



# ONC-HIE Final Evaluation Report

**Delaware Health Information Network**

**Prepared by:**



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# ONC HIE PIN Final Report

## Executive Summary

The Delaware Health Information Network (DHIN) has been in existence since 1997. In the subsequent years great progress has been made through engaging stakeholders, offering products and services that stakeholders desire, and connecting communities both within the state and outside the borders of Delaware (Figure A).

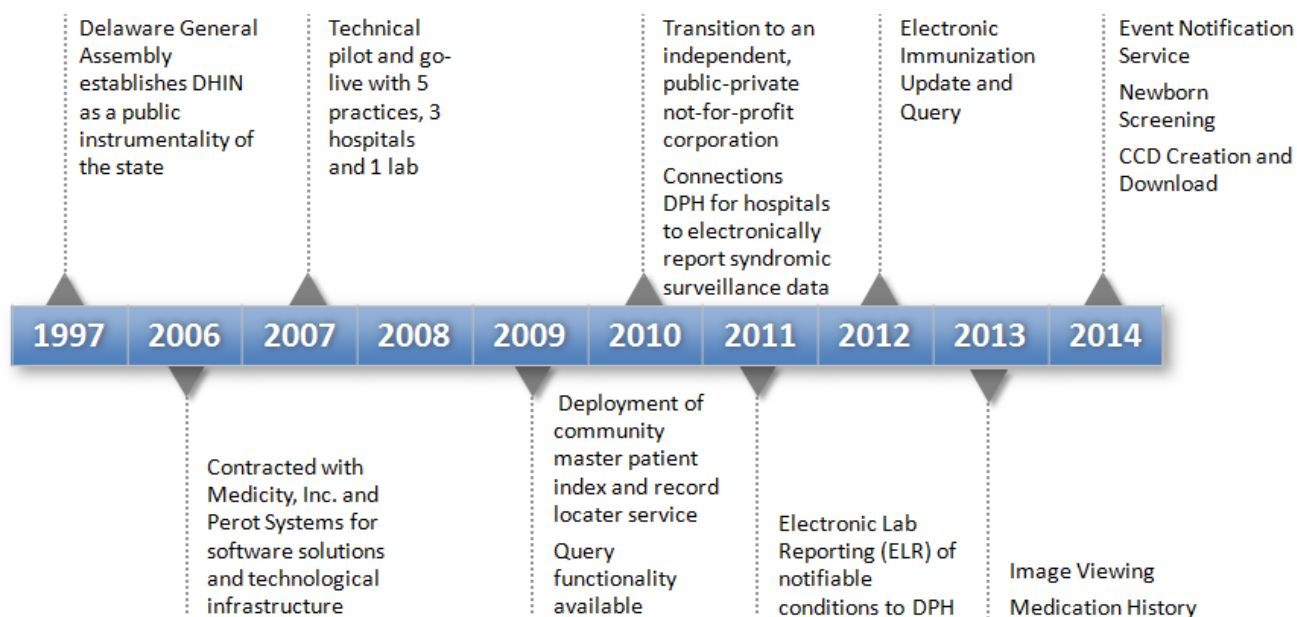


Figure A

The end users of the Community Health Record include not only 98% of providers who place clinical orders (including 100% of the FQHCs in Delaware), but numerous other organizations who find value in being able to access the patient's previous medical history. From the start to the end of the grant period, participation by such organizations has increased nearly seven-fold, and today includes:

- 100% of Delaware's skilled nursing facilities
- 87% of Delaware's assisted living facilities
- 53% of home health agencies
- 75% of school-based clinics
- Department of Corrections
- Division of Public Health Epidemiology Program
- Division of Public Health Communicable Disease Group
- Cancer Registry (Delaware and Maryland)
- DSAMH Community Mental Health Centers
- Adult Protective Services

- A variety of specialties such as hospice, dentistry, optometry, psychiatry, pain management and chiropractics

Success has been demonstrated in the areas of adoption and utilization, reduction of healthcare costs and sustainability. There are many lessons learned that can be shared with other initiatives across the country. DHIN continues to expand the depth and breadth of services offered, so that end users rely on DHIN and are willing to contribute to the sustainability of health information exchange in Delaware.

## Introduction and Overview

In March, 2010 the Delaware Health Information Network (DHIN) was designated by the Governor as Delaware's State Designated Entity (SDE) and was charged with implementing the state's plan for Health Information Exchange. Funding was available under the HIE Cooperative Agreement; according to terms of the agreement DHIN is required to evaluate the impact of Health Information Exchange across the State of Delaware and document quantitative results, qualitative results and lessons learned. The purpose of this final report is to evaluate the nature and extent to which Healthcare Information Exchange (HIE) has had an impact across the State of Delaware with an emphasis on the following priority programs for all states as established by the Office of the National Coordinator (ONC):

- Laboratories delivering electronic structured lab results
- Pharmacies participating in e-Prescribing
- Providers exchanging patient summary of care records

This report also evaluates DHIN's impact related to submission of Public Health Data, improvements in cost and quality of care, and sustainability of health information exchange initiatives. In addition, preliminary lessons learned by DHIN are incorporated to facilitate sharing of successes across states. Additional information about the formation and growth of DHIN from 1997 to present is available in the closeout checklist document to ONC submitted March 7, 2014<sup>1</sup>.

DHIN has contracted with Maestro Strategies to design and conduct the evaluation as an independent assessment of the progress made and value realized. This is the final report as required by ONC. The remainder of this document discusses DHIN's progress over the past five quarters (July 2012-September 2013) as compared to baseline operations. Progress has been divided into three areas: HIE Adoption, Reduction in Healthcare Delivery Costs, and Sustainability. In addition there is commentary on lessons learned and future plans.

## Evaluation Approach and Data Sources

The evaluation approach includes analysis of user and transaction data from the HIE, comparison with publicly available data, and analysis of results from an end user survey conducted by IPSOS Corporation in 2013. The evaluation also incorporates DHIN's Closeout Checklist Document (March 2013) as well as the evaluation of DHIN done for AHRQ in September of 2011. These data sources have been instrumental in identifying key accomplishments relative to ONC's PIN as well as additional results unique to DHIN.

In general, quantitative analysis has been conducted using operational reports from the HIE vendor. These include but are not limited to transaction logs, audit logs and provider counts. These have been supplemented with ONC-developed tools such as the Lab Survey, vendor reports, and ONC supplied reports from Surescripts around e-Prescribing. Publicly available data (e.g. Census data to determine number of Delaware residents) has

been used to provide meaningful denominators. Qualitative evaluations have been done through use of survey responses from DHIN provider members.

In general, the measures identified will encompass the performance characteristics required for any HIE to be successful. These include participation by both patients and providers (adoption), and value delivered to stakeholders including patients, providers and payers. Only when value is perceived will organizations and individuals agree to fund the effort. Lastly, the way in which HIE is funded will be studied over time to understand how adoption and value have driven the shift in the financial model for HIEs.

Unless otherwise stated, the evaluation period includes a baseline measurement in 2010 and quarterly updates from the 3<sup>rd</sup> quarter of calendar year 2012 through the 3<sup>rd</sup> quarter of calendar year 2013.

**Data Sources:** Data used for the evaluation were both quantitative and qualitative and came from several sources. Listed below are the key sources of information and the specific items they contributed to the evaluation.

***DHIN Quarterly Progress Reports*** – Statement of Progress reports to the ONC were used to document basic statistics such as number of participants and volume of transactions.

***DHIN Financial Statements*** – Quarterly income statements as presented to DHIN’s Board of Directors were used to identify and analyze sources of income.

***DHIN Operational Reports***- Audit reports around justified access were used to conduct the Maximization analysis.

***DHIN Executive Briefings*** –Additional operational data and strategic plans, as presented to DHIN’s Board of Directors, are included to supplement operating reports and financial statements.

***HIE Vendor Produced Reports***- Special reports produced by Medicity were used to perform analysis on number of unique patients, number of discharge summaries sent, and number of high cost tests resulted.

***DHIN Provider Research Final Quantitative Report*** To help guide future development DHIN commissioned IPSOS Corporation, a market research company, to conduct qualitative and quantitative market research with its provider population. The objectives of the research were to:

- Assess current DHIN satisfaction levels among providers
- Determine which features and functions offered by DHIN are valued by providers and practice managers
- Identify any areas where improvement is needed
- Evaluate potential new products and services that could add value for providers and determine how much they would be willing to pay for value-added services
- Establish a quantitative baseline against which DHIN can compare future scores to measure the success of its efforts

Online interviews were completed with the following:

- 105 physicians
  - 52 primary care physicians
  - 43 specialists
  - 10 ER physician s
- 75 nursing and administrative staff employed by health care providers

Questions were asked in three basic areas:

- Current Usage & Perceptions - Gather data about current usage of DHIN and obtain baseline satisfaction & loyalty levels
- Evaluation of New Service Ideas - Expose to concept(s) for new DHIN products/ services and obtain ratings on IPSOS Key Performance Indicators (e.g. intent to use, liking, need fulfillment)
- Pricing Assessment - Assess interest for new services across price points

As appropriate, responses from this survey, including free text responses, are included to support quantitative findings from the data above.

## HIE Adoption

Multiple types of adoption drive value, so a single factor cannot be studied in isolation. Arraying levels of adoption along a curve helps stakeholders understand the success of the initiative as well as the value they are receiving. As shown in the HIE Adoption Curve<sup>ii</sup> (Figure B), the degree of adoption has been evaluated at three different levels: participation, utilization and maximization. Each will be described below.

