



Delaware Statewide Strategic and Operations Plan for Health Information Exchange

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Introduction

In 2007, Delaware launched the nation's first operational, standardized, real-time, interoperable statewide health information exchange, connecting hospitals, reference laboratories, and physician practices across the state. The Delaware Health Information Network (DHIN) originated as a vision of the Delaware General Assembly, which established it as a public instrumentality of the state in 1997. Created in statute as a public-private partnership, DHIN was given the mission of developing an electronic data interchange network to provide health care professionals across the state with immediate access to the most current patient information at the point of care.

Where political, logistical and technical barriers previously existed, DHIN has succeeded in bridging geographical and organizational boundaries to expedite the availability of clinical test results to health care providers. Initially with the Delaware Health Care Commission (DHCC) serving as its parent agency, DHIN contracted with technology firms Medicity, Inc. and Perot Systems in September 2006 to implement and maintain the software solutions and technological infrastructure needed to ensure more timely delivery of laboratory and pathology results, imaging studies, and admission face sheets. On March 30, 2007, DHIN went live with a technical pilot; and on May 1, 2007 the system was fully operational in five physician practices. In June of 2009, DHIN deployed a community master patient index (CMPI) and record locator service (RLS) to enable patient record search of over two years of clinical history available through DHIN by way of a web-based community health record.

In 2005, DHIN was awarded an Agency for Healthcare Research and Quality (AHRQ) State and Regional Demonstration project contract. The contract was for \$4.7 million over five years and ended September 2011. Additionally, DHIN was selected as one of the original nine health information exchanges to participate in the Nationwide Health Information Network (NwHIN) Trial Implementation project led by the Office of the National Coordinator for Health Information Technology and was subsequently awarded an option year contract to continue participation in the NwHIN.

In the years that followed, DHIN grew, connected practices and data senders from throughout the State, and expanded services and functionalities beyond simple results delivery. For example, participating hospitals now send syndromic surveillance data to the Delaware Division of Public Health while providers use the DHIN's query functionality to locate and view a patient's clinical data – contributed by any participating data senders – in a true community health record format. Today, the eHealth Initiative recognizes the DHIN as a Stage 5¹ HIE. As one of the most advanced HIEs in the nation, with a level of penetration and adoption unmatched by any other state, the DHIN has

- More than 5,000 providers and staff at 570 Delaware practices and organizations live on DHIN (this figure represents approximately ninety percent of providers

¹ The eHealth Initiative Stages of Development range begins at Stage 1 (Starting) and progress numerically to Stage 7 (Innovating). Stage 5, an advanced HIE by eHI's standards, is a fully operational health information organization; transmitting data that is being used by healthcare stakeholders.

practicing in Delaware); 238 of these practices receive clinical results/reports exclusively through the DHIN.

- One hundred percent of Delaware acute care hospitals are enrolled in DHIN.
- One hundred percent of Delaware's Skilled Nursing Facilities are enrolled in DHIN.
- Three statewide, independent laboratories – Laboratory Corporation of America (LabCorp), Quest Diagnostics, and Doctors Pathology Services – participate.
- One hundred percent of federally qualified health centers in Delaware exclusively receive results via DHIN.
- Five types of transactions (laboratory results, radiology reports, transcribed reports, pathology results, and hospital admission, discharge and transfer (ADT's)) delivered via three methods (EMR interface, electronic inbox delivery, and printer delivery).
- Eighty percent of laboratory tests ordered or performed in Delaware are reported through DHIN.
- More than 9,000,000 results and reports are transmitted annually via DHIN.
- More than 1,200,000 unique patients represented in the community master patient index, representing ninety percent of Delaware residents (based on 2010 census figures) as well as patients from nearly every State in the union.

In 2010, the General Assembly rewrote DHIN's enabling statute. The new enabling statute maintained DHIN's classification as a public instrumentality of the state but transitioned from its position under control of the Delaware Health Care Commission an independent, public-private not-for-profit corporation.

Mission, Vision and Goals

DHIN's mission is to facilitate the design and implementation of an integrated, statewide health data system to support the information needs of consumers, health plans, policymakers, providers, purchasers and research to improve the quality and efficiency of health care services in Delaware.

Specifically, it is designed to:

1. Promote more efficient and effective communication among multiple health care providers, including, but not limited to, hospitals, physicians, payers, employers, pharmacies, laboratories and other health care entities;
2. Create efficiencies in health care costs by eliminating redundancy in data capture and storage and reducing administrative, billing and data collection costs;
3. Create the ability to monitor community health status; and

4. Provide reliable information to health care consumers and purchasers regarding the quality and cost-effectiveness of health care, health plans and health care providers;

The vision of DHIN is to develop a network to exchange real-time clinical information among all health care providers (office practices, community clinics, hospitals, laboratories and diagnostic facilities, etc.) across the state to improve patient outcomes and patient-provider relationships, while reducing service duplication and the rate of increase in health care spending.

The DHIN's five primary goals serve as the basis for interoperability among all health care providers in the State of Delaware:

1. To improve the care received by patients served by Delaware's health care system and to reduce medical errors associated with the often inaccurate and incomplete information available to providers of medical care.
2. To reduce the time required and financial burdens of exchanging health information among health care providers and payers (necessary for patient care), by addressing the currently siloed and unintegrated model of distribution methods and dramatically increasing use of electronic means.
3. To improve communication among healthcare providers and their patients to provide the right care at the right time based on the best available information.
4. To reduce the number of duplicative tests to afford specialists a more comprehensive view of the patient upon referral from his/her primary physician and to expedite the reporting of consultant opinions and tests/treatments between specialists and the referring physicians.
5. To improve the efficiency and value of electronic health records (EHR) in the physician office and to assist those physicians without an EHR to better organize and retrieve test results.

Benefits of DHIN

The transparent availability of information, and the incentives and ability to use it, are critical prerequisites for effective, safe, coordinated care. According to a Commonwealth Fund report, U.S. health spending is projected to increase from 16 percent of GDP in 2006 to 20 percent in 2016 – from \$2 trillion to \$4 trillion.¹ Despite this enormous expenditure, care is either underused (patients do not get recommended care) or overused (patients receive inappropriate care that is of little value or may expose them to harm). Furthermore, missing information has been shown to adversely affect care in 44 percent of clinic visits and delay care in 59 percent of visits.² In 2007, Kaelber and Bates reported that 18 percent of patient safety errors and 70 percent of adverse drug events could be potentially eliminated if the right information about the right patient was consistently available at the right time.³ Nationwide use of a system that incorporates many of the features already in place in DHIN could improve patient safety and clinical outcomes while saving more than \$80 billion over 10 years.¹ These savings could be attributed to fewer duplicate tests, shorter hospital stays, and reduced administrative costs.

In 2011, DHIN commissioned an independent, third-party evaluation of benefits as a requirement of its Agency for Healthcare Research and Quality (AHRQ) contract. The evaluation process examined and measured DHIN's growth and value. When formed, DHIN's mission was to develop an electronic data interchange network to provide health care professionals across the state with immediate access to the most current patient information at the point of care. Through implementation of technology, commitment of Data Senders (hospitals and reference labs who submit results data to the DHIN), and systematic enrollment of providers, DHIN has established the infrastructure and data penetration required to carry out this mission.

While significant progress has been made by DHIN to establish the foundation, the real value of an HIE comes when care givers actively use results available through the HIE as a part of their workflow. This is commonly referred to as information being "pulled" from the HIE versus "pushed" to or "retrieved" by the end users and made available for use. When users are retrieving and utilizing the information as a part of the care delivery process, effectiveness and efficiency are improved, and cost savings are realized. Both the quantitative and qualitative measures demonstrated that while DHIN continues to push data to providers, those same providers are seeking results (retrieving data) from the DHIN at increasing rates. Users are realizing the benefits expected including:

- End users interviewed, without exception, indicated that using the DHIN information, whether through look up features provided by the DHIN or interfaced to their Ambulatory Electronic Health Record (AEHR), was part of their workflow. Phrases such as "DHINing the patient" and "Did you DHIN it?" have developed as part of the practice dialogue related to obtaining patient information required for care delivery
- Data evaluated on user access indicated provider use of the DHIN to access information on patients presenting for treatment where a prior clinical relationship was not established in the DHIN increased ten-fold between July 2010 and June 2011. This data, combined with interview information, demonstrates the DHIN is searched for results and reports to support effective and efficient care
- Among the providers interviewed, there was consensus that data provided in the DHIN will have an impact on care delivery including reduction in duplicate tests. This was supported with an analysis of test results for tests that are often high cost and high volume. The rate of test results per unique patient sent through the DHIN (as determined by the Community Master Patient Index), in June 2011 as compared to June of 2009 was 30 percent lower for radiology exams and 33 percent lower for lab results. Based on Medicare reimbursement rates, this represents a \$6.5 million cost avoidance through reductions in unnecessary testing.

DHIN has also had an impact on cost for both providers and senders beyond those recognized from workflow improvements related to patient care. These savings include:

- Using the DHIN structure, annual savings of over two million dollars has been realized by data senders with providers who utilize the DHIN as the primary method for receiving results based on the average cost to send results using

traditional methods of fax and mail. Additional savings of one million dollars could have been realized for the same period if all DHIN member providers were committed to use the DHIN as their primary source of results reporting

- Resource requirements related to results receipt and processing were reduced in one five-physician practice by using the DHIN. One staff member was redirected to direct patient care and three positions were eliminated
- Practices who establish interoperability to their AEHR through the DHIN versus directly with hospitals and reference labs results realize cost savings as related to the implementation of the AEHR. By comparing the cost to interface via point to point methodology versus through the DHIN, it was determined an estimated implementation cost savings of between \$18,500 and \$28,500 can be realized by each provider practice.
- As DHIN member practices adopt AEHRs, the total potential savings for connecting to the DHIN for interoperability required to achieve meaningful use under the Health Information Technology for Clinical and Economic Health (“HITECH”) is significant. Through DHIN negotiated interface rates and the single point of interface, estimated savings if all providers connected to a DHIN certified AEHR are \$7.5 million in one-time costs and \$1.5 million in annual costs.

DHIN Governance

The DHIN was created through Delaware legislation in 1997 to “...promote the design, implementation, operation and maintenance of facilities for public and private use of health care information in the state...” The original statute creating DHIN (Delaware Code Title 16, Part XI, Chapter 99, Subchapter 9922) detailed the Powers and Duties of this public-private partnership: “Develop a community-based health information network to facilitate communication of patient clinical and financial information, designed to:

In 2009, many states, including Delaware faced serious State budget deficits. In response, Delaware Governor Jack Markell proposed numerous State agency consolidations and reorganizations to close these gaps. The State’s Fiscal Year 2010 Budget Act administratively moved the Delaware Health Care Commission (DHIN’s original parent agency) into the Office of the Secretary, Department of Health & Social Services (DHSS). The move removed the Commission’s operating budget but did not change its statute or its statutory authority.

In January 2010, legislation rewriting DHIN’s enabling statute was introduced. That July, the General Assembly passed and the Governor signed Senate Bill 231 in July, 2010, setting in motion DHIN’s transition from its position under Delaware Health Care Commission control to a public-private not-for-profit corporation.

Current Board Structure The new enabling statute called for DHIN to transition fully into a more traditional corporate model on January 1, 2011. Under the new statute, the Board of Directors (Board) consists of 19 members (please refer to Appendix A for a listing of the current Board) with various business, technology, and healthcare industry skills:

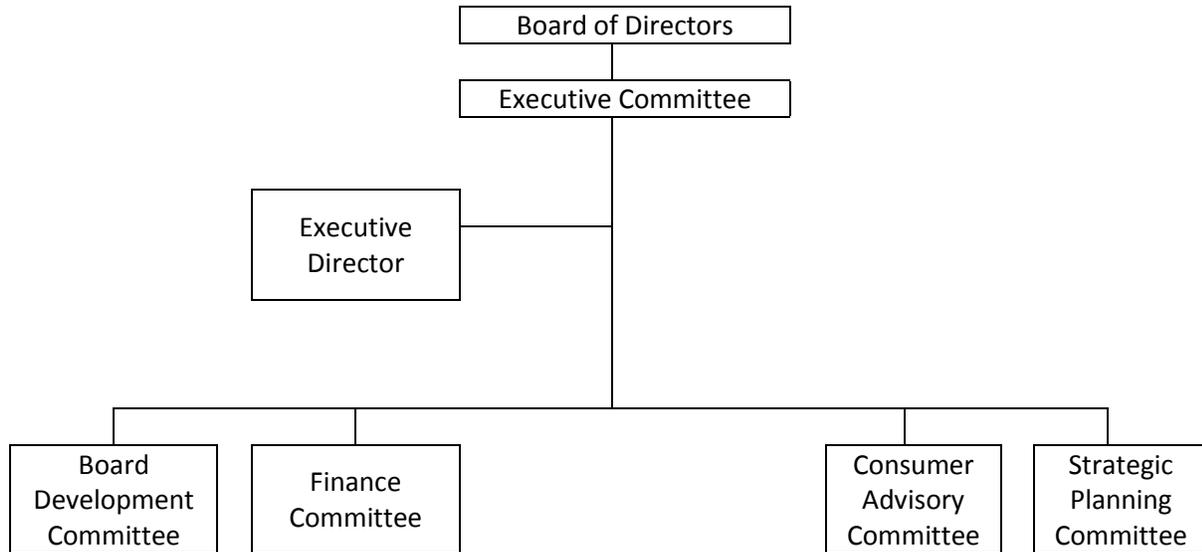
- (1) The Director of the Office of Management and Budget or the Director's designee.
- (2) The Chief Information Officer of the Department of Technology and Information or the Chief Information Officer's designee.
- (3) The Secretary of the Department of Health and Social Services or the Secretary's designee.
- (4) The Controller General or the Controller General's designee.
- (5) Six members, appointed by the Governor, including at least one person who representing the interests of medical consumers and at least three with experience and/or expertise in the healthcare industry.
- (6) Three members appointed by the Governor representing hospitals or health systems.
- (7) Three members appointed by the Governor representing physicians.
- (8) One member appointed by the Governor representing businesses or employers.
- (9) Two members appointed by the Governor representing health insurers or health plans.

Additionally, the Board, the Delaware Healthcare Association, the Medical Society of Delaware, Delaware State Chamber of Commerce, and other interested organizations were permitted to make nonbinding recommendations to the Governor for appointments to the Board.

The new enabling legislation contained several provisions similar to the DHIN's original 1997 enabling statute such as the Chair of the Board was elected by a majority of the Board members: members serve staggered 3-year terms, do not require State Senate confirmation and are unpaid. Also, the State extended sovereign immunity and liability protection for DHIN and its officers and directors as well as DHIN's the ability to receive state appropriations.

DHIN remains a quasi-government entity, but maturing as an organization and moving from the capital funding stage to the sustaining business operations stage made it appropriate to provide DHIN with the status and prerogatives of a corporation rather than a State controlled entity. Enabling this successful transition to a more traditional corporate structure, high-level Board appointees support and lend expertise to a strong Executive Director.

DHIN Board and Committee Structure



Committees and Workgroups

DHIN’s Board committees, established through its by-laws, as well as ad hoc, advisory committees and workgroups, created at the discretion of DHIN management are described below. Each DHIN Board committee is chaired by a Board member with DHIN staff providing support.

Board Committees:

Executive Committee

The Executive Committee consists of the officers of the Board, and three (3) additional members of the Board of Directors. The Executive Committee is comprised of seven (7) members at all times and, to the extent feasible, representative of various stakeholder groups (consumers, employers, health plans, hospitals, physicians, and State government). The Board Chair or his/her designee presides at the Executive Committee and oversees the operations of the DHIN and the Board of Directors. In addition, the Executive Committee evaluates the performance of the Executive Director; guides development, reviews and authorizes personnel policies and procedures; and assists the Executive Director with leadership and management matters.

Consumer Advisory Committee

The Consumer Advisory Committee (CAC) advises the Board of Directors on policies regarding privacy of patient health information, consumer adoption, communication and education, and other duties as assigned by the Board of Directors. The CAC interacts with the community to

gain input from consumers of health care and to provide information and education about the DHIN, its benefits and manner in which to access personal health information.

Finance Committee

The Finance Committee, presided over by the Board Treasurer, oversees the development of the budget; ensuring accurate tracking/monitoring/accountability for funds; ensuring adequate financial controls; and planning and supporting audits of all major functions, e.g., finances, programs or organization; and coordinating with the Strategic Planning Committee.

Board Development Committee

The Board Development Committee, chaired by the Secretary of the Board, supports the development of Board policies and procedures and monitor needed changes or amendments to the by-laws. The Board Development Committee identifies needed board member expertise/skills; recommending potential members to the Governor for appointment; nominates Officers and Executive Committee members; orients and trains new members; ensures effective board processes, structures and roles, including retreat planning, committee development, and board evaluation; and monitors the need for ongoing Board training, education and informational activities.

