Health Information Exchanges
Part 1: The Basics
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HIEs: Yesterday and Today

An Historic Perspective
Health Information Exchanges (HIEs): A Genealogical Overview

Federal Entity
- NBS (1901-88)
- NIST (1988)
- ONC (2004)
- AHIC (2005-08)
- NeHC (2008)
- SLHIE (2009)

State Entity
- CHIN
- CHMIS
- HIE
- RHIO
- HIO (2008)

What is it?
- 1985
- 1990
- 1995
- 2000
- 2005
- 2010
- 2015
- EDI (1996)
- The Direct Project (2010)
- S&I Framework (2010)
- HITSP (2006-09)
- HISPC (2006-09)
- NHII (2004)
- NHIN (2004)
- NwHIN (2011)

Source: NBS founded March 3, 1901: http://www.100.nist.gov/
Health Information Exchanges (HIEs): A Genealogical Overview

The journey to discover what we know and what we have learned from the various models from which Health Information Exchanges (HIEs) have evolved.

Along the journey, we will visit:
- Community Health Information Networks (CHINs)
- Electronic Data Interchange (EDI)
- Community Health Management Information System (CHMIS)
- Santa Barbara County Care Date Exchange (SBCCDE)
- National Health Information Infrastructure (NHII)
- David Brailer, MD, PhD, and the inception of the Office of the National Coordinator (ONC)
- Nationwide Health Information Network (NwHIN), the early strategies
- Office of the National Coordinator (ONC) trials
- Health Information Technology Standards Panel (HITSP) / American Health Information Community (AHIC) / Health Information Security and Privacy Collaboration (HISPC)

He who fails to plan, plans to fail.

*Winston Churchill*
Community Health Information Networks (CHINs) ~ 1985

**Definition:**
“A community health information network is an organizational and technical entity designed and operated to facilitate the electronic data interchange and integration of various types of health care information for the benefit of those organizations and health care professionals that participate in the network.”

**3 Key Technical Aspects of a CHIN:**
- Connectivity (via modems and standard phone lines)
- Interoperability
- Data Repository (or Data Warehouse)

**Access to Information:**
- Open Systems (most or all are eligible)
- Restricted or Proprietary Access

### Community Health Information Networks (CHINs)

#### Organizational Models for CHINS:

<table>
<thead>
<tr>
<th>Model</th>
<th>For-Profit, Vendor Model</th>
<th>Insurer / Payer Model</th>
<th>Hospital or Integrated Delivery System Model</th>
<th>Community / Foundation Model</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ownership and Management</strong></td>
<td>Vendor in partnership with local Providers and Payers</td>
<td>Insurer, Payer, Preferred Provider Organization sometimes in Partnership with local Providers</td>
<td>Local Hospital or Hospital Coalition owns CHIN; Vendors frequently provide capital, develop systems, and manage networks</td>
<td>Regionally-based Community Coalitions; Often with Employers as Key members</td>
</tr>
<tr>
<td><strong>Expertise</strong></td>
<td>Varies with Vendor background</td>
<td>Claims Processing</td>
<td>Clinical and Administrative</td>
<td>Varied</td>
</tr>
<tr>
<td><strong>Information Emphasis</strong></td>
<td>Financial and Patient Management with some Clinical Information (e.g. Results, Medical Records, Prescription Orders, Image Transmission)</td>
<td>Financial</td>
<td>Financial and Patient Management with some attention to Clinical Information</td>
<td>Financial and Patient Management</td>
</tr>
<tr>
<td><strong>Access</strong></td>
<td>Sometimes a Common-Access Regional Provider but will often offer primary access to partners</td>
<td>Relatively open access for Providers with limited access to other payers</td>
<td>Primary access to local Provider or Coalition partners</td>
<td>Open</td>
</tr>
</tbody>
</table>

**Source:** Adapted from Friedman BA, Mitchell W. Community Health Information Networks (CHINs) and Their Relationship to Telemedicine. In: Bashshur R, Sanders JH, Shannon GW, eds. *Telemedicine Theory and Practice*. Springfield: Charles C. Thomas; 1995: 53-76.
Community Health Information Networks (CHINs)

A CHIN Case Study – Example of One Model

Name: Metropolitan Chicago Healthcare Coalition
(The Chicago Metropolitan Healthcare Council and the Illinois Medical Society; 110 hospitals participated)

Year CHIN Developed: 1994

Type of Ownership: Hospital coalition in a single city

Prime Contractor: Share Medical Systems (SMS; now Siemens)

Networking: AT&T Health Care Solutions

Payer Eligibility Files: Healthcare Data Exchange

Systems Integration Expertise: Coopers & Lybrand’s healthcare consulting practice

Electronic Communication of Text, Data and Messaging: IMS/Illinois Medical Information Network

Electronic Claims Processing: National Electronic Information Corporation (NEIC)

Prescription Services: PCS Health Systems (parent company of IMS)

Payer Claims Processing for Physicians: Synaptek

Community Health Information Networks (CHINs)

Some CHINs did evolve over time ..... Where they are today?

Even though CHINs disappeared, two of these Health Information Networks did evolve over time:
- Wisconsin Health Information Network (www.whin.net)
- Utah Health Information Network (www.uhin.org)

Wisconsin Health Information Network

Date CHIN Developed: 1993
Key Stakeholders: Aurora Health System and Ameritech
Scope of CHIN: Link 16 hospitals (equal to 40% of beds in the city of Milwaukee at that time), 8 clinics, 3 nursing homes, 7 insurers, 4 billing services and more than 1,300 physicians
Data Made Available: Claims transmission, physician access to patient status at local hospitals and ability to view laboratory results via modem

Utah Health Information Network

Date CHIN Developed: 1993
Key Stakeholders: Public (State Department of Health) / Private partnership
Participants: More than 85% physicians, more than 80% other practitioners, and all but one major year

Community Health Information Networks (CHINs)

Wisconsin Health Information Network
(www.whin.net)

Status: Unavailable
Goals: Technical innovation allows for enhanced quality of healthcare delivery while reducing administrative costs and maximizing reimbursement
Stakeholders: Various
Scope: Services to hospitals, physicians, dentists, clinics and other providers, and payers
Services: Suite of integrated browser-based products and business solutions; clinical, financial and practice solutions

Utah Health Information Network
(www.uhin.org)

Status: State, not-for-profit company (member fees cover costs of network operations)
Goals: Common goal of reducing healthcare costs and improving the quality of care
Stakeholders: Broad-based coalition of Utah healthcare insurers, providers, and other interested parties, including the Utah state government
Scope: Serves all the hospitals, ambulatory surgery centers, national laboratories and approximately 90% of the medical providers
Services: Administrative, clinical and credentialing

CHINs that Evolved Over Time ...
Case Studies
What went wrong?