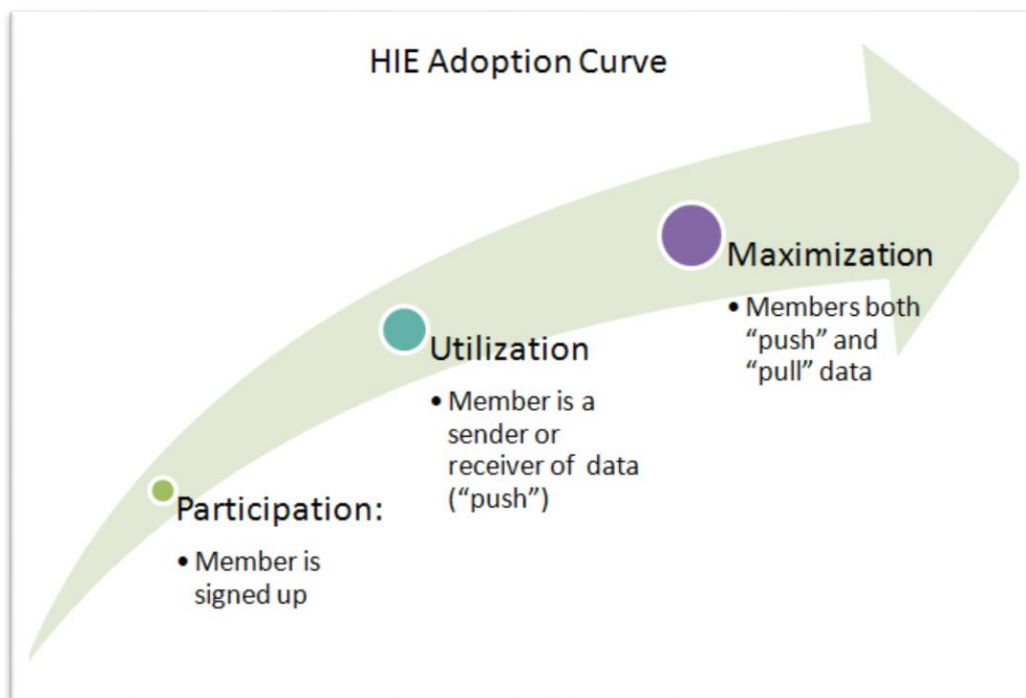


Figure B

## 1. Participation

The number of participants (those who are “signed up” with an HIE) is the first level of adoption – measuring growth in number of participants over time as well as the percent of the market participating for each cadre (such as labs, pharmacies, physician practices, etc.) will describe this phase. In addition, understanding the total patient population in the HIE’s “medical trading area” that is participating (i.e. the number of patients who have some data in an HIE), will describe consumer adoption.

**Organizations Participating:** The level of participation in DHIN has grown significantly since the baseline period of March 2010. As seen in Figure C, 95% (22 of 23) laboratories in the state of Delaware are participating by sending results as structured data<sup>iii</sup>; over 95% of pharmacies in the state are participating in e-Prescribing<sup>iv</sup>, and 100% of Delaware’s hospitals are DHIN participants<sup>v</sup>. In addition, a hospital from a neighbor state (Atlantic General Hospital in Berlin Maryland) is also sending and querying data through DHIN. Recognizing that Marylanders and Delawareans regularly cross the border for care, DHIN approached the State of Maryland’s HIE, CRISP, and established agreement for interstate connectivity between the two HIEs.

When diagnostic laboratories in New Jersey wished to access the Delaware health care market and provide services to Delaware providers, the first question they faced was whether or not they participated with DHIN. Without the labs participating and transmitting information through DHIN, their value in the Delaware health care marketplace would be greatly diminished. Two New Jersey-based labs have elected to participate as DHIN data senders in order to establish a viable business presence in Delaware. Two additional labs have approached DHIN with similar requests; pre-contract negotiations are under way.

DHIN and the Kansas Health Information Network successfully validated HIPAA-compliant national interoperability by facilitating the secure exchange of data between each organization via Direct Secure Messaging. DHIN does intend to become a participant in eHealth Exchange once the next major software upgrade is complete and DHIN is on a version which will be certified for inclusion in the Exchange.

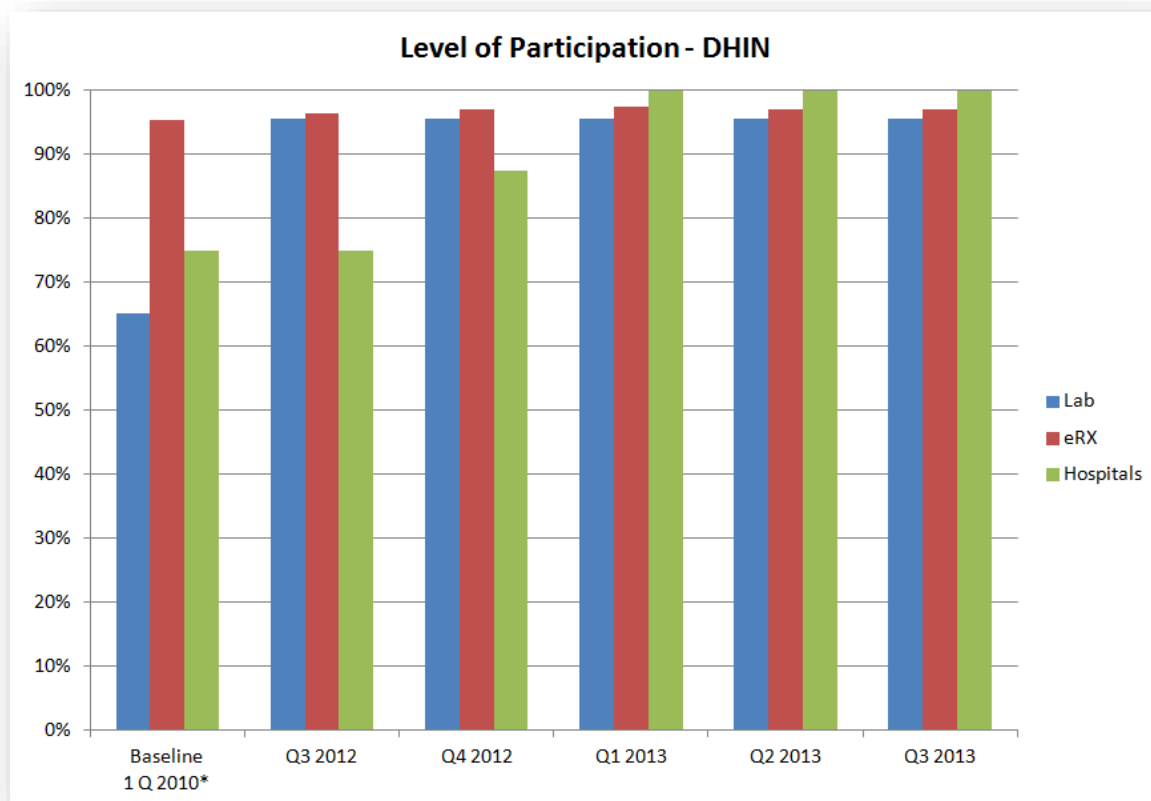


Figure C

**Providers and Users Participating:** The number of users who access DHIN has grown from 6,936 during the baseline period to 8,075 in the third quarter of 2013, which is an annual increase of over 2% (Figure D). Users are defined as those professionals in the Physician office who are accessing information including Physicians, Mid-Levels/Extenders, Office Staff, Clinic Staff, and Public Health Officials. In addition, the number of practices “signed off” (practices that acknowledge DHIN as the sole provider of results from participating diagnostic facilities including hospitals, labs, and freestanding radiology) with DHIN has grown from 242 in 2010 to 676 at the end of the third quarter of in 2013, a 179% increase. More importantly, over 81% of practices who participate in DHIN rely solely on electronic transmission of results as opposed to mail, fax or courier for these results. 100% of Federally Qualified Health Centers (FQHCs) also participate in DHIN. Other portions of the care continuum are represented including Skilled Nursing (100%), Assisted Living (80%), Home Health and Hospice organizations.