Strategic Planning Committee

The Strategic Planning Committee, presided over by the Board Chair or his/her designee, is responsible for overseeing development and implementation of the DHIN's sustainability and fundraising plans; reviewing major grants and contracts and their associated terms; identifying and soliciting funds from external sources for DHIN support; and coordinating with the Finance Committee.

Ad Hoc/Advisory Committees and Workgroups:

CIO Advisory Council

The CIO Advisory Council's membership is comprised of the Chief Information Officers from DHIN's data senders. The Council, chaired by DHIN's CIO, advises DHIN management and provides recommendations and advice regarding technology and data issues as they affect the DHIN and the use of data.

Health Information Management Systems (HIMS) Workgroup

The HIMS Workgroup provides guidance and oversight for ensuring the data integrity of information provided through the DHIN. The Workgroup members are also members of their organization's HIMS department, representing hospitals and also include reference laboratory members. The HIMS Workgroup develops DHIN business processes to ensure consistency of data management and master patient index (MPI) integrity. Workgroup members provide guidance and input to the Project Management Advisory Committee on the impact of adding new functionality on existing DHIN data as well as developing use cases and requirements for testing new data types and data sources.

Project Management Advisory Committee

The Project Management Advisory Committee supports the work of DHIN by providing input and guidance on the project management, implementation and testing processes. The Project Management Advisory Committee is comprised of project managers from DHIN, the technology vendor, data sender organizations, the State HIT Coordinator and is chaired by the DHIN CIO. The Committee members advise DHIN management at various stages of the implementation process, including interface coding and maintenance, testing, data standardization, monitoring. Committee members coordinate with the necessary business units within their organizations to ensure buy-in and commitment at all levels. The Committee also monitors and reviews the DHIN project plans and timelines assessing risk and defining mitigation strategies. Additionally, this Committee provides guidance for planning future functions, makes change requests, and ensures technical resources are appropriately dedicated to the project and that their systems are positioned for DHIN connectivity to ensure projects are implemented on time and consistent with specifications. The Committee makes recommendations to DHIN management with regard to risk management, evolving standards and technical priorities.

Emergency Access Workgroup

The Emergency Access Workgroup is an ad hoc group of emergency medical providers that meets as needed to provide guidance to DHIN with regard to developing solutions for emergency services, medication history, and access rights for emergency providers. The Emergency Access Workgroups provides insight into the workflow of the Emergency Department. The members of this workgroup consist of Emergency Department physicians and lead nurses. As the DHIN expands its reach, the Workgroup will be expanded to include emergency medical technicians and paramedics.

Clinical Advisory Group (CAG)

The Clinical Advisory Group (CAG) provides a forum for clinical and administrative staff from DHIN user organizations to advise DHIN on use of the system, improvements and additions they recommend. The CAG works in collaboration with the Consumer Advisory Committee to make privacy and security policy recommendations to management as indicated. Additionally, the CAG assists DHIN in addressing issues and barriers to the adoption of DHIN for practices across the state as well as reviews and makes recommendations on materials developed to educate and support DHIN users. The CAG membership is comprised of physicians and practice administrators from private practices, Federally Qualified Health Centers and hospitals. The CAG is staffed by the Provider Relations Team and supported by the DHIN technology partner, Medicity, Inc.

Lab Standardization Workgroup

The Lab Standardization Workgroup provides guidance on the development of result and ordering compendium standardization, lab result trending and electronic lab test ordering. The Workgroup is overseeing the LOINC mapping process as well as is defining methodologies for electronic lab ordering through DHIN, including analyzing workflow changes, developing business processes and defining policies and procedures needed to support the new system functions. The Lab Standardization Workgroup is also responsible for developing test requirements and is directly involved with testing electronic orders and lab result trending functionality. The members of this workgroup consist of the laboratory directors from all the DHIN data sending organizations as well as the respective project managers.

Staffing Model

In 2010, DHIN's organizational structure changed when the Delaware General Assembly passed and the Governor signed Delaware Senate Bill 231 (SB231). This resulted in DHIN control shifting from the Delaware Health Care Commission to a more traditional corporate model of governance. Up until this point, the Delaware Health Care Commission contracted with an outside management company to manage day to day DHIN operations. In 2011, the management contract with the outside management company was wound down and the Board hired a new Executive Director and Chief Information Officer. Today, the relationship between the Executive Director and the Board more closely resembles that of a traditional corporation with all staff now directly employed by DHIN.

The DHIN Executive Director provides day-to-day oversight and leadership for the DHIN and represents DHIN locally and nationally. The Executive Director is responsible for setting strategic direction of DHIN and providing guidance to the DHIN management team. This position also develops, implements and manages regional and national relationships to enhance DHIN's stature as a national leader in health information technology and ensures that DHIN is represented in discussions that set local and national policy direction for health information exchange.

The DHIN staffing model is comprised of four teams:

- Financial Management,
- Technical Operations,
- Provider Relations and Business Development, and
- Operations and Government Relations.

Financial Management, led by the Finance Manager, is responsible for budgeting, managing revenue and expenses, financial reporting and accounts payable and accounts receivables management, staff timekeeping, analytics development, new product and stakeholder pricing and EHR vendor contract management.

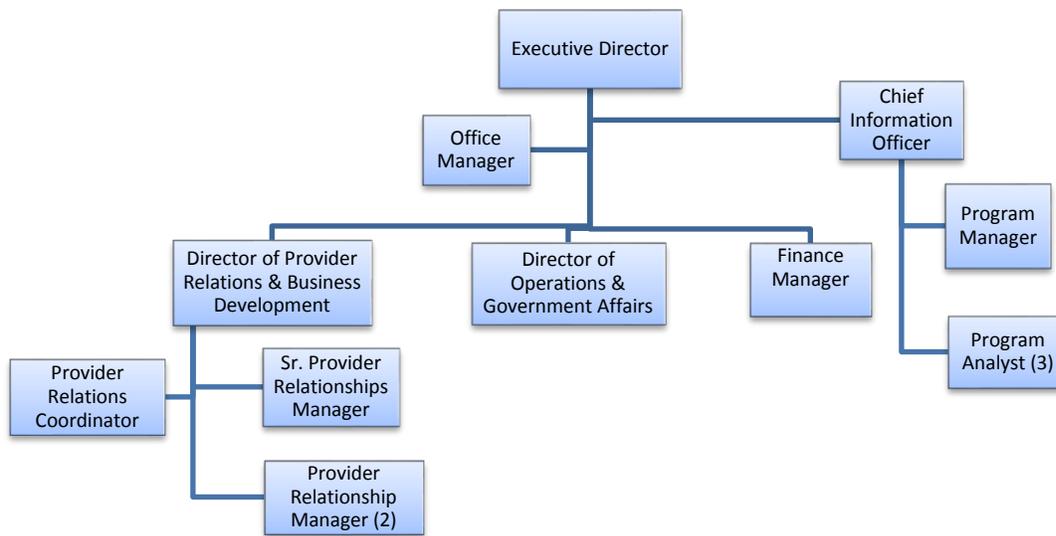
DHIN's Chief Information Officer leads Technical Operations. This team is responsible for managing the technology contracts, overseeing the project plan, managing EHR vendor relationships, working with participant organizations, collaborating with the provider relations team to address provider issues, and monitoring the system for availability, usage, access controls and security. This team is responsible for tracking and monitoring projects to ensure that they are progressing according to plan.

Under the direction of the Director of Provider Relations and Business Development, this team is the "face of DHIN." They are responsible for enrolling and training DHIN users, communicating with consumers and addressing questions or concerns, providing customer service to providers and working with potential data senders and EHR partners to educate them on DHIN participation, make presentations in the community to educate providers and consumers on DHIN, and develop marketing and communications materials.

The Director of Operations and Government Relations manages day-to-day activities, human resources and responsible for management and reporting for Federal contracts, grants and cooperative agreements. This position also provides guidance and consultation to the Executive Director regarding stakeholder priorities, policy implementation and issues resolution.

The organizational chart below depicts the reporting structure for these positions in support of DHIN’s mission and goals.

DHIN Organizational Chart



Accountability and Transparency

The statute creating the health information network in Delaware (Delaware Code Title 16, Chapter 103) established the DHIN as a public instrumentality of the State. As a State entity, all meetings of the DHIN Board of Directors are conducted in public in accordance with state law. Board of Directors’ meeting notices and minutes are posted on the DHIN website in accordance with Delaware Code: Title 29, Chapter 100, Freedom of Information Act.

Additionally, DHIN complies with Delaware’s Freedom of Information Act (Delaware Code Title 29, Chapter 100) and Governor Executive Order #31 (issued in October 2011) establishing uniform procedures for Freedom of Information Act requests..

Collaboration

Coordinated, collective action is required at every level of the health care system to realize the full benefit of health information exchange. Collaboration is essential to ensuring interoperability across providers of care. DHIN has achieved a significant and growing level of interoperability because it is flexible enough to work with the existing systems and infrastructure at the participating organizations from both a technical and operational standpoint.

DHIN is capable of connecting with virtually any system or technology solution able to transmit Health Level 7 (HL7) transactions – the internationally accepted standard for health care data sharing – and can also support other industry formats such as CCR/CCD/ANSI standard transactions. This architecture ensures wide adoption of the system by organizations that perform tests and services in support of clinical care. The success of DHIN is dependent on cooperation and consensus-building across all participating organizations in order to achieve a critical mass of provider adoption. By bringing everyone to the table (health care professionals from competing hospitals and health systems, laboratory personnel, technology specialists, consumers, and State officials), the network has been able to reach meaningful compromises to work toward building a system that meets the greatest needs of all end-users. To that end, DHIN enables provider participation regardless of the level of technology adoption in physician offices that have historically been slow to adopt clinical information systems.

It is DHIN's goal to support providers (hospitals and physician practices) in meeting meaningful use criteria in a manner that allows them to maintain their current systems and allows for them to leverage their investment in DHIN to support standardized reporting, meet eOrder entry, ePrescribing, public health reporting and quality reporting requirements, among others.

State Government HIT Coordinator

In March 2012, The Governor appointed Gary Heckert of the Delaware Department of Health and Social Services to be the State Government HIT Coordinator. Mr. Heckert currently serves as the Director of the Division of Management Services within the Delaware Department of Health and Social Services. In this role, he leads the Information Technology, Fiscal, Human Relations, Labors Relations, Purchasing and Facilities Organizations for the Department. Mr. Heckert also administers the "Birth to 3" program under Part C of IDEA and quality Assurance of state and federal Welfare programs.

Prior to joining the Department of Health and Human Services in 2011, Mr. Heckert worked in the private sector for 34 years. Most recently, he served as Senior Director, Operations for Educational Testing Service where he performed special projects to improve quality in critical testing programs and consulted with the VP of IT Operations to improve quality of daily production processes. Mr. Heckert also held senior level leadership positions in Elk River Trading LLC and EI DuPont de Nemours & Co.

Standards

Using widely adopted industry standards, such as HL7, enables healthcare organizations to participate in the exchange of healthcare information as standards continue to evolve. DHIN is

well represented on the national front – through Medicity and DHIN staff participation in national organizations, such as HIMSS - with regard to standards development and implementation.

The following table provides the list of standards in use today and those to be supported through 2013:

Standards Timeline

Standards	Today	2010	2011	2012-2013
Formats				
HL7 v2.x	Implemented			
HL7 v3.x	Implemented			
CDA				Implemented
CCR				Planned
CCD				Implemented
C32 Care Summary				Implemented
C19 SAML				Planned
C25 Anonimization				Planned
C37 Lab Results				Implemented
C39 Encounters				Implemented
C41 Radiology				Implemented
C62 Unstructured Docs				Planned
C80 Terminology				Implemented
C83 Consult & History				Implemented
C87				Planned
C154 Data Dictionary				
C163 Lab Orders				Planned
TN907				Planned
TN904				Planned
TN903				Planned
TN901				Planned
TN900				Planned
TP13 – XDS				Planned
TP14 – Lab Results				Implemented
T15 – ATNA				Planned
T16 – CT				Planned
T17 – Secure Comm				Planned
T18 – View Lab				Planned
T23 – PDQ				Planned
T24 - Pseudoanon				Planned
Transactions				
PIX/PDQ				Planned
XDS.b				Planned
XCPD				Planned
XCA				Planned
XDR				
XDM				
NAV				Planned

Vocabularies				
ICD9	Implemented			
CPT4	Implemented			
LOINC				Planned
SNOMED	Implemented			
NCPDP				Planned
RxNorm				Planned
ICD10				Planned
NDC	Implemented			
MULTUM				Planned
MicroMedex Drugdex				Planned
Medispan				Planned
UMLS				Planned
UCUM				Planned
UNI				Planned
First Databank NDDF				Planned
GS - Gold Standard Alchemy				Planned

Legend:

- Implemented – Currently implemented and operational within the Health Information Exchange.
- Scheduled – Health Information Exchange supports this standard functionality, but it is not yet operational.
- Planned – Health Information Exchange supports this standard functionality, but software configuration is required. In addition, an implementation timeframe has not yet been finalized within DHIN.

Transaction sets

DHINs support all HIPAA-standard transaction sets including HL7 and ANSI. Among the standards we support are ASTM, LOINC, SNOMED CT, RxNorm, ICD -9CM, ICD-10, X12N, NCPDP, HCPCS, and CPT and is not limited in using only these standards and code sets through its vendor Medicity.

Message Formats

Through DHINs HIE vendor Medicity, they have an extensive library of connecting and routing adaptors with the most prevalent being SOAP over HTTPS. These adaptors have been used with a wide variety of hospital, reference lab, payer, practice management, and electronic medical records products. The adaptors support a multitude of message payloads including HL7 v2.x - 3.x, ASTM CCR, NHIN CCD, NCPDP, ANSI HIPAA, XML-CCR, 3rd party proprietary formats, bridge interfaces, and many more. In addition, DHIN supports the HITSP format rationalization standard of Continuity of Care Document (CCD), which harmonizes the current HL7 v3 CDA and the ASTM CCR.

IHE interoperability profiles

DHIN supports IHE certified (Integrating the Healthcare Enterprise) profiles. We support patient search and exchange (PIX/PDQ support) services, clinical document search and exchange services (XDS/XDA), and auditing (ATNA) services.

National HIE-to-HIE standards

DHIN supports both current and new technical messaging and security standards for secure HIE-to-HIE exchange, including: core Microsoft-certified web service extensions, X.509 Certificate Token, SAML, and SOAP message security through its vendor Medicity

Direct

DHIN has implemented the Nationwide Health Information Network (NwHIN) Direct standard from iABILITY Network Inc™. This standard delivers low-cost, simple, standards-based, open, and secure connectivity for healthcare providers in Delaware who choose not to contribute to the Community Health Record. However, Direct allows an option to securely send Care Summaries and DPH Immunization data as HL7, through the DHIN to Public Health. DHINS Direct, though a partnership with Ability and Microsoft HealthVault, also allows Delaware providers to securely send care summaries to patients who have a Microsoft HealthVault account.

Standards at a DHIN Stakeholder Level

It is important to acknowledge, however, that although standards enhance information-sharing in DHINs community setting—particularly when data must be aggregated for patient-centric presentation and analytics purposes (i.e. Claims, Eligibility, Quality Indicators)—they are not always a viable means to facilitate exchange at a local level because of variations in standards implementation. DHIN must be able to adapt to and bridge specific current and future standards—and address proprietary formats as well. The DHIN platform, through Medicity, enables bridging to disparate translation formats to meet those standards—ultimately providing immediate time-to-value benefits to DHIN and its stakeholders.

File Transfer Protocol Standards

DHIN supports Secret File Transfer Protocol, Secure FTP, or SFTP) which is a network protocol that provides file access, file Transfer and file management functionalities to and from stakeholders data streams. This allows DHIN to use a number of different applications, such as secure file transfer over Transport Layer Security (TLS) and transfer of management information in VPN integration to the State Public Health & Medicaid.

Vocabulary Standards

In order to support interoperability of health information systems, DHIN has implemented common clinical terminologies and services that make those terminologies available on a shared infrastructure. The Reference Terminology Service is designed to tie together disparate systems whether from the perspective of nomenclature, content or structure standards. Among the terminology standards supported are LOINC, CPT4, HCPCS, ICD-9, ICD-10, SNOMED CT, RxNorm, NDC, MULTUM, MicroMedix, Medispan, UMLS, UCUM (for units of measure), and UNII (for ingredient allergy). The major recommendations of the HIT Standards Panel's Clinical Operations Workgroup with respect to vocabulary standards in support of proposed meaningful use Stage 1 and Stage 2 objective and how our product support these standards is discussed below:

Problem List:

The vocabulary standards adopted by the HHS/ONC in the Interim Final Rule - Health Information Technology (IFR - HITECH) for problem lists are ICD-9-CM or SNOMED CT. We support both ICD-9 and SNOMED CT in addition to ICD-10.