"The real killer why CHINs did not get any further than they did is that very few of them paid attention to sustainability," Dr. Overhage said. CHINs received tens of millions of dollars from foundations and vendors, but lacked a business plan to become self-sufficient after they burned through their initial wave of funding and community enthusiasm for their projects.

Community Health Management Information System (CHMIS) ~ 1991

**Definition:** Create both a data network and a data repository to measure cost and quality from competing providers in a given community

**Originator and Chief**

**Financial Sponsor:** Hartford Foundation of New York

**Grants Available:** 1991

**Financed Grants:** 7 states (MN, IA, OH, VT, WA, NY, TN)

**Stakeholders:** Public and private, purchasers and providers

**Level of Risk:** High due to no existing networks to connect all participants and no existing community-level quality assessment system available

**Momentum:** State healthcare reform

**Organization With a Twist**

**New York:** Based in state department of health

**Tennessee:** Located in Memphis with a regional scope; initially run by a business coalition

Community Health Management Information System (CHMIS)

Potential Impacts on Outcomes:
- National and state level shifts in political environment
- Predilection for investment in building independent networks rather than a single, community network
- Changes in both healthcare and electronic communications contradicted the Hartford model

Support from State Legislation:
- 1992: IA mandates compliance through state-wide legislation
- 1993: MN establishes a public/private partnership, the Minnesota Health Data Institute; entity authorized to create the CHMIS
- 1993: WA restructure its health insurance market in legislation that mandated a state-wide, health information system with a mandate for Providers and Insurers to comply with CHMIS

Most Successful CHMIS:
MN: Legislation partially funded the Minnesota Health Data Institute as a partnership between the Commissioner of Health and a 20-member Board (with stakeholders). Law also asked for standard electronic transmissions, unique patient identifiers and privacy protections. MedNet was built in 1995 for transmitting claims, eligibility and enrollment.

Community Health Management Information System (CHMIS)

What went wrong?

Vermont
- Vermont Health Care Information Consortium (VHIC) intended to bring together key stakeholders.
- Difficulty arose in securing long-term cooperation.
- Competitive issues caused Fletcher Allen to build its own network in the wake of Dartmouth’s expansion in the east part of the state.
- Insurer Blue Cross also faced competitive challenge from managed care, and established its own network with software for physicians.

Memphis, Tennessee
- The Memphis Business Group on Health received the grant and was to build the CHMIS around Baptist and Methodist, existing entities which held approximately half of the local market.
- The Memphis Business Group on Health had a long-term business relationship with Baptist only, and no relationship with public officials.
- It lacked a broad community base of stakeholders.
- Local physicians very uncomfortable with allowing access to data from their practices.
- CHMIS collapsed when Baptist contracted for network services from IMS Medacom (one of the vendor-finalists for the CHMIS).

Community Health Management Information System (CHMIS)

What went wrong?

Iowa
- Great progress was made initially.
- The cost of the Data Repository was problematic.

Ohio
- Independent community networks were developing, which limited revenue to the CHMIS project. CHMIS implementation postponed.

Other General Observations
- Faulty premise of CHMIS Model: assumption that fee-for-service care model would continue and impetus of providers and payers would be the transmission of claims.
- No agreement from providers and payers to share information within the community data utility in order to secure desired benefits of electronic transactions.
- Rise of managed care meant that a CHMIS could not assume that a centralized model with one network and one repository would continue to work.
- With the increased number of independent networks, CHMIS would need to function as a master network with decentralized data.
- No one could draft a business plan that would sustain after the grant funding was exhausted.

Source: Starr P. Smart Technology, stunted policy; developing health information networks. Health Affairs. 1997:16 (3); 91-105. [http://content.healthaffairs.org/content/16/3/91](http://content.healthaffairs.org/content/16/3/91) Accessed 9/28/11.
Community Health Management Information System (CHMIS)

What went wrong?

More General Observations

- The Hartford model was influenced by the banking industry, under the assumption that the CHMIS would need to build a separate network for transactions rather than using existing networks.
- Less expensive and less complicated, Internet technology was just becoming available while the CHMIS was in progress.

- The existing CHMIS model did not allow for independent or incremental steps to generate short-term outcomes in order to build confidence among participants.
- With so many stakeholders, it was difficult to secure ongoing cooperation across that group.
- By 1996, the remaining CHMIS were moving to Internet technology and became focused on security, provider directories, master person indexes and immunization registries.
- The term “CHMIS” ceased being used as a result of the changes mentioned above.

“Getting away from trying to build a huge, costly proprietary pipe and moving toward content and enabling applications has resurrected what was a moribund community health information movement. For the first time, I think we are riding the wave, instead of swimming against it.”

Richard Rubin, President of the Foundation for Health Care Quality (WA)
Santa Barbara County Care Data Exchange (SBCCDE) ~ 1998-2006

Where: Santa Barbara, California

When: 1998 Project Initiation; Targeted Operational Date 2001; Actual Testing mid-2004; Shutdown in 2006

What: 1. A secure regional network for electronically sharing healthcare data among doctors, healthcare facilities and patients.
    2. About a dozen entities participated. Shared patient information included test results and reports

Investment Level: California HealthCare Foundation (CHCF) provided a $10 M Grant (1999)

Vendor Selected: CareScience

Visibility: Considered one of the most ambitious and publicized efforts in the country at that time.
“In fact, David Brailer—who was involved with the project as the CEO of CareScience and SBCCDE's program manager—wrote that the lessons he learned from working on the Santa Barbara project ‘shaped nearly every aspect of the federal approach to health IT.’ Brailer went on to become the first National Coordinator for Health IT.”
Santa Barbara County Care Data Exchange (SBCCDE)

What went wrong?