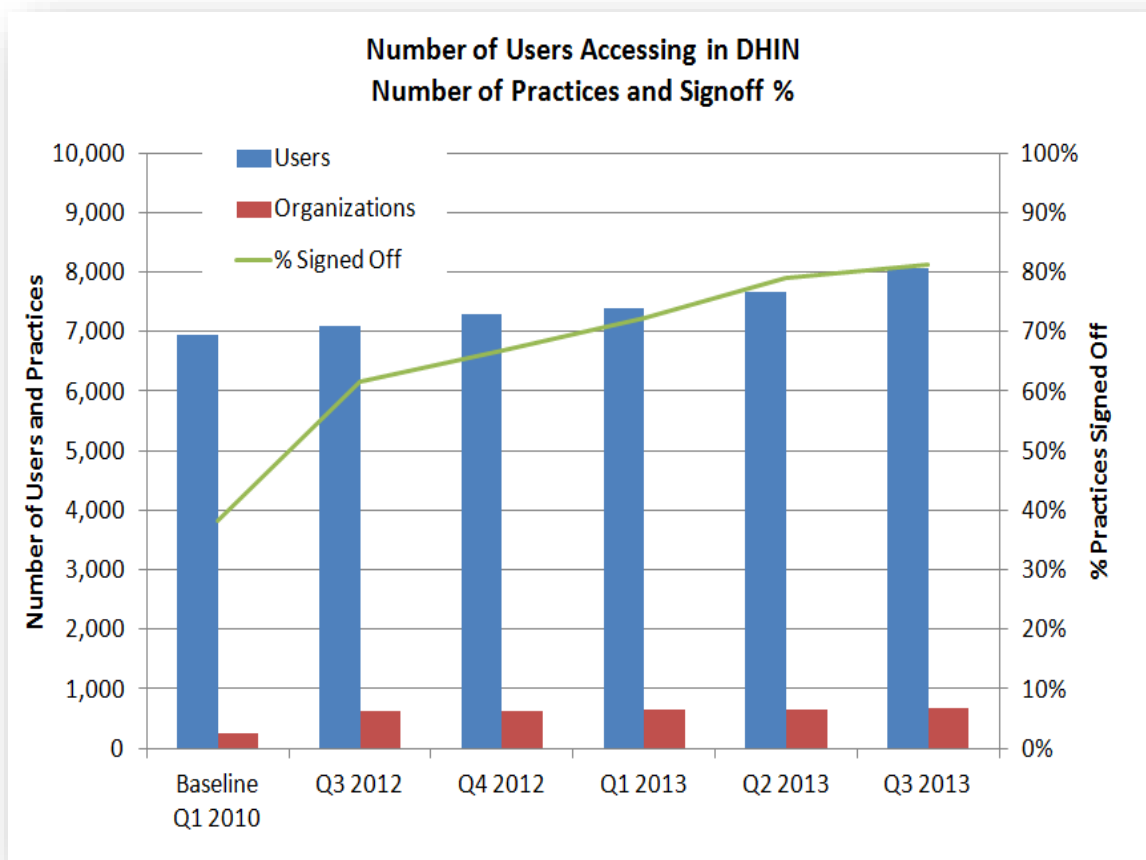
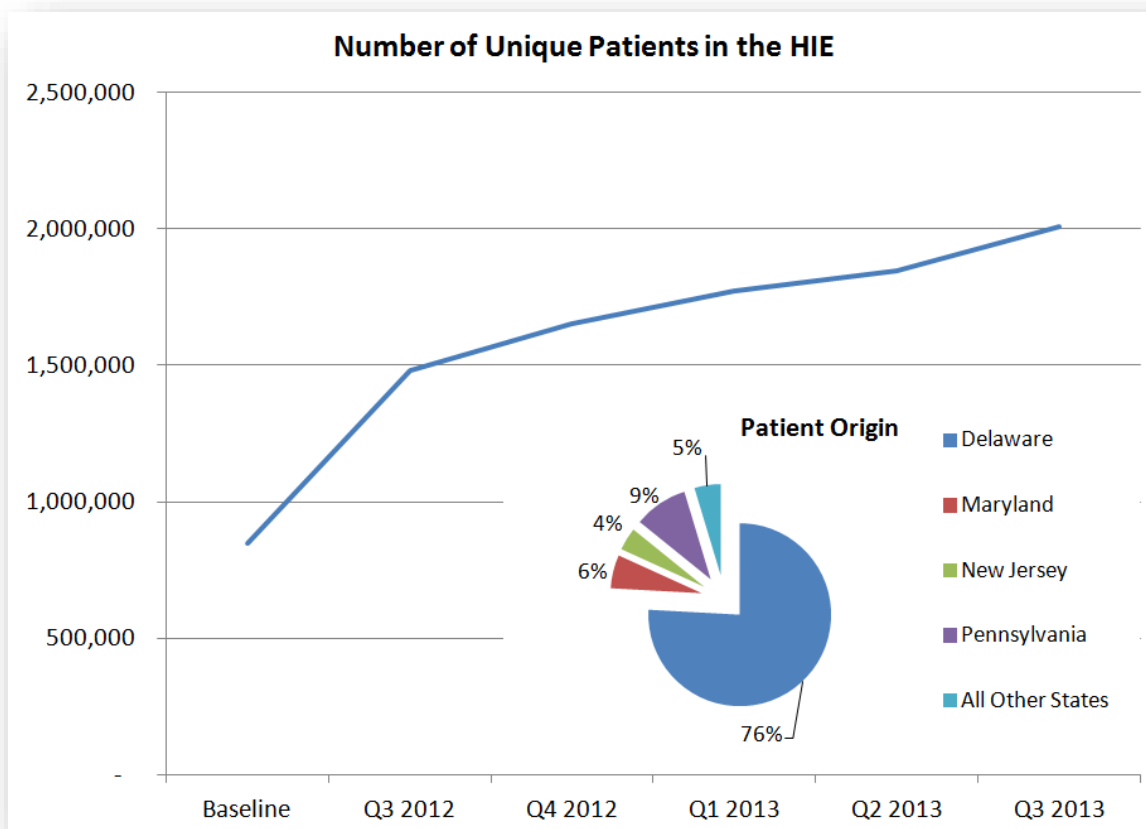


Figure D

**Patients Participating:** Finally, along with number of organizations participating, the number of patients who now have data accessible through DHIN has also grown over time, from about 846,000 in March of 2010 to over two million as of September 30 2013 (Figure E). This number contains some duplicate patients (estimated to be about 200 thousand duplicate records), due to inability to create an exact identity match where information is missing. Nonetheless, the rate of growth is impressive with a calculated compound annual growth rate (CAGR) of 24.14%. Patients from all 50 states have results or documents in DHIN; about 1.2 million of the records are attributable to Delaware residents. This number exceeds the current population of Delaware, based on a population estimate of roughly 926 thousand residents in 2013<sup>vi</sup>. Given that the DHIN Community Health Record contains clinical data dating back almost seven years, this is most likely attributable to deaths and movement out of state. Taking any view of the numbers there can be very few residents of Delaware who do not have any clinical data in DHIN.

Approximately 24% of patients state an origin outside the state of Delaware. While this is due primarily to Delaware's small size and geographic proximity to Pennsylvania, Maryland, and New Jersey, it also represents information from patients from much further away who may have had urgent or emergent conditions while visiting in Delaware. Also the presence of Dover Air Force Base and its military population is contributing to the number of patients from out-of state.



**Figure E**

From a clinical data perspective, DHIN has become both ubiquitous and indispensable in Delaware, as it touches all consumers in the state. Participation by all hospitals and, statistically speaking, all labs and providers (including Federally Qualified Health Centers), as well as participants in subacute facilities, freestanding radiology facilities, health plans, public health, home health, and hospice means information can follow the patient almost wherever he or she may present for care in Delaware.

## 2. Utilization

Utilization is the next tier of measurement for adoption. A provider may be enrolled in DHIN, but how often do they actually use DHIN? From a quantitative perspective, how often do they receive results electronically, and how often do they send information electronically? The total number of transactions per time period as well as the number of transactions sent or received per entity (for each cadre) indicates the degree of reliance on the HIE.

From a qualitative perspective, the services DHIN provides that are most heavily utilized are results delivery (directed exchange) and query-based exchange via the Community Health Record. The means for receiving data varies. EHR integration is the most commonly used method for downloading data from DHIN. Today, 73% of Delaware practices using an EHR are using one of the 19 EHRs with a certified results delivery interface to DHIN. This single interface to DHIN enables all results from all data senders to flow directly from

DHIN into the provider's EHR, and keeps them in their natural workflow until and unless they need to search for a new, previously unknown patient. When this need arises they make that query through DHIN's provider portal into the Community Health Record. However, EHR integration is not a requirement for access. About 36% of general practices still schedule automated printing of reports<sup>vii</sup>.

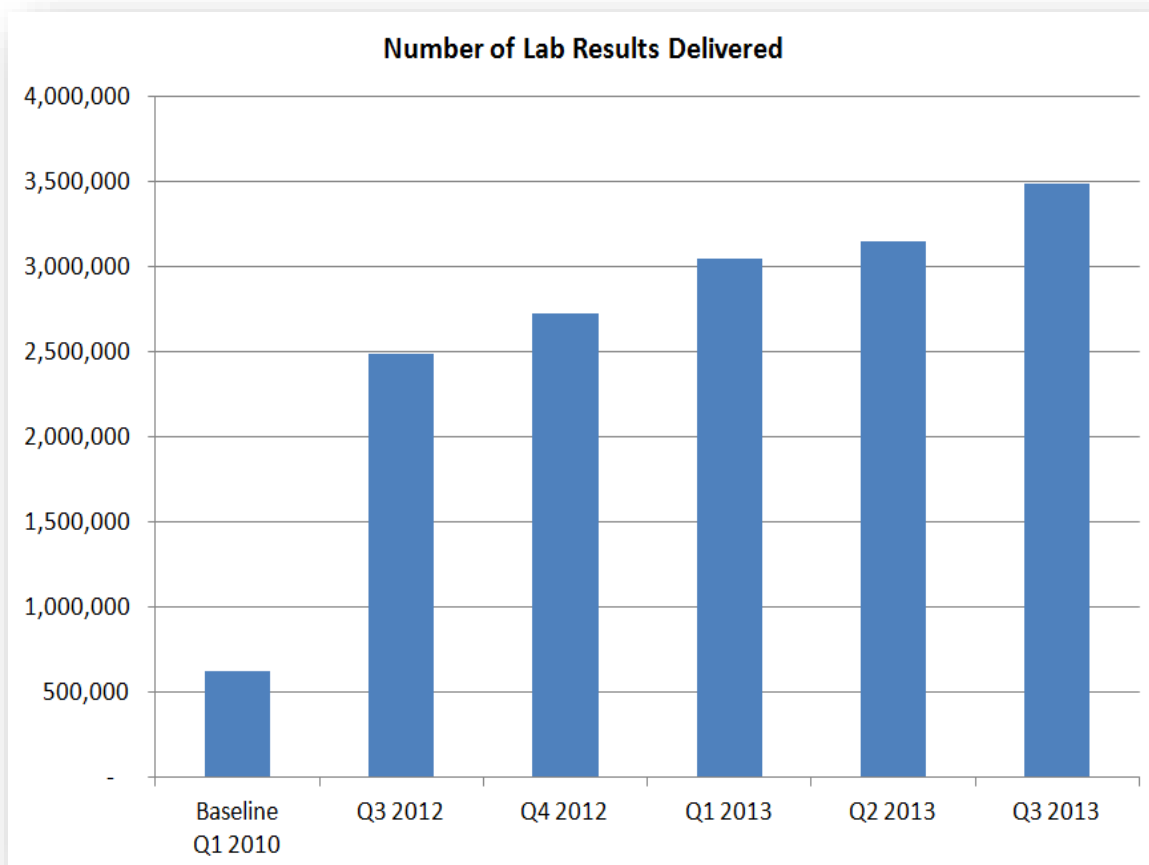


Figure F

**Lab Results Delivered:** The number of results delivered to providers via DHIN has grown from 620 thousand during the baseline period of January through March of 2010 to 3.5 million for the quarter ending September of 2013, a 462% increase (Figure F). This is the result of the increase in both the number of facilities transmitting lab results (hospitals and reference laboratories), and the number of practices (and users within each practice) that are receiving results. As the level of participation has grown, so has the level of utilization.