Medications:

RxNorm is the adopted vocabulary standards for medications. In addition to RxNorm, we also support a wide range of other medication vocabularies listed below:

- Multum MediSource Lexicon
- Micromedex Drugdex
- First Databank NDDF
- FDA NDC
- FDA MTHSL (FDA Standard Product Labels)
- Medi-Span Master Drug Database
- GS- Gold Standard Alchemy

DHIN also supports mapping of proprietary to RxNorm to promote the use of the coding standards as recommended by the Workgroup.

Allergies:

The Workgroup did not specify the adopted terminology standard for allergies and the IFR allows use of free text or local vocabularies. DHIN's solution supports the usage of Unique Ingredient Identifier (UNII) to represent the ingredient allergy information.

Procedures:

DHIN supports all the coding schemes referenced in the IFR such as ICD-9-CM, (ICD-10 as candidate), SNOMED-CT, LOINC and CPT-4) for procedures.

Lab Orders & Results:

Use of LOINC codes is preferred but the IFR also allows usage of proprietary or local codes when LOINC codes are not received from a participating laboratory. DHIN supports LOINC codes and also supports the cross-mapping of proprietary lab codes to LOINC codes.

Vital Signs:

The adopted vocabulary standard for Vital signs is not specified at this time, i.e., free text or local vocabularies are fine. The candidate vocabulary is a CDA template.

While DHIN supports these standards, we are not limited in any way to using only these standards and code sets. Our architecture allows the flexibility of extending the master synonym

dictionary for local representation of clinical concepts and cross-referencing to standard vocabularies.

HIT Adoption in Delaware

The University of Delaware’s Center for Applied Demography and Survey Research, on behalf of the Delaware Division of Public Health’s Office of Primary Care and Rural Health, regularly conducts a capacity study of primary care and specialty providers. The last study was completed in 2011. The following are highlights from the 2006, 2008 and 2011 report with regard to physician response to questions related to use of technology.

Use of Technology	2011 % Primary Care	2008 % Primary Care	2006 % Primary Care	2011 % Specialists	2008 % Specialists	2006 % Specialists	% All 2011
High Speed Internet Connection	N/A	88%	74%	N/A	89%	78%	88%
Electronic Billing	89%	90%	88%	83%	83%	84%	85%
Electronic Scheduling	86%	86%	82%	79%	82%	79%	81%
Email	40%	70%	68%	44%	85%	81%	42%
Electronic Medical Records	59%	43%	28%	56%	51%	43%	57%
Electronic Order Entry	42%	22%	15%	54%	29%	26%	50%
Electronic Prescribing	64%	30%	22%	49%	25%	21%	54%
Electronic Lab/Rad Results	65%	53%	34%	65%	48%	46%	65%
Local Area Network	N/A	66%	57%	N/A	69%	70%	68%

While all use of technology in physician practices has increased during the five year period between 2006 and 2011, the use of electronic medical records has increased the greatest at a rate of 31 percent for primary care providers and 13 percent for specialists. In 2011, nearly 60 percent of Delaware physicians are using an electronic medical record. It should be noted, however, that the survey does not define electronic medical records. As a result, this number may be exaggerated. Access to electronic lab and radiology results also has significantly increased for primary care providers – a rate increase of 31percent over the five-year period. Use of electronic prescribing has also increased significantly since 2006 with primary care providers increasing use by 42% and specialists increasing use by 28%. There is a significant decrease in the use of email from 2008 to 2011. Researchers attribute this decrease to the fact that more sophisticated ways of exchanging patient information have become available since 2008.

With regard to adoption of DHIN, the map on the following page illustrates the geographic and special distribution of providers by service location type and enrollment status in the DHIN. DHIN enrollment spiked dramatically since the implementation of the patient search function, affording authorized providers secure, immediate access to patient clinical history at the time and place of care.

Distribution of DHIN Users

The distribution of DHIN users is consistent with the distribution of health care providers in the State of Delaware, with almost 60 percent of DHIN practices located in New Castle County—the

most populous county in the State; 20 percent located in Kent County—the smallest of Delaware’s three counties; and about 20 percent coming from Sussex County –the largest county in terms of land mass and the most rural of the three.

DHIN users also are diverse and representative of the State’s provider population with regard to specialty. DHIN users practice the following specialties:

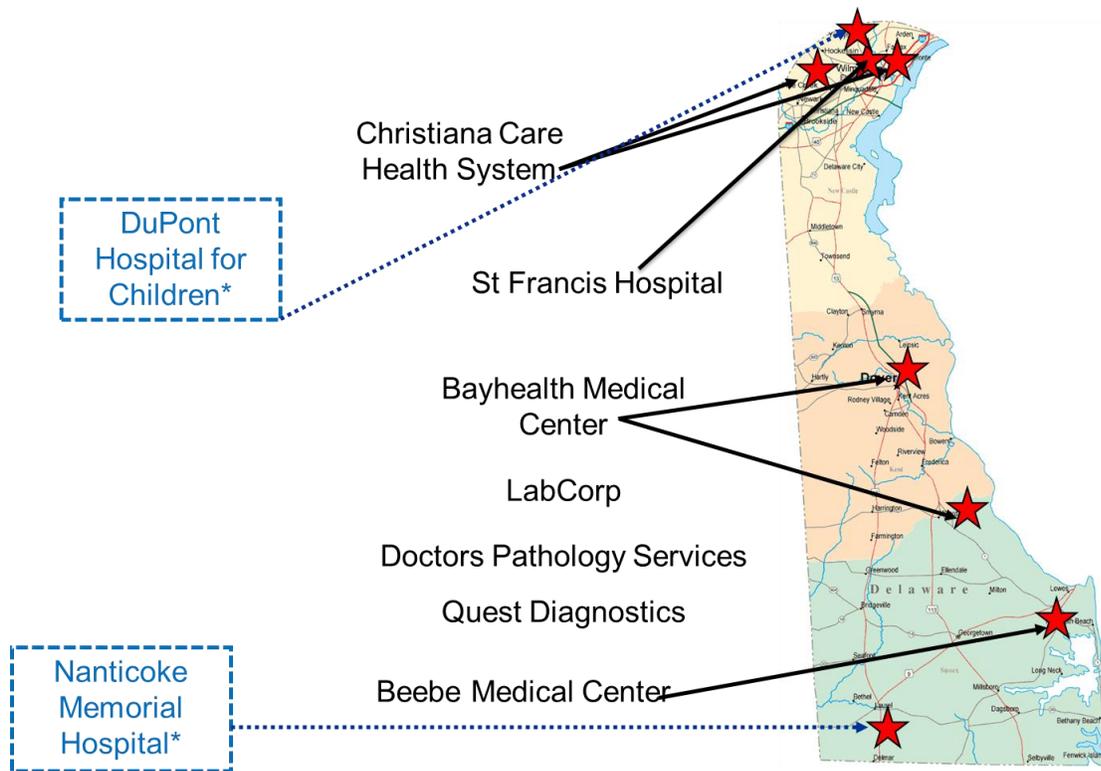
Assisted Living	Neurology
Cardiology	Neurology-Imaging
Cosmetic Surgery	OB/GYN
ENT	Oncology
Emergency	Orthopedics
Family Practice	Pathology
GI	Pharmacy
GYN	Podiatric
Hospice	Pulmonologist
Hospitalist	Surgery Center
Internal Medicine	Surgical Group
Long-term Care	Surgical Group-Oncology
Multi Specialty	Urology

Business Operations & Technical Infrastructure

Implementation

Service Area

The following map depicts the current service area acute care hospitals participating in DHIN. Those hospital organizations listed in black are fully interoperable with DHIN. Those labeled in blue have signed a Memorandum of Agreement to join DHIN and are in the implementation process. Three lab organizations, Lab Corp, Quest and Doctors Pathology are fully interoperable with DHIN. LabCorp and Quest Diagnostics have patient service sites statewide and Doctors Pathology Services serves provider offices in all three counties. Tri-State Open MRI and Papastavros’ Associates have executed Memoranda of Agreement to join DHIN and are currently in the on-boarding process. Tri-State Open MRI has locations throughout the state of Delaware. Papastavros’ Associates has locations in 2 of the 3 Delaware counties with facilities heavily concentrated in New Castle county, the most populated county in the state.



The below chart offers a graphic depiction of the history of when DHIN data senders have joined the network. Clearly there has been strong momentum generated in the last year in expanding the organizations that provide results to the DHIN. With 100% participation of acute care hospitals, along with five of the most prominent labs and radiology firms participating, DHIN can reasonably claim that DHIN users have access to well over 95% of medical results generated in the State of Delaware.

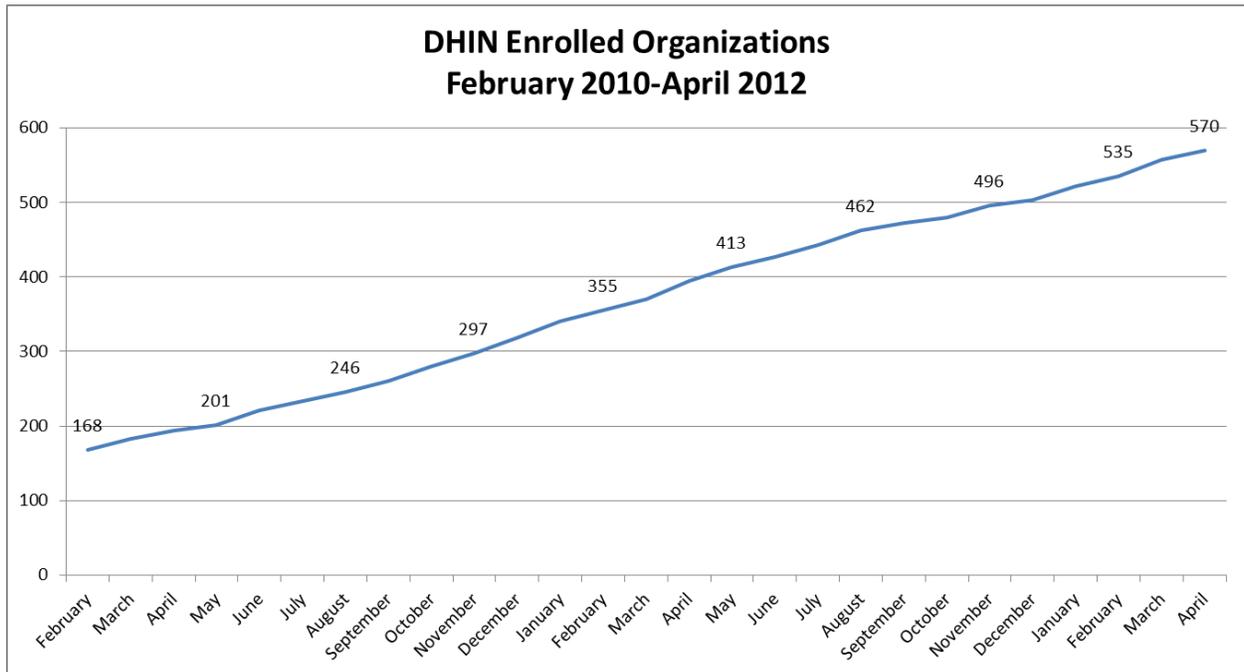
The Growing Roster of DHIN's Data Sending Partners



DHIN achieved 100% participation among Delaware's acute care hospitals in 2012

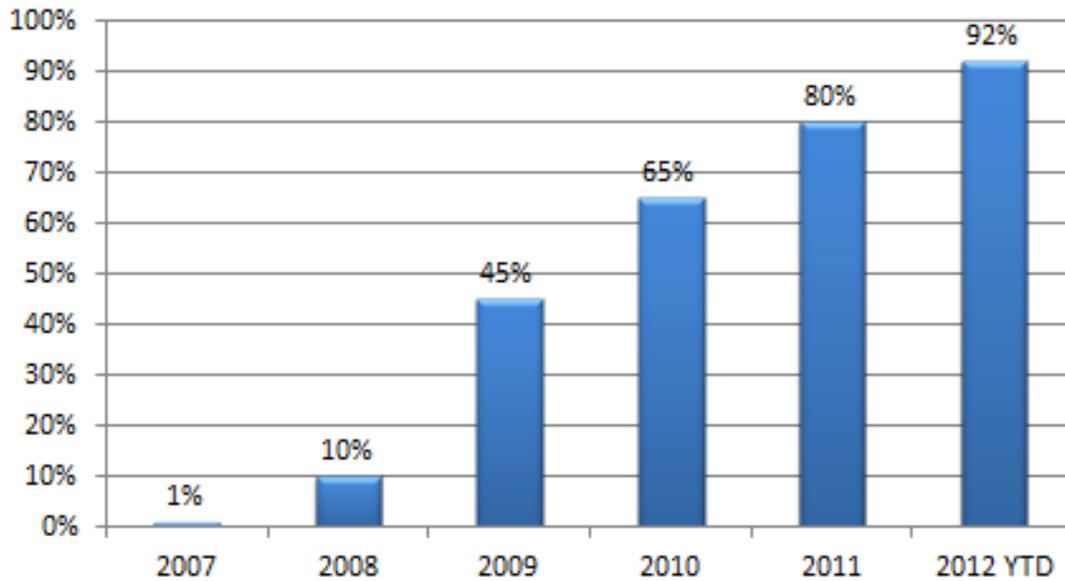
DHIN connects Delaware's largest cities with outlying rural and coastal areas through the participating organizations of BayHealth Medical Center (Dover and Milford), Beebe Medical Center (Lewes), Christiana Care Health System (Wilmington, Newark), and Laboratory Corporation of America (LabCorp), Quest Diagnostics, and Doctors Pathology Services each serving the entire state. St. Francis Hospital (Wilmington) went live in early 2010. Delaware became the second state to have all hospitals commit to participating in a statewide HIE when, in 2011, A.I. DuPont Hospital for Children joined and, in 2012, Nanticoke Memorial Hospital joined DHIN. In early 2012, DHIN enrolled its first two radiology practices.

User Enrollment



Provider Adoption of DHIN

(as a percent of Delaware healthcare providers – Mar 2012)



Denominator = 2,746

Better Communication for Better Healthcare

Per the above charts, DHIN continues to build on its outstanding track record of success for engaging Delaware's health care professionals and institutions. By way of background, the organizations enrolled in the DHIN include private practices, hospital departments, state and private long-term care facilities, short-term rehabilitation facilities, hospices, and skilled nursing facilities. It is important to note that the number of enrolled organizations has increased 218% since February 2010. Correspondingly, enrollment of providers has increased from 10% in 2008 to 80% at the end of fiscal year 2011. The penetration rate as of April 2012 was 92% and is expected to be at 95% by the end of FY 2012 (June 30, 2012).

This success is a direct result of several best practices, not the least of which is the intensive research and survey activities conducted prior to the network's launch in May 2007. This research made it abundantly clear that Delaware's health care professionals valued access to patient results more than any other service that a statewide health information exchange could offer. In 2009, about two years after the network launched, "Patient Query" functionality was added to the network which helped generate the most significant spike in provider enrollment. Delaware's state-wide health information network was designed with the needs and interests of the ultimate end users in mind and its on-going growth reflect this continued focus on Delaware providers. The DHIN is an information network that is easy to use and delivers a valued product to Delaware's health care professionals. Achieving current penetration levels would not be possible otherwise.

The actual mechanics of enrolling practices continues to be aided by a collaborative effort between the state, the University of Delaware and the Medical Society of Delaware. This collaborative effort has produced a list of Delaware providers and their practices that DHIN Provider Relationship Managers leverage for recruiting and engaging new health care professionals. Additionally, as DHIN has expanded its roster of results providers (100% acute care hospitals and 5 labs and radiology firms in 2012), these relationships provide additional channels for recruiting more enrollees. The DHIN also continues to leverage its relationship with Delaware's Regional Extension Center in coordinating with their efforts to support Delaware practices in meeting Meaningful Use criteria. The natural overlap of these two organizations serves the mutual needs of both organizations, including DHIN's priority to identify and enroll practices and providers not currently enrolled in DHIN.

