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NACCHO

National Association of County & City Health Officials

HIE Toolkit for Public Health

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Using This Toolkit

This Toolkit seeks to help public health departments understand health information exchange (HIE) services and the types of organizations providing them; how a health department might use or support such services; and to assess if the value of participating in HIE will be worthwhile. It also seeks to orient HIE organizations to the functions of health departments, and their value as customers and partners in HIE.

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Introduction to Public Health and HIE

A health department administrator may ask if it is critical to join a **health information exchange organization (HIO)** today, and whether HIE will be important for the health department's future. Even if the answer to the first question is "No," the answer to the second is a definite "YES!"

This toolkit seeks to help public health departments to do the following:

- understand **health information exchange (HIE)** services and the types of organizations providing them;
- understand how a health department might use or support such services; and
- assess if the value of participating in HIE will be worthwhile.

The toolkit also seeks to orient HIOs to the functions of health departments, and their value as customers and partners in HIE.

A. What is Public Health?

An orientation for HIE leaders

"**Public health**" is a complex concept, defined broadly as "what society does collectively to assure the conditions for people to be healthy."¹ Health care providers, businesses, schools, non-profit organizations and other government agencies all contribute to the public health of a community.

In the United States a "**health department**" is a government agency that oversees public health in a state or local jurisdiction (including U.S. territories). Health department functions now go beyond enforcing sanitary codes and delivering direct services, to encouraging and coordinating various public and private activities that promote and protect health in their jurisdictions.

Although health departments once provided much healthcare for the indigent, publicly-funded insurance (such as Medicaid, Medicare and the Affordable Care Act insurance exchange subsidies) and community health centers have largely replaced this role in many communities.

Local, State and National Public Health

Because the U.S. Constitution reserved 'police powers' (including public health) for states rather than the federal government, there is considerable variation in what services are offered and how they are organized. In some states, public health authority and budgets are centralized at the state level; in others, these are subject to "home rule" by counties, villages and cities.¹

¹ Excellent surveys of the characteristics of state and local health departments are available: Association of State and Territorial Health Officers. ASTHO Profile of State Public Health Volume Two. September, 2011. <http://www.astho.org/Research/Profile-of-State-Public-Health/> [This

While the federal government has direct control over public health in limited domains like interstate commerce, much of its influence on state and local public health departments is based on funding, research and consensus building. One consequence of this is that most ‘national’ public health information systems are actually built from somewhat independent state-level systems. This partly decentralized approach led to the creation of national **public health information exchange (PHIN)** standards, some of which were incorporated into the EHR Incentive Program (Meaningful Use) specifications.ⁱⁱ ⁱⁱⁱ

Many public health information systems are operated at the state level, such as communicable disease reporting, immunization information systems, syndromic surveillance systems and cancer registries. However, like HIOs, some of these also developed and remain active at local or regional sub-state levels.

Public Health Core Functions, Essential Services and Accreditation

Core Services

Three core functions and services are common for any public health jurisdiction:

- (1) assessment of population health and risks,
- (2) assurance of necessary services, and
- (3) policy-making for a healthier environment and population.

Essential Services

Essential public health services include:

- Monitoring health status to identify and solve community health problems.
- Diagnosing and investigating health problems and health hazards in the community.
- Informing, educating, and empowering people about health issues.
- Mobilizing community partnerships and action to identify and solve health problems.
- Developing policies and plans that support individual and community health efforts.
- Enforcing laws and regulations that protect health and ensure safety.
- Linking people to needed personal health services and assure the provision of health care when otherwise unavailable.
- Assuring competent public and personal health care workforce.

document includes a useful state-by-state summary.] National Association of County and City Health Officials. 2010 National Profile of Local Health Departments. <http://www.naccho.org/topics/infrastructure/profile/resources/2010report/>.

- Evaluating effectiveness, accessibility and quality of personal and population-based health services.
- Researching for new insights and innovative solutions to health problems.

Accreditation

A national system for voluntary accreditation of local and state health departments, based on these functions and services, was recently implemented by the [Public Health Accreditation Board](#).^{iv}

Health Departments and HIE

There are many areas of potential overlap between health departments and most HIOs. Health departments have been an important voice in the evolution of early HIE organizations, and continue to play several key roles in the development of HIE services and use cases.

Facilitators

Given their roles in monitoring community health, mobilizing partnerships, and improving health services, local and state health departments are often important **facilitators** of HIE organizations. They bring two key advantages to the process:

- 1) They can play the role of *neutral convener* among health care providers who are in competition with one another.
- 2) Public health grants sometimes provide *implementation funding* for certain exchange use cases.

Information Users / Contributors

Health departments are important **information users**. Examples of the types of information used include the standardized reports listed among the “Population” and “Public Health” Meaningful Use objectives of the EHR Incentive Program, such as:

- laboratory results for reportable illnesses;
- syndromic surveillance of healthcare utilization for various symptom complexes;
- immunization events to populate immunization information systems; and
- reports of cancer incidence and treatment through cancer registries.

In some jurisdictions HIE organizations are critical suppliers of this reporting (see [Appendix A: Public Health Use of HIE – Case Study #1](#) on page 48).

Health departments consume other information as well. They may have information needs similar to primary care providers, such as receiving laboratory and imaging results, or viewing a patient’s medical summary for the case management of a contagious or chronic disease.

Health departments also benefit from population statistics on health risks (like the prevalence and distribution of obesity or chronic disease), and on the utilization of preventive services. Some health departments are creating community-level registries to support coordinated clinical and community management of health risks like obesity or asthma (see [Appendix B: Public Health Use of HIE – Case Study #2](#) on page 51). Some are participating in efforts to leverage HIE to support public health nurse support for diabetes care, school nurse participation in asthma care plans, and to enhance information availability for EMS professionals, all in non-medical settings (see [Appendix C: Public Health Use of HIE – Case Study #3](#) on page 54).

Health departments are important **information contributors**. Some health departments offer laboratory and diagnostic services, and many still provide clinical services ranging from immunizations and comprehensive primary care to home health services, without which a community health record would be incomplete.

Various public health registries aggregate information from many providers, like immunization information systems and chronic disease registries. By providing a historical patient record from multiple providers, these can provide critical information for accurate clinical quality measurement and clinical decision support.

Health departments may also provide timely alerts important to clinical decision-making, such as advice about disease outbreaks or environmental emergencies. Some have begun to support Clinical Decision Support using standards like InfoButton.^v

In some communities, health departments provide small-area information about the prevalence of health risk factors and community assets that help healthcare providers recognize and combat disparities in the context of an individual's health care.

Transformers of Healthcare

Many health departments play a critical role in the **transformation of healthcare** in communities. In this role, they may work with HIOs to develop use cases for better multi-disciplinary or multi-organizational team care; for better health care access, navigation and coordination; or to link patients with community-based services.

Unfortunately, it is difficult to generalize about health departments given the variability in their programs, authority, leadership and informatics competency. An HIO needs to get to know the unique constellation of assets and needs of the state and local health departments within its service area. The State HIT Coordinator may help introduce HIO leaders to state public health leaders. The state association of local health departments may also be a very useful partner in obtaining information about local health departments.^{vi}

In some states it may be tricky to ascertain if HIE initiatives should route information transactions through statewide public health systems or more local systems. For example, some states have

multiple (local or regional) immunization information systems or cancer registries. Joint conversations with state and local public health leaders may be important to resolving such questions to the greatest satisfaction of all concerned.

In virtually all cases, however, local and state health departments will be important partners in the planning, governance and execution of health information exchange.

B. What is Health Information Exchange?

A Section Especially for Health Departments

The term “health information exchange” is commonly expressed as both a verb and a noun.

HIE as a Verb

Health Information Exchange (HIE) is used as a verb to describe “the electronic movement of health-related information among disparate organizations according to nationally recognized standards in an authorized and secure manner.”^{vii} HIE does *not* describe information movement solely *within* a single organization, nor a one-off idiosyncratic connection between two systems.