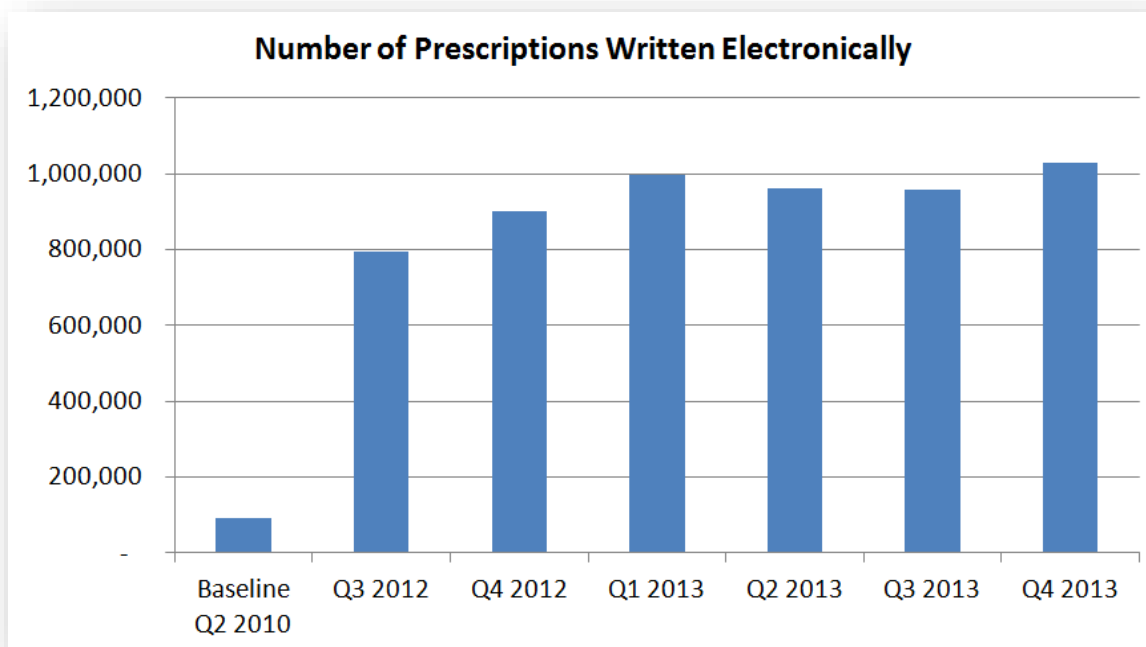


Figure G

**Number of Prescriptions Written Electronically:** Similarly the number of prescriptions transmitted electronically has grown since the baseline period from 93 thousand to over one million prescriptions for the quarter ending December 2013<sup>viii</sup> – a tenfold increase (Figure G). Adjusting for seasonality, this functionality appears to have reached a maturity level and utilization is expected to remain flat – this utilization trend is consistent with the percent of pharmacies participating in e-prescribing and the number of providers writing prescriptions electronically.

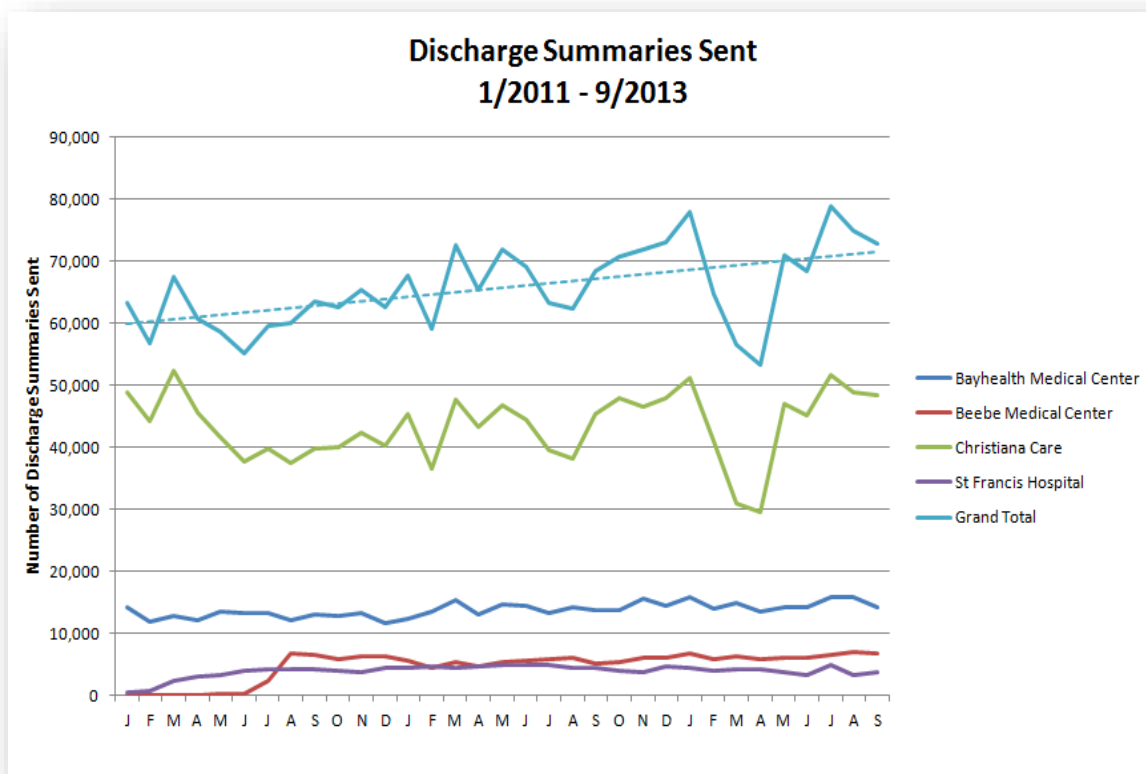


Figure H

**Discharge Summaries Sent:** The ability to track number of discharge summaries sent by hospitals began in January of 2011. There has been a steady growth in the number of discharge summaries sent during this timeframe, from roughly 63 thousand in January 2011 to nearly 73 thousand in September of 2013, an increase of 15%<sup>ix</sup> (Figure H). Christiana Care is the biggest sender of discharge summaries; the dip in number of discharge summaries sent in March and April of 2013 is due to an issue with their transcribed reports interface which they corrected internally and ensured those transcribed results were delivered and available in DHIN in the May – July time frame .

**Immunization Reporting:** Functionality for DHIN to submit immunization records electronically from providers to the DelVax system (Delaware’s state immunization registry), was made available in October of 2012. There are early indications that DHIN is a viable tool to get more immunization data into the state’s repository, as DHIN accounted for 28% of all immunization records entered into DelVax in the third quarter of 2013\* (Figure I), and grew to 47% for the quarter ending December 31, 2013. Delaware currently has a significant backlog of paper records awaiting transcription into DelVax. This number had dropped to a negligible level, but increased again during flu season. It is hoped that by next flu season, so many organizations will be reporting electronically that there will be virtually no paper backlog, that the DelVax registry will be fully up to date, and that they will be current with all reported immunizations in the registry. A significant number of organizations that now report electronically, including Christiana Care and several pharmacies, had previously never reported immunizations by any method. DHIN’s ability to facilitate transmission of information electronically into the database has great benefit to the state not just in replacing manual processes with electronic processes, but in obtaining data that is far more complete and accurate than has previously been the case.