One perspective from a 2007 article highlights the problems which ultimately contributed to the demise of SBCCDE:

1. “The care data exchange technology was cutting-edge. (The technology challenges were more than anyone bargained for.)”
2. “The substantial financial support from California HealthCare Foundation made the community a passive participant in the whole process.”
3. “The project was drawn out so long, eight years from conception to death, made most in the community, mainly the physicians, very cynical about its possible success.”
4. “Crafting user agreements and vendor agreements required making the project legally "real," so real commitments, real responsibilities and rights, and real obligations had to be negotiated, agreed to and captured in legally binding documents. The process of doing that gave rise to new concerns about liability and indemnification in the event that bad data crept into the system or good data was used improperly and, in either case, patients were injured.”

Santa Barbara County Care Data Exchange (SBCCDE)

Lessons Learned

<table>
<thead>
<tr>
<th>Category</th>
<th>Issue/Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Funding</strong></td>
<td>Sustainability</td>
</tr>
<tr>
<td><strong>Funding</strong></td>
<td>Participating healthcare entities did not contribute</td>
</tr>
<tr>
<td><strong>Vendors</strong></td>
<td>Software development delayed</td>
</tr>
<tr>
<td><strong>Community</strong></td>
<td>No demand from local community</td>
</tr>
<tr>
<td><strong>Governance and Leadership</strong></td>
<td>Neither physicians nor hospital administrators had control or provided input</td>
</tr>
<tr>
<td><strong>Legal Issues</strong></td>
<td>No consensus from lawyers across participating entities</td>
</tr>
<tr>
<td><strong>Data Privacy</strong></td>
<td>Participating entities could not find consensus</td>
</tr>
</tbody>
</table>

Study performed to investigate what led to the demise of SBCCDE:

• “From fall 1999 through fall 2005, software development delays slowed SBCCDE progress.

• From fall 2005 to end 2006, disputes over liability risk assumption and payment for RHIO services among community participants eventually ended the SBCCDE.

...several proximate causes for the SBCDE failure, including:

1. The behavior distorting effect of foundation funding of the demonstration—in particular, both community organizations and the project manager/software vendor (CareScience) reduced their efforts once foundation subsidies ended;

2. The lack of community leadership of the effort, fostered by CHCF largesse and CareScience expertise;

3. Limitations of the project manager/software vendor, which underestimated software development challenges in an area where it had little substantive expertise; and

4. Lack of a compelling value proposition to community participants, in part due to the simplicity of the market which reduced the need for HIE.”

Santa Barbara County Care Data Exchange (SBCCDE)

• **Lesson:** Instead of relying on grant money in the start-up phase and then hoping that the community would be willing to pay for the data exchange once it's up and running, the Santa Barbara project taught the lesson that, even in the beginning, HIEs cannot be predominantly funded by grants. Instead, if communities helped fund the data exchange, they would have more of a stake in the success of the project.

• **Lesson:** HIEs need to settle privacy and liability issues from the outset.

  *Sam Karp, vice president of programs at CHCF, said that the experience in Santa Barbara highlighted the need for uniform, nationwide data exchange standards.*

• **Lesson:** Engage the community in the HIE project from the very beginning. Community input and involvement are key to the long-term sustainability of the HIE.

  *The top-down approach to implementation was wrong,* too, according to Brailer. The top-down approach typically used in IT projects involves strict schedules and "centralized corporate controls," Brailer said. However, this method turned out to be in ineffective in Santa Barbara, and the project instead used a bottom-up approach, Brailer wrote. He said that *the bottom-up approach was key to efforts the national coordinator's office made on a national level and projects were as "decentralized as possible."* Brailer added that "looseness and grassroots energy are aspects of the national efforts that have led to the most success."

Without a standards-based approach to data sharing between organizations, the on-going evolution of exchanging data might have remained a difficult obstacle for the entire healthcare industry.
Electronic Data Interchange (EDI) ~ 1996

**Definition:**
Structured transmission of data between organizations by electronic means.

**Defined By:**
National Institute of Standards and Technology (NIST)

**Definition Issued:** 1996

**History:**
- Mid-1970s: American Hospital Supply introduces proprietary electronic order entry system (ASAP)
- Mid-1980s: 90% of pharmaceutical manufacturers and 96% of drug wholesalers were using EDI
- By 1985: Medicare received about two-thirds of Part A claims and one-third Part B claims electronically
- Early 1990s: 95% of drugstores were computerized and they were submitting electronic claims for more than half of prescriptions covered by insurance
- 1991: Workgroup for Electronic Data Interchange (WEDI) convened
- 1992 proposed industry-led push for EDI standards

**1992:** proposed legislation, Medical and Health Insurance Information Reform Act of 1992; Congress would authorize Secretary of HHS to mandate formats for electronic data

**Source:** Starr P. Smart technology, stunted policy; developing health information networks. *Health Affairs*. 1997: 16 (3); 91-105. [http://content.healthaffairs.org/content/16/3/91](http://content.healthaffairs.org/content/16/3/91) Accessed 9/28/11.
Electronic Data Interchange (EDI) ~ Today

In its initial stage, Electronic Data Interchange primarily focused on financial and administrative data. As automation of clinical information has grown since 1996, a number of bodies have continued to work on EDI for all types of healthcare data.

Note: CORE is an abbreviation for Committee on Operating Rules for Information Exchange, A CAQH Initiative; Council for Affordable Quality Healthcare (CAQH) is nonprofit alliance of affordable health plans and trade associations.
A Federal Perspective: HITECH and HIEs
Office of the National Coordinator for Health Information Technology (ONC)

**Definition:**
A principal federal entity with the Department of Health & Human Services; charged with coordination of nationwide efforts to implement and use the most advanced health information technology and the electronic exchange of health information.

**Created:** 2004, by Executive Order of President George W. Bush

**Legislated:** By Health Information Technology for Economic and Clinical Health Act (HITECH Act) of 2009.

**Mission:**
1. Promote development of a nationwide Health IT infrastructure for electronic use and exchange of information
2. Provide leadership in the development, recognition, and implementation of standards / certification of Health IT products
3. Health IT policy coordination
4. Strategic planning for Health IT adoption and health information exchange
5. Establish governance for the Nationwide Health Information Network (NwHIN)

David J. Brailer, MD, PhD

Office of the National Coordinator for Health Information Technology (ONC)

First National Coordinator for Health Information Technology

Biography

Appointment: May 6, 2004 (by Executive Order on April 27, 2004)

Industry

Expertise: Recognized in the strategy, financing of quality and efficiency in healthcare, with a particular emphasis on health information technology and health systems management

Experience: Senior Fellow at the Health Technology Center, San Francisco, CA, a non-profit research and education organization CareScience, Inc., Chairman and CEO