HIE (the verb) usually refers to *real time or near real-time exchange* of information needed for clinical care, case management, or public health purposes. This is distinct from moving information exclusively for billing and other administrative functions, known as **electronic data interchange (EDI)**, or moving historical data for research and statistics. However, HIE services can also be used for these purposes.

Push / Pull

Push

At its simplest level, HIE requires the capability to “push” a message securely from one party to another. This is a post-office-like function, sending a message or document – such as a laboratory result or an e-prescription – from one organization to another. This is also referred to as “messaging,” “direct,” “point-to-point” or “transactional” exchange.²

Some HIE organizations focus almost exclusively on “push” messaging, and do not support queries of assembled information from multiple providers. Unfortunately there is no universal term used to distinguish “push-only” HIOs, so buyers must make the distinction.^{viii 3 4}

Pull

A second, more sophisticated level of exchange builds on messaging, but also enables users to discover, assemble and “pull” information about one or more patients from various providers. “Pulling” can be used to assemble a longitudinal and comprehensive view of a patient’s health

² Some terminologies (for example in the Minnesota system for certifying health information exchange) use the term Health Data Intermediary (HDI) for an organization that does nothing more than “push” individual messages between organizations. But this term is not common, and is described in Minnesota as a sub-type of HIE. Minnesota e-Health Initiative and the Minnesota Department of Health. *A Practical Guide to Understanding Health Information Exchange*. Revised July 2013. P. 24. www.health.state.mn.us/divs/hpsc/ohit/hieguidance/resources.html

³ Additional definitions and discussion of types of HIE may be found at Health Information Management Systems Society. *A HIMSS Guide to Participating in a Health Information Exchange*. http://www.himss.org/files/HIMSSorg/content/files/HIE_GuideWhitePaper.pdf pp. 6-22.

⁴ Readers may encounter the term **Health Information Service Provider (HISP)** in relation to DIRECT push exchange. These assist with some encryption functions but may not deliver all needed services (such as directories and data use agreements) that an HIE organization does.

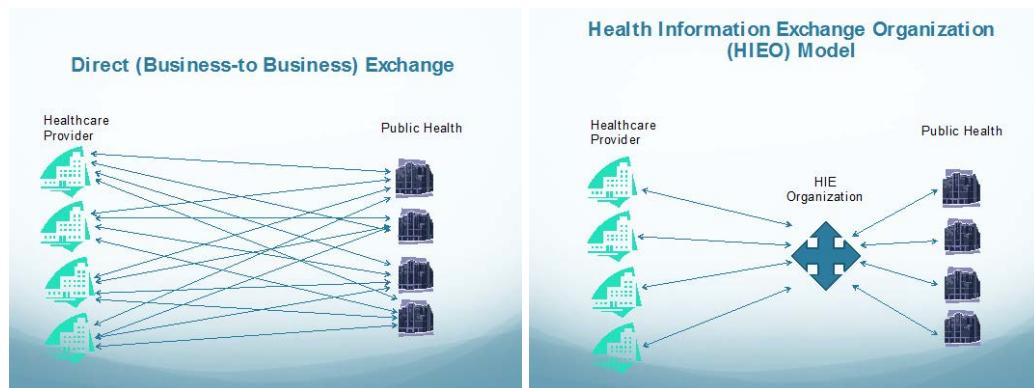
history, similar to creating a “community” medical record department. This is sometimes called “query,” “aggregate” or “community health record” exchange.

HIE as a Noun

HIE organizations (HIO) are usually membership organizations that facilitate exchange between many different providers. Most members both contribute and receive information.

HIO members benefit from economies of scale and from **shared services** and **uniform participation agreements** that simplify exchange, rather than each making such investments separately. For example, multiple laboratories can share one HIE solution to deliver results to many health departments, and the latter can use one HIE solution to receive information from many labs.

FIGURE 1. CONTRASTING DIRECT MESSAGING WITH HIE ORGANIZATION EXCHANGE



HIE Advantages

Compared to mail, phone or fax, electronic HIE offers advantages of higher speed, lower labor and supply costs, and data encryption, so unauthorized persons cannot read it.

One profound advantage is the opportunity to import information *directly into the receiver's information systems*, rather than re-enter it by hand. Managed skillfully, this can reduce data entry errors, speed recognition and delivery of urgent information, and improve workflow for routine tasks.

Such automated importing requires **interoperability** - that is, information is sent using data elements, vocabulary, formatting and transport standards recognized by computers at the receiving end.^{5 6}

⁵ A useful introduction to interoperability standards from the public health perspective is available at Joint Public Health Informatics Taskforce. Future Information Capabilities for Public Health. September, 2013. <http://iphit.org/resources>.

⁶ The Public Health Information Network identifies and supports several interoperability standards frequently used in public health. Centers for Disease Control and Prevention. Public Health Information Network. <http://www.cdc.gov/phin>.

Knowledge about all of a patient's diagnoses, treatments, allergies and preventive services across many providers, like that provided in "community health record" pull-type HIO functions, can be used to improve treatment while reducing expensive redundancies. Such information also facilitates public health case and outbreak investigation, care management and quality measurement, and supports studying the patterns of incidence, care and modifiers of illness and injury in the community (for example, for Community Health Assessments).

HIE in Practice

Depending on the types of information shared, these message and query processes can be combined in an enormous number of ways to meet a wide range of needs, including but not limited to:

- delivering a diagnostic test result or case report
- delivering immunization data to an immunization information system
- reviewing records for outbreak investigations
- performing population health surveillance
- alerting providers of opportunities to improve a patient's care (often called **clinical decision support**)

HIE typically refers to information exchange between health care providers, but patients' ability to **View, Download and Transmit (VDT)** their own records using the new Blue Button standards (and supported in Meaningful Use regulations) offers a new twist.^{ix} **Patient-mediated exchange** may provide an alternate pathway for HIE, and because the exchange is patient-driven it can obviate some of the privacy and confidentiality concerns of inter-provider exchange.

The simplest "push" messaging HIE process does not require a sophisticated HIE organization. Two professionals could send each other health information using relatively simple secure messaging protocols, such as DIRECT encrypted email,⁷ if they know one another's secure email addresses and can exchange the necessary decryption keys.⁸

However, because of the large number of entities that seek to communicate from time to time (e.g., doctors, hospitals, pharmacies, labs, and now even patients), it rapidly becomes impractical for each to establish one-on-one communications with all possible exchange partners. For

⁷ The DIRECT messaging protocol has been collaboratively created and maintained in an open source environment. See The DIRECT Project. <http://wiki.directproject.org/>

⁸ This exchange of encryption "keys" is offered by Health Information Service Provider (HISP) service providers. Hospital systems, EHR vendors, telecommunication companies, HIE organizations, or other trusted entities can provide this service. DirectTrust is a membership organization establishing "rules for the road" for such relationships. <http://www.directtrust.org/>

example, 229 other doctors treat the Medicare patients seen by the average primary care physician!^x

Nor does such simple messaging allow for more sophisticated exchange, such as “pulling” and integrating information about one patient from multiple providers simultaneously. This is where an HIO⁹ may come in to provide these more complex exchange services.

Connecting Systems

Members typically use their own electronic systems to connect to HIE. For instance,

- health care providers use their **electronic health record (EHR)** systems,
- laboratories use their **Laboratory Information Systems (LIS)**, and
- health departments use their surveillance, registry or EHR systems.

Additionally, HIOs frequently provide secure Internet websites called **portals** to view exchange information for those unable to import information into their own systems.

With EHR and other information software vendors building DIRECT exchange capabilities into their products, the line between EHR vendors and HIOs is becoming increasingly blurred. Some HIOs also offer their members end-user technologies like EHR systems, and some EHR vendors are becoming powerful HIOs in their own right – see **HIE Organization Types** on page 22 for more details.

However, as long as diverse organizations want to use diverse software applications (in other words, many “brands” of EHRs and other software) to communicate with one another, the need for some kind of vendor-neutral information exchange brokers will exist indefinitely.