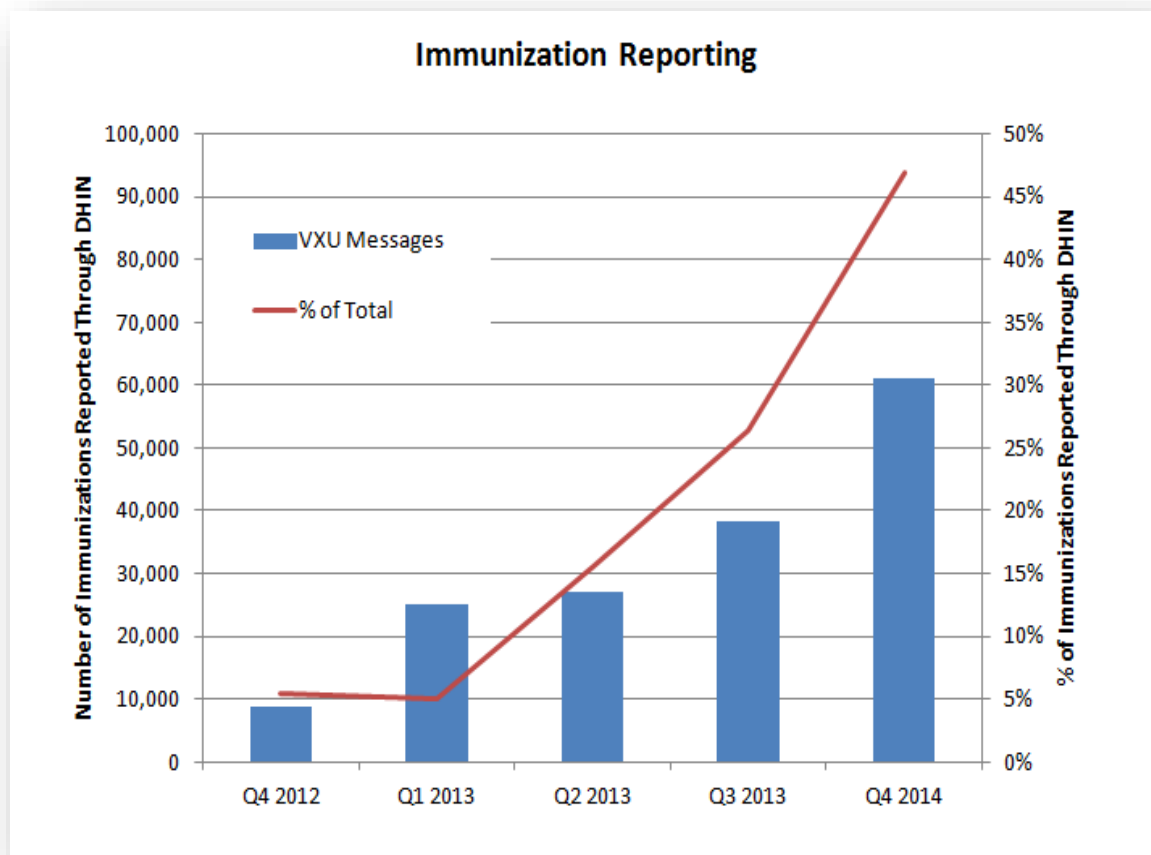


Figure I

### 3. Maximization

True realization of the value of HIE occurs when there is bi-directional exchange of information. Instead of a laboratory just sending results to a provider, or one provider sending summary of care documents to another provider, all members of the HIE can both send and query data (i.e. they query the HIE), for all relevant information about a particular patient. Measuring the number of times end users query the HIE helps describe to what degree the capabilities of HIEs are maximized. In addition, there are situations where a provider sees patients for the first time, and may not have access to the patient's medical history and other critical information (lab results, medication list, etc.), at the time of the visit. That information would be available only if results were sent to the provider. Typically, providers must either telephone other providers or ask the patient about relevant medical information. However, providers that are members of an HIE can search for the patient and access any information available through the HIE by specifying their identity and reason for need to access the information ("Justified Access"). Additional information provided by the HIE that is not available immediately from other sources allows providers to make better decisions and deliver better care by potentially avoiding contraindicated care and unneeded tests/hospitalizations. When providers adopt HIE as their means for information sharing, there is greater value delivered to the community.

**Justified Access:** Through DHIN, providers who are justified in accessing patient information can get relevant data quickly as opposed to placing telephone calls to other providers to get the information. Figure J depicts both the number of providers accessing DHIN for patient information, as well as the number of times information was accessed. This has grown from 94 to 469 providers (a five-fold increase) and from 2,700 accesses per month in January 2010 to more than 82,000 accesses per month in September of 2013, a 30-fold increase. This ever-growing reliance on the HIE for this information shows maximization of the available technological and data resources provided by DHIN.

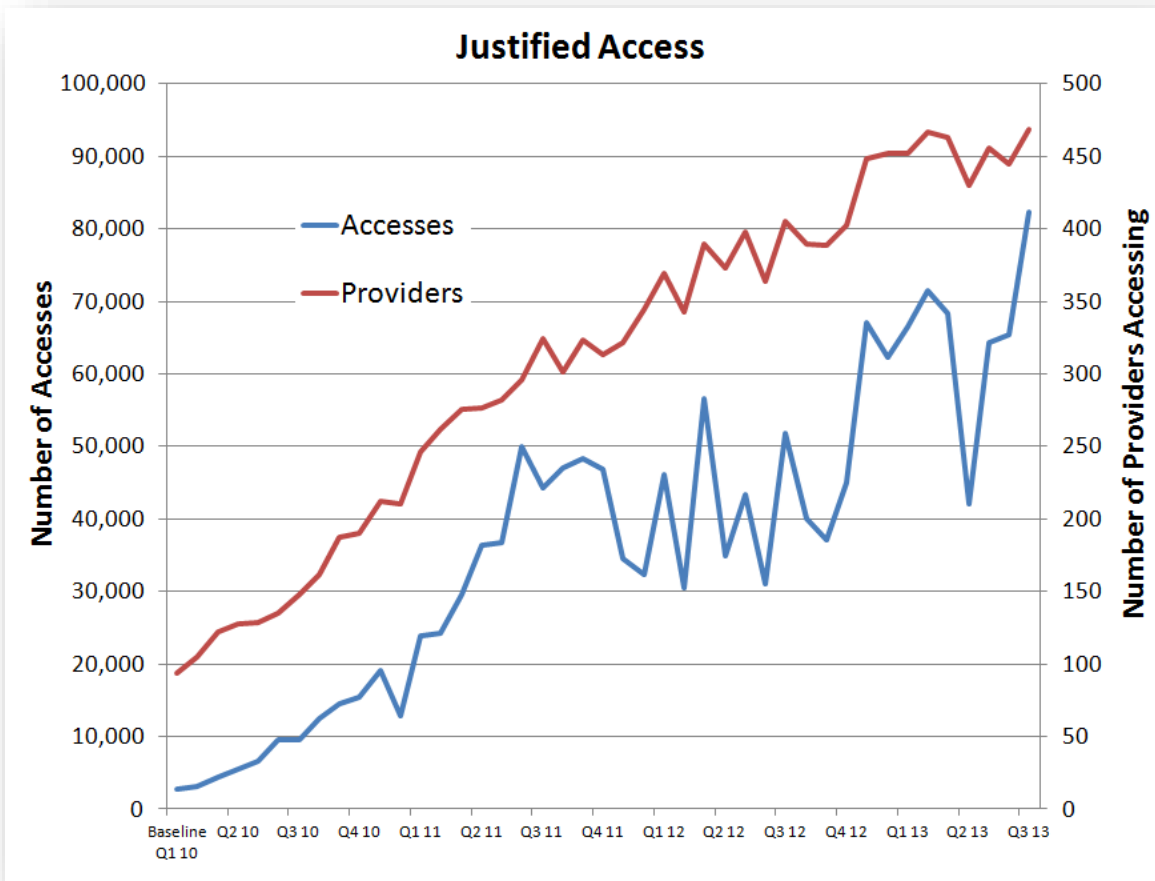
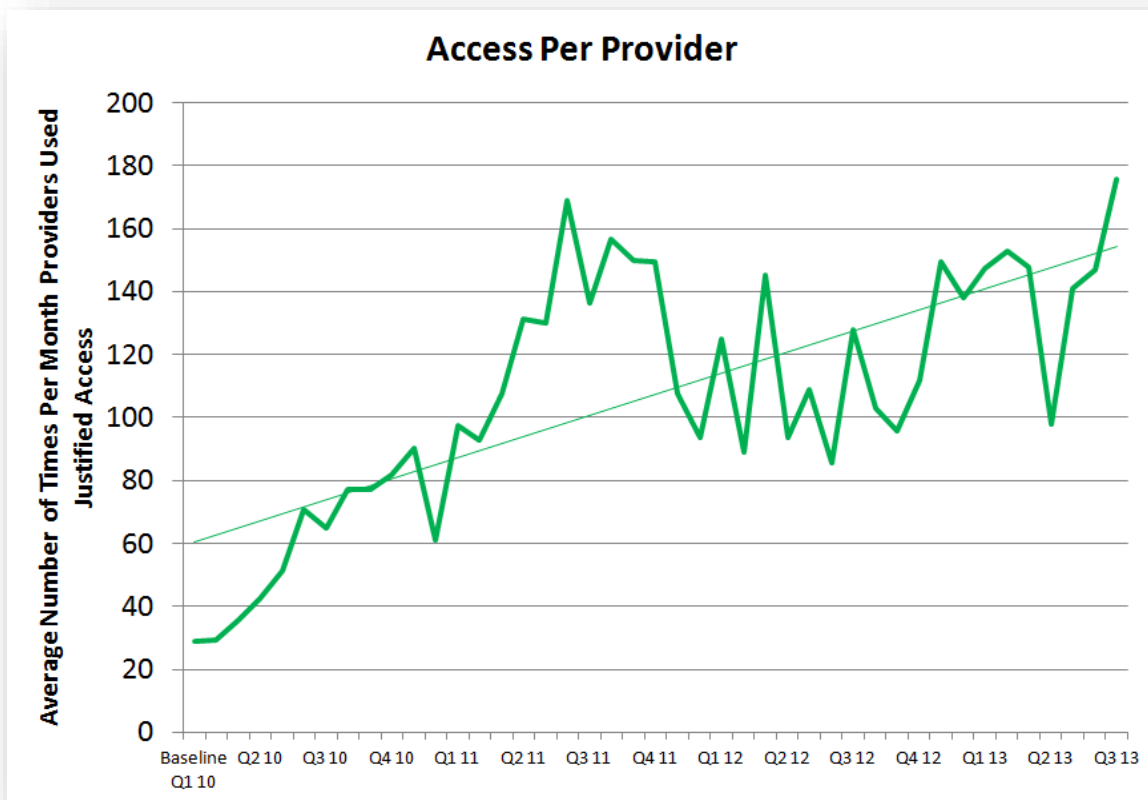


Figure J

When combining the number of providers accessing data with the number of actual justifiable queries made, a ratio of number of justified accesses per provider can be derived (Figure K). This ratio grew from just under 29 accesses per provider per month in the baseline period of January 2010 to 175 accesses per provider per month in September of 2013, a six-fold increase. This demonstrates an increasing reliance on DHIN to have the necessary information about patients for both ambulatory and acute care providers.

The use of this capability has been integrated into physician office workflow. End users have coined phrases such as “DHINing the patient” and “Did you DHIN it?” to describe part of the routine to obtain patient information required for care delivery.<sup>xi</sup>

Figure K



## Reduction in Healthcare Delivery Costs

To drive adoption and sustainability, HIEs must provide value to the participants. Research supports the premise that the current lack of information exchange between providers, does result in unnecessary inpatient hospitalizations, possible adverse events (especially around medication allergies), and duplication of high-cost services<sup>xii</sup>.

### Reduction in Duplicate High-Cost Tests

One area of focus around cost reduction involves duplicate high-cost tests being ordered for a patient during encounters in physician offices, in emergency departments and during inpatient stays in acute care facilities. Many of these tests, such as CT scans, MRIs and complicated lab panels, have very high associated costs. When a provider can view results from previously ordered tests it minimizes the need to re-order the same tests. This reduction in duplicate test ordering reduces resource consumption providing overall value to healthcare consumers through reduction in healthcare costs.