Education: Doctoral degrees in both medicine & economics
MD degree at West Virginia University
PhD in managerial economics at The Wharton School

Charles A. Dana Scholar, University of Pennsylvania, School of Medicine
First recipient, National Library of Medicine, Martin Epstein Award for work in expert systems
Robert Wood Johnson Clinical Scholar at the University of Pennsylvania

Source: http://www.hitaudioconferences.com/HIT20040614/bios.html
Office of the National Coordinator for Health Information Technology (ONC)

ONC National Coordinators for Health Information Technology Since Inception (2004)

David J. Brailer, MD, PhD  
(appointed May 2004)

Robert M. Kolodner, MD  
(appointed September 2006)

David Blumenthal, MD  
(appointed March 2009)

Farzad Mostashari, MD, MSc  
(appointed April 2011)
Office of the National Coordinator for Health Information Technology (ONC)

ONC Relationship to the Department of Health and Human Services
Office of the National Coordinator for Health Information Technology (ONC)

Today’s ONC Organizational Structure

Source: Organizational Chart updated January 13, 2011; http://www.hhs.gov/about/orgchart/onc.html
Office of the National Coordinator for Health Information Technology (ONC)

Eight Major ONC Initiatives

- CyberSecurity
- Innovation
- Nationwide Health Information Network
- Federal Health Architecture
- Rural Health IT
- State-Level Health Initiatives
- Health IT Adoption
- Clinical Decision Support / CDS Collaboratory

American Health Information Community (AHIC)

ONC’s Previous Engagement Model ~ 2005-2008

American Health Information Community
Led by HHS Secretary

Office of the National Coordinator Project Officers

Standards Harmonization Contractor
Compliance Certification Contractor
NHIN Prototype Contractors
Privacy/Security Solutions Contractor

Continuous Interaction with Multiple Public and Private Stakeholders

AHIC was formed by the Secretary to facilitate achievement of Americans to have access to secure electronic health records by 2014.
American Health Information Community (AHIC)

**Definition:**
A federal advisory body to make recommendations to the Secretary of the U.S. Department of Health and Human Services on how to accelerate the development and adoption of health information technology.

**Relationship:**
Strategic partnership established through a contract with the U.S. Department of Health and Human Services.

**Initiated By:** Then-Secretary Michael O. Leavitt

**Initiated On:** Chartered in 2005

**Concluded:** November 12, 2008

**Transitioned:**
From a Federal Advisory Committee to a private-public organization, the National eHealth Collaborative (NeHC).

**Recommendations (200 over duration):**
- Standards and certification
- Business case
- Business processes
- Social and cultural issues
- Privacy and security
- Medical-legal issues
- Consumer/patient needs, population health needs, and technology/interoperability
AHIC, The Next Generation:  
National eHealth Collaborative

**Definition:**
A public-private partnership that enables secure and interoperable nationwide health information exchange to advance health and improve healthcare.

**Founded:**
As a grant from the Office of the National Coordinator for Health IT (ONC) to build on the accomplishments of the American Health Information Community (AHIC), a federal advisory committee to the U.S. Department of Health and Human Services (HHS) until 2008.

**Mission:**
Address barriers that might thwart the nation's progress toward interoperability. Work to educate, connect and encourage healthcare stakeholders who are critical to the successful deployment of health information technology and health information exchange nationwide.

**Relationship:**
National eHealth Collaborative is a cooperative agreement partner of the Office of the National Coordinator for Health IT within the U.S. Department of Health and Human Services.
National eHealth Collaborative (NeHC) ~ Today

NeHC Mission, Vision and Strategy

**VISION**
A transformed U.S. healthcare system that ranks #1 worldwide in health and healthcare through innovative access, sharing and use of health information in every community and across the nation.

**STRATEGIC GOALS**
- Promote Nationwide HIE
- Engage with Stakeholders on HIE
- Ensure NeHC’s Vitality and Relevance
- Achieve Sustainability for NeHC to Accomplish Our Goals

- Develop and Communicate a National HIE Roadmap
- Convene Consumer Consortium on eHealth
- Operate NeHC University
- Support NwHIN Exchange
- Develop and Disseminate National HIE Leader Profiles
- Accelerate HIE Progress Through Collaborative Forum and Programs
- Create Online Communities and Knowledge Base

**MISSION**
NeHC is a public-private partnership that enables secure and interoperable nationwide health information exchange to advance health and improve healthcare.

Health Information Technology Standards Panel (HITSP) ~ 2005-2010

**Definition:**
Define healthcare information standards

**Relationship:**
Strategic partnership established through a contract with the U.S. Department of Health and Human Services.

**Awarded/Concluded:** October 6, 2005 / April 30, 2010

**Mission:**
Serve 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.

HITSP is committed to:
1. An open and transparent mode of operation
2. Membership and participation is open to all interested parties
3. Work products are published for public review and comment before approval, and
4. All meetings are open for membership participation
The Standards & Interoperability Framework (S&I Framework) ~ Today

The Next Generation of HITSP: The S&I Network

What is it?
The Standards and Interoperability (S&I) Framework is a set of integrated functions, processes, and tools being guided by the healthcare and technology industry to achieve harmonized interoperability for healthcare information exchange.

The focus of the S&I Framework is on delivering guidance to the health information technology community that can achieve lasting results in healthcare delivery improvements, through the development of content and technical specifications, the development of reusable tools and services, and the effort to unite stakeholders on common healthcare challenges.

The Standards & Interoperability Framework (S&I Framework) ~ Today

Goals of the S&I Framework

The objective of the S&I framework is to create a robust, repeatable process based on federal best practices that will enable ONC to execute initiatives that will help improve interoperability and adoption of standards and health information technology. The S&I Framework includes processes and tools that will streamline and coordinate the execution of the initiatives to support the goals of the ONC and the HITECH Act.

- Linkage of objectives, challenges, use cases, requirements, and standards across the solution development lifecycle (e.g., pre-discovery, discovery, implementation, pilot, and evaluation)
- Repeatable mechanisms for harmonization and integration of existing standards, as well as identification of new standards
- Development of tools that enable consistent, robust, and testable solutions (e.g., test suite to validate an implementation against a specification)
- Integration of multiple Standard Development Organizations (SDOs) with different expertise across the solution development lifecycle
- Leveraging of federal guidance and best practices

ONC-Supported Standards and Certification

**Definition:**
Providers and patients must be confident that the electronic health information technology (health IT) products and systems they use are secure, can maintain data confidentially, can work with other systems to share information, and can perform a set of well-defined functions.