DHIN also attends and has a presence at several large meetings and events throughout the year that feature Delaware medical professionals. DHIN staff members, who may be attending as featured speakers or as exhibitors, leverage these opportunities to promote awareness of DHIN and its services. Correspondingly, success begets success and as medical professionals have incorporated the DHIN as a means for providing care for their patients, their formal and informal endorsements and recommendations across their professional networks continue to drive new enrollments and enhance our provider penetration rate. Finally and in the best traditions of the organization, DHIN stays close to understanding the ever evolving preferences and needs of providers with professionally designed market research campaigns and surveys. This feedback and the direct counsel from providers that serve on DHIN committees and the Board Directors provide essential information for maintaining the DHIN's status a valuable product, helping Delaware providers more effectively serve the needs of their patients.

Identity Management, Directories and Credentialing

The current and proposed solutions leverage various internal components, largely written as software products of Medicity Corporation, in such a way that we are compatible with the NwHIN 2010 Service Interface Production Specifications. The internal architecture of the DHIN solution is opaque from the perspective of the NwHIN specifications by explicit intent.

The current production solution includes a live identity management system, which is a component of the Medicity MediTrust platform. The system is Medicity's fifth generation identity matching solution, which has been deployed for the entire state of Delaware, along with many other live and operational Health Information Exchanges. The system is a software product, not custom coded, and is deployed using an XML based configuration file defining the rules for each applicable deployment. The identity management service also includes an optional pseudonymization function allowing for the NwHIN Authorized Case Follow-up use case to be implemented. The Medicity identity management service has a number of proprietary, and patent-pending, technologies. It can be deployed to match almost any type of "matchable" data including patients (which was its initial purpose), providers, non-patient persons such as next of kin, and users. In addition it has been deployed to match encounters, orders, medications, payers, plans, and more. The service has been in production use for many years at DHIN as well as other Medicity customer sites.

Additionally, the identity management service can be deployed at various scope levels, from matching patients for a single inbound ADT interface up to a community wide patient/provider matching engine.

The DHIN's exchange platform includes an internal database (which acts like a directory) of HIO participants (organizations, data sources, etc.). End-user identity verification/confirmation is the responsibility of the trusted administrator at each of the DHIN user organizations (i.e., practice office, hospital, clinic, etc.). The organization/practice administrator can add non-credentialed staff users and assign them to provider/providers within the organization. DHIN verifies credentials for all providers and monitors use of all DHIN users to ensure appropriate activity. An internal certification authority is utilized for remote endpoint nodes but is not exposed to end users or administrators for management outside of the application itself.

Because user authenticity is an important factor in ensuring data security and patient privacy, the DHIN Provider Relations Coordinator verifies whether providers are properly licensed to practice medicine as well as ensure that they have been through the appropriate credentialing practices at the data sender organizations. First, every applicant organization's and provider's ten-digit National Provider Identifier number is verified in the NPPES (National Plan and Provider Enumeration System)'s NPI registry at <https://nppes.cms.hhs.gov/NPPES/NPIRegistryHome.do> to ensure that the applicant organization and providers are properly licensed. Should DHIN not have been provided or is unable to verify credentials through NPI, the applicant organization is reviewed against the Department of State's business license database at <https://dpronline.delaware.gov/mylicense%20weblookup/Search.aspx?facility=Y> to ensure that the organization and individual providers are properly licensed.

DHIN has a reciprocal agreement with the participating hospitals; therefore, if an applicant organization and its applicable providers are credentialed with a DHIN-participating hospital, then they are “credentialed” in DHIN and enrolled in the DHIN system. This process requires that the applicant be mapped to the provider databases at each of the DHIN participating organizations—linking the provider ID at the data sender organization with the DHIN provider applicant in the DHIN system. This linking process facilitates the delivery of results and reports from the data contributing organization to the applicable DHIN user.

Provider Registry

Once the user is enrolled in DHIN, their name is tied to a user name/unique identifier in DHIN. This user database allows DHIN to track user log-ins and usage of the DHIN data. This review process is consistent with the DHIN privacy policy. Additionally, DHIN keeps a tracking database of all DHIN organizations and their status in the process: enrollment, training and active use. This database allows DHIN to track user enrollments and run metrics on the workload and effectiveness of the Provider Relations Managers.

Project Management

DHIN’s approach to managing the proposed timeline will follow the project management methodology it has had in place since 2006. This approach is a primary reason for DHIN’s success to date. It relies heavily on the work of the Project Management Advisory Committee, which provides day-to-day input and guidance on developing, communicating and monitoring the project plan. As with all DHIN implementation projects, the Project Management Advisory Committee will conduct weekly status reviews of the project timeline, define and manage implementation milestones, develop and implement testing strategies and define and approve go-live criteria. Refer to the Project Management Advisory Committee section for further information about the project management approach.

The process for developing and publishing technical and operational workplans is as follows:

- The technology vendor and DHIN project management staff develop the initial project plan based on project goals and desired outcomes, input from project partners and federal requirements.
- The Project Management Committee reviews the project plan and makes recommendations.
- DHIN management communicates the plan to the CIO Advisory Council for review.
- Once consensus has been reached among DHIN management and participating stakeholders, the project plan is then resourced by the technical vendor, DHIN and the DHIN participating organizations.
- Project status is reviewed on bi-weekly project manager calls; planning and risk mitigation are addressed at monthly Project Management Committee meetings.
- Project status is communicated to the CIO Advisory Council in monthly meetings and to the Board at quarterly meetings.

- Project plan is amended based on status changes and plan changes as approved by the Project Management Committee and CIO Advisory Council.

Risk Mitigation

The DHIN is the only HIE in Delaware and it covers health care providers statewide. DHIN's planning, monitoring and remediation processes occurs within the governance structure of the HIE, through committees and workgroups. Attached is the State of Delaware Risk Assessment Plan by the five HIE Cooperative Agreement domains.

Managing DHIN and implementing HIE functions and data sources and types is very complex and requires excellent communication and coordination among all project partners as well as strong project management focused on planning, documentation and managing risk. As such, an important and ongoing focus of the Project Management Committee is to identify risks and establish remediation plans that address those risks – this process includes gaining consensus among all data sender organizations and uniformly applying remediation activities within and across these organizations and the DHIN system. This mitigation may be associated with meeting the project plan/timeline, implementation and go-live issues, data integrity, interface and database changes, system upgrades, and other factors that may affect DHIN's success. All issues are discussed in an open forum via Committee meetings and are addressed based on a consensus approach.

Furthermore, current and ongoing responsibility of the Project Management Committee is to review and approve testing plans and set testing exit criteria—the factors that when met enable the new feature, function or interface to be taken to production. Once the exit criteria is met, each DHIN data sender/participant affected by the system change must “sign-off” on the change giving DHIN approval to deploy it to the production environment. Sign-off is completed by the Project Manager, the CIO and/or the director of any affected business units within each data sender organization. Once all appropriate sign-offs are received, the DHIN technical team communicates to the technology vendor that the change is approved for production.

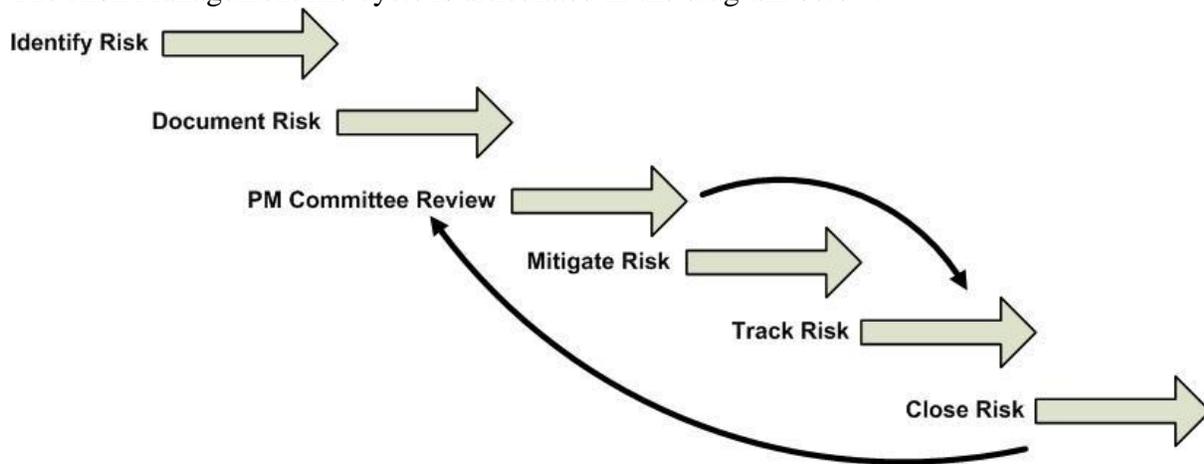
Upon completion of a change in the DHIN system, the DHIN technical team and the technology vendor meet to review lessons learned and identify improvements that can be made to the processes and activities.

- The Project Management Committee meets bi-weekly by teleconference and web conference (when needed) and meets each month in person for a four-hour period. In addition, the DHIN has implemented several milestone review processes designed to understand and mitigate the risks encountered during implementation. Risk mitigation is performed on several levels
- Monthly Project Reviews: The Project Management Committee provides ongoing evaluation and assessment of work in progress and planned efforts. This effort also includes representation from the Health Information Management Committee. These meetings include identification of risk, strategies to mitigate and effects to the project plan, timeline, and overall DHIN activities.

- Annual Project Scope Reviews: Leadership from the DHIN and the State and private funders of DHIN meet annually for a series of planning and scope reviews, which includes identifying risk activities and mitigation strategies and setting scope for the following fiscal year.

The DHIN evaluates risk, impact, and severity at three core levels: Resource, Timeline, and Financial Impact. These levels allow for proper escalation paths to be identified, and provide initial insight into risk probability, severity, and priority. Risk assessment is an ongoing process, and thorough review of identified risk events is paramount.

The Risk Management life cycle is articulated in the diagram below.



Risk identification and mitigation strategies are reviewed at a minimum on a bi-weekly basis, but often occur during the daily course of business activities. It is important to note that the Project typically has several concurrent implementation efforts running in parallel, each with a different set of associated risks.

A table identifying risks and mitigation strategies is attached as a separate document.

Strategic Planning and Vendor Selection

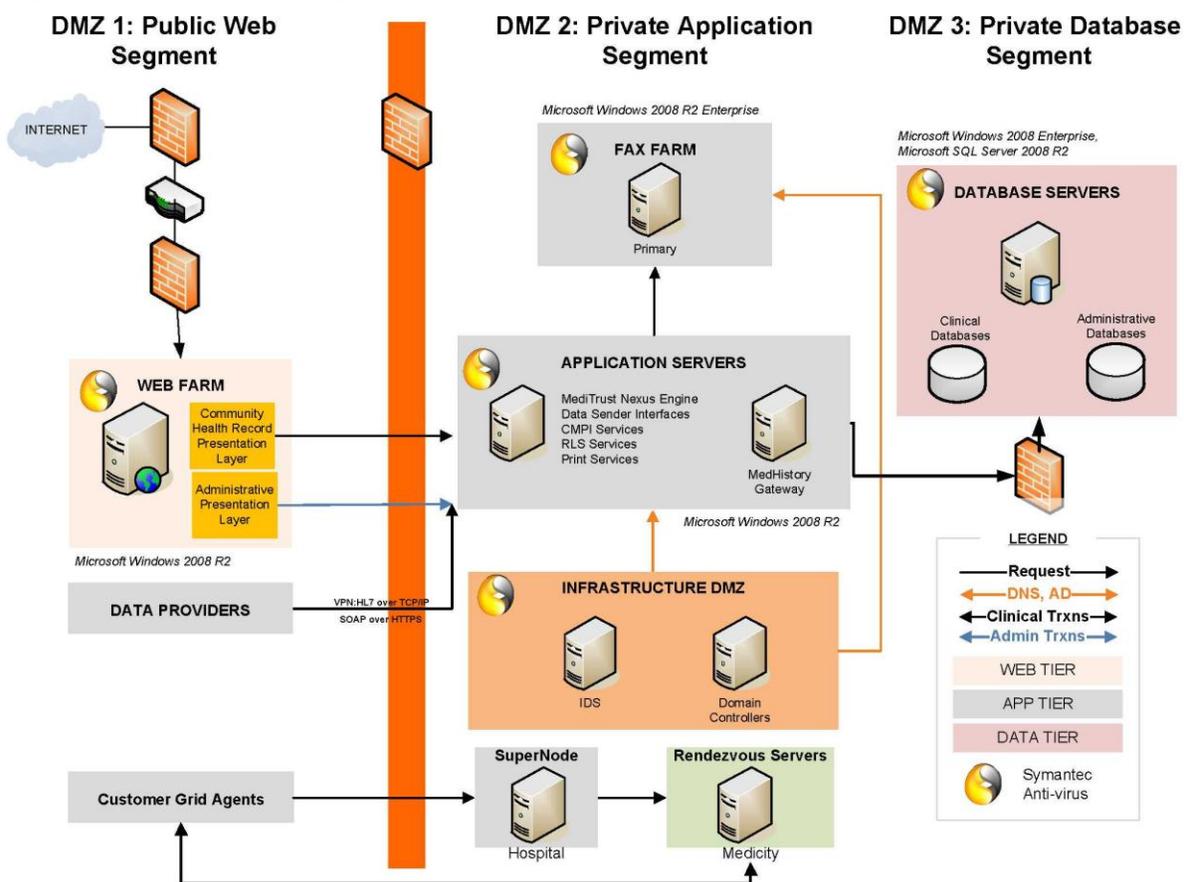
In 2005, DHIN began a lengthy strategic planning process including an environmental analysis and technology scan of representative health care entities, which resulted in the development of functional and architecture requirements documents. (The outcomes of this process are described in further detail in the Architecture and Functionality Sections.) Subsequently, financing and governance were defined to support the development and implementation of the HIE. A vendor selection process, resulting from a competitive procurement, completed the planning process in June 2006.

In September 2006, DHIN contracted with Medicity, Inc. to implement the system and in March 2007, DHIN went live in beta with a 30 physician practice. On May 1, 2007, DHIN became the first statewide, operational health information exchange in the country. Since that time, DHIN has added features, functions, data types, and data contributors.

Architecture

DHIN's architecture has been reviewed and approved against the State's standards for a n-tier Internet architecture. See attached (below) for the technical architecture. The platform is incrementally scaled at all tiers to handle both a growth in users and clinical/administrative transactions.

DELAWARE HEALTH INFORMATION NETWORK



Delaware's Department of Technology and Information has validated both physical and logical security and determined the DHIN infrastructure to be compliant with State requirements.

In 2001, the Delaware General Assembly created the Technology Investment Council (TIC). The duties of the Council (among others) are to enforce active project management, review the progress of current projects to determine if they are on budget and have met their project milestones, and when necessary, recommend the termination of projects; develop minimum technical standards, guidelines, and architectures as required for state technology projects; and identify opportunities to leverage expertise in strategically important areas of information technology by partnering with private sector entities.

In support of the TIC, DTI's Internal Technology Investment Council (iTIC) was established by the State's Chief Information Officer (CIO) to provide a forum for cross-team assessment of

proposed technology-related business cases. Business cases are reviewed with specific consideration given to the proposed project's feasibility, risk, and suitability, as well as its overall compliance with stated and de-facto technical standards and guidelines. The iTIC makes recommendations and it reports findings to the State's CIO. With the CIO's concurrence, business cases are recommended or held pending additional discussion.

In 2003, the Technology and Architecture Standards Committee (TASC) was created within DTI. In cooperation with the State's Information Resource Manager Committee's Policies and Standards Subcommittee, a process was adopted to develop enterprise standards that are comprehensive and current. In 2005, enterprise policies were added to the TASC responsibilities. To date, over 30 enterprise standards and policies have been created and approved by the State CIO. Of the 30+ standards and policies, DTI approved a Systems Architecture standard on March 19, 2007 (and it was most recently updated on December 10, 2009). The State of Delaware policies and standards are available at the following URL:
<http://dti.delaware.gov/information/standards-policies.shtml>

Information on the Delaware Health Information Network (DHIN) initiative was provided to the State's Technology Investment Council on April 13, 2005. The DHIN business case was reviewed and approved by DTI's iTIC on October 11, 2006. The DHIN's architecture diagram was reviewed and approved by DTI's Architecture Review Board (ARB) on October 28, 2009.

Functionality

Cooperative Agreement Implementation Plan (2009 to 2013)

DHIN's current and planned functionality is consistent with guidance provided by the Office of the National Coordinator for Health Information Technology (ONC).

- Incorporation of claims data for viewing by payers and clinicians
- Electronic clinical laboratory ordering and results delivery*
- Radiology image inquiry
- Electronic public health reporting*
- Quality reporting
- Clinical summary exchange for care coordination and patient engagement
- Medication fulfillment history*
- Transcribed Reports Delivery*
- Bidirectional exchange with EHRs for laboratory tests ordered in an ambulatory environment*

Those noted with an asterisk (*) have already been or are in the process of being implemented by the DHIN.