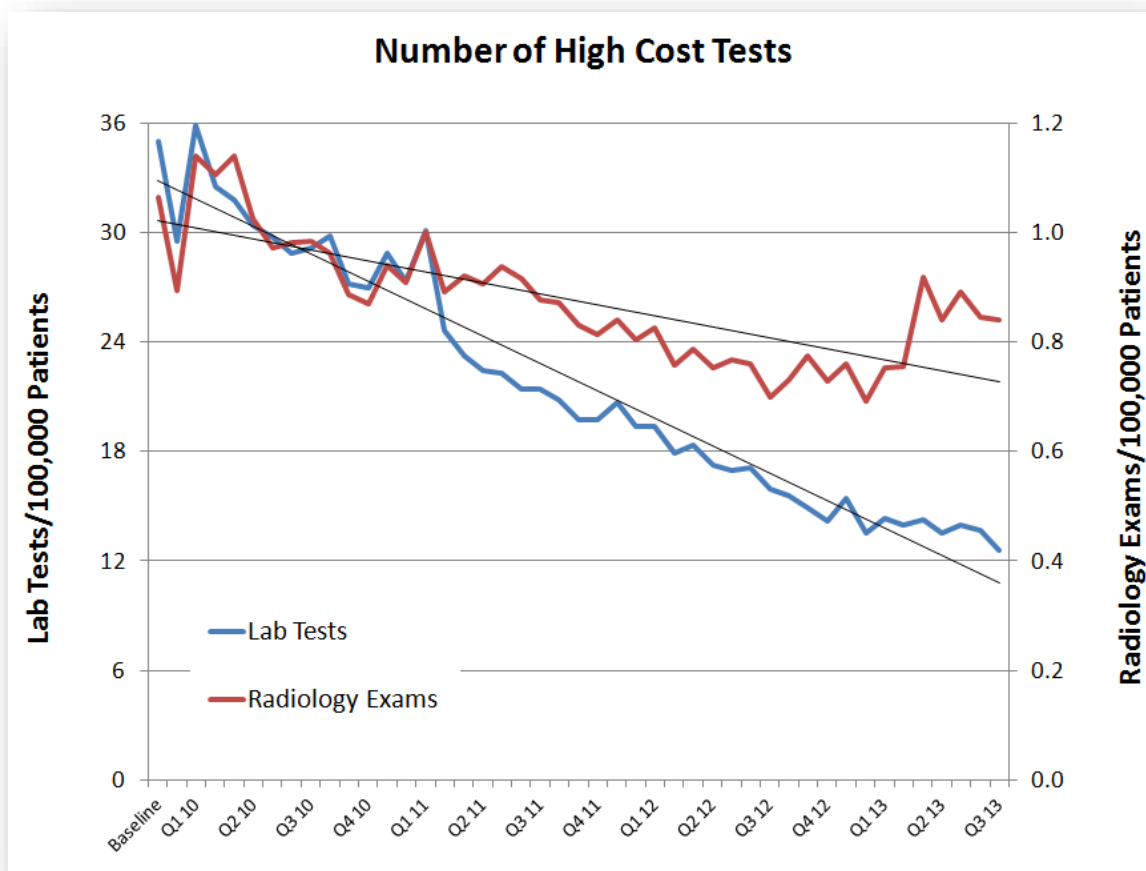


Figure L

Reviewing DHIN’s experience in this area (Figure L), a steady decline has been demonstrated in the number of high cost tests per patient in the DHIN database that were resulted for both laboratory and radiology. The number of high cost laboratory tests per 100,000 unique patients in DHIN has been reduced from 35.0 in the baseline period of January 2010 to 12.6 in September 2013, the most recent period measured. This represents a reduction of 64%. Similarly, the number of high cost radiology tests per 100,000 unique patients has dropped from 1.1 to 0.8, a reduction of 21% from January 2010 to September 2013. There are limitations to this data; specifically around the number of duplicate patients in DHIN that could be impacting the test rates. In the first quarter of 2013, six freestanding radiology practices became members of DHIN. While the addition of new senders did cause the number to “spike” during that timeframe, it can also be seen that the rates then began to decline again. The trendline reinforces that there continues to be an overall decline in number of tests per unique person in DHIN.

### Event Notification

DHIN has implemented and is offering an Event Notification Service to health plans. This service notifies case managers or care coordinators in the payor organization when a covered member is discharged from the emergency room or hospital, allowing for rapid intervention and follow up to potentially prevent another hospitalization. This service is being expanded to providers so that they can, under the new

Medicare reimbursement codes for transitional care management, be in a position to do follow up care so as to prevent another hospitalization.

## Sustainability and ROI

ONC has stated ongoing sustainability of data exchange as a key priority. Understanding both costs of operating an HIE as well as sources of funding will be key to ensuring future sustainability. As part of the business plan that DHIN developed in 2011 and continues to execute on, an analysis of sources of funding over time demonstrates the shift from governmental and grant funding to funding by those who receive value from HIE. Understanding and documenting lessons learned around developing a sustainable HIE model will be critical so that successful models can be developed for future HIEs.

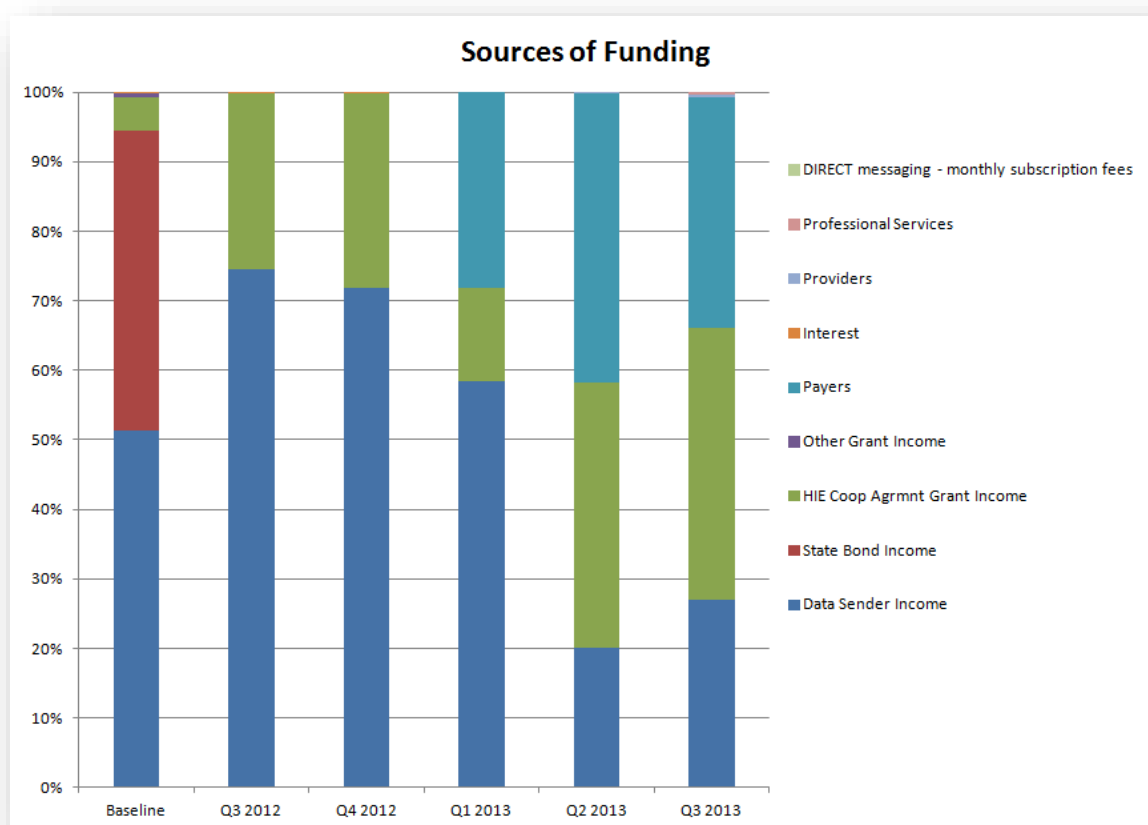


Figure M

## Sources of Funding

As DHIN continues to mature it is expected that other stakeholders (e.g. data senders and data consumers) will provide additional support because they see the value to their organizations. This can only happen if DHIN continues to provide new value-added services. DHIN is forecasted to end its fiscal year with all operational expenses met and a cash and capital reserve to accommodate future growth. As can be seen in Figure M<sup>xiii</sup>, there has been a significant shift from reliance on direct state funding and grant monies in the baseline period to income from data senders and payors. The income from data senders – who realize value

by avoiding costs for faxing, mailing and courier fees to distribute results – still constitutes a significant amount of revenue to support DHIN’s costs. The other significant contributor to ongoing costs is from payors – approximately 43% of Delaware residents are covered by a health plan contributing financially to DHIN, including Blue Cross/Blue Shield, Medicaid, and the State Employee Benefits plan – who will realize significant reduction in duplicate tests across radiology, pathology and other diagnostic services.

## Return on Investment

Return on Investment can be expressed both qualitatively and quantitatively. DHIN has demonstrated value in several areas. The most significant include:

**Data Senders:** Hospitals and other data senders such as freestanding diagnostic senders realize value by avoiding costs for faxing, mailing and courier fees to distribute results. The amount DHIN charges to provide this service is lower than other mail or fax costs (not to mention the labor costs to manually send faxes or prepare a mailing). Based on the analysis done in 2011, if the average cost of sending reports prior to use of DHIN services is combined with the number of reports sent for calendar year 2013, with an average sign-off rate for the year of 81%, the CY13 savings for senders is estimated at \$6,967,338. Additional benefits to Data Senders include: the ability to query the community health record; immunization connectivity to State; electronic Lab reporting to State; Biosurveillance reporting to State; and the ability to make images available for end users to view.