**Relationship:**
The HITECH Act directs the Office of the National Coordinator for Health Information Technology (ONC) to support and promote meaningful use of certified EHR technology nationwide through the adoption of standards, implementation specifications, and certification criteria as well as the establishment of certification programs for HIT.

ONCs first certification program began with the Certification Commission for Health Information Technology (CCHIT) framework to certify EHR Products in 2006.

Today there are multiple ONC Authorized Testing and Certification Bodies (ATCBs)

Source: [www.cchit.org](http://www.cchit.org) & [http://healthit.hhs.org](http://healthit.hhs.org)
ONC Certification / Compliance Testing ~ Historical View

**2004**
- **July 2004**
  Certification of HIT products a key action in HHS Strategic Framework

**September 2004**
AHIMA, HIMSS, and the Alliance fund and launch the Certification Commission for Health Information Technology (CCHIT)

**2005**
- **June 2005**
  Eight additional organizations add $325k funding support

**July 2005**
HHS issues Health IT RFPs

**September 2005**
CCHIT awarded 3 year, $7.5M HHS contract to develop compliance criteria and inspection process for EHRs and the networks through which they interoperate

**2010**
- **June 2010**
  ONC issues 45 CFR Part 170 subpart D - Establishment of the Temporary Certification Program for Health Information Technology establishes certification programs for purposes of testing and certifying health information technology

**2011**
- **January 2011**
  ONC issued the final rule to establish the Permanent Certification Program for Health Information Technology (Permanent Certification Program)
  The temporary certification program will continue to be in effect until it sunsets on December 31, 2011, or at a later date when the processes necessary for the permanent certification program to operate are completed

**June 2011**
ONC approved the American National Standards Institute (ANSI) as the ONC-Approved Accreditor (AA) for the Permanent Certification Program
## Highlights: Testing & Certification-Permanent Certification Program

### Testing
- **The National Institute of Standards and Technology (NIST),** through its National Voluntary Laboratory Accreditation Program (NVLAP), will be responsible for **accrediting organizations to test health information technology** (particularly EHR technology) under the permanent certification program.
- **Only test tools and test procedures that have been approved by the National Coordinator** can be used to test Complete EHRs and/or EHR Modules in order for them to be eligible for certification by an ONC-Approved Accreditor (ONC-AA).
- **ONC plans to continue to collaborate with NIST** to develop test tools and test procedures as needed for the testing of new and/or revised certification criteria adopted by the Secretary in the future. However, as under the temporary certification program, other entities can submit test tools and test procedures to the National Coordinator for approval.

### Certification
- **One accreditation organization** (ONC-Approved Accreditor or “ONC-AA”) will be approved through a competitive process to accredit certification bodies. The ONC-AA will be selected every three years.
- **All certification bodies will have to apply to ONC for ONC-ACB status.** ONC-ATCBs (certification bodies authorized under the temporary certification program) will not automatically become ONC-ACBs, as a certification body must first be accredited to be eligible for ONC-ACB status.
- An **ONC-ACB will have to renew its status every three years.**
- An **ONC-ACB may also be accredited by NVLAP** to perform testing under the permanent certification program in order to serve as a “one-stop-shop.” In such situations, the ONC-ACB must be structured in a manner that ensures the objectivity and impartiality of its certifications.

### Gap Certification
- When the Secretary adopts new and/or revised certification criteria in future rulemakings, **gap certification will be available as a more efficient certification option to have previously certified Complete EHRs and EHR Modules tested and certified to only the applicable new and/or revised certification criteria.**
Today’s Relationship of S&I Framework with ONC and Other Relevant Entities

Office of the National Coordinator (ONC)

- Health Information Technology Policy Committee (HITPC)
  - An ONC Policy Committee

- S&I Framework
  - ONC Policy Steering Committee
  - S&I Steering Team
  - Initiative Steering Committee

- Standards Development Committee (SDO)
  - Includes 20 Standards (e.g. HL7, DICOM, etc.)

- Federal Partners

- Health Information Security Standards Committee (HITSC)
  - An ONC Standards Committee
National Health Information Infrastructure (NHII) ~ The Genealogy

**NHII Definition:**
A healthcare standardization initiative for the development of an interoperable health information technology system.

**NHII Goal:**
Build an interoperable system of clinical, public health and health information technology.

**To Achieve Goal:**
Encourage public-private partnership with a Federal leadership role.

**Evolution of NHII ~ From 2004 to Today**
The NHII evolved into the Nationwide Health Information Network (NwHIN)

**Source:** Presentation NHII Tutorial, Dr. Yasnoff. July 20, 2004. [http://156.98.150.11/e-health/npyasnoff.pdf](http://156.98.150.11/e-health/npyasnoff.pdf)
### NHIN Prototype Phase I:
- Contract awarded May, 2007
- Determination of Need
- Four Contractors Involved:
  - Accenture
  - CSC
  - IBM
  - Northrup Grumman
- Demonstration (i.e., Prototype) Model Only

### NHIN Prototype Phase II:
- Amount of Contract: $22.5 M
- “Specification Factory”
- 9 HIEs to participate in NHIN implementation:
  - CareSpark (TN/VA)
  - Delaware Health Information Network
  - Indiana University (Indianapolis)
  - Long Beach Network for Health (CA)
  - Lovelace Clinic Foundation (NM)
  - MedVirginia (Central VA)
  - New York eHealth Collaborative
  - North Carolina Healthcare Information and Communications Alliance, Inc.
  - West Virginia Health Information Network

### NwHIN / NHIN Production Phase:
- Planned Q4, 2011 Connectivity
- Expected Participants: 35 entities sharing date
- As of 10/3/11, Participants are:
  - Center for Disease Control and Prevention / Community Health Information Collaborative (CHIC)
  - Department of Defense / Department of Veterans Affairs / Douglas County Individual Practice Association (DCIPA) / EHR Doctors / HealthBridge / Inland Northwest Health Services / Kaiser Permanente / Marshfield Clinic / MultiCare Health System / MedVirginia / North Carolina Healthcare Information and Communication Alliance, Inc. (NCHICA) / OCHIN / Regenstrief Institute / Social Security Administration / South Carolina Health Information Exchange / Southeast Michigan Health Information Exchange / Utah Health Information Exchange / Western New York Clinical Information Exchange

Nationwide Health Information Network (NwHIN) ~ Today

Previously known as the National Health Information Network (NHIN)

**Definition:**
A set of standards, services and policies that enable secure health information exchange over the Internet.