For all the advantages that HIE has to offer, there is one key lesson that must be pointed out to all healthcare stakeholders:

The benefit of HIE comes from being connected, not from acquiring technology.

If a health department’s frequent information sharing partners, or **trading partners**, are not connecting to an HIO, there will be no benefit no matter how elegant the technology.

⁹ Other terms have been used over time, including the **Regional Health Information Organization (RHIO)**, and the inelegant term **Sub-Network Organization (SNO)**; see http://www.himss.org/files/HIMSSorg/content/files/HIE%20Topic%20Series_SNO%20071709.pdf. The latter term recognizes that some HIEs may be defined by geography (“regional”) but others might be defined by other characteristics, such as organizations serving veterans, migrants or a nationwide Health Maintenance Organization.

“The benefit of HIE comes from being connected, not from acquiring technology. If a health department’s frequent **information sharing partners**...aren’t connecting to an HIE organization, there will be no benefit no matter how elegant the technology.”

Until recently, there were few HIOs, but their numbers are increasing due to the HITECH and Affordable Care Acts. Thus a given community may be served by more than one HIE organization, each with different members, missions and exchange services. There can be enormous variation. Few states legally define and regulate HIE, and accreditation or certification of these entities is in its infancy (see **HIE Certification and Accreditation** on page 24) so the buyer must beware. Meaningful Use incentives and standards are beginning to create some uniformity, but HIOs are still greatly differentiated by their **memberships, shared technology services and architectures, participation agreements, the actual exchange services (use cases) they provide, and their organizational type.** Each of these features may affect their value to a health department. These are further defined and described in the following section.

C. HIE 101

No two **HIE organizations (HIOs)** are alike, and more than one HIE solution may be available in a given public health jurisdiction. HIE standardization and accreditation are in their infancies, and some branches of the HIE evolutionary tree may yet become dead ends as others thrive. Therefore, health departments need to “look under the hood and kick the tires” when assessing available HIE options.

This section of the Public Health and HIE Toolkit will help to identify and put into context many of the HIE concepts, technologies and practices that will be important in the decision-making process.

The Basics

Virtually all HIE employs the same Internet used by the general public. This means there is no need for separate expensive ‘wiring’ from one partner to the next, but it also means that privacy and security must be protected.

At the most fundamental level, several things are needed for one health organization to send private health information to another securely and confidentially:

- The sender must assure the recipient’s authority to see information (**authorization**) and confirm their identity (**authentication**). These are jointly referred to as **identity management**.
- The information must be delivered to the appropriate address (email, drop-box, IP address, port or secure website).
- Patient consent may be needed, particularly when dealing with highly sensitive information.
- There must be a system for the sender to encrypt information, allowing only the intended receiver to decrypt it.
- The sender must format the information so that the recipient’s system can interpret it (e.g., you can’t send an Acrobat PDF file to most fax machines). Health Level 7 (HL7) standards for messages (like **Admit, Discharge and Transfer [ADT]** messages or laboratory result transmission) or for documents summarizing clinical records (**Consolidated Clinical Document Architecture [C-CDA]**) are common examples.
- If the recipient intends to automate the management of incoming information, **semantic interoperability** is essential – both sender and receiver must use compatible data elements (the “fields” in a database, or “items” in a form or questionnaire) and vocabularies (text or machine-readable code standards like ICD-10, LOINC or SNOMED).
- There must be agreement about the ways the recipient may use the information (e.g., can she sell it to Google?).

- There must be trust between sender and recipient, often summarized in legal agreements (such as Business Associate or Data Use agreements) that spell out expectations and consequences for their violation. When such trust must extend to many different roles using information in different ways, a **fabric of trust** or **trust framework**¹⁰ is needed in order to successfully address these needs while protecting privacy and security.

To query and assemble a patient record from multiple provider record systems the following must also be added to the mix:

- A way to find out which providers holds records about which patients (**record locator**)
- A system to assure that one patient's information from various sources can be matched and linked, without sending information about other patients with similar names (**master person index**)
- A way to access information stored in others' information systems without threatening the integrity or security of their data.

Each HIE arrangement, whether two partners messaging each other or a nationwide exchange framework, has to accomplish these basic needs. Unfortunately, different communities have developed different sets of technical standards and trust frameworks for exchange. For example, some readers may remember the **PHIN-Messaging System (PHIN-MS)**, an early public health message transport solution. Today HIOs are often using a different standard for the same function, like DIRECT secure email. The pace of national standardization of exchange is beginning to quicken under the pressure of the HITECH Act and healthcare reform, which may allow more applications and systems to enjoy off-the-shelf "plug and play" readiness for exchange and interoperability in the future.

One-to-One Exchange

“Given the complexity of managing multiple different exchange relationships, it is not surprising that [the one-on-one exchange] approach resulted in slow and uneven recruitment of exchange partners.”

¹⁰ A trust framework consists of policies, agreements and enabling technologies that together create transparency and accountability for confidential data sharing across many information exchangers. One example is the eHealth Exchange (<http://healthewayinc.org>) in which every member signs the same **Durable Use and Reciprocal Support Agreement (DURSA)**. Another approach, the **Patient-Centric Coordination of Care (PCC)** Pilot (<http://www.resilient-networks.com/nstic/healthcare.html>), seeks to build executable systems that facilitate exchange between users who may have different confidentiality policies and technologies (and to prohibit exchange as appropriate).

Before HIOs emerged, many health department programs (like immunization registries or disease surveillance systems) established one-on-one exchange arrangements with several healthcare providers. Given the complexity of managing multiple different exchange relationships, it's not surprising that this approach resulted in slow and uneven adoption by exchange partners. Recruitment of smaller doctor offices and hospitals often lagged, and many healthcare providers were left mired in hand-typing data into public health websites. Thus, many health departments have looked to HIOs, hoping that shared technology and uniform participation rules would accelerate exchange.

There are trade-offs, however. For example:

- Since HIOs must operate, to some extent, by consensus, public health programs cannot always have exactly the exchange relationship they would like.
- In some situations, more providers are already connected to public health systems (e.g., successful immunization registries) than to younger HIOs. Ripping out and replacing those connections may not make sense in the short term.
- Some programs engage in a very intricate *push and pull* of information (e.g., when immunization information systems seek to use EHRs to help clinicians manage vaccine inventory). Such complex “conversations” go beyond the current capabilities of some HIOs.

Using an HIE organization is not always the best answer. The advent of DIRECT secure email may also make it simpler in the future to push messages without an HIE organization.

Shared Technologies and Participation Rules

HIOs work by supplying both a shared set of core technical services and a shared set of participation agreements that simplify exchange between multiple partners. These shared technologies and participation agreements are the building blocks that then permit many different services and products to be offered to members. The **information governance** of the HIO, which usually includes considerable member representation, directs the development of both technology and agreements. Health departments will need to assess whether HIO agreements and governance structure are appropriate to public health needs, and should consider seeking a role in governance if they join.

Core Technologies

Secure Internet technology delivers encrypted information only to authorized users, who are listed in a **directory**. **Portals** are designed for data viewing by various users (providers, health departments, patients). To assemble and provide information about a patient from multiple

providers, a **record locator service** and a **master person index (MPI)** are required to accurately match and link records.¹¹

Some HIOs also provide a shared service called **normalization**, sometimes referred to as **integration capability**. This service converts information to the standardized machine-readable formats and vocabularies that enable **semantic interoperability**. Normalization services may be optional, and affect the price of participation. Other HIE organizations may depend heavily on their members to normalize data before sharing.

The software for HIE services is rarely developed from scratch. Several vendors have emerged to support exchange, making the evaluation of vendor performance and dependability an essential part of assessing an HIE organization.

Different HIOs may also implement core technologies differently. For example, there are many ways to transport an encrypted message, but only two or three might be used by a particular HIO. Members typically need to use the standards required by their specific HIE organizations.