**Data Consumers:** From a qualitative perspective, 91% of organizations surveyed through IPSOS indicated that DHIN plays either an extremely important or very important role. Additionally, 90% of those surveyed indicated that DHIN fits extremely well or very well into their office workflow.<sup>xiv</sup>

The Regional Extension Center works directly with practices regarding their technology and DHIN has become a de facto partner in this effort because of Meaningful Use incentives and has assisted the REC through:

**“It is very useful to have all pertinent information in one central place. Instead of calling several facilities the patient might have been, that can be time consuming. It is also beneficial because sometimes patients forget where they had a test.”**

*Survey respondent – IPSOS Study report October 2013*

- Enabling functionalities that keep providers in workflow
- The richness and completeness of the data available to providers
- The ability to query

**Savings Related to Interface Costs:** DHIN’s ability to negotiate a single price with ambulatory electronic medical record vendors for interfaces to DHIN has allowed practices to participate in DHIN with minimal investment. A total of 19 results delivery interfaces are in “Production” representing 73% of DHIN provider organizations using an EHR. Another eight interfaces are in beta testing and represent another 7% of DHIN provider organizations.

DHIN Estimates that they were able to save individual practices, on average, about \$3,000 for interfaces. The value to-date for the 295 practices that utilize a certified DHIN results-delivery interface, as

represented by savings over contracting individually with EHR vendors for interfaces is estimated at \$885,000.

**Reduction of High Cost Tests:** The ability to justifiably access patient records around lab and radiology tests has impacted the number of high cost tests per unique patient that have been performed and resulted. Based on the analysis done as part of the report to AHRQ in 2011, it is estimated that the cost (paid claims) impact to payors due to reduced number of tests from 2011 to 2013, (if conservatively estimated at \$250 per radiology exam and \$10 per lab exam) would be over \$29 million annually. [See Table A Potential Savings for High Cost Lab Tests and Table B - Potential Savings for High Cost Radiology Exams] Adjusting for the number of duplicate patients and the change in test descriptors for lab and radiology, a conservative estimate is that savings of about \$10 million per year has been realized.

**Table A Potential Savings for High Cost Lab Tests**

High Cost Lab Tests per Unique Patient 2011	2.62
High Cost Lab Tests per Unique Patient 2013	1.52
Change	(1.11)
Number of Unique Patients 2013	2,127,953
Potential High Cost Lab Tests "Saved"	2,352,958
Nominal Cost Savings Per Test	\$ 10.00
Potential Annual Savings	\$ 23,529,583

**Table B - Potential Savings for High Cost Radiology Exams**

High Cost Radiology Exams per Unique Patient 2011	0.10
High Cost Radiology Exams per Unique Patient 2013	0.09
Change	(0.01)
Number of Unique Patients 2013	2,127,953
Potential High Cost Radiology Exams "Saved"	23,919
Nominal Cost Savings Per Test	\$250.00
Potential Annual Savings	\$ 5,979,864

*"I feel if you are going to EHR you should have DHIN pulling results in also to make your job easier. So far any problems have been minimal.."*

*Survey respondent – IPSOS Study report October 2013*

**Functionality to Support Meaningful Use:** Based on payments made through December 2013 for Delaware Eligible Providers (\$16.9 million<sup>xv</sup>) and Eligible Hospitals (\$9.9 million<sup>xvi</sup>), it is estimated that 2014 payments will amount to approximately \$7.0 million for Eligible Providers and \$5.2 million for EHs in either Stages 1 or 2<sup>xvii</sup>. Data from the survey conducted by IPSOS reinforces the notion that DHIN has assisted in organizations achieving Stage 1 of meaningful use. Of the 37% of provider respondents who indicated that they had attested, they also identified the role that DHIN

played in their ability to attest including: lab results as structured data, electronic exchange of clinical information, transition of care summary, immunization reporting, reportable lab results reporting and syndromic surveillance data reporting.<sup>xviii</sup>

**Table C Estimated Meaningful Use Incentive Payments for Eligible Providers**

Year	Number of Eligible Providers	Year 1 Stage 1	Year 2 Stage 1	Year 3 Stage 1	Year 1 Stage 2	Total
2011	288	\$4,862,019				\$4,862,019
2012	743	7,782,466	3,646,515			11,428,980
2013	39			574,200		574,200
2014 (est)			5,836,849		1,215,505	7,052,354
<b>Total</b>		<b>\$12,644,485</b>	<b>\$ 9,483,364</b>	<b>\$574,200</b>	<b>\$1,215,505</b>	<b>\$23,917,554</b>

Although some providers may not be using DHIN today for Stage 1 Meaningful Use, survey results indicate most (78%) providers would use DHIN for Stage 2 Meaningful Use attestation if DHIN provides Meaningful Use certified technology. In addition to capabilities already offered, they would use DHIN to: view images and reports electronically; report syndromic surveillance data to Public Health electronically; report cancer cases to Public Health cancer registry electronically; and report to a specialized registry other than a cancer registry electronically.

**Reduced Immunization Reporting Costs:** The ability for providers to electronically submit immunization data to DHIN through their EHR and for DHIN to forward the data to DelVax (the state immunization registry) has saved practices time since there is no longer paperwork to submit, and saves the state time because manual data entry will be minimized compared to previous requirements. Currently the state has hired temporary workers to enter data from paper submissions that are creating the backlog. Once this is completed, it is believed the level of electronic submission will reduce the need for the temporary help and associated labor costs.

**Submission of Reportable Results to Public Health:** Over 430 thousand transactions around syndromic surveillance and reportable lab results were sent to DPH for the 12 months ending September 30 2013. Despite the relatively small population in Delaware, DHIN ranks #3 in the nation in volume of data exchanged with a Public Health Agency<sup>xix</sup>. The ability to send data on reportable events to public health via DHIN again saves providers and hospitals the effort in assembling paper based reports or filling out electronic forms. While a quantification of this has not been completed, it is anticipated there would be no labor (FTE) savings in terms of salaries paid; however, based on anecdotal information, it does free up staff to focus on other patient care activities such as care coordination.

**Query Ability by Public Health:** In addition to providers and hospitals being able to submit data to Public Health, Public Health has the capability to query DHIN around patient information. For the period January 2013 through November 2013 over 5,600 queries were made by Public Health. The highest users are: Epidemiology (averaging 252 charts viewed per month); State Cancer Registry (averaging 166 charts viewed per month); and Department of Corrections (averaging 80 charts viewed per month). The ability to receive

data in a more rapid fashion, coupled with the ease and speed of retrieving critical data allows Public Health to have time critical information and respond to events in a more timely fashion.

**Summary:** The initial state and federal investments are paying dividends – the ongoing value that DHIN provides is in its role in facilitating clinical information flow, both quantitative and qualitative, summarized in Table D. This is not an all-inclusive list but it highlights the level of benefits that various stakeholders have received. While specific dollars are not cited, the relative impact is indicated. A more substantive analysis will be required to determine the exact Return on Investment.

**Table D**

Value Category	\$ Valuation	Other Quantitative	Qualitative
Savings to Senders	\$\$\$	+++	✓
Data Consumers and Reduced Interface Costs	\$\$		✓✓✓
Reduction in High Cost Tests	\$\$\$\$		✓✓
Functionality to support Stage 2 MU	\$\$	+	✓✓
Reduced Immunization Reporting Costs	\$	++	✓
Reduced Healthcare Delivery Costs	\$\$\$\$		✓✓✓
<b>Submission of Reportable Results to Public Health</b>		+	✓✓
<b>Query Ability by Public Health</b>		+++	✓✓

## Key Lessons Learned

### Adoption

DHIN's success is due to the careful execution of operations plan by the DHIN staff. Rather than try to implement full HIE functionality on day 1, DHIN has incrementally added features and targeted specific audiences who see value in that feature. Efforts continue to improve the quality of data available, including reducing the number of duplicate records for a single patient, by working with data senders to ensure that the information necessary for matching a new transaction to an existing patient is complete.

Adoption is a virtuous cycle – the more data senders into the HIE, the more valuable the Community Health Record becomes to providers as a one-stop-shop for all clinical data. Additionally, the more providers who adopt HIE, the more attractive it becomes to producers of clinical data to deliver those results through health information exchange. DHIN is now at the point where potential data senders are coming to them, rather than DHIN soliciting the data senders, because their customers demand it.

Early adopters are more fault-tolerant than later adopters. Later adopters expect that the technology will work just like the light switch. You lose later adopters faster and it is harder to get them back once they experience technical difficulties. It is very helpful to work with a few fault-tolerant beta users in the early stages of rolling out a new service and make sure all the “bugs” are worked out before taking that service to market at scale.

Governance is key – the decision making body must be broadly representative of all the stakeholders, but the board must be a manageable size. Participation in board committees by non-board members can be a helpful way to ensure broader and deeper stakeholder involvement in decision making.

The role of the State has changed over time. Initially, DHIN stood up under a State agency. This was helpful in the early days of formation and capitalization to establish legitimacy. However, if the HIE is expected to eventually be self-sustaining, there comes a time when it needs to “live” outside the State and function as an independent business with the ability to be nimble in making business decisions. DHIN's amended enabling statute establishes DHIN as a public instrumentality (with sovereign immunity and legal representation through the Department of Justice), but liberates DHIN from State procurement rules and the State personnel system, which certainly makes it easier to hire and retain qualified staff.

Working with practices to ensure they have the technology they need (e.g. EHR interfaces to DHIN) is critical. One of the challenges DHIN experienced was engaging the vendors on the practices' behalf to create EHR interfaces to DHIN. Delaware is considered a small marketplace, so the weight that DHIN might carry versus a state with a larger population and more practices limits its ability to influence. While each practice does make decisions on their own regarding the platform they use, because DHIN had negotiated lower vendor interface costs, this made entry into DHIN more financially viable.

Providing technical support so that practices understand how to use HIE functionality is another key contributor to utilization. DHIN has aggressively pursued getting provider organizations to “sign off” within 90 days of implementation “go-live.” As such the number of “aged” practices (those that have not been signed off within 90 days) has decreased dramatically, with only 16% of practices now aged (November 2013) as compared to 57% in April of 2011<sup>xx</sup>. This ensures quicker time to value.

DHIN tracks and trends the rates of “justified access” by organization; for those with very low rates of use they initiate follow-up to determine the reasons why the functionality is not being used. Typically, it is because there has been a turnover of staff, and new people haven’t yet been trained. This gives DHIN the opportunity to provide additional training and reinforce the value of HIE.