**Goal:**
Facilitate exchange of healthcare information being developed under governance of the U.S. Office of the National Coordinator for Health Information Technology (ONC).

**Approach:** Public-private venture.

**Stakeholders:**
1. Care delivery organizations (CDOs) using EHRs
2. Consumer organizations operating personal health records (PHRs)
3. HIEs with multi-stakeholder entities to facilitate data within a state, region or group of stakeholders
4. Specialized participants (data for secondary uses)

The NwHIN is a community to create the set of standards and services that, with a policy framework, enable simple, directed, routed, scalable transport over the Internet to be used for secure and meaningful exchange between known participants in support of meaningful use.

Nationwide Health Information Infrastructure (NwHIN)

NwHIN Exchange Update as of 2011

10 Current Exchange Participants:

- Department of Defense (DoD)
- Veteran’s Administration (VA)
- Social Security Administration (SSA)
- Center for Disease Control (CDC)
- MedVirginia
- Kaiser Permanente
- Regenstrief Institute (IN)
- HealthBridge (OH)
- Inland Northwest Health Services
- North Carolina Healthcare Information and Communications Alliance (NCHICA)

Active Onboarding Applicants:

- **Qualification:** 9 (Beacon Communities, State HIEs and CMS and their partners)
- **Validation:** 13 (7 SSA Awardees, 3 Beacon Communities and 3 State HIEs)
- **Activation:** 5 (5 SSA Awardees)

Inquiries Received:

14 (combination of State HIEs, Beacon Community awardees and others)
Health Information Security and Privacy Collaboration (HISPC)

**Objective:**
Address the privacy and security challenges presented by electronic health information exchange through multi-state collaboration. Harmonize state privacy law.

**Initial Contract:**

**Awarded/Concluded:** June 2006 / 2009

**Then Membership:** 42 states and territories

**Working Body:**
Harmonizing State Privacy Law Collaborative (HSPLC)

**Purpose of Working Body:**
To support the implementation of both intra- and interstate electronic health information exchange (HIE) by assisting states to identify, analyze and address state laws that may impact HIE.

Sources:

HSPLC identified best practices for
- categorizing,
- evaluating, and
- reforming state laws related to electronic disclosure of health information.
Health Information Security and Privacy Collaboration (HISPC)

**Highlights from Roadmap Report (3/31/09):**
- Narrative and tools to guide states about privacy laws
- Designed to help states with *interstate HIEs*
- **Legislative reform** will be required for states to collaborate
- All states will benefit from the development of *workable information exchange standards and practices* within and among states
- Two tools developed: (1) Comparative Analysis Matrix, and (2) Assessment Tool.

**Comparative Analysis Matrix (CAM):** collection of almost 150 subject matter areas typically addressed by state law that involve or may impact the use and disclosure of health information

**Assessment Tool:** (a) assist stakeholders to identify and obtain consensus on priority recommendations for legislation, (b) enable a state to identify and analyze relevant state statutes and establish a priority order for potential statute modernization efforts, and (c) allow states to identify non-legislative solutions to address identified issues

**Sources:**
What did HITECH do for HIEs?

- **Emphasis:** Automation and electronic access to patient information

- **Federal Funding:** HITECH allocated $2B to support Health Information Exchange (HIE) activities; State HIE Cooperative will receive $564M

- **Requirements:** Meaningful Use incentives for Electronic Health Records (EHRs) to improve automation of providers to Medicare and Medicaid patients (CMS incentives). This automation would facilitate HIE.

- **Staging:** Meaningful Use will be staged in 3 phases to achieve the level of desired HIE. [Stage 2 appears to be delayed by one year.]
HITECH and Its Impact on HIEs

2009 The American Reinvestment and Recovery Act (ARRA) is signed into law which includes The Health Information Technology for Economic and Clinical Health Act (HITECH)

ARRA = $ 787 Billion  \rightarrow  HITECH = $ 34 Billion

Health Information Exchange Initiatives = $ 2 Billion
The HITECH Act’s Framework for Meaningful Use of Electronic Health Records (EHRs)

- Regional Extension Centers
- Workforce Training
- Medicare and Medicaid Penalties and Incentives
- State Grants for Health Information Exchange
- Standards and Certification Framework
- Privacy and Security Framework

Meaningful Use of EHRs

- Adoption of EHRs
- Exchange of Health Information

Improved individual and population health outcomes

Increased transparency and efficiency

Improved ability to study and improve care delivery
HITECH and Its Impact on HIEs

Two Specific HITECH Programs Directly Supporting HIEs

1. State Health Information Exchange Cooperative Agreement Program,

    and

2. the “Beacon” Community Program

HITECH and Its Impact on HIEs

Two Specific HITECH Programs Directly Supporting HIEs

State Health Information Exchange Cooperative Agreement Program

Purpose of Program:
Facilitate and expand the secure electronic movement and use of health information among organizations according to nationally recognized standards. This program will be a federal-state collaboration aimed at the long-term goal of nationwide HIE (NwHIN) and interoperability. To this end, ONC awarded cooperative agreements to states and State Designated Entities (SDEs).

Size of an Individual Award:
Determined by formula with pre-determined, multiple factors (*states with the largest populations will receive the largest awards*).

Range of Individual Awards:
$4 to $40M over 4-year period (2010-2013) - $560M allocated to this program.

Qualification:
One award per state; multi-state arrangements are permitted (*District of Columbia and Puerto Rico are included*).

HITECH and Its Impact on HIEs

Two Specific HITECH Programs Directly Supporting HIEs

“Beacon” Community Program

Amount Allocated in HITECH: $220 Million
Range of Individual Awards: $10 to $20 Million per award

Difference from State Health Information Grants:
Competitive process

Type of Applicants for “Beacon” Grants:
State agencies, non-profit Integrated Delivery Networks (IDNs), Health Information Organizations (HIOs), and Regional Extension Centers (RECs)

Applicant Requirements:
Must have existing HIE capabilities and high rates of health IT adoption to demonstrate advanced quality and efficiency required designated recipients.

Main Purpose of Program:
Define best practices in the adoption and use of HIT that other communities may emulate.