Technical Architectures

HIOs offering “pull” query exchange have different **technical architectures** related to accessing data, each with different advantages.^{xi} These may include **centralized**, **decentralized** or **hybrid** architectures.

- In a **decentralized** architecture, all information remains in the database of each exchange member, and specific information is moved or viewed by others only after an authorized request. This may require HIE members to maintain edge servers or other ‘always-on’ technology to provide information on demand.
- **Centralized** HIOs keep information in centralized databases, which may increase the consequences of a major data breach, but may also offer computational benefits.
- Many HIOs use a **hybrid** model, leaving the choice to each member as to whether or not their information is stored by the HIE.

A concise comparison of these architectures is found elsewhere in the [HIMSS HIE Toolkit](#).¹²

A less common model is **health record banking**, where patients, rather than their healthcare providers, are given tools and rights to assemble and share their health records.^{xii} The advent of patient capability to **View, Download and Transmit (VDT)** medical record summaries using Blue Button+ standards (discussed in **Competing Technologies for HIE** on page 23) may accelerate the adoption of such patient-controlled exchange.

¹¹ For more detail on these core shared services see *A HIMSS Guide to Participating in a Health Information Exchange*. HIE Toolbox. Health Information Management Systems Society. http://www.himss.org/files/HIMSSorg/content/files/HIE_GuideWhitePaper.pdf pp. 23-30.

¹² Additional resources are available in the HIMSS HIE Toolkit: <http://www.himss.org/library/health-information-exchange/toolkit>

Few health departments will be in a position to “pick” an HIE’s architecture unless they are engaged in forming or governing an HIE organization, but understanding the risks and benefits of each may help inform choice when competing HIE options are available.

Participation Rules

Membership agreements, data use/sharing agreements and other participation rules about sharing and using information are as critical as the technology. For example, always requiring patient consent before information is shared may void the usefulness of an HIO for public health functions like mandatory reporting.

What HIE Organizations Produce

Use Case Services and Products

HIOs and members can use the “push” and “pull” technologies separately or in combination to design many different services that meet communication needs for different types of users. These are what customers really want and use. The “story” that defines what a service or product will deliver is called a **use case**. HIE organizations may use this term, or the terms **exchange services or products or functional capabilities** to describe the value they can provide to members.

HIE Services and Data Sharing Examples^{xiii}

Examples of HIE/HIO Service Offerings

- Community viewer / Portal services
- Secure messaging services
- Record / Document locator services
- Interoperability support services for member organizations
- Continuity of Care Documents (CCD/CCR) production and sharing services
- Data query services
- DIRECT connectivity services
- eHealth Exchange connectivity services
- Security services (user authentication, etc.)
- Registry and directory services
- Provider indexing services
- State-Level HIE connectivity
- Electronic prescribing & refill requests
- Query services across member organizations
- EHR services and related services

Examples of Data Exchange Supported by HIOs

- Medication history, summaries, alerts, etc.
- Immunizations, syndromic surveillance and public health data
- Electronic prescribing, refill information
- PHRs / Patient-reported data
- EMT / 1st responder notes
- Claims transaction / Electronic eligibility information
- Data quality / research supported documents
- Clinical results delivery (lab, radiology, etc.)
- Clinical information, notes & documentation
 - *Transcription notes*
 - *Allergy*
 - *Care summary notes*
 - *Emergency department notes*
 - *Discharge summaries*
 - *Referrals*
 - *Consultation notes, etc.*

As an example, lab results can be pushed to ordering physicians, to a public health surveillance program, or directly to patients - all different *use cases*. Information about an Emergency Department visit might be messaged to a public health syndromic surveillance system, or to the members of a patient's care team (also different *use cases*). A query of multiple providers' medical records might be used to support Emergency Department care for an individual patient (one *use case*) or to assemble a statistical portrait of diabetes care across a community (a very different *use case*).^{xiv xv}

Once a large number of members begin exchanging a wide variety of information, the number of possible *use cases* becomes enormous. Different HIOs offer different assortments of these services, and establish new service offerings on an ongoing basis according to member demand.

Public Health HIE Use Cases ^{xvi}

- Electronic lab results for reportable conditions (ELR)*
- Immunization reports to immunization registries*
- Syndromic surveillance of ED visits and hospitalizations*
- Cancer and other case reports for disease registries*
- Care summaries for case investigation
- Sharing prenatal records with hospitals
- Sharing asthma care plans with schools
- Patient information sharing between clinic & community-based care teams
- Patient information sharing between hospitals and skilled/home care
- Supporting case management and care navigators
- Reporting public health lab results to providers*
- Assessing narcotic dispensing and polypharmacy using Prescription Drug Monitoring Programs or other pharmacy data
- Clinician reminders for overdue preventive services
- Patient reminders for overdue preventive services
- Community statistics on disease, injury or preventive services
- Mapping obesity and other risk factors in the community
- Health care quality reporting*
- Safety monitoring (drugs, vaccines, healthcare acquired infections)
- Alerting providers to recalls and emergencies

* specifically supported by 2013 EHR Incentive Program Meaningful Use regulations

Now that the EHR Incentive Program ("Meaningful Use") is creating nationwide incentives and standards for HIE use cases, several involving public health reporting, these will likely be offered by more HIE organizations, and will use more uniform technology standards.¹³

¹³ Among the use cases supported by Stage 2 of the EHR Incentive Program are "push" messaging to public health authorities of reportable laboratory results, immunization messages, syndromic surveillance and cancer registry reporting. Others include "push" messaging of summaries of information between healthcare providers during transfers of care (for example, from hospital to nursing home) and directly to

HIE Organization Types

Ten years ago, there was a largely shared vision of HIE. This focused on regional collaborations among healthcare providers, and often included health departments and insurers. These **regional health information organizations (RHIOs)** were typically not-for-profit, though they might deploy software from a for-profit vendor.^{xvii} They were basically viewed as utilities, serving virtually all providers in a community. RHIO members would connect using many different brands of EHR systems, participate in governance, and support the organization through membership and/or use fees. These organizations have developed and operate successfully in many communities. However, different technical and organizational developments have spawned alternative models that have called into question the long term prospect of the “universal utility RHIO” model.

Other HIOs focus on a **common EHR system**, sharing among different customers working with a particular EHR vendor. While relatively simple technically, this approach may create barriers for providers using a different EHR brand. As more universal standards emerge for inter-HIE exchange, however, these barriers may lower.

Some HIOs begin by serving a **selected network of organizations**, such as those serving military personnel and veterans, members of an **Accountable Care Organization (ACO)** or community health centers belonging to a Health Center Controlled Network. For example, OCHIN began as a network of community health centers sharing technical services. Originally it offered access to a single EHR product and an EHR-based health information exchange. It now offers multiple EHR options, works to link its members to HIE regardless of EHR brand, and offers additional business services.^{xviii}

The 2009 HITECH Act funded states and their **State Designated Entities (SDEs)** to assure state-wide HIE services and to support a nationwide model of exchange. Some SDEs accommodated existing HIOs, while others competed with them. SDEs have quasi-official status in many state governments, so they are powerful features of the HIE landscape. As of 2013, however, federal funding for these entities is rapidly waning, so the importance of SDEs compared to RHIOs and newer private HIE initiatives like Accountable Care Organizations is likely to evolve.

Large **integrated delivery networks (IDNs)** or hospital provider systems may launch an HIO, often as a subsidiary corporation. It is anticipated that these **enterprise HIOs** will continue to grow and develop, especially in areas that may not have another HIO option available.

patients; ePrescriptions; lab and imaging test orders and results; and clinical quality reports. Patients are enabled to “pull” certain information from their medical records. For more detailed information on public health Meaningful Use incentives and standards, see Centers for Disease Control and Prevention’s Meaningful Use webpage: www.cdc.gov/ehrmeaningfuluse.

The business model for HIOs keeps changing rapidly in response to both technical and public policy developments. In this tumultuous environment, there has been considerable turnover of HIOs across the nation. Picking a long-term HIE partner ideally includes selecting a management team that studies and responds promptly to such environmental changes.