The following schedule is provided to illustrate the roll-out of current and future functionality in the DHIN. This schedule was first developed in the 2005 DHIN strategic plan. The roll-out timing of some of the functions have changed due to changing priorities among DHIN's participants as well as direction and guidance provided by the Federal government. As such, the schedule has been updated to reflect completed functionality and planned functionality deployment over the next four years.

Implementation Year	Functionality Deployed
Year 0 2006 - 2007 Completed	Data Transport Security & Access Controls Audit Processing and Reporting Secure Results/Reports Delivery Laboratory Results Pathology Results Radiology Reports Admission, Discharge, Transfer Reports Patient Demographics/Face Sheets Inbox Management <ul style="list-style-type: none"> • Printing & Faxing • Sorting • Results Retrieval & Reprinting • Results Forwarding • Interfaces to EHR Systems
Implementation Year	New Functionality
Year 1 2007 - 2008 Completed	Two-tiered, delegated MPI and Community MPI (CMPI) Record Locator Service Interfaces to EHR Systems New Participants Public Health Reporting
Implementation Year	New Functionality
Year 2 2008 -2009 Completed	MPI Harmonization Inquiry Viewing of Patient-Centric Data Additional Interfaces to EHR Systems New Participants NwHIN Trial Implementation (Lab and Biosurveillance Reporting)

Implementation Year	New Functionality
Years 3-5 2009 - 2011 Completed	Transcribed Reports Medication History Pilot Additional Interfaces to EHR Systems New Participants

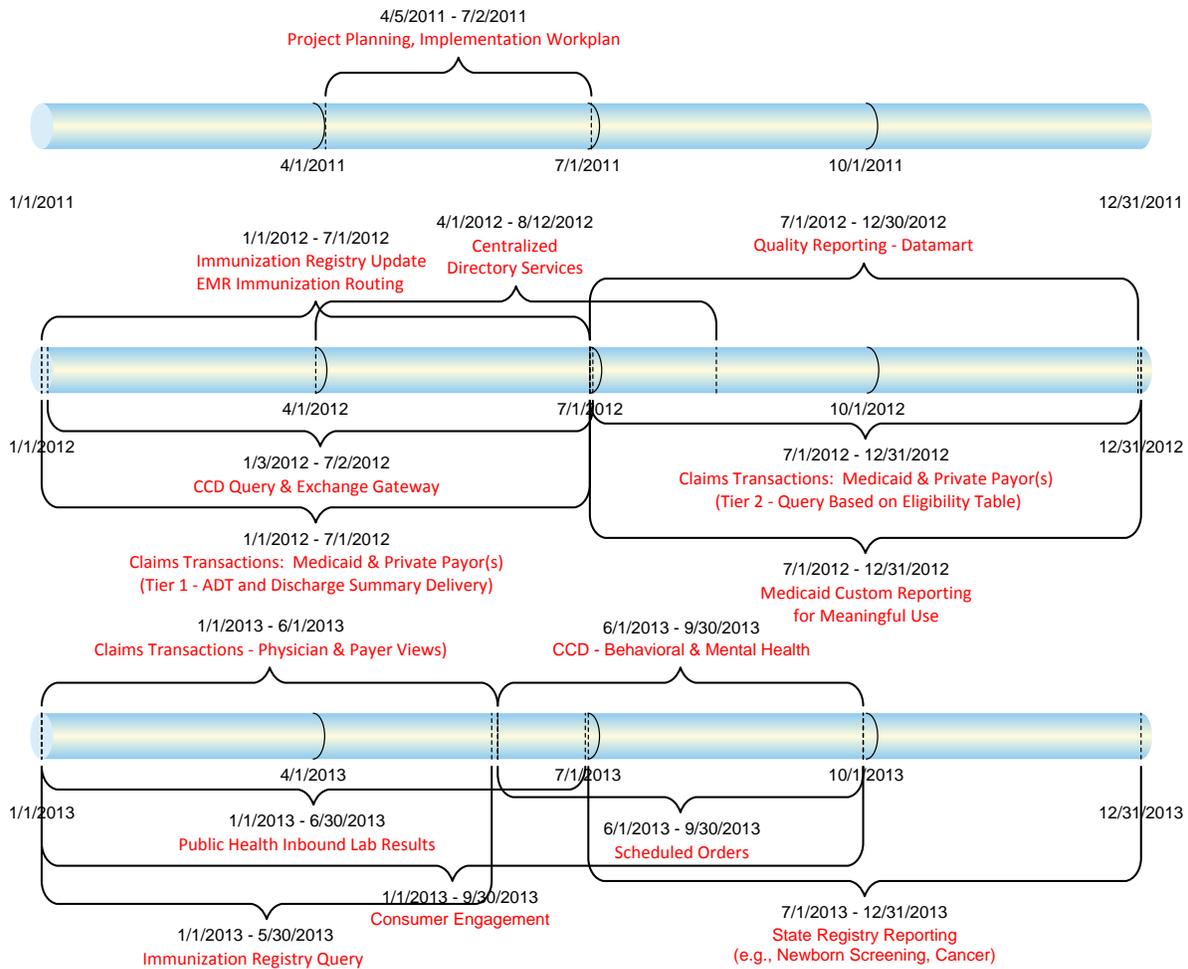
Implementation Year	New Functionality
Years 6-7 2012 - 2013 Planned	Laboratory Order Entry from EHR PACS image retrieval Connectivity to Immunizations Registry DIRECT implementation Clinical Summary Document Exchange Additional Interfaces to EHR Systems Medication Reconciliation Quality Reporting NwHIN Referral Network Implementation Transitions of Care Radiology Order Entry Patient Engagement Tool Enhanced Public Health Connectivity Download Queried Data from DHIN to EMR Receive CCD from EMR New Participants Medication History full implementation

Functional Roll-Out Plan: 2010 through 2013

With regard to the functionality required in the State HIE Cooperative Agreement, the following sections provide a description of the DHIN’s implementation strategy for the requirements set forth in the Cooperative Agreement. The DHIN’s proven project management and risk mitigation strategies will be deployed to develop, implement and manage the project plan associated with the following timelines.

In 2010 - 13, DHIN is working with the Division of Public Health and the Division of Medicaid and Medical Assistance to interface with the Public Health Immunization Registry, Public Health Laboratory, , and Medicaid Managed Care Organizations for claims reporting respectively. The DHIN is also working with these organizations to implement a Provider Directory, reporting for Medicaid Meaningful Use, and quality reporting and analytic tools. We plan to implement patient engagement tools in 2013. We are still evaluating the market and are in discussions with our technology vendor pertaining to appropriate tools. We will add this to our project timeline as we have greater clarity around the tools. The following timeline illustrates the high-level approach to implementing these functions.

DHIN HIE Cooperative Agreement Timeline – 2011-2013



In planning for the implementation of the new functions described above, DHIN has foundational functionality already in place, which enhances its capability for developing and implementing the State HIE Cooperative Agreement requirements. These foundational functions are described below and include: secure results delivery, patient record inquiry, electronic public health reporting, and prescription fill status and/or medication fill history.

Secure Results Delivery

Traditionally, physicians receive laboratory results and radiology reports by fax, mail, courier, and interoffice mail. Such protocols are often slow and introduce numerous opportunities for data to be lost or misdirected. In many cases, physicians receive reports from at least five different laboratories, each of which uses a different format and delivery method. DHIN's approach allows for expedited access to information while decreasing the likelihood for error. By providing all clinical reports and results in one standard format regardless of where the test was performed, DHIN eliminates opportunity for misinterpretation of data. The ordering

provider knows who performed the test by the logo and contact information presented on the report, while preserving branding and the necessary information for CLIA certified laboratories.

Authorized and authenticated users can receive clinical results in three ways: electronic inbox, auto printing, and a direct interface to an existing electronic health record (EHR) system. The electronic inbox provides a secure mailbox for delivering reports and results to ordering physicians and anyone copied on the order, as well as face sheets for office users. Information is accessible in the inbox for 30 days and may be saved, printed, or transferred to another physician for consultation purposes. Reports stored in the inbox can be sorted and configured to the user’s preferences. The AutoPrint option sends results directly to a network printer on the basis of the practice’s printing preferences (by times of day, hours between print jobs, etc.). Physician practices that choose to receive data via an existing EHR system are set up to connect directly through their EMR vendor, whereby a clinical result can be automatically matched with a patient record and presented to the physician in their EHR worklist.

Presently, DHIN’s data distribution methods adhere to the following standards:

<i>Distribution Method</i>	<i>Transport Method</i>	<i>Security</i>	<i>Authentication</i>
<i>EMR Grid Delivery</i>	<i>HL7 2.x over HTTPS (SOAP 1.2), WSDL</i>	<i>2048 bit AES, SSL</i>	<i>Multi-step pre-shared key validation</i>
<i>AutoPrint</i>	<i>HL7 2.4 over HTTPS (SOAP 1.2), WSDL</i>	<i>2048 bit AES, SSL</i>	<i>Multi-step pre-shared key validation, Password (hashed) + PIN</i>
<i>Electronic Inbox</i>	<i>HTTPS</i>	<i>SSL</i>	<i>Password (hashed)</i>
<i>Secure FTP Server</i>	<i>SFTP & FTPS</i>	<i>SSL</i>	<i>Password</i>
<i>Direct</i>	<i>POP3 and SMTP over SSL/TLS</i>	<i>X.509 Certificates, SSL/TLS</i>	<i>Digital Certificates, Public and Private key, Direct Username & Password</i>

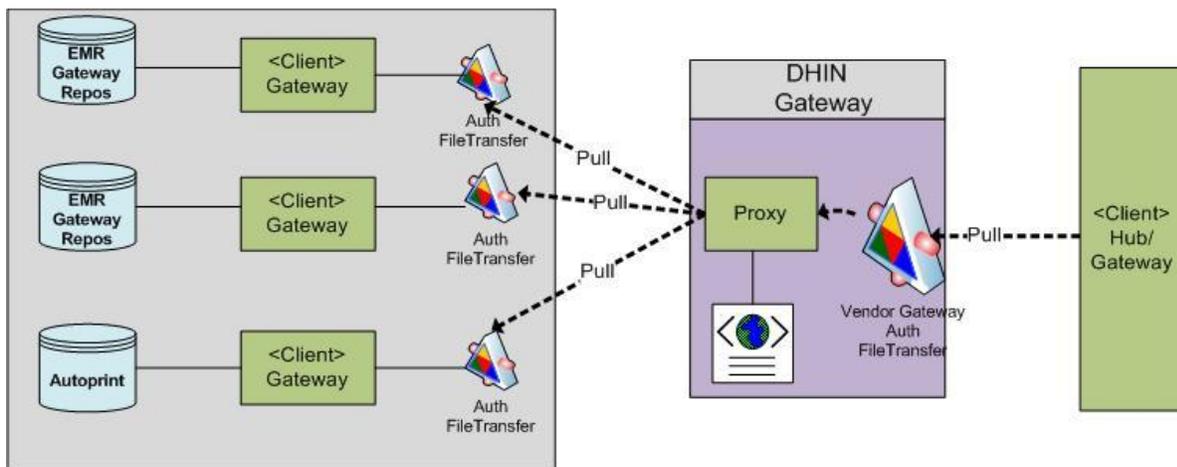
In addition, DHIN has implemented the applicable NIST and HIPAA security practices including:

- Encrypting data while at rest and in transit
- Internal policies, procedures, and training

- Applicable OWASP 2010 best practices
 - Top 10 list
 - Developers and QA practices
 - ASVS Level 4

DHIN also complies with all applicable security standards, and leverages industry best practices such as those promoted by OWASP 2010 RC. The DHIN uses industry standard 2-way SSL for end-point connections, or VPN, or AES-256 encrypted payloads. Data is delivered to end-users using SSL/TLS 128 into their web browsers. X.509 and other PKI components including CRLs and OCSP Responder Networks are used for digital key pair management. Only NIST-approved cryptographic service providers are used at the data layer. All internal end-points are pre-enrolled into an internal database and are validated in real-time for authenticity.

The current DHIN Data Distribution architecture is presented in the following diagram:



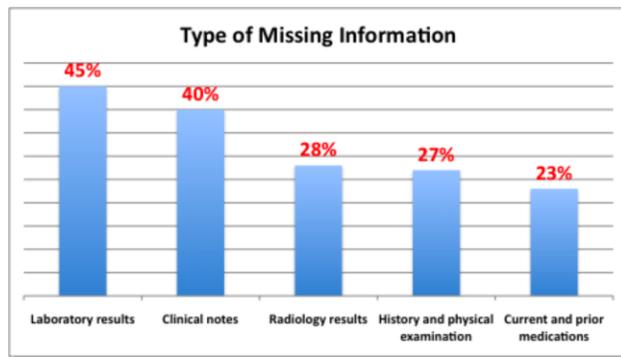
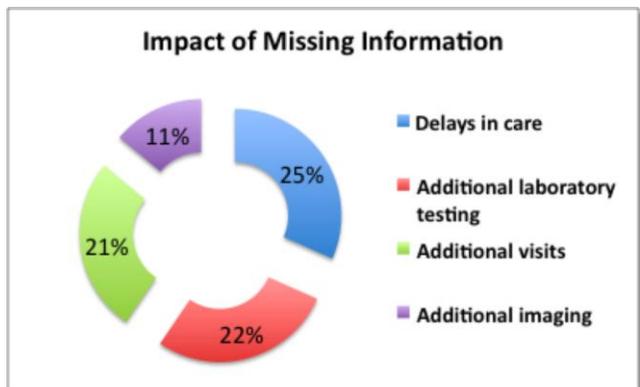
The receipt of results and report through DHIN can be customized to the workflow of the practice and job function of the end-user. As a result, authorized users with a need to know can access patient demographic data, payer information, admission discharge and transfer (ADT) data, laboratory and pathology results, and transcribed radiology reports.

Additionally, DHIN connects to the State’s public health biosurveillance system for real-time delivery of reportable diseases and emergency chief compliant data. Currently, more than nine million reports are distributed through DHIN annually, represents 86% of Delaware’s hospital admissions (DHIN expects this percentage to increase following the integration of the final two Delaware hospitals which are in process) and at least 95% of outpatient laboratory tests.

Patient Record Inquiry

According to the Journal of the American Medical Association (October 2006), missing information at the point of care negatively impacts patient care. As illustrated below, missing

results cause delays in care 25 percent of the time, while additional tests and visits are needed 54 percent of the time. The types of information that is missing directly relates to that which is mostly provided through the DHIN, by results delivery and patient record search; and includes lab results, radiology reports, history and physical and medications history.



In June 2009, DHIN upgraded its system to include enhanced delivery preferences for users as well as patient record inquiry capabilities. This functionality gives access to authorized providers to search for their patient’s available clinical history in DHIN. This history includes all lab, radiology, and admission, discharge and transfer data, which has been sent to DHIN since 2007. The inquiry (search) function is powered by an integrated Community Master Patient Index (CMPI) and Record Locator Service (RLS) solution, which supports a standardized web-based community health record. With the early 2012 upgrade to the Meaningful Use certified 5.6 version of ProAccess and the corresponding maintenance update, DHIN users have the ability to create continuity of care documents as well as to use advanced functionality for conducting patient level search.

In addition to adding specific enhancements to the network and new data senders, DHIN has been also been focused on increasing the number of certified EMR integrations. In the first half of 2012, DHIN added certified integrations with e-Clinical Works (eCW), Cerner and NextGen. These integrations are in addition to the previous integrations with All Scripts and STI. With this current roster of integrations, nearly half of all Delaware practices (46%) with an EMR have the option to integrate their EMR with DHIN. When the 13 EMRs currently under contract or active beta testing have fully certified interfaces to DHIN, more than 75% of DHIN practices using an EMR will have the option to interface their EMR to DHIN.

The following sections describe the access controls and user authentication processes implemented by DHIN in support of the patient record search function.

Authentication and Authorization

Users are identified by user ID, classified by type, and authenticated with a password. A second factor is optional in the system but has not yet been implemented by DHIN). User names can be assigned by a system administrator. Users are classified by a type that defines a basic set of functional and data type access authorities as defined by DHIN. Many of these security attributes can be adjusted individually to create users with authority profiles that have been

tailored to meet user and environment specific needs, such as for users in the Emergency Department versus those in a practice office.

Role-based Access

A physician or staff member's level of access to a patient's clinical data in DHIN is determined by their role in the organization and their relationship to the patient. The DHIN access model relies upon a combination of controlled user access driven by rules and organizational roles which can be configured by the organization administrator within a group of DHIN allowable roles.

