide technical assistance and disseminate best practices and other information learned from the national HIT Research Center (also to be established by HHS) to support and accelerate efforts to adopt, implement and effectively utilize HIT that allows for HIE, is standards based and certification based. Least developed of the programs at this point.
Type of Program	Competitive Grants
Amount	To be determined. Funding available up to four years
Timing	2009 to 2011— secretary required to release a notice within 90 days of enactment of ARRA describing the program and amounts of funding to be available.
Eligibility	Non Profit organizations that can demonstrate capacity to provide specific services, detail geographic diversity and service area and other funding
Funding Source	ONC
CT State Involvement	None required: ONC can only provide up to 50% of the costs of the program BUT the match does not have to come from the state.
Implications for CT HIE Plan	• If schedules are met, this program MAY begin quickly • Funding for technical assistance for implementation would be an asset to implementation of HIE Plan • Competition for funding likely among organizations across the state

What	Medicare Incentive Payment Provisions
Description	Enhancements to Medicare reimbursement for "meaningful EHR use" Meaningful use requires demonstration of a certified EHR including electronic prescribing, that is connected to an HIE. Submission of data on quality measures identified by the Secretary is required.
Type of Program	Reimbursement through insurance carriers
Amount	Up to $44,000 per physician and a funding allocated on a formula for hospitals. 10% bonus for physicians who practice in HPSAs (health professional shortage areas) and to critical access hospitals. Disincentives for those not complying begin in 2015.
Timing	Begins in 2011, providers and hospitals may receive payments over 5 years; amounts decline for providers who become eligible after 2011, must quality by 2014 to receive funding.
Eligibility	Physicians and hospitals receiving Medicare payments who can demonstrate meaningful use of EHR
Funding Source	CMS
CT State Involvement	None seems to be required, there is no match and Medicare dollars do not flow through the state State could play a role in establishing bond and loan funds to be repaid when Medicare EHR funds are received.
Implications for CT HIE Plan	• Significant boost and incentive to EHR adoption that is required for the HIE plan to ultimately succeed • This is "back-end" money; providers and hospitals still require upfront capital. Federal loan funds are one source, will need to be supplemented by state or private dollars to be sufficient. • Definition of requirement to be connected to an HIE requires more detail but represents incentives for HIE participation. Depending on language may affect decisions on pilot projects. • Pressure to comply by 2011 is high, increasing risk of problematic or failed adoption. Coordination in obtaining ONC funds to support implementation could reduce problems in this area.

What	Medicaid Incentive Payments
Description	Payments to state Medicaid plans that implement programs to encourage the adoption and use of certified EHR. States receive 100% of payment outlays and 90% of administration costs. Payments to providers up to $63,750 towards adoption, implementation, upgrades, maintenance, and operation of certified EHR techno logy. Payments to hospitals similar to those under Medicare.
Type of Program	Reimbursement through state Medicaid program (DSS).
Amount	See description above
Timing	Begins in 2011
Eligibility	Funding expansion to pediatricians, FQHCs, rural health clinics and physician assistants practicing in rural health clinics who can demonstrate use of certified EHR technology that provides for HIE and compliance with reporting requirements; state is required to make these assessments. Acute care hospitals, children's hospitals Third party entities encouraging EHR adoption may qualify (purchasing and implementation agents, ASPs) with 95% going to the physicians and 5% remaining with the third party for administrative expenses.
Funding Source	CMS and State of Connecticut
CT State Involvement	• DSS involvement is significant • State must cover 10% of the administrative costs of running the program
Implications for CT HIE Plan	• Required connection to HIE is important • DSS role in HIE plan may expand or change • May be implications for pilot projects in the third party model • Important to determine whether this is "new money" or funding that would have been available previously.

N. Connecticut Health Information Exchange Network Project Inventory

The following section contains two parts. The first table outlines the categories of HIE projects that will incrementally develop statewide HIE capacity. The second table lists existing HIE projects in Connecticut that may be leveraged as part of the CT State Health IT Plan.

HIE PROJECT CATEGORIES		
Category	**General Description**	**Recommendation**
Continuity of care record (CCR)	Provides a patient summary including vital statistics, insurance info, provider info and other summary info in support of a patient transfer or referral	Defer as a follow on to direct patient care domain pilots Include requirements as part of EHR framework
Electronic Health Record (EHR) and HIE development	Direct patient care domain HIE and EHR providing clinical data at the point of care which is aggregated from multiple clinical settings.	**Recommend as pilot project** Requires state funding Specify phased-in development that is tied to funding availability
Electronic Medical Record (EMR) promotion/adoption	Hospital-based or IPA-based promotion of a standards-based EMR software application.	Tie to direct patient care domain pilot projects Consider supplemental state funding
Health Information Exchange Hub	A centralized infrastructure and support organization that provides data exchange and data management resources	**Recommend as pilot project** Requires state funding Specify phased-in development that is tied to funding availability
Medication management/ ePrescribing	Integration of medication history through prescription data aggregators as well as pharmacies and providers in support of exchanging prescriptions and medication information	Defer as a follow on to direct patient care domain pilots Include requirements as part of EHR framework
Pay for performance (Chronic disease management)	Collection and reporting of clinical indicators which are tied to provider incentives for program participation and compliance with performance measures.	Defer as a follow on to direct patient care domain pilots Include requirements as part of EHR framework
Personal health record (PHR)	Similar to the CCR, the PHR provides a patient summary including vital statistics, insurance info, provider info and other summary info in support of patient care and patient involvement in the care process	Defer as a follow on to state HIEN pilot Include requirements as part of EHR framework