Competing Technologies for HIE

In addition to the different organizational models listed above, two alternate systems for sending health information have emerged that call into question the model of an HIO at the center of all such “push exchange”.

Patient ability to View, Download and Transmit (VDT) EHR information has been required for Meaningful Use certified EHR systems, and a new Blue Button+ standard enables downloading record files for personal use as well as to transfer them to a third party. This “patient-mediated exchange” enables a possible alternative system for exchanging health information online. Such exchange may end up being very helpful for voluntary patient sharing of information with health departments (for example, during disease outbreak investigations) or research, but may not prove satisfactory for population-wide surveillance. It is important to note, however, that if patient-mediated exchange becomes very widespread, it might decrease the demand for HIE-mediated exchange, and thus disrupt the business model of HIOs.

Another alternative is to enable the secure emailing of messages between EHRs and other health information systems without requiring a full-scale HIE in the middle. This is facilitated by the development of an open-source protocol called **Direct** (also sometimes written as DIRECT or NwHIN Direct), and its required inclusion in Meaningful Use-certified EHR technology. Senders are required to have the appropriate email address for one another, and to use a **Health information Service Provider (HISP)** to assist with encryption and decryption. Theoretically, if both EHRs and public health information systems were all equipped to send and receive Direct messages, and if they could easily access address directories and HISP services, and if a set of generalized trust agreements appropriate to public health were developed, Direct services might reduce the need for HIO involvement in information exchange. Today, many, if not most, HIOs are beginning to provide the HISP role, so it is too early to know if Direct messaging risks undercutting the HIO business model (and revenue streams) in a significant way.

Decentralized information exchange protocols like Direct and Blue Button+ don’t necessarily make the future of HIE organizations untenable, but they do add some flexibility to the notion of an HIO sitting in the middle of most “push” messaging. A forward-looking health department will monitor these developments, assessing their impact on the business models of HIOs with which they are working, and adjust their approach to secure messaging over time.¹⁴

¹⁴ See, for example, Carr DF. Health information exchange needs a simpler model. (Commentary) InformationWeek Healthcare. November 11, 2013. <http://www.informationweek.com/interoperability/health-information-exchange-needs-a-simpler-model/d/d-id/1112209?>

Nationwide Health Information Exchange

There is no single nationwide HIE organization, but HIOs in different parts of the country still need to exchange information with one another. The ONC sponsors efforts to standardize different use cases and governance policies for exchange under the label **Nationwide Health Information Exchange (NwHIN)**.^{xix}

ONC currently oversees open-source development of the **CONNECT** gateway (formerly known as NwHIN or NHIN CONNECT).^{xx} CONNECT is considered a **reference implementation** for inter-HIE exchange, meaning that it embodies the current standards for national exchange prescribed by ONC. The software code can also be used to create a new HIE, and it may be used by other exchange software vendors to enhance their products. Although there is currently (summer 2014) no certification of HIEs as “NwHIN compliant,” compliance with NwHIN standards should be considered a routine part of evaluating any HIE opportunity to assure national connectivity.

The **eHealth Exchange**, previously known as the NwHIN or NHIN Exchange, is a public-private network of over 40 participants including federal agencies, states, Beacon communities and over a dozen HIOs and health systems. They use a shared trust framework and set of technical standards for coast-to-coast exchange. eHealth Exchange members originally used the CONNECT gateway, but the network now says it anticipates most members will use commercial solutions.^{xxi} The eHealth Exchange is supported by **Healtheway**, a non-profit corporation.^{xxii}

The Centers for Disease Control and Prevention (CDC) also continue to support a framework for public health information exchange, the **Public Health Information Network (PHIN)**, which is foreseen as becoming integrated and consistent with the NwHIN over time.^{xxiii}

HIE Certification and Accreditation

HIOs today may bring to mind the old phrase about health departments: “**If you’ve seen one HIO, you’ve seen one HIO.**”

At this point, although some states require local registration, certification or accreditation, there is no single widely recognized certification or accreditation for HIOs.¹⁵ However, a handful of efforts are currently underway:

- DIRECT Trust and the Electronic Healthcare Network Accreditation Commission (EHNAC) have been selected by the ONC to perform **accreditation of DIRECT messaging**, one of the core infrastructure services needed by HIE service providers.^{xxiv}

¹⁵ Certification of an organization or software usually refers to a self-attestation (checklist) process often combined with tests of compliance to standards. Accreditation typically adds a periodic on-site visit to assess full compliance with all standards.

- EHNAC also offers a separate **HIE Accreditation Program**^{xxv} which assesses the entire HIE organization, including a site visit, rather than just the software or technical compliance. However, as of March 2014 only four organizations had been accredited, with four more in “Candidate” status.^{xxvi}
- In March 2013 the Certification Commission for Health Information Technology (CCHIT) announced a pilot of a voluntary compliance testing and certification program for HIE software products, though not for the organizations that use them.^{xxvii}
- eHealth Exchange states it will deem technical solutions, presumably including HIE software, that meet all of its interoperability tests as “Exchange Ready,” but has not yet released a list of such products (as of March 2014).¹⁶

As preceding paragraphs illustrate, it can be difficult to keep track of changing concepts, labels, policies and organizations in the HIE space. A helpful review of the historical evolution of the HIE domain is available elsewhere in the HIMSS HIE Toolkit.¹⁷

Terms Sometimes Confused with HIE

The following terms are sometimes confused with Health Information Exchange:

- **Health Insurance Exchange** (sometimes abbreviated as HIX, or called Insurance Marketplace) allows individuals and small businesses in each state to purchase health insurance products under the **Patient Protection and Affordable Care Act (ACA)**.
- **All-Payer Databases (APDB)**, which evolved from hospital discharge claims databases maintained by many states, collect and share data from billing claims, as opposed to real-time clinical record information.
- **Electronic Data Interchange (EDI)** refers to standardized electronic document exchange for administrative purposes, like billing, often facilitated by claims clearinghouses.
- **Health Information Handlers (HIH)** are organizations – which *may include* HIE organizations or claims clearinghouses – that help providers assemble supporting documentation for billing claims.
- **Health Information Service Providers (HISP)** provide technical services for the emerging DIRECT secure email messaging.

While it is useful to understand how these organizations and functions are different from HIE, creating a successful, secure network for any one of these services will enhance an organization’s ability to offer HIE. Therefore, it is not surprising that some HIOs have emerged from these other types of organizations, and vice versa. Some level of convergence between these different types of organizations may be likely over time.

¹⁶ According to <http://www.eHealthExchange.org> as of March 2014.

¹⁷ See “HIMSS HIE Presentation: The Basics” <http://www.himss.org/ResourceLibrary/ResourceDetail.aspx?ItemNumber=10537>