DHIN distinguishes two main groups of users: providers and staff. Providers are granted access to data based on their relationship to their patient's data. Staff is granted access based on their relationship to the provider. A variety of options are available to limit which patients and which types of data provider and staff users have access. Access can be refined further on the individual user level, thus supporting personalization.

Break-glass Access

Access controls are based upon a provider having previously received a result/report through DHIN on a patient, which establishes their relationship with the patient in the system. A provider may "break glass" to expand their access to a patient's information with whom a previous relationship does not exist in DHIN. When breaking glass, users are warned that their actions are being monitored and documented, and they must provide a reason for breaking the glass. The provider must establish a relationship and provide a reason for his/her access to the patient's information. Users are also required to set a defined time period for access, in one (1) month increments, not to exceed six (6) months. Reasons a provider may select to break glass include:

- Received request for consultation
- Providing coverage for this patient's physician
- Patient is new to my practice
- Patient is presenting for emergency services
- Patient is presenting for clinical care
- I have a clinical relationship with this patient that is not yet established in DHIN

DHIN logs all system activity and at any time, the patient may request an audit report of access to their record through DHIN. Audit reports do not contain any clinical results. An audit log provides the following information: DHIN user log-in identification, user name, user organization (practice), patient account that was accessed, date and time of access, and type of records viewed by user. DHIN administrators also run logs of break-glass activity and if patterns of misuse are defined, appropriate action is taken in accordance with DHIN's privacy and security policies. Refer to "Legal and Policy" Section for more information on DHIN's privacy and security policy.

Electronic Public Health Reporting

In 2008, DHIN went live with reporting of chief complaint data from hospital emergency departments (ED) to the State's public health biosurveillance system – the Delaware Electronic Reporting and Surveillance System (DERSS). This functionality also was demonstrated at the NWHIN Forum in December 2008 as part of the biosurveillance use case. Via the emergency department admission (ADT transaction), DHIN receives the chief complaint for the patients visit to the ED and routes it to the patients provider as well as to the DERSS system in real-time standardized format. Public Health pseudonymizes the data and imports it into the DERSS system nightly in batch. DHIN recently finalized implementation and syndromic surveillance reporting for its latest hospital data sender.

DHIN is currently in test with DERSS on lab reporting from hospitals for reportable diseases. This works much the same as the ED chief complaint data feed to public health; however, only lab results flagged by the laboratory's interface is delivered to DERSS.

Medication History

In 2012 Delaware will offer a unique value added, subscription based proposition – the ability to quickly distribute comprehensive, state-wide medication history data by way of the DHIN HIE platform and Community Health Record. This solution provides the added benefit of accessing medication history in through a third party aggregator, affording participating stakeholders early and comprehensive availability of commercial and retail medication data while ensuring its end users experience exceptional response time when making inquiries to the system, and reducing the dependence on a fee-based query each time a DHIN patient is brought into focus via the Community Health Record.

DHIN also will provide medication reconciliation support in order to assist users in meeting meaningful use criteria. Medication reconciliation empowers clinicians to move from transcription to more clinically relevant reconciliation of medications across the continuum of care. Medication reconciliation provides the ability to (1) utilize an up to date view of a patient's prior medication history using actual fill and refill information; (2) analyze the data to check for drug interactions, duplicate therapy and potential non-compliance; and (3) create a printed or electronic home medication report to serve as the foundation for subsequent patient interviews.

The following functions will be implemented in support of helping providers meet Meaningful Use requirements as well as those of the State HIE Cooperative Agreement:

Direct

In order to provide at least one viable option for all Eligible Providers (EPs) and Eligible Hospitals (EHs) in Delaware to meet care summary exchange and Public Health immunization reporting requirements of Meaningful Use, DHIN implemented Direct in December 2011 in addition to existing infrastructure.

Claims Data Viewing

This initiative provides connectivity of hospital clinical and ADT information through DHIN to the State's Managed Care Organizations (MCOs) and Payers for covered member tracking and

follow-up. In addition, this initiative provides the upload of payer information from the MCOs and Payers to DHIN for matching of patient/covered member clinical and claims data.

Electronic Prescribing and Refill Requests

According to SureScripts tracking, Delaware is one of the leaders in the nation in the electronic delivery of prescription and medication refill requests. As such, the DHIN will not duplicate this functionality that is already in place and widely used. The DHIN will continue to support the electronic prescribing and medication refill requests through the current methods.

Electronic Clinical Laboratory Ordering and Results Delivery

The DHIN is currently working with two Beta EHR vendors to implement electronic lab orders through the practice EHR applications. Beyond the Beta implementation, the DHIN will be rolling out this functionality to all EHR vendors and user practices. For providers who have an EHR with a bi-directional interface to DHIN, they will have the ability to leverage existing order entry functionality in the EHR, and have that order electronically transmitted to the performing laboratory. The performing laboratory will deliver the ordered test(s) via DHIN, with the appropriate order and result matching occurring in the EHR.

Quality Reporting

The DHIN quality initiative is built on the strong foundation laid over the last several years. Starting with comprehensive data acquisition services, DHIN contains 1.3 million unique patient records (for perspective, Delaware's population is 897,934). Beginning in 2010, DHIN has been working with Delaware's Federally Qualified Health Center HIT network (Delaware Health Net) to establish an interface to two health centers in order for DHIN to receive problem lists, medications and allergies from the EHR. Additionally, as EHR adoption and meaningful use criteria continue to evolve. DHIN is adding other EHR vendors as data contributors to the network. This vast amount of patient records, clinical results and uniquely identified physicians is an essential foundation for a strong quality reporting environment.

The DHIN plans to leverage its foundational data stores by providing quality of care reports and analytic tools. Quality reports include the ability to generate reports and distribute information to key stakeholders including physicians and physician groups, de-identified reports to health plans and hospitals, and population reports to public health.

In addition to the quality reports which can be published regularly to targeted physicians and physician groups, DHIN is considering plans to provide a module available to authorized users supporting the ability to notify, track, and to act on the quality outliers. Using an Internet based tool, for example, users can generate patient lists with key identifiers, and initiate follow-up care. Additionally, this feedback loop allows the ordering physician to identify patients that should either be "excluded" from the population (e.g. a snow bird patient that has returned to their primary care physician) and to add patients that had been wrongly excluded. This process of patient list management, follow-up notification and tracking, and refining PCP responsibility builds accuracy and credibility into the process.

DHIN currently facilitates electronic reporting of chief complaint data from hospital emergency department admissions to the Delaware Division of Public Health's biosurveillance system via a

web-services interface. Implementation is scheduled for mid-2012 for the reporting of laboratory notifiable-disease results to the biosurveillance system. All chief complaint and applicable laboratory results are delivered to a public health queue in real-time. The Division of Public Health takes a nightly batch feed into the biosurveillance system. This process creates significant efficiencies for both public health and the DHIN-participating hospitals.

Shared Services

DHIN's focus has been on providing those functions that enhance the ability of providers within the state to obtain unparalleled access to patient data but also to share data beyond the functional capabilities of the organizations involved. In order to accomplish this, DHIN offers its participants a set of core services that will be expanded over time.

Initial Core Services

- Community Master Patient Index
- Record Locator Service
- Identity management
- Data distribution
 - AutoPrint
 - EMR delivery
- Public health reporting
- Security audit
- Vocabulary services
-

Future Services

- ePrescribing (offered outside of DHIN)
- Federal institution connectivity
- Patient consent management
- Immunization query
- Payer connectivity
 -
 -
 - Claims summary
- Referral management
- Quality indicator reporting
- Order routing from EMRs
- Medication history
- Medication reconciliation

The core services offered by DHIN will continue to be evaluated and extended with stakeholder feedback.

Meaningful Use

DHIN has worked with its users and participants to assess their needs in terms of meeting meaningful use criteria. In order to enhance DHIN's value and ensure that physicians and hospitals that participate in DHIN are able to leverage DHIN to meet meaningful use criteria, DHIN does or will provide the following services in support of its participants. Those items marked with a (*) denote functionality that has already been implemented; an (^) indicates functionality currently in the implementation process.

- Electronic Order Entry[^]
- Incorporate Lab Results into EHRs as structured data^{*}
- Maintain an Active Medication List[^]

- Perform Medication Reconciliation
- Standards-Based Transactions*
- Record Demographic Data (preferred language, insurance type, gender, race and ethnicity)*
- Quality Reporting - generate List of patients by specific conditions for outreach and quality improvement
- Patient Access to Electronic Information
- Exchange Key Clinical Information*
 - Clinical Summary
- Public Health Reporting
 - Immunization Registry
 - Reportable Labs
 - Electronic Syndromic Surveillance*
- Proof of Compliance with HIPAA Privacy and Security Rules through the comprehensive audit reporting system, and compliance tools available to practice administrators using DHIN*

With the release of the most recent NPRM in 2012, DHIN and its stakeholders are reviewing the impact of the rule on previous plans for supporting meaningful use among eligible providers as well as for those who do not qualify for Medicare and Medicaid incentives under the rule.

Clinical Summary Exchange for Care Coordination and Patient Engagement

DHIN has been an active participant in the NwHIN cooperative since 2007, helping shape many of the technical & security standards like pseudonymization, technical messaging and security frameworks and subject discovery. DHIN will continue to look for opportunities to shape technical specifications, implement them and move those services into Production. Per the meaningful use criteria for HIEs, DHIN will offer connectivity to physicians with certified EHR applications in the ambulatory care setting to drive patient safety, and drive improved care coordination through the exchange of summary-of-care records during the transition of care. Please reference the illustration below to gain a better understanding of the breadth and reach of our transition of care use cases implemented/planned and how they map to meaningful use objectives. As standards evolve for consumer empowerment and personally controlled health records, DHIN will be prepared to implement using NwHIN-approved standards.

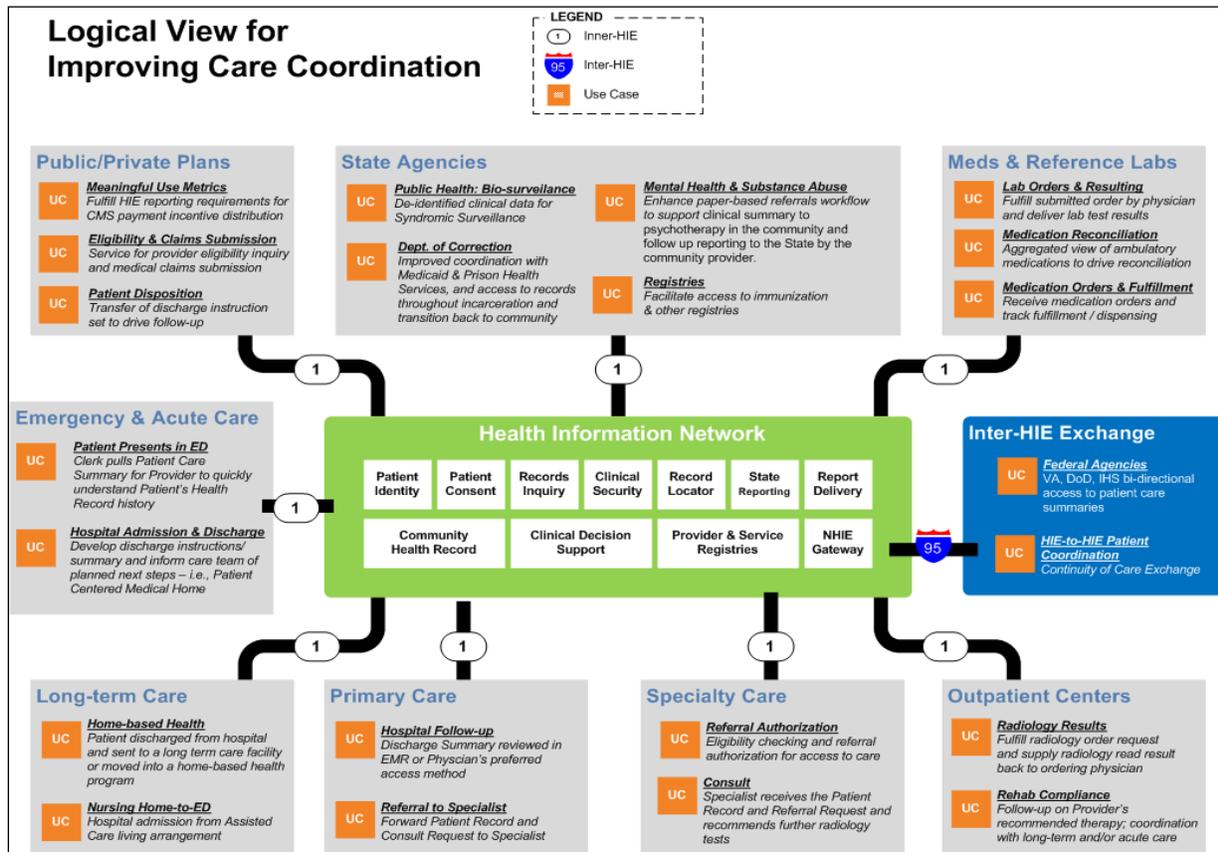
All electronic transitions will be implemented using NwHIN approved technical messaging standards like CCD formatted transactions (C32), HIE integration profiles such as ATNA, ITI technical framework version 2, and interoperability capabilities to support certified applications to name a few.

Additionally 1.3 million patients are managed across multiple organizations within the State’s Community Master Patient Index, allowing for a composite view of the health record across multiple care locations.

The illustration below (Improving Care Coordination) depicts how DHIN will leverage Core Services to meet established use cases for improving care coordination within the HIE. DHIN’s Core Services are designed to:

1. Allow secure, role-based access to clinical data;
2. Initiate or receive requests to exchange clinical summary documents or discrete results to external consumers, or community physicians
3. Facilitate the ordering and referral requests from community physicians;
4. Provide timely reporting and document exchange to State Agencies.

In addition to these use cases, DHIN offers a secure, audited community health record and patient inquiry capability to all authorized physicians and emergency departments state-wide.



Coordination with Other Programs

Epidemiology and Laboratory Capacity Cooperative Agreement Program

DPH has implemented Orion's Rhapsody integration engine as the data mapping tool with PHIN-MS as the communicator for the reporting of lead and tuberculosis data. DPH sees great potential in using Rhapsody as a data mapping tool to begin communication of other key data sources within DPH. The DHIN and DPH will work over the coming year to determine the potential for using the DHIN to integrate data from the Laboratory Information Management System (LIMS) to DERSS, from the State drinking water system to the State LIMS, and establishing interoperability efforts to deliver results to ordering providers in the community as well as other facilities and providers, such as those in support of the newborn screening program.

Assistance for Integrating the Long-Term Care Population into State Grants to Promote Health IT Implementation

The State (including the Division of Public Health) implemented an Electronic Health Record (EHR) System. This system encompasses the State's three Long Term Care (LTC) facilities as well as all clinics and programs that are responsible for clinical and population health. The data from an EHR will be crucial to patient care within the State's LTC facilities.

Additionally, in 2011-2012, 100% of the state's long-term care resident facilities in the State (including the State's three Long Term Care hospital facilities) connected to DHIN. Availing State clinical information to other DHIN users will be an asset to ensuring continuity of care statewide

Health Systems Management

All of the State's Federally Qualified Health Centers are connected to DHIN through their electronic health records systems. They also are represented on DHIN committees, as is the Director of the Bureau of Health Planning and Resources Management.

Every other year, the Bureau of Health Planning and Resources Management commissions a report on provider capacity in Delaware, completed by the University of Delaware. The University surveys healthcare providers to get an understanding of their practice locations, insurance and uncompensated care accepted, and their use of technology and other practice patterns that affect access to quality, affordable healthcare. As such, DHIN is a beneficiary of this report in helping to better understand the technical capabilities of provider practices and their interest in participating in DHIN. This is an important tool for DHIN and also will help establish meaningful users based on survey feedback coupled with DHIN data and will help complete the provider directory for Delaware.

State Mental Health Data Infrastructure Grants for Quality Improvement

The Delaware Department of Health and Social Services' Division of Substance Abuse and Mental Health (DSAMH) is the single state agency responsible for administering mental health, substance abuse and gambling prevention and treatment services in Delaware. The DHIN plans

to provide the capability for DSAMH to exchange behavioral health, substance abuse, and mental health information through the clinical summary document with its partners as well as the community health record (under enhanced security granularity). In addition when available, the DHIN will exchange clinical information with a planned EHR application in DSAMH.