***“It is very useful to have all pertinent information in one central place. Instead of calling several facilities the patient might have been, that can be time consuming. It is also beneficial because sometimes patients forget where they had a test.”***

*Survey respondent – IPSOS Study report October 2013*

## Reduction in Healthcare Delivery Costs

While the ability to access results via DHIN is not the only factor affecting frequency of high-cost tests, qualitative data from the IPSOS survey suggests that providers rely on DHIN as a primary resource for previous results to ensure additional testing is indicated.<sup>xxi</sup>

One of the difficulties encountered in calculating number of lab and radiology tests was identifying the correct high cost tests for each organization. Every organization and locale

had a different way to describe a procedure (e.g. “CT HEAD W/WO CONTRAST” versus “Computerized Tomography Head With and Without Contrast”), which required significant manual effort to match tests for counting purposes.

## Sustainability

DHIN has learned that in the state of Delaware, data exchange sustainability is inexorably linked to the business model – if the business is not sustainable, data exchange capabilities cannot be financially supported.

Without a legislative or regulatory mandate, health care stakeholders need a business case incentive to participate. For HIEs, a driver of sustainability is ability to develop functionality that end users want to use and are willing to pay for. The social value of the network is greater than the sum of the parts, but participants will only pay for what they perceive to be of value to them personally, not what is of value to the greater community.

The metrics of business success may not be exactly the same as the metrics demonstrating social value. The sustainable organization must measure both, and make the case to participants that they can achieve business goals while also contributing to the greater good.

Plan for a sustainable business model from the beginning – HIE cannot be run on grants alone. Approach each service line like any business would – ask the questions “What is the initial investment? What is the market? What is the expected trajectory for adoption? What price point will the market bear? and When will we break even at that price point?” It is imperative to know how long the organization can afford to run that service at a loss and when the organization must cut its losses if adoption does not occur.

New services that provide revenue have been developed because DHIN continues to add demonstrated value to its stakeholders, including hospitals and payors. The IPSOS survey indicates that providers who are affiliated with

DHIN are satisfied with the value they receive from DHIN. When asked “How likely are you to continue using Delaware Health Information Network?” (using a 10 point scale where 1 means not at all likely and 10 means extremely likely) 74% responded with a score of 7 or higher. When asked “How likely are you to recommend Delaware Health Information Network to a colleague?” (using the same scale), 65% responded with a “7” or better.

Sufficient staffing is critical. When DHIN was formed there was a thin layer of management and support staff with the technology functions almost totally outsourced to the prime vendor. The growing complexity of the DHIN ecosystem (four-fold increase in number of data sending organizations, number of interfaces managed, and number of vendor relationships), required a greater level of sophistication and vendor management skills. Hiring staff with deeper skill sets gave DHIN the ability to take over some functions previously performed by the vendor.

## Future Plans

DHIN will continue to support technologies to ensure continued utilization levels for lab results. The capability to send discharge summaries from remaining DHIN hospital members as well as from freestanding facilities is planned to be complete by end of calendar year 2014.

As the number of records and types of information, such as images and public health data available through DHIN continues to grow DHIN will continue to work with organizations to expose them to new functionalities, reinforce existing capabilities and share best practice and use cases across organizations.

DHIN plans to continue active support of participating hospitals, labs, and freestanding radiology facilities. Connectivity to out of state facilities, where appropriate, will continue. The ultimate goal for provider practices is to have 100% of practices signed off. Goals specific to fiscal year 2014 include: developing functionality to allow practices to submit Continuity of Care Documents for display and search within the Community Health Record, as well as delivery to a specified recipient; offering consumer engagement tools; and developing a plan and methodology to enable DHIN data to be used for clinical research.

The Event Notification Service for health plans has just been implemented and it is premature to evaluate data related to cost reductions around this functionality. DHIN is in the process of developing the metrics and ongoing reports to assess the impact of the Event Notification Service on cost.

In the future it will be important to have a crosswalk between sending (and receiving institutions) that includes standardized test descriptions with a unifying identifier such as e.g. CPT, ICD10 or LOINC codes. This will allow analysis on cost savings due to reduced high-cost tests to be done in an efficient manner.

As DHIN continues to mature it is expected that other stakeholders (e.g. practices and other payors) will provide additional support because they see the value to their organizations. DHIN is forecasted to end its fiscal year with all operational expenses met and a cash and capital reserve to accommodate future growth. DHIN plans to continue follow its business plan, maintain a revenue stream that is diverse and permits DHIN to continue operations while funding appropriate functionality development. One of the Fiscal Year 2014 goals<sup>xxii</sup> is to increase Year-Over-Year (FY13 to FY14) revenue by 5%.

DHIN sees the value of secondary uses of data and is currently under negotiations and concept exploration with several potential partners around use of the data for research purposes.

Concluding Remarks

DHIN continues to show progress along numerous fronts in terms of its maturity as an HIE – from high levels of participation, to increasing utilization of the various dimensions of HIE functionality, to realizing value to both providers and payors. Looking at the HIE Maturity Model proposed by eHealth Initiative in 2011 (Figure N<sup>xxiii</sup>), DHIN is one of the more advanced HIEs in terms of the level of functionality, the robustness of the organization, and the breadth of the stakeholders it serves. According to the model, DHIN is hovering between Stage 6 (Sustaining) and Stage 7 (Innovating), and will probably be solidly in Stage 7 by end of 2014.

No longer just a communications tool between testing facility (i.e., hospital or reference lab), and providers, DHIN now reaches across the continuum of care, from public health to payors to ambulatory facilities subacute care, and in the patient’s home with home health and hospice services. As DHIN looks outside the State of Delaware to neighboring states, their ability to serve as the medium for health information exchange across platforms and networks for the citizens of Delaware and those visiting Delaware, will continue to advance the case for improved healthcare delivery through information exchange.

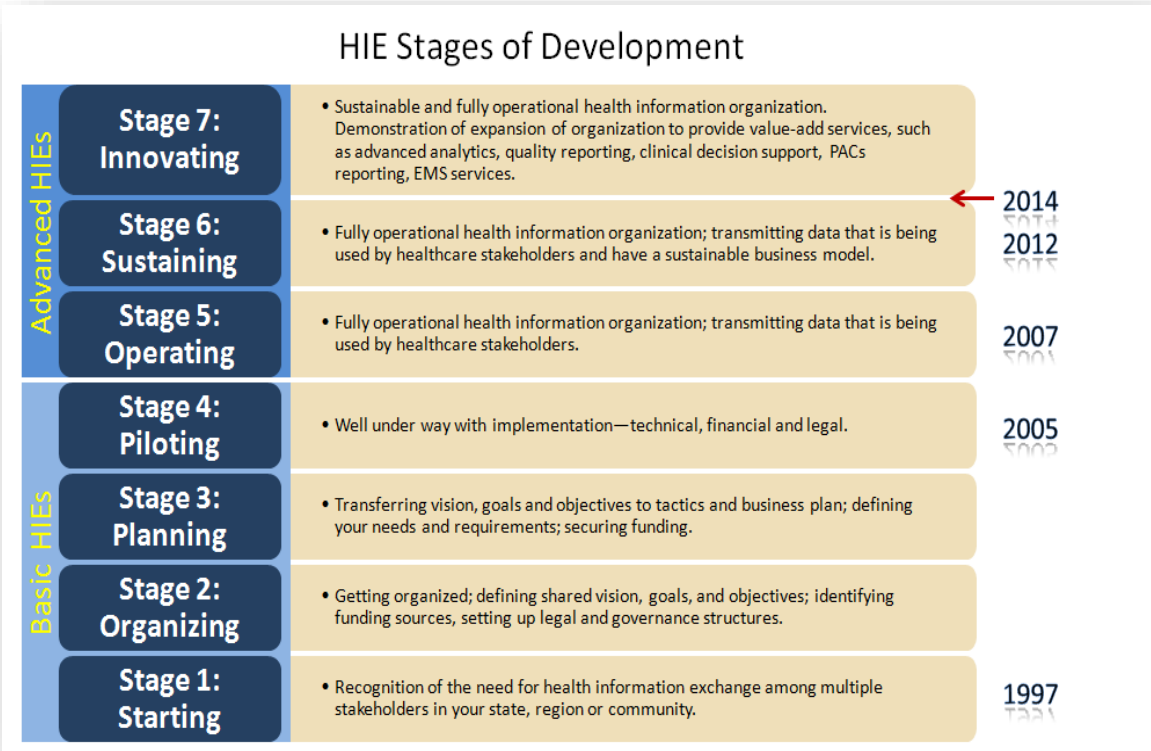


Figure N

## References/Data Sources

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- <sup>ii</sup> © 2012 Maestro Strategies, LLC
- <sup>iii</sup> DHIN Quarterly SOP
- <sup>iv</sup> Surescripts files
- <sup>v</sup> DHIN Quarterly SOP
- <sup>vi</sup> United States Census Bureau <http://quickfacts.census.gov/qfd/states/10000.html>
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- <sup>xii</sup> Besnik, Jennnifer, “Study: HIE can reduce unnecessarily repeated tests” EHR Intelligence January 24, 2014 [ehrintelligence.com/2014/01/24/study-hie-can-reduce-unnecessarily-repeated-tests/](http://ehrintelligence.com/2014/01/24/study-hie-can-reduce-unnecessarily-repeated-tests/) |
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- <sup>xv</sup> CMS Published data files “EP\_ProvidersPaidByEHR\_122013\_FINAL.csv”
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- <sup>xvii</sup> Maestro Strategies analysis
- <sup>xviii</sup> DHIN PROVIDER research Final quantitative report, IPSOS, October 2013
- <sup>xix</sup> DHIN Presentation to Executive Committee 12/13/2013
- <sup>xx</sup> DHIN Presentation to Executive Committee 12/13/2013
- <sup>xxi</sup> IPSOS Study page xx
- <sup>xxii</sup> DHIN Presentation to Executive Committee 12/13/2013
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