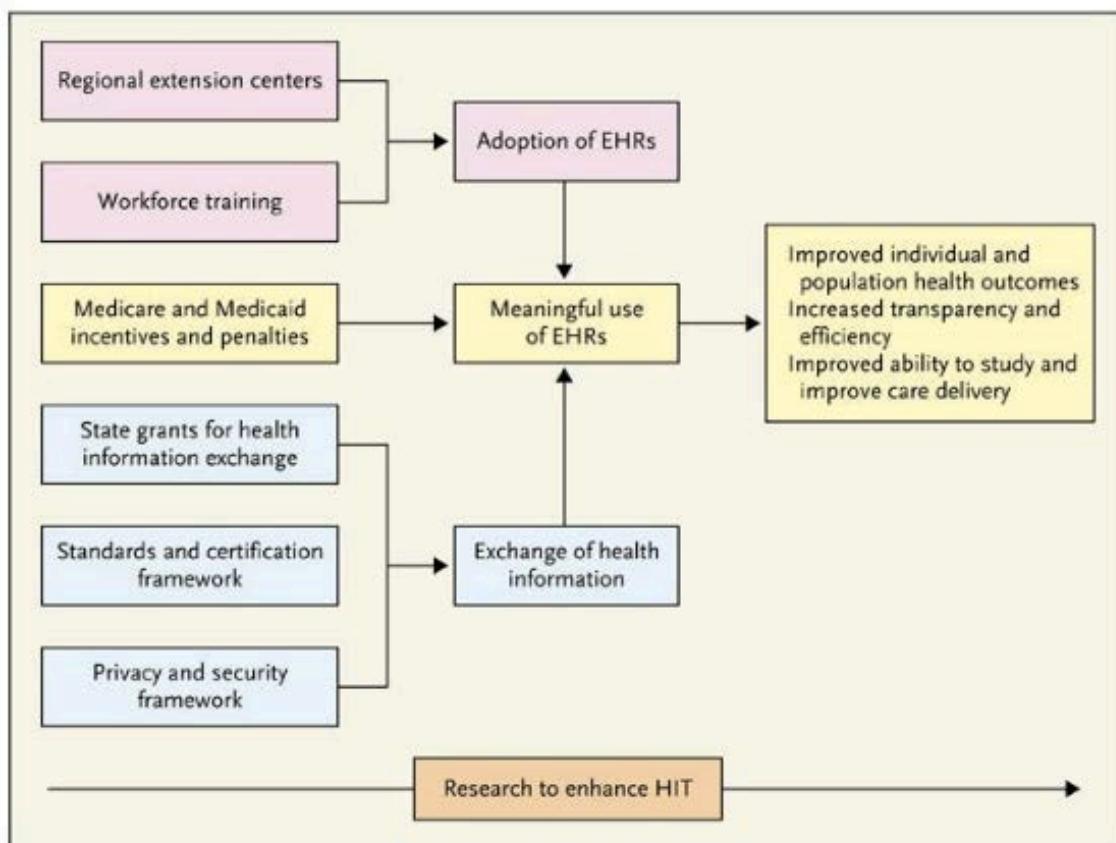
Deciding to Engage

A. Why Bother? Why Partner? Why Now?

While the concept is not new, electronic information exchange has become an increasingly urgent topic for public health. Telephone, mail and fax were adequate - if slow, error-prone and labor-intensive - for exchanging health information when medical records, physician orders, diagnostic results, prescriptions and bills were managed on paper. However, the rapid adoption of **electronic medical records (EMR)** and other clinical information systems is increasing the need for sending and receiving information electronically.

HIE is just one element of transforming healthcare through better information practices, which also includes the use of comprehensive and longitudinal **electronic health records (EHR)**, as well as appropriate incentives and policies.

FIGURE 2. HIE IN THE TRANSFORMATION OF HEALTHCARE^{xxviii}



The following sections offer information on some of the key environmental factors behind HIE's increasing prevalence.

Federal Incentives: HITECH and Meaningful Use

HIE adoption was accelerated by the **2009 Health Information Technology for Economic and Clinical Health (HITECH) Act^{xxix}** and its **Electronic Health Record (EHR) Incentive Program**, often called the “**Meaningful Use**” program, operated by the **U.S. Centers for Medicare and Medicaid Services (CMS)** in collaboration with the **Office of the National Coordinator for HIT (ONC)**.

These laws and regulations provide financial incentives for clinicians and hospitals to adopt EMR systems, and require them to exchange information electronically with each other and with pharmacies, labs, public health departments and others serving the same patient. They also support various parts of the infrastructure for HIE at the national and statewide levels.

The EHR Incentive Program contains Meaningful Use incentives and new certification specifications for information exchange between EHR systems and public health programs. These include:

- **electronic laboratory reporting (ELR)** of communicable diseases by hospitals
- reporting vaccinations to **immunization information systems** (sometimes called **immunization registries**)
- reporting hospital and doctor visits to **syndromic surveillance systems**
- supplying data to **cancer and other registries**

Clinics and hospitals are now seeking to establish HIE with health departments to earn Meaningful Use Medicare & Medicaid incentive payments, as well as to eliminate costlier and slower methods of exchanging information.

Thus, the new standards for healthcare providers are becoming de facto standards for public health information systems as well. Many health departments will need to adopt such standardized HIE, or face the equivalent of using telegraphs after others have switched to telephones.

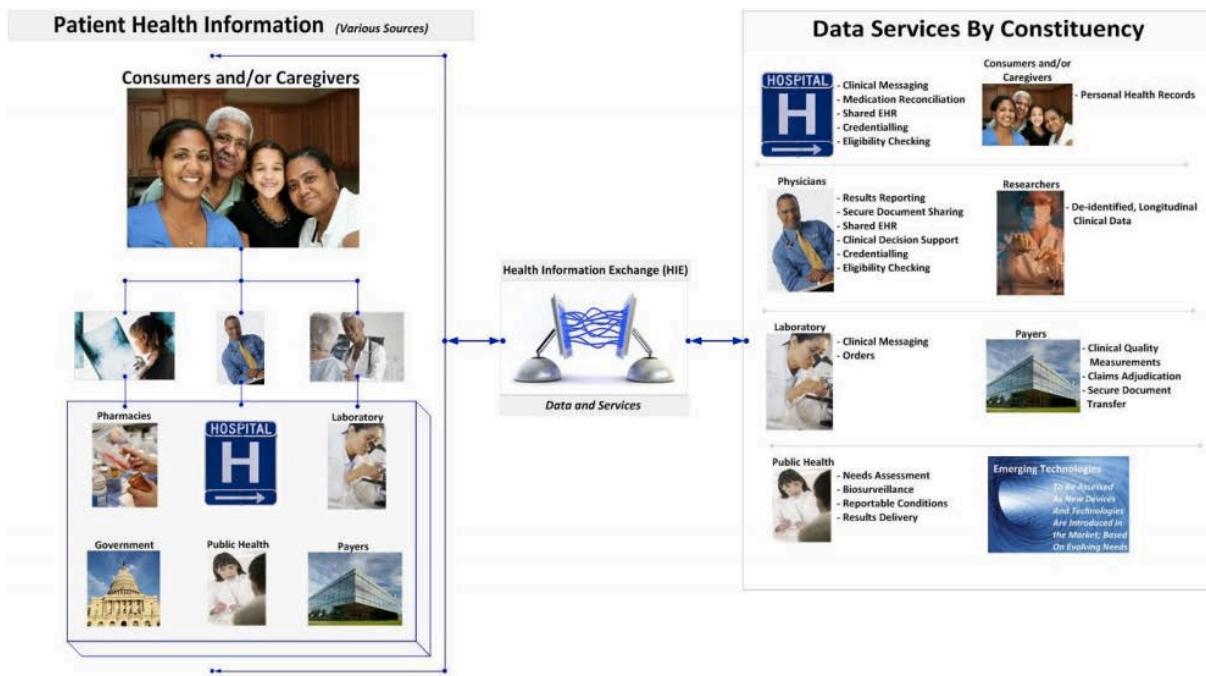
Federal Incentives: The Affordable Care Act

The more recent **Patient Protection and Affordable Care Act (ACA)^{xxx}** does not often mention HIE, but creates incentives and structures for quality-, safety- and population-based care initiatives (like **Accountable Care Organizations [ACO]**) that effectively require information exchange.

In addition to sending and receiving individual messages, information exchange can be used to assemble information about each patient from multiple EMRs to create a comprehensive lifetime record.^{xxxi} Such an EHR can be used to improve the quality, efficiency and safety of both individual healthcare and population health.

These capabilities are foundational to health reforms associated with the ACA. Sooner rather than later, these capabilities will change how public health is practiced.

FIGURE 3. CONCEPTUAL MODEL OF HIE^{xxxii}



State and Community Efforts

Many local and state health departments have led HIE development in their communities. For example:

- Public health leadership has often been critical to facilitating collaboration among competing health care providers.
- The immunization registry was an early, single-function model of HIE.
- Some health departments participated in HIE development for near-real-time case reporting of reportable diseases. Some also used HIE to monitor surges in healthcare utilization to detect or track outbreaks - this is now referred to as **syndromic surveillance**.
- Others have used information exchange to establish disease registries and improve chronic disease management.