HITECH and Its Impact on HIEs

Meaningful Use Objectives Requiring Health Information Exchanges (HIEs)

2011
- Lab Results Delivery
- E-Prescribing
- Care Summaries
- Claims and Eligibility Checking
- Quality and Immunization Reporting, if available

Increases volume of transactions that are commonly happening today:
- Laboratory to Provider
- Provider to Pharmacy

2013
- Registry Reporting / Reporting to Public Health
- Electronic Ordering
- Health Summaries for Continuity of Care (COC)
- Receive Public Health Alerts
- Home Monitoring
- Population Personal Health Records (PHRs)

Substantially Steps Up Exchange For:
- Provider to Laboratory
- Pharmacy to Provider
- Office to Hospital / Vice Versa
- Office to Office
- Office to Patient / Vice Versa
- Hospital / Office to Public Health / Vice Versa
- Hospital / Office to Reporting Entities
- Hospital to Patient

2015
- Access Comprehensive Data From All Available Sources
- Experience of Care Reporting
- Medical Device Interoperability

Starts to Envision Routine Availability of Relatively Rich Exchange Transactions:
- “Anyone to Anyone”
- Patient to Reporting Entities
State Focus: 
The Lynchpin for Success
The states themselves are an important entity in the progression of HIE initiatives. Some of the areas in which the states engage include:

- **State-Specific Office**: To manage federal funds and support the strategic planning process for HIEs.

- **State Privacy Laws**: There are nuances in the privacy laws and this information is critical to participants within each HIE.

- **Inter-State Commerce Issues**: While most HIEs have a state-specific focus, there are other HIEs that span across borders to another state(s). Inter-State Commerce concerns must be considered for HIEs.

- **Trust Domains**: In order to ensure security when accessing or storing information, *Trust Domains* have been created. They are a framework that takes into consideration those requirements and standards.
An Example of a Trust Domain:

Health Information Trust Alliance (HITRUST)

www.hitrustalliance.net

- Established the Common Security Framework (CSF), a certifiable framework that can be used by any and all organizations that create, access, store or exchange personal health and financial information.
- Harmonizes the requirements of existing standards and regulations, including federal (HIPAA, HITECH), third party (PCI, COBIT) and government (NIST, FTC).

National Institute of Standards and Technology (NIST)

http://www.nist.gov/index.html

- The National Institute of Standards and Technology's website. NIST, a federal, non-regulatory agency of the U.S. Department of Commerce, was founded in 1901 as the nation's first federal physical science research laboratory.
- NIST Mission: promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life.

To gain a better understanding of the HIE activities at each state level, [http://statehieresources.org/](http://statehieresources.org/) can provide a variety of information to assist you.

- Every state will have a state-level HIT Coordinator or Department of eHealth.
- A State-Designated Entity (SDE) may or may not be created in a state. It functions as a vehicle for public-private collaboration.
- State level organizations help to create a trust zone. It allows for the voices of constituents to be heard as well as act as a vehicle for information sharing.
- Every state has both a Strategic and Operational Plan (loaded on this website).
- State contacts (listed on the website).
- HIE activities may be include more than one state specific organization.
- For additional state-specific information, go to each state’s web site and search for HIE information.
State Privacy Laws

State Privacy laws

• Privacy laws at the state level are not identical.

• If you participate in an HIE, a Business Associate Agreement (BAA) is required to ensure protection of privacy for patient information. These agreements must be provided to each party that interacts with another party. As a result, there could be a very large number of BAAs in place to view or exchange patient data.

• Data Use and Reciprocal Support Agreement (DURSA): With the growing number of Business Associates that will be entering into an HIE, there was a need to simplify the arrangement between and among those associates. DURSA is a policy which allows one agreement to be signed for all participants within the NwHIN initiative.
Why is Data Use and Reciprocal Support Agreement (DURSA) important?

- **Multi-party agreement** among participating HIEs that defines how the HIEs relate to each other.
- **Legal framework** within which HIEs can exchange data electronically.
- A type of **Trust Agreement**.
- Assumes that each HIE has **trust relationships in place** with its participants.

As part of the DURSA conversation, it is important to understand why there are challenges to the development of Trust Agreements.

1. Compliance with Applicable Federal Law
   - HIPAA
   - Privacy Act
   - FOIA
   - Federal Torts Claims Act
   - Federal Information Security Management Act

2. Reconciliation of and Compliance with Varying State Law
   - Health records privacy laws
   - Basic contract law

3. Accommodation of Multiple Participants
   - Structure and Governance
   - Capabilities
   - Policies and Procedures

Data Use and Reciprocal Support Agreement (DURSA)

Key Components of Data Use and Reciprocal Support Agreement (DURSA)

1. Delineation of “Permitted Purposes” for exchange
2. Delineation of the permitted future uses of exchanged data
3. HIPAA
4. Consent or authorization
5. Performance specifications
6. Reciprocal duties
7. Representations and warranties
8. Dispute resolution
9. Entity protection

State Collaborative Effort to Advance HIE/EHR Interoperability

One Example of Multi-State Collaborations

• EHR / HIE Interoperability Workgroup is in place to advance these efforts.

• **Mission:** Establish a strong marketplace of integrated EHRs which have connected capabilities to HIEs.

• **Approach:** Engage in a two-phase effort.

**Phase I: Develop Implementation Guides and Create Certification**

- Create workgroup with states and vendors
- Develop priority list of capabilities
- Harmonize with ONC S&I
- Create functional & technical specs
- Collaborate with state policy advisory groups to ratify criteria
- Standardize interface for vendors to connect to HIE

**Phase II: Implement Preferred Vendor Certification Program**

- Develop preferred vendor program with REC based on certification process
- Convert workgroup participants to preferred vendors
- Engage broader vendor community for certification process
- Create mechanisms to promote use of standards in connecting EHRs to HIEs
### Why is this list of states Important?

The eight states listed to the left contain 30% of the U.S. population.

### Why are these vendors included and not others?

These eleven vendors who have products for both EHRs and HIEs have significant market share.

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<thead>
<tr>
<th>States</th>
<th>EHR Vendors</th>
<th>HIE Vendors</th>
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<tr>
<td>California</td>
<td>Allscripts</td>
<td>Axolotl</td>
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<td>Colorado</td>
<td>eClinicalWorks</td>
<td>InterSystems</td>
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<td>Oregon</td>
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*Note: Listing above contains information last updated as of August 5, 2011.*
Terms of Engagement

• Members have signed a Memorandum of Understanding (MOU).