Child Mental Health Services

In addition to DSAMH, whose focus is on services for adults 18 years and older, the Division of Child Mental Health Services (DCMHS) in the Department of Services for Children, Youth and Their Families (DSCYF) serves the needs of minors. In 2012, DSCYF will begin an implementation of a new SAMHSA-approved application that includes an EMR component. A pilot between DHIN and DCMHS and its mental health/substance abuse treatment providers will replace current, manual processes, which can result in delays in treatment. Service Plan information is currently received primarily via paper forms and the data is currently summarized in a word document pulled from various sources and systems. This information is used to advise the designated provider of the background and treatment needs of the patient. The plan and service authorization is then faxed to the community provider. Connectivity to DHIN will afford DCMHS the ability to send a CCD to the referred to provider in order to facilitate the patients treatment.

Medicaid and the Children's Health Insurance Program (CHIP)

The Delaware Division of Medicaid and Medical Assistance (DMMA) has primary responsibility for administering the Medicaid and CHIP programs. In 2011, DMMA received approval for its State Medicaid Health Information Technology (HIT) Plan (SMHP) on September 29, 2011 and its Health HIT Implementation Advanced Planning Document (IAPD) for the EHR Incentive Payment Program on November 30, 2011.

DMMA and DHIN continue to collaborate on approaches to connectivity that support improved care management and improved communication with Medicaid providers. In 2012, the Delaware HIT Coordinator will establish a State HIT working group to include DHIN, DPH, DMMA, and the REC to address State program connectivity.

Clinical Data to MCOs – In 2012, the DHIN is working with the DMMA Managed Care Organizations (MCOs) to provide them with clinical data from data senders for their covered members. In addition, the DHIN plans to provide statewide access to authorized practitioners to enable them to view summarized Medicaid claims data. Combining claims data with the robust clinical results (such as lab tests) currently available to DHIN users are expected to dramatically improve patient safety, reduce duplicate test ordering and prevent patients from misusing the health care system (whether drug seeking or lack of appropriate follow-up care to the Medical Home).

Measuring Meaningful Use Compliance and EHR Adoption – The State Medicaid HIT plan describes Delaware's plans to participate in the Medicaid Provider EHR Incentive Program. Delaware launched the program on November 7, 2011 and as of the third quarter of Federal Fiscal Year (FFY) 2012, over \$11,200,000 in incentive payments have been issued to 271 eligible professionals and hospitals. Delaware has programmed the Medical Assistance Provider

Incentive Repository (MAPIR) to accept Meaningful Use attestation information for Eligible Hospitals for Year 2, Stage 1 as of April 2012. Delaware is preparing MAPIR to accept program Year 2, Stage 1 Meaningful Use attestation information in the summer of 2012 for Eligible Professionals. This program will increase the medical provider communities use of EHR and HIE utilization in Delaware. Providers will be expected to meet the meaningful use criteria to receive these incentives. Collaboration between DHIN and Medicaid will allow Delaware to provide an infrastructure that allows providers to meet meaningful use requirements and for Medicaid to have the tools necessary to monitor and assess this meaningful use. Both organizations realize that ongoing collaboration will be required to meet the incremental meaningful use measurements. Specifically, the DHIN is working to connect more practices onto the DHIN using certified EHR applications and bi-directional communication to exchange information such as orders, CCDs, and Immunization Registry updates and queries.

Clinical Quality Measures – DHSS has entered into discussion with DHIN regarding the delivery of clinical quality data reporting metrics to MAPIR and the MMIS. The DHIN already supports many of the MU measures as it allows for communication via HL7 and can accept a CCD or some other HL7 CQM reporting tools to facilitate the exchange of this information. The DHIN is capable of collecting the appropriate information from certified EHR systems and conveying it automatically to the state repository for incorporation into MAPIR. This would allow for automated MU measure updates directly from the EH and EP. This process would eliminate the need for independent submission and reduce provider burden to participate in the Delaware EHR Incentive Program. In addition, DMMA and DHIN have discussed the implementation of a dashboard monitoring tool for tracking of providers MU quality measures. As meaningful use criteria become more stringent in 2015, DHIN objectives and corresponding reporting will continue to evolve accordingly.

Continuum of Care Workgroup (Long-Term Care and Home Health)

The purpose of the Continuum of Care Workgroup is to determine how DHIN can support patient care along the health care continuum and to identify potential processes that enable the use of DHIN to facilitate communication of critical patient data as patients make transitions between hospitals, long term care facilities and home health care. Committee membership includes representatives from hospitals, home health agencies, long term care agencies and regulatory agency leadership. As the application of DHIN expands to other points of care, rehabilitation services representation will be added to the Workgroup.

Population Health Committee

DHIN plans to participate in a new committee, chaired by the State HIT Coordinator, which will include key personnel responsible for implementation of connectivity to Medicaid and Public Health programs. The purpose of this committee will be to ensure that the State initiatives are being managed at the grant level and from a more technical perspective.

Coordination with Other Federally Funded and ARRA Programs

Immunizations Registry

In 2012, DHIN began implementation of Immunization Registry update transactions through three methods: Direct attachment of VxU message, FTPS upload and EHR interface. Early in

2012, DHIN is working with various practices, hospitals, EHR vendors, Federally Qualified Health Centers and pharmacies to test the message exchange and content.

Regional Extension Centers

DHIN and DHIN participants have relationships with the Regional Extension Center grant program recipient Quality Insights of Delaware (QID). QID administered the DOQ-IT program in Delaware and was extremely successful in helping Delaware providers implement EHR systems; QID has been a strong and active proponent of DHIN for many years and currently works collaboratively with DHIN to support physician practices with interfacing their electronic health records with DHIN.

It is important to note that DHIN has made a policy decision to be vendor neutral with regard to electronic health records and provider adoption. Furthermore, the support provided to community providers through the Medical Society of Delaware in partnership with Quality Insights of Delaware is DHIN's preferred source for supporting providers with HIT adoption, workflow analysis and change, and sustainable HIT operations.

Institutions of Higher Education

Delaware does not have an institute of higher medical education within the state; however, it has a long-standing relationship with two schools in nearby Philadelphia, Pennsylvania. The Delaware Institute of Medical Education and Research (DIMER) was created in 1969 by the Delaware General Assembly as a cost effective alternative to establishing a medical school in Delaware. DIMER provides enhanced opportunities for Delaware residents to obtain medical education by providing financial support to Thomas Jefferson University's Medical College and Philadelphia College of Osteopathic Medicine in exchange for reserved admission slots for qualified Delawareans. Scholarships and tuition supplements are also available for participating students. DIMER's relationship with these institutions has facilitated and enhanced collaboration on health-related initiatives in Delaware.

In March 2009, a new coalition of leading education, healthcare and medical research institutions, the Delaware Health Sciences Alliance, was announced. The partners include Thomas Jefferson University, University of Delaware, Christiana Care Health System, and Nemours / A.I. DuPont Hospital, whose common priorities are world-class healthcare education; interdisciplinary "bench-to-bedside" research; and better healthcare quality and delivery. Their goal is to improve health and health services to all Delawareans through the nurturing of research and the development of advanced technology. Through the Alliance, major research centers are being considered in the areas of cardiovascular disease, cancer, women's and children's health, neuroscience and health policy. DHIN has had preliminary discussions with the Alliance to discuss the potential cache of de-identified patient data DHIN will have available through its data mart. DHIN will continue to play a role in the growth and development of this new and exciting opportunity in Delaware.

Broadband

Delaware did not receive any ARRA or other grant funding for expanding broadband connectivity within the State. A primary reason is that Delaware is in the top 10% of states with broadband connectivity. The State of Delaware, however, did receive grant funding for more

focused broadband initiatives – Mapping, Community Awareness, and Library Job Centers and wireless connectivity:

Research

Two Delaware organizations have submitted research grants naming DHIN as an implementation partner. DHIN continues to be open to working with organizations to provide understanding and further granularity of the clinical and other data in the community health record.

Data Sharing at Local, Regional and Nationwide Level

DHIN has had a long-standing commitment to move beyond State borders at such time it has achieved critical mass within the State of Delaware. Having achieved 100 percent hospital enrollment and realizing a steep rise in physician practices using the system, DHIN is in a position to begin looking at opportunities to connect with neighboring states. Additionally, DHIN has participated in the NwHIN since 2007 and looks forward to production connectivity with the Federal NwHIN partners.

Regional Data Sharing

The concept of a regional health information exchange (HIE) serving the Mid-Atlantic States is currently under discussion with several states in the region.

Most notably, the States of Delaware, Maryland and Pennsylvania see a significant proportion of patients crossing state lines for health care. For example, patients in Delaware are referred to hospitals in Philadelphia and Baltimore for specialty care and specialized trauma services. Residents of Maryland and Pennsylvania frequent Delaware beaches, casinos, shops and restaurants and when in Delaware may need to seek emergent care. This is exemplified by the significant increase in emergency visits to beach-area facilities during the summer months. As work toward regional connectivity begins, attention toward understanding interstate privacy and security, legal and policy inconsistencies will be taken to ensure an optimal environment to support interoperability.

The DHIN interface architecture provides the flexibility to leverage the NwHIN Gateway in exchanging data between neighboring State HIE's using the NwHIN standard(s), or within state boundaries (Medicaid, Mental Health and Substance Abuse, Department of Correction, federally qualified health centers, etc.) as capabilities allow. Opportunities to implement meaningful exchange of clinical care summary records within Delaware, in the context of Care Coordination, are being evaluated, and may extend to regional HIE's and/or regional HIO's.

Nationwide Data Sharing

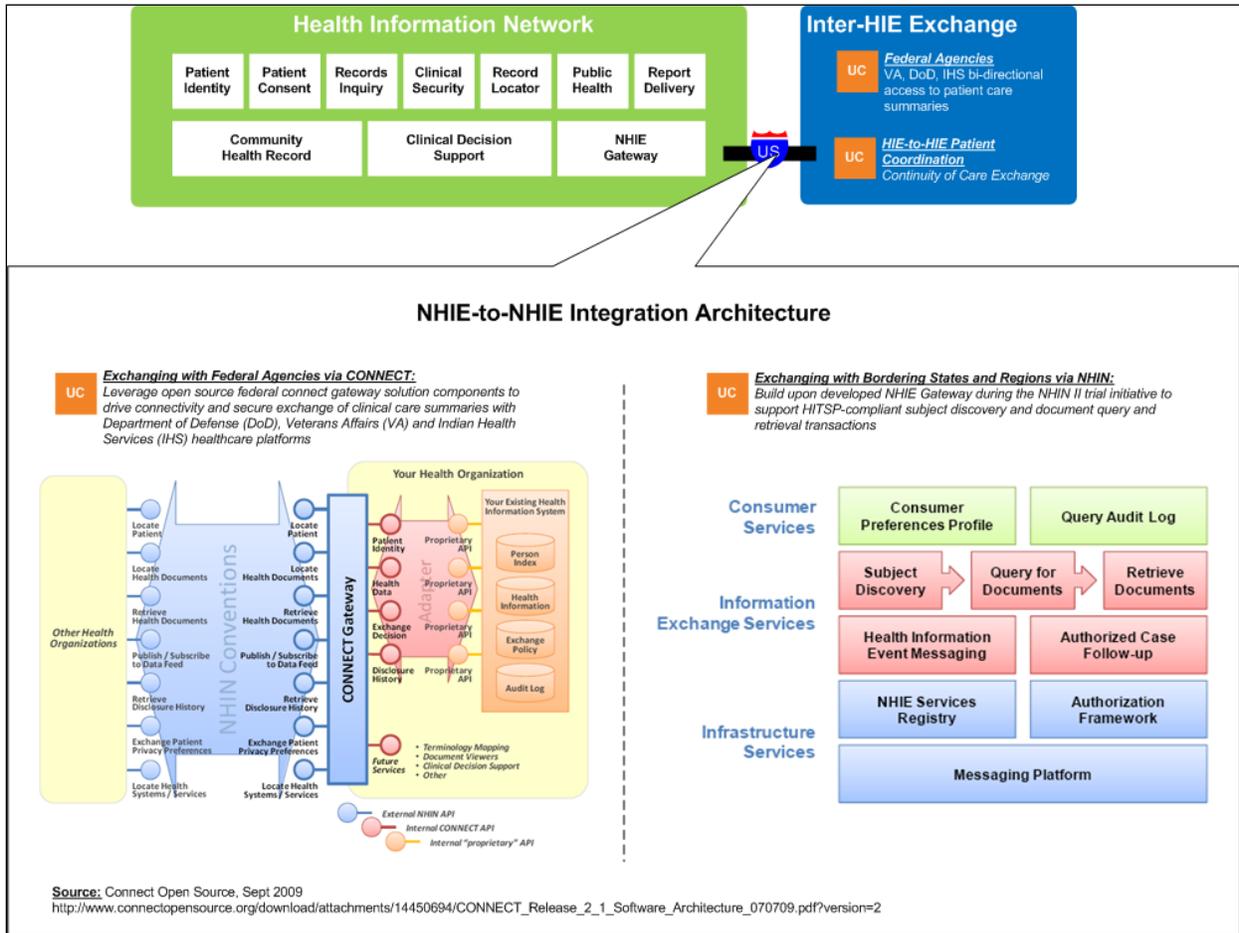
DHIN was selected as one of nine health information exchanges to participate in the Nationwide Health Information Network (NwHIN) Trial Implementation project led by the Office of the National Coordinator for Health Information Technology. DHIN was a contract award winner and active participant in the development of NHIE gateway specifications and implementation or core services / bio-surveillance use case during the second trial demonstration. Among the long

list of accomplishments, a key one was being the first to connect to the Federal partners during trial implementation in 2008.

As part of the trial implementations, DHIN demonstrated patient preferences, subject discovery, query, retrieval and display of a summary record, lab results distribution, and biosurveillance reporting. DHIN has subsequently been awarded an option year contract to continue participation in the NwHIN, whereby work toward production connectivity with the Federal CONNECT Gateway planned to support clinical exchange with the Veterans Administration, Department of Defense, and Indian Health Service where applicable. DHIN, being a co-author of the majority of the 2010 Production Specifications, is designed to be NwHIN compatible. The responsibility of issuing x.509 certificates for gateway-to-gateway end-points is outside of HIOs and lies with the NwHIN's contracted Certification Authority (CA). Thus, upon production NwHIN connectivity, the DHIN would leverage and use the NwHIN official CA, for the 2-way SSL end points, and would leverage the NwHIN's official UDDI 3.0 registry as a directory of DURSA-approved and validated NwHIN participants.

The main benefit of the DHIN platform is the ability to allow organizations that cannot aggregate data in a way that complies with the NwHIN architecture to participate and look like a document registry to service queries that come from outside the state/DHIN. The gateway was designed to fully comply with all applicable NwHIN core service interface specifications which do not make a distinction between intra-state and inter-HIO pairings. Thus the DHIN-NwHIN gateway is agnostic as to its use of or relationship to other responding or initiating gateways and can be used for intra-state and inter-HIO exchanges. (Business agreements, not technical limitations, dictate the use of the DHIN-NwHIN gateway for specific scenarios.) As the DHIN-NwHIN gateway has already demonstrated compatibility with NwHIN Trial Implementations II specifications and was extensively tested exchanging data with other NwHIN compatible gateways, some of which included federal agencies, states, and inter-HIO participants (SSA/VA, MedVA, and Long Beach respectively). DHIN's intended use leverages the NwHIN gateway between other trading partners that also are deploying a NwHIN gateway.

The diagram below illustrates DHIN's technical integration architecture with Federal partners via the FederalCONNECT Gateway as well as connecting with other state and enterprise HIEs using federal standards for the NwHIN.



DHIN has committed to continue participation and conformance to all nationally defined standards for inter-HIE clinical data exchange, including that with federal partners, such as VA, DOD and HIS, when available. Below are examples of some of the standards implemented during the 2008 trials:

- Subject Discovery – PIX, PDQ, XDS.b, etc.
- ATNA Logging
- Technical Messaging
- Pseudonymization
- DURSA
- Content

Legal and Policy

Privacy and Security

As set forth in the DHIN Statute, DHIN shall by policy or regulation ensure that patient specific health information be disclosed only in accordance with the patient's consent or best interest to those having a need to know. The health information and data of the DHIN is not subject to the Freedom of Information Act, Chapter 100 of Title 29, nor to subpoena by any court.

Any violation of DHIN policies, rules or regulations regarding access or misuse of the DHIN health information or data shall be reported to the office of the Attorney General, and subject to prosecution and penalties under the Delaware Criminal Code or federal law. (71 Del. Laws, c. 177, § 1)

With the assistance of DHIN's hospitals, privacy officers, legal counsel and Consumer Advisory Committee, DHIN has established a policy that considers individuals' rights and expectations, while balancing the need for health care providers to have information that enables them to make informed decisions and ultimately provide better quality health care services.