Communities are beginning to use HIE to support more profound health system transformation. Some use it to support better care coordination and access, others to measure, analyze and

improve the delivery of clinical preventive services for individuals, or for entire populations. Some use aggregate HIE data to map and attack health inequities.¹⁸

Now that federal programs are incentivizing exchange and establishing national specifications, health departments may be less prominent in driving exchange, but may see more benefits faster.

“HIE is not a destination – it is a foundation.”

HIE is both catalyst and mechanism for ongoing improvement in public health surveillance, health care and preventive services.

Not every health department needs to implement HIE today. Some local health departments, for instance, may find it more appropriate to rely on state-operated information systems to exchange information with healthcare providers. The next section of this Toolkit offers tools to assist public health departments in determining when to make HIE a priority.

Nevertheless, every health department will be affected as HIE changes the characteristics, speed and volume of data exchange activities with health care providers. It is critical to be prepared to use this information for the benefit of the public's health. For a collection of writings on the intersection of public health with HIE see **Appendix G: Writings on Public Health and HIE** on page 80.

¹⁸ The Beacon Projects funded by the Office of the National Coordinator for Health IT are pilots for such broader transformation.
<http://www.healthit.gov/policy-researchers-implementers/beacon-community-program>

B. Does Our Health Department Need HIE Today?

All state or territorial health departments should have a strong relationship with their HIT Coordinator (or whatever position currently oversees state-wide HIE development) given the importance of Meaningful Use public health reporting and the many possible future benefits of HIE to state and local programs.

Local health departments should investigate if HIE will provide a good return on investment if they meet any of the following characteristics. “Trivial” service volumes are performed so rarely that there is minimal cost or workflow issues for manual data management (and thus little reason to make them electronic).

TOOL 1: HIE IMPORTANCE CHECKLIST

Does Our Health Department Need HIE Today?

Select each characteristic that describes your health department.

- Performs clinical services** in non-trivial quantities:
 - Diagnosis or therapy of disease
 - Clinical preventive services like immunization or cancer screening
 - Diagnostic (lab or imaging) services
 - Home health care
 - Care management or coordination (e.g., prenatal care coordination)
 - Has or is acquiring an EHR system
- Directly receives public health reports** – Healthcare reporting occurs directly to the health department and not into a system operated by a state or other third party (e.g. a state disease reporting system or a national syndromic surveillance system like BioSense).
 - Diagnostic results for reportable conditions (e.g., communicable diseases, lead poisoning)
 - Immunization events (for immunization registries)
 - Syndromic surveillance
 - Cancer or other disease registry reports
 - Health care safety event reports
- Uses healthcare information** for case or outbreak investigation and management
- Desires **electronic communication with clinicians**
- Participates in health care improvement** initiatives
- Monitors utilization of health services** in near-real time (e.g., for emergency management)
- Desires to shape health information sharing in the jurisdiction

Local health departments that might benefit from HIE may be surrounded by other departments with similar needs. Consideration should be given to whether the issue is most efficiently approached individually or as a regional or state-wide process.

Engaging with HIE

A. Approaching HIE Engagement

Early considerations and data gathering

Depending on the needs and capabilities of each, the relationship between a health department and an HIO could be considered a **purchase of services**, a **business investment**, or a **strategic relationship**. It may even take on aspects of all three.

Each type of relationship represents a **business decision** which should be approached with its own appropriate logic, and which is dependent on what the goals and needs are for both the health department and the HIO. Therefore, it may be helpful to consider and analyze these relationships separately for a given HIE opportunity, and then reassess them periodically on their own merits thereafter.

What Kind of Relationship?

Service Provider

Some HIE organizations may act as a **service provider**. Like a telephone company, they offer various services at different prices. Your relationship is limited to picking the best contract for the best service for the best price. If you want something better or cheaper, you change providers - in other words, the service is a *commodity*. Like your phone company, they don't expect or even want you to seek a seat on their board.

At the time of this writing, this is not a common exchange service offering for public health. This is because HIE connections for health departments are not yet very standardized, and existing public health exchange services can be both limited and complicated from either a technology or a pricing perspective. However, as more exchange services become nationally standardized and integrated into certified EHR products, these relationships may become more common. Health departments investing in EHR systems may find some HIE services (like Direct messaging) currently offered through their EHR vendor, and thus may already have options to choose from.

Business Investment

More often, there is significant up-front **investment** in the form of time, money and maybe technical modifications to implement HIE – especially for health department systems. The fiscally responsible health officer should ascertain whether the **return on investment (ROI)** - in money or in public health capacity - is worthwhile.

Such calculations are not always straightforward. In addition to calculating the costs and benefits of the exchange services arrangement, one must also consider the risk that the HIO in which you invest fails to produce the expected benefits, or to survive. On the other hand, your stockholding may give you influence and potential participation in the governance of the HIO. Your value to the organization is more than financial. Because your participation may influence others'

participation and funding, and because your department may bring unique information to the exchange, you might be able to negotiate when it comes to prices and services.

Strategic Relationship

You may enter a **strategic relationship** with an HIO, creating an ongoing affiliation for transformative change in the community. In other words, you may conclude that the health of the entire community could benefit from HIE services, and thus your involvement is about more than just your health department's ROI. At this level, the public health department is not only an investor but becomes a strategic leader in the exchange.

Available relationship opportunities will change depending on who offers services in your jurisdiction, which services are needed by the health department, and the health department's capabilities. There is no "one right answer." The environment for HIE will likely continue to change rapidly over the coming years, and so will the need for regular reassessments of such decisions.

Who is Out There?

The Environmental Scan

There may be more than one organization offering, or planning, HIE services in a given jurisdiction. Identifying each of these early on is highly recommended. Information on HIE service offerings and HIOs can rapidly become out of date, so there is no single comprehensive source of such information available at this time. However, the following resources may be useful in locating and assessing the options available in your area.

TOOL 2: LOCATING HIE SERVICES

Locating HIE Services
<p>The following resources will assist in identifying available HIE opportunities in your area:</p> <ul style="list-style-type: none"> • Your State HIT Coordinator (http://statehieresources.org/contacts) • Your Regional Extension Center (REC) for health IT (http://www.healthit.gov/providers-professionals/regional-extension-centers-recs#listing) • The HIMSS State HIT Dashboard (http://apps.himss.org/statedashboard) • The list of HHS ONC State HIE grantees (http://www.healthit.gov/policy-researchers-implementers/state-health-information-exchange) • The list of Agency for Health Research and Quality (AHRQ) HIE Grantees (http://healthit.ahrq.gov/ahrq-funded-projects) • Your EHR vendor (if you have one) • Your state hospital association • Your state medical association • Local Chapters of the Healthcare Information and Management Systems Society (HIMSS; http://www.himss.org/get-involved/chapters) or the American Health Information Management Association (AHIMA; http://www.ahima.org/about/csa.aspx)

Locating HIE Services

- State and local public health staff addressing Meaningful Use objectives (e.g., syndromic surveillance, disease registries)
- Others who frequently exchange information with clinicians (e.g., vital registration and health alert network)

It is important to note that some public health information systems represent successful narrow-purpose HIE systems, and should be considered alongside other HIE options. For example, a communicable disease surveillance system, syndromic surveillance system, or Immunization Information System in your jurisdiction may be establishing successful relationships directly with healthcare providers without depending on third-party HIE organizations.

Be sure to consult your own staff leads in these program areas to assess the adequacy of current and planned public health exchange solutions. If state public health systems meet local health department needs (and those of healthcare providers) they need not be duplicated. This frees you to explore other available HIE functions that might match different health department's needs.

What Can It Do?