Category	General Description	Recommendation
State health agencies HIE and program registry platform	Data collection and data management in support of public health programs and public health oversight functions.	**Recommend as pilot project** Requires state funding Specify phased-in development that is tied to funding availability
Monitoring & evaluation HIE and data warehouse	Data collection, analysis and reporting based projects using de-identified data that support the overall quality of the CT healthcare system.	**Recommend as pilot project** Requires state funding Specify phased-in development that is tied to funding availability

EXISTING HIE PROJECTS IN CONNECTICUT

Category	Project	Description	Primary Contact	Sponsoring Org
Continuity of Care Record	Medicaid Transformation Project	Continuity of care record for patients referred to/from FQHCs and Hospitals	Michael Starkowski Scott Cleary	DSS eHealthCT
EHR Development	Eastern CT Healthcare Network EHR project	Hospital based EHR to physician community	Charlie Colvin	Eastern CT Healthcare Network
EHR Development	Medical Home – Personal Health Record	EHR development in support of medical home project	Shanti Carter	Community Health Centers Inc.
EHR Development	Middlesex Hospital EHR project	Hospital based EHR integration with CHC Inc and affiliated physicians (eClinicalWorks)	Lud Johnson	Middlesex Hospital
EHR Development	St. Francis EHR Project	Hospital based EHR integration with ProHealth and affiliated physicians (AllScripts)	Kathy Demateo	St. Francis CIO
EHR Development	Bridgeport Primary Care Access Group	Data exchange with 2 hospitals and FQHCs	Betsy Thornquist	St. Vincent's Hospital
EMR promotion/ adoption	Eastern CT Healthcare Network EHR project	Integrating with two area IPAs using AllScripts	Charlie Colvin	Eastern CT Healthcare Networ

Category	Project	Description	Primary Contact	Sponsoring Org
EMR promotion/ adoption	Middlesex Hospital EHR project	Integrating hospital EHR with eClinicalWorks	Lud Johnson	Middlesex Hospital
EMR promotion/ adoption	St. Francis EHR Project	Hospital based EHR integration with AllScripts	Kathy Demateo	St. Francis CIO
Medication management/ ePrescribing	Prescription Management Program expanded to medication history and ePrescribing	Schedule II through V drug distribution monitoring and compliance	John Gadea	Dept Consumer Protection
Pay for performance	P4P - Diabetes Care Link	Chronic disease management	Francois Desbrantes	Bridges to Excellence
Pay for performance	P4P - Cardiac Care Link	Chronic disease management	Francois Desbrantes	Bridges to Excellence
Pay for performance	P4P - Physician Office Link	Certification for program participation	Francois Desbrantes	Bridges to Excellence
Pay for performance	Various	Mostly based on standard HEDIS measures. Disease state references (A1C for managing diabetic monitoring), digital eye exams, cost incentive with payers compared to other providers. Asthmatic populations, immunization benchmarks.	Jack Reed	Pro Health
Pay for performance	Chronic Disease Management	Diabetes performance measures tied to physician incentives with Anthem	Doug Arnold Richard Lynch	Middlesex Professional Services Anthem
PHR	Personal health record	PHR is developed with claims data, patient input, and participating doc input. Made available to participating docs.	Mike Hudson	Aetna

Category	Project	Description	Primary Contact	Sponsoring Org
State health agencies HIE/program registry platform	DOIT – Health information exchange utility	Development and management of HIE utility supporting data exchange for all providers in the state	Rick Bailey	Department of Information Technology
State health agencies HIE/program registry platform	DPH/DSS – Program registry consolidation and data ware-house	Develop standards and strategy for program registry and HIE capacity to support public health programs and data exchange with providers	Meg Hooper Bob Mitchell	Department of Public Health Department of Social Services
State health agencies HIE/program registry platform	Medicaid Transformation Project	ePrescribing and HIE for Medicaid patients	Michael Starkowski	DSS
State health agencies HIE/program registry plat-form	CHIN expansion		Robert Aseltine	CHIN
Monitoring & evaluation HIE/ Data warehouse	Hospital Driven Quality Project	Collaborative of CHA (CHIMENET, CHIMEDATA and TEIC), OHCA and Qualidigm	John Brady	Connecticut Hospital Association
Monitoring & evaluation HIE/ Data warehouse	Connecticut Health Quality Cooperative	Physician Report Card with claims data from 5-6 payers	Marcia Petrillo	Qualidigm
Monitoring & evaluation HIE/ Data warehouse	MyHealthDirect	Directs patients away from ERs and toward CHCs for care.	Dan Clemons	Community Health Center Association of Connecticut, Inc.