• Vendors commit to develop product to agreed upon specifications.

• States commit to market advance value of EHRs and HIEs (those vendors that receive “plug and play” certification) to provider community.

• New York HIE (NYeC) will lead all project management, technical development, and coordination.
State Collaborative Effort to Advance HIE/EHR Interoperability

Alignment with Other State and National Initiatives
ONC Standards & Interoperability (S&I) Framework

• Workgroup will conduct a GAP analysis of work being done on S&I Framework and will work to align.
• By piloting standards aligned with the S&I Framework, it will accelerate adoption in the market by 9-12 months.

Beacon EHR Affinity Group

• Alignment exists at leadership level of both groups; biweekly calls being held to ensure coordination.
• All workgroup products between both groups are being shared; technical consultants attending both WG meetings to ensure consistent deliverables; GAP analysis underway to ensure any discrepancies in approach.
• Similar vendors and state members make up both the Beacon Communities Workgroup and EHR/HIE Interoperability Workgroup.
Available State Level Resources

http://www.himss.org/statedashboard/
http://healthit.hhs.gov/portal/server.pt?v=en=512&objID=1488&mode=2
http://statehieresources.org/
Transitioning to the Future
Known and Unknown

What do we think will transpire?

- **Cost**: High infrastructure costs may accelerate merging of HIEs or truncating plans for a variety of HIEs in a state.

- **Political Environment**: Given the current national debt and concerns about funding existing programs, future federal funding may be compromised in the future.

- **Sustainability**: Long-term sustainability will remain a challenge for some HIEs, especially if they must support all costs, potentially without federal funds.

- **Emerging Services**: Can each HIE develop additional services that are emerging in a timely, cost-effective manner, as well as secure the level of adoption required to sustain emerging services?
Business drivers will always be important as a path to the future is paved for HIEs.

- Sustainability
- Adoption
- Improved Care
- Coordination of Care
- Decreased Health Costs
Various models promise to facilitate more efficient care delivery and begin to “bend” the cost curve. Examples of these models include, but are not limited to:

- Accountable Care Organizations (ACOs)
- Care Coordination
- Patient-Centered Medical Home (PCMH)

**What drivers do these patient-care delivery organizations have in common?**

- Need to access patient clinical information across various healthcare organizations
- Requirement to facilitate coordination of care
- Maintain and access metrics to show outcomes of patient care
- Leverage electronic transmission of data to payers / insurers
- Need to automate with Electronic Health Records (EHRs) to capture more data
- Engage consumers with services to accelerate services such as scheduling, physician communication, request for records, etc.
How will they shape the future based on benefits to Patients and Providers?

- Payers can point patients to **providers who have integrated technology** into their practice and facilitate Coordination of Care.
- Payers are participating in **joint ventures** for various care models, including ACO as well as HIEs, to facilitate Coordination of Care.
- Payers are **working with employers to education consumers** and ask that consumers participate in managing their care through prevention.
- Shifting of greater **personal responsibility** to patients and/or caregivers will require access to personal health data.
- **Market share may be lost or gained** if providers are automated or provide electronic access for certain services.
How will they shape the future based on benefits to Patients and Providers?

- **Adoption** will be critical for providers who collect critical patient information.
- Continued **reimbursement challenges** will require HIE solutions that are priced to market pressures.
- Employers will continue to **encourage employees** to document their health information through tools such as a Personal Health Record (PHR).
- Employers believe that **providing employees with access** to their health information will help to decrease costs.
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  (1) http://healthit.hhs.gov/portal/server.pt?open=512&objID=1488&mode=2
  (2) http://healthit.hhs.gov/portal/server.pt/community/healthit_hhs_gov__hitech_and_funding_opportunities/1310

- HIMSS HIE State Dashboard  http://www.himss.org/statedashboard/


- Health Information Security and Privacy Collaboration (HISPC)

- HITrust Alliance  http://www.hitrustalliance.net

- National eHealth Collaborative (NeHC)  http://www.nationalehealth.org


- Nationwide Health Information Network  

- Office of the National Coordinator for Health Information Technology (ONC)
  http://healthit.hhs.gov/portal/server.pt/community/healthit_hhs_gov__onc/120 0

- State HIE Information
  (1) http://statehieresources.org/
  (2) http://healthit.hhs.gov/portal/server.pt/community/healthit_hhs_gov__hitech_and_funding_opportunities/1310

- The Standards & Interoperability Framework  http://www.wiki.siframework.org
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Reports
- Health Information Security and Privacy Collaboration, HSPLC Roadmap: Analytical Framework and Collaborative Recommendations, prepared by Harmonizing State Privacy Law Collaborative (includes Florida, Kansas, Kentucky, Michigan, Missouri, New Mexico, Texas); March 31, 2009.
Additional Sources

Providers can find ONC-ATCB certification results at the Certified Health IT Products List (CHPL)

ONC’s Certified HIT Products List (CHPL) Web Page
http://onc-chpl.force.com/ehrcert

- All certified Complete EHRs and EHR Modules that could be used to meet the definition of Certified EHR Technology (from all ONC-ATCBs).
- Providers electing to combine certified EHR Modules use the CHPL to validate whether the EHR Modules they have selected satisfy all of the applicable certification criteria that are necessary to meet the definition of “certified EHR technology.”
- Provides ID number required for CMS application.

Source: http://healthit.hhs.gov
Additional Sources

Resources to Find Information about ONC Criteria and NIST Test Procedures

ONC’s website with a link to “Standards and Certification Criteria for Electronic Health Records”

NIST’s website with a link to “Approved Test Procedures”

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Glossary: Acronyms to Learn Related to Continuity of Care (COC)

- International Organization of Standardization (ISO)
- American National Standards Institute (ANSI)
- Health Level 7 (HL7)
- American Society for Testing and Materials (ASTM)
- Integrating the Healthcare Enterprise (IHE)
- Healthcare Information Technology Standards Panel (HITSP)
- Certification Commission for Health Information Technology (CCHIT)
- Healthcare Information Security and Privacy Collaboration (HISPC)
- Nationwide Health Information Network (NwHIN)
- Regional Health Information Organizations (RHIOs)
- Health Information Exchange/Organization (HIE/HIO)
- Systematized Nomenclature of Medicine Clinical Terms® (SNOMED CT)