DHIN's Access to Individually Identifiable Health Information Policy is applicable to all users and data contributing organizations of DHIN. All users, senders and receivers of data have signed and agreed to the DHIN Data Use Agreement. This policy does not supersede or replace any Health Insurance Portability and Accountability Act (HIPAA) privacy or security policies in use by individual DHIN users and data contributing organizations.

As an instrumentality of the State, DHIN receives legal counsel and opinions from the Attorney General's office. Opinions have included privacy and security policies (including mental health data), governance structure options, as well as contracts and business associate agreements.

DHIN adheres to all of the privacy principles articulated in the DHHS Privacy and Security Framework:

Openness and Transparency Principle

There should be openness and transparency about policies, procedures, and technologies that directly affect individuals and/or their individually identifiable health information.

As an instrumentality of the State, DHIN is required to permit access to its public records, including policies, procedures, and technologies, in accordance with the law and as that term is defined in Delaware Code Title 29, Chapter 100 Freedom of Information Act. All of DHIN's policies regarding privacy and security are posted on DHIN's public website.

All participating DHIN data contributing organizations' Notice of Privacy Practices have been reviewed and are inclusive of electronic health information exchange. This applies to the delivery and query of information through DHIN for the purposes of treatment, payment or operations/administrative actions.

Data Quality and Integrity Principle

Persons and entities should take reasonable steps to ensure that individually identifiable health information is complete, accurate, and up-to-date to the extent necessary for the person's or entity's intended purposes and has not been altered or destroyed in an unauthorized manner.

The DHIN Health Information Management Systems (HIMS) Workgroup is responsible for evaluating, creating, and maintaining business processes that ensure data integrity and optimize data quality across all sending systems. The Workgroup is comprised of the HIMS representatives from each of the data sender organizations and is staffed by the DHIN technical team who reviews the integrity of data and the CMPI matching process on a global DHIN level. DHIN staff work closely with the HIMS staff at each of the contributing organizations and together they identify and address issues for review and resolution by the broader committee.

This workgroup develops the business processes that ensure data quality at the Community Master Patient Index (CMPI). They were integral in defining the matching algorithms by which DHIN patients are matched across disparate data sources. These rules were defined through a series of meetings in which use cases were defined, data was analyzed, and criteria from each of the sending organizations were reviewed. The HIMS Workgroup continually reviews the CMPI match results in order to validate their continued success. The Workgroup also evaluates each software deployment and defines certification testing for patient matching. They are responsible for “signing-off” on each change in the production environment with regard to data integrity and the CMPI.

The HIMS Workgroup members manage data integrity within each of their respective organization's DHIN Clinical Data Repository (CDR) using system tools that manage patient matching. There are tools for merging, moving or linking patient records within a single CDR and the CMPI. The functionality of each tool is defined as:

- **Merging Patient Records** - It is confirmed that two records exist for the same patient and there is no need to maintain both records. After merging patient records, only one record for the patient will exist.
- **Move Patient Records** - Only specific encounters need to be moved from the patient chart. For example, an encounter may be mistakenly associated with the wrong patient.
- **Link Patient Records** - When you confirm that Patient 1 and Patient 2 are the same person, but yet you want to maintain both records. This will associate the encounter data for the source or child patient to the target or Primary patient's record. After patient records are linked, all future encounter information for the source patient will point to the Primary patient.

Management of CMPI patient records must be approved by all members of the DHIN HIMS Workgroup.

Correction Principle

Individuals should be provided with a timely means to dispute the accuracy or integrity of their individually identifiable health information, and to have erroneous information corrected or to have a dispute documented if their requests are denied.

In accordance with HIPAA, individuals are provided the means to challenge and amend their individually identifiable health information. Requests to amend data shall be made directly to the data contributing organizations; DHIN does not have the authority or access to amend individually identifiable health information.

Individual Choice Principle

Individuals should be provided a reasonable opportunity and capability to make informed decisions about the collection, use, and disclosure of their individually identifiable health information.

Individuals may decide not to participate in (or “opt-out” of) DHIN. Non-participation results in personally identifiable health information not being available to users (including emergency personnel) upon a query or expanded query.

The DHIN system is capable of meeting all NwHIN patient consent requirements, as demonstrated at the September 2008 NwHIN Forum, such as granular control to individuals over the specific types of data that are or are not made available to authorized users. However, DHIN adopted a policy whereby individuals must decide to participate fully or not at all. The DHIN Board at the time approved this recommendation; therefore consumers may choose to have their information either “all in” the DHIN or “all out” as it pertains to having their data available for query by their providers using DHIN. Individuals do not have an option whether or not to participate in the delivery of clinical results through DHIN. This function is a business-to-business process established between a participating health care provider that orders a test/procedure and the facility (DHIN data sender) that performs the diagnostics and delivers the results.

Individuals that have previously chosen not to participate may choose to be reinstated in the system again at any time with no penalty. DHIN has developed procedures to process non-participation requests, as well as requests to begin participating again. In both cases, individuals must complete a form that requires the requestor to verify their identity in one of two ways: 1) have the form notarized by an authorized notary public in Delaware; or 2) have the form signed by a health care provider licensed in Delaware. The onus is on the individual, not the health care provider, to return the form to DHIN with original signatures to be processed.

Individuals are also provided the means and opportunity to request an audit report that identifies which DHIN user(s) has accessed their individually identifiable health information through DHIN. Audit reports do not contain any personal health information or clinical results. DHIN has established specific procedures to respond to requests for audit reports in a timely manner. Audit reports may contain information that indicates care was provided to an individual by certain types of providers (e.g. OB/GYN). Therefore, in accordance with State law regarding privacy of minors, if the individual is between 12-18 years of age, their permission (i.e.

signature) is also required in order for an audit report to be released to a parent/guardian. The audit report request form requires individuals to submit a photocopy of their most recent photo identification (ex. driver's license, student identification or passport) in order to verify their identity; however, since no clinical information is disclosed, the audit report form does not require the same level of verification as the non-participation form.

Consistent with meaningful use requirements, DHIN will be further empowering individuals by exploring options that will enable consumers to access their health information directly. DHIN already makes consumer health data available to appropriately authenticated individuals upon request.

Collection, Use and Disclosure Limitation Principle

Individually identifiable health information should be collected, used, and/or disclosed only to the extent necessary to accomplish a specified purpose(s) and never to discriminate inappropriately.

Only users enrolled in DHIN who have an established relationship with a patient will have access to that patient's information available through DHIN. Emergency care personnel will have access to DHIN whereby they can access patient records in emergency care situations on a need to know basis.

Users may expand their access to patient information by requesting to establish a relationship with a patient in DHIN. Users are required to log a reason for the relationship and set a defined time period for access, not to exceed six (6) months.

DHIN patient/consumer information is not sold or disclosed for any activity that may support marketing to the individual nor is individual information provided and/or used for mailing lists.

Safeguards Principle

Individually identifiable health information should be protected with reasonable administrative, technical, and physical safeguards to ensure its confidentiality, integrity, and availability and to prevent unauthorized or inappropriate access, use, or disclosure.

Access rights in DHIN are based on user roles and job responsibilities. Users are granted access to information on a need to know basis. That is, users may only receive access to the minimum functions and privileges required for performing their jobs. Users are required to acknowledge and accept the DHIN Terms and Conditions of Use prior to logging into the application. DHIN has adopted procedures to suspend or terminate a user's access to the system in the event misuse is identified. Pre-emptive efforts are also made by DHIN's implementation and training teams to educate users to adhere to privacy regulations; and the consequences of misuse are strongly emphasized.

All disclosures of individually identifiable health information through DHIN and the use of such information obtained from users of DHIN are consistent with all applicable federal and state laws and regulations and shall not be used for any unlawful discriminatory purpose. Violations of privacy include legal action in accordance with DHIN's privacy policy and with all applicable

federal and state laws and regulations. Pursuant to the DHIN Statute, inappropriate access is a criminal offense that could be subject to prosecution by the State of Delaware as a Class D felony punishable by eight (8) years imprisonment, fines and penalties for each offense.

Accountability Principle

The Principles in the Privacy and Security Framework should be implemented, and adherence assured, through appropriate monitoring and other means and methods should be in place to report and mitigate non-adherence and breaches.

DHIN logs all system activity, including user log-in identification, user name, user organization, date and time, patient account that was accessed, and type of records viewed by user. DHIN monitors and audits access to individually identifiable health information on a regular and scheduled basis to ensure appropriate use of the system. In consultation with the State's High Tech Crime Unit, procedures have been developed to report and address misuse and/or breaches of the system.

Possible misuse is identified in a number of ways: DHIN staff identify suspicious patterns of use through routine internal monitoring; an individual or their legal representative contacts DHIN with a concern about a specific user or a practice/organization; or a participating organization (e.g., hospital, lab, health care facility) identifies suspect behavior or terminates an employee and reports it to DHIN.

Once a case of suspicious use has been identified, an investigation is launched. If the investigation concludes the suspected activity or suspected inappropriate access or use is deemed consistent with the DHIN Data Use Agreement, the result is recorded and the matter closed. If the suspected activity or suspected inappropriate access or use is deemed inconsistent with the DHIN Data Use Agreement, that matter is escalated and could be referred to DHIN's Deputy Attorney General for follow up, which may result in termination or access and/or prosecution in accordance with Delaware State law.

State Laws

In 1997, DHIN was created by statute (Delaware Code Title 16, Part XI, Chapter 99, Subchapter IV) to be a public instrumentality of the State of Delaware to promote the design, implementation, operation and maintenance of facilities for public and private use of health care information. The DHIN statute establishes that inappropriate access of the system is a criminal offense that could be subject to prosecution by the State of Delaware as a Class D felony punishable by eight (8) years imprisonment, fines and penalties for each offense. DHIN's enabling statute was rewritten in 2010, establishing DHIN as an independent operating entity. The new enabling statute left unchanged previous privacy laws and, in fact, explicitly stated that all regulations promulgated previously to 2010 remain in effect. There are no plans at the current time to further modify the state laws that created DHIN and provide protections from liability.

Policies and Procedures

DHIN was created by statute, which defines its governance as well as provides liability protections. DHIN has promulgated regulations for participation in the network. Additionally, DHIN has implemented policies, procedures and/or protocols for privacy and security, provider relations and user management, and system monitoring. Refer to the Privacy and Security section for more information.

With the assistance of DHIN's hospitals, privacy officers, legal counsel and Consumer Advisory Committee, DHIN has established policies and procedures that consider individuals' rights and expectations, while balancing the need for health care providers to have information that enables them to make informed decisions and ultimately provide better quality health care services.

It is important to note that DHIN's procedures are confidential in order to protect patient privacy and the integrity of those policies. Release of such policies would allow those contemplating misuse to better understand the ways in which DHIN monitors for such misuse and works with law enforcement to investigate such improprieties.

Trust Agreements

The DHIN has in place, business associate agreements with all data sender organizations and electronic health record vendors. Additionally, DHIN requires all users of the system to certify that they have read and agree to the data use agreements. DHIN also provides practice offices with a security check-list that is encouraged to be initialed and signed by every DHIN user in the practice.

Oversight of Information Exchange and Enforcement

Violations of privacy could be subject to immediate termination of access to DHIN up to and including legal action in accordance with DHIN's privacy policy and with all applicable federal and state laws and regulations. Any violation of the DHIN's rules or regulations regarding access or misuse of the DHIN health information or data shall be reported to the office of the Attorney General, and subject to prosecution and penalties under the Delaware Criminal Code or federal law. Pursuant to the DHIN Statute, inappropriate access is a criminal offense that could be subject to prosecution by the State of Delaware as a Class D felony punishable by eight (8) years imprisonment, fines and penalties for each offense. In consultation with the State's High Tech Crime Unit and Attorney General's Office, procedures have been developed to report and address misuse and/or breaches of the system.

Funding and Sustainability

Financial Management

From its inception until July 1st, 2011, DHIN leveraged financial management personnel, policies and procedures within Delaware State Government to ensure proper budget management as well as authorization and payment of all DHIN accounts payable. Those staff resources maintained DHIN's asset account and appropriated funds accounts and worked with Federal, State, and private agencies to ensure that proper deposits, payments, and reimbursements are

made. DHIN's asset accounts and invoice authorization were subject to monitoring and auditing requirements of the Office of Management and Budget for the State of Delaware. On July 1st, 2011 DHIN became its own fiscal agent, responsible and accountable for its financial operations. During the transition, DHIN's Finance Committee approved financial policies to ensure its ongoing compliance with the Federal and State accounting standards. DHIN employs a Finance Manager to oversee and implement all financial aspects of the organization, including but not limited to: sustainability, budgeting, reporting, payroll and invoice processing, treasury, and revenue management.

Capital Phase

DHIN has been funded by a combination of Federal, State and Private funds. These funds ensure diversity in the funding streams for the DHIN. From Fiscal Year 2006 to Fiscal Year 2012 (planned), DHIN has spent approximately \$31 million in staffing and operating the DHIN as well as implementing, testing, and maintaining the system, developing policies and procedures and training providers on the most effective use of the system. The three sources of funding have accounted for an even distribution of revenue in the capital phase of the project as follows:

Federal Contracts

DHIN's contract with the Office of the National Coordinator (\$4.7 million) has provided funding for DHIN to build functions consistent with the NwHIN Trial Implementations core services as well as the laboratory harmonization and biosurveillance use cases. . Prior to DHIN's ONC contract, DHIN also received \$7 million in combined funding from the Nationwide Health Information Network and the Agency for Healthcare Research and Quality, whose contracts are now closed

State Funding

DHIN has received a total of \$12.1 million dollars from the State's capital budget over the past six years.

Private Funding

DHIN's model for private sector funding during the start-up or capital phase of the project (FY07 to FY12) was based on the premise that those who benefit from DHIN shall share in its financing. The primary benefits went primarily to hospital and lab participants. These participants, or data senders, paid a proportionate share of the cost based on their transaction volume as well as their own start-up costs associated with hardware and interface development. A donation to DHIN was provided by Delaware's largest health plan during the capital phase.

Ongoing Operations

DHIN has been funded by federal, state, and private sources over the past six years and is now at the point where daily operations are providing tangible value to its stakeholders. The following summary outlines DHIN's ongoing funding sources..

DHIN **Data Senders** receive benefit via expense reduction by turning off existing manual delivery methods (mail, fax, etc.) and having clinical results and reports delivered electronically. DHIN has seven active data senders who pay DHIN for results delivery services, with four more

who have signed agreements and are expected to go live in near future. . Data senders will fund 38% of expenses going forward, but DHIN must implement strategies for achieving maximum market saturation and providers willing to turn off old delivery methods in order for the data senders to obtain maximum benefit.

Health Plans receive benefit from the reduction of duplicate tests and better patient outcomes (i.e., lower hospital readmissions), which is made possible by the patient search function, which allows users to query a patient's history for past test results and medication history. DHIN expects health plans to contribute 30% of the necessary ongoing funding.

The **State of Delaware** receives benefit from DHIN as a payer as a result of a reduction in duplicated tests for its Medicaid population, employees, and retirees. From an operational standpoint, DHIN provides emergency chief complaint and reportable lab results to the state's public health biosurveillance system for outbreak detection and provides information to the state's immunization registry. As a result of the benefits provided to the State in terms of cost savings and efficiencies, DHIN expects the State of Delaware to fund 32% of its ongoing expenses.

In addition, DHIN will provide benefit to **employers** as a result of improved patient care and increased patient engagement with their providers and associated medical information. As employers recognize the gains realized from fewer sick days and doctor's appointments, as well as less time spent at the doctor's offices, for employees and their families, they will begin to fund DHIN's ongoing efforts.

The DHIN is in the final stages of working with the State of Delaware to redirect financing from the State's capital budget to its operating budget by showing cost savings and reallocation derived from a more efficient way of doing business for many of their divisions and departments, including public health, Medicaid, employee benefits, correctional health, and substance abuse and mental health. DHIN expects operational funding to commence in state fiscal year 2013.

An evaluation of DHIN's services and benefits was completed in 2011 which noted financial benefits relative to cost reduction, revenue enhancement and productivity gains. By sending results through the DHIN, a savings of approximately \$2.03 million dollars is generated annually for the data senders. This figure is expected to rise as more providers enroll and sign-off accepting DHIN as the report of record. By utilizing the DHIN to connect to provider practice's Electronic Health Record to hospitals and others, a single provider can save between \$18,500 and \$28,500 in initial implementation costs. The estimated total savings for all providers in the DHIN to connect their EHR via the DHIN is \$7.5 million one-time and \$1.5 million annually. In addition, the evaluation found a 30% reduction in high cost radiology test results and a 33% reduction in high cost lab tests per patient in the DHIN database over a two year period. This equates to up to \$6.5 million in annual savings based on Medicare reimbursement rates these specific sets of tests..

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Appendix A: DHIN BOARD OF DIRECTORS

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