TOOL 3: HIE DATA GATHERING

Early Data Gathering on Each HIE Option

As you investigate HIE options try to obtain the following information:

- What existing HIE systems or organizations serve healthcare providers in your jurisdiction?**
 - These may be public or private, broad-purpose or narrowly focused, EHR-based or freestanding, etc.
- What use cases / exchange functions does each offer now, and plan to offer in the future?**
- Who are the actual or committed information exchange members?**
 - In other words, which providers - and which types of provider - are committed to exchanging what information?
- What are the corporate and governance structures?**
 - Examples include private for-profit companies, non-profit collaboratives, institutionally sponsored organizations, etc.
 - How could the health department participate in governance?
- Membership criteria**
- Fee structures**
- Participation agreements (such as membership, data sharing agreement and service level agreements.)**
- Business plan, if it is shared**

Early Data Gathering on Each HIE Option

A few additional recommendations for assessing HIE options:

- Consider using the HIE Evaluation Checklist in the HIMSS HIE Toolkit (<http://www.himss.org/ResourceLibrary/ResourceDetail.aspx?ItemNumber=7055>).
- Review pages 31-45 of *A HIMSS Guide to Participating in a Health Information Exchange* (http://www.himss.org/files/HIMSSorg/content/files/HIE_GuideWhitePaper.pdf) to organize the information you've gathered, and to help you think of other information you may need about each HIE option.
- Share the **Public Health & HIE Goals Matrix** ([Appendix D: Public Health & HIE Goals Matrix – Instructions and Example](#), page 56) with each HIE provider.
 - Ask them to identify which exchange services they offer, or plan to offer, that might be relevant to each goal.

This information will help you in the following sections to identify which HIE options have relevance for a particular health department, identify possible HIE projects, perform due diligence on a possible HIE partnership, and create the final business case for an HIE project.

B. Public Health HIE Goals Matrix

Matching health department goals with HIE capabilities

A health department has many needs, and local HIE options may offer a wide range of opportunities. How do you find the “sweet spot” on which to focus your early HIE efforts?

The Public Health HIE Goals Matrix offers one approach to answering this important question. To better understand the instructions and example, have a copy of [Appendix D: Public Health & HIE Goals Matrix – Instructions and Example](#) (pages 56-62) and [Appendix E: Public Health & HIE Goals Matrix – Template](#) (pages 63-67) as you review the instructions.

TOOL 4: PUBLIC HEALTH HIE GOALS MATRIX

Step 1: Identify Priorities

First, identify the health department’s information exchange priorities. Ideally, these priorities drive technology decisions, not the other way around.

Instruction 1	<p>In the first column of the Goals Matrix, identify which goals best match your health department’s current needs.</p> <p>Try to limit your selections to the top FIVE goals based on the department’s strategic plan, jurisdictional health improvement plans, other planning documents, and top program or administrative challenges.</p> <p><i>Note: The HIE-relevant goals provided in the Goals Matrix may not address all of your unique needs. Please feel free to add your own.</i></p>
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In the example below, a fictional health department has selected five areas where HIE might help meet the priority goals. One goal was added to the bottom of the list by the health department.

Example of Health Department Priorities	Top 5
Improve cost-effectiveness of Health Department (HD) clinical care	
Improve cost-effectiveness of HD diagnostic services (e.g., lab)	•
Improve care coordination between healthcare providers and HD programs (e.g., prenatal case management, elder home health services)	
Improve reporting and management of public health cases	•
Improve outbreak / disaster detection and tracking	
Improve clinical revenues / cycle time	

Example of Health Department Priorities	Top 5
Communicate with individual members of the public	
Communicate with healthcare providers (e.g., alerts, prevention-oriented clinical decision support, marketing community-based programs)	•
Track / Analyze population health metrics	
Satisfy provider demand for Meaningful Use (MU) public health reporting objectives	
Monitor healthcare quality or safety measures (external to HD)	
Establish community diseases registries (surveillance and/or intervention)	
Partnership to link clinical and community-based services	
Partnership for healthcare access / navigation	
Partnership for healthcare quality / safety	•
Enhance clinical information sharing in jurisdiction	
Other (<i>add your district's priorities</i>) Example: <i>Care coordination between home health and skilled nursing facilities</i>	•

Step 2: List HIE Service Offerings

Once the health department's priorities are identified, they can be matched against available HIE service offerings.

Instruction 2a

At the top of the “HIE Option” table columns, list each locally relevant HIE opportunity you discovered in your environmental scan.

Don't forget exchange capabilities offered by your own Electronic Health Record (EHR) or Laboratory Information System (LIS), as well as those made available to you through state or federal public health information systems.

In our fictional example (see [Appendix D: Public Health & HIE Goals Matrix – Instructions and Example](#) on page 56) there are three HIE opportunities available to the health department:

- 1) A multi-function Regional Health Information Organization (RHIO) which permits an assembled “pull” view of a community health record and also enables “push” messaging of laboratory results to providers, and of public health reports to the state’s **immunization information system (IIS)** and **electronic disease surveillance system (EDSS)**.
- 2) The health department already owns both an electronic health record system (EHR) and laboratory information system (LIS) that bring their own information exchange capabilities.

- 3) The capabilities of existing state IIS and EDSS are also described.

Instruction 2b

Under each HIE Option (column) briefly describe the capabilities offered – now or in the planned future – relevant to each health department goal (row) in the cell where they intersect.

It may be helpful to use the knowledge and imagination of *both* program staff and HIE representatives in this process. Insert capabilities that address both the identified priority *and* non-priority goals.

Step 3: Match Priorities to HIE Service Offerings

Finally, look at how HIE capabilities compare to health department goals and priorities.

Instruction 3

Identify intersections that appear to address priority goals effectively and efficiently.

Take note of key points, such as:

- If one solution appears to be easier or less expensive to implement than another
- If one or more HIE functions might serve *multiple priority and non-priority goals*
- The extent to which one option strengthens not only health department capabilities, but also the quality, effectiveness, safety and resilience of the *entire jurisdiction's health system* (including healthcare providers and other partners)

The example provided here illustrates several important aspects of how a basic HIE technology's value can vary widely, depending on participants in the network and which use cases are supported.

- In this fictional jurisdiction, both the local RHIO and the health department LIS could "push" laboratory results to health department laboratory customers and the state EDSS. However, the RHIO has already established directories, secure messaging and information exchange protocols to many of the same customers and to the EDSS, thus eliminating major tasks that would be needed to distribute results using the health department's "in-house" LIS.
- The RHIO can "pull, aggregate and share" a patient's care summary from multiple providers that use many different EHR applications, while the health department's EHR vendor offers such exchange only with other providers using the same vendor. Thus, in this jurisdiction the RHIO bring economies of scale, already-built networks, and a broader array of data sources than the in-house EHR exchange solution.
 - This is just an example and may not be the case everywhere. Future developments in EHR and HIE technology may raise the utility and lower the cost of different options over time.

- While joining the RHIO helps meet some of the fictional health department's pre-identified priorities, the same exchange functionalities might meet additional (non-priority) goals as well (these are identified in grey-shading).
 - For example, the capability to pull patient care summaries from many providers supports the priority "Improve reporting and management of public health cases," but also addresses other lower-priority goals like "Improve cost-effectiveness of health department clinical care," and, "Improve care coordination between health care providers and health department programs." Thus an investment in one exchange solution for one priority created potential solutions for other goals as well. You may find that certain HIE capabilities "kill many birds with one stone," increasing your confidence in making the investment, and identifying opportunities to improve services that earlier may have seemed beyond reach.
- Finally, if the health department joins the RHIO it will help accelerate HIE availability and public health reporting for the larger community (an example of a **strategic partnership**), which would not occur if the health department used only its own stand-alone systems to send messages.

The health department in this example will likely choose to join the RHIO, while continuing to use and benefit from its own EHR and LIS systems, as well as state information systems. The sample matrix illustrates that these latter systems also provide fallback options in case the RHIO fails, becomes unaffordable, or otherwise disappoints.

If No Local Solution Exists

A final point: if there is a strong need and no appropriate HIE solution locally available, it may be opportune for the health department to begin creating a local solution. This may be done by partnering with an existing HIE organization or working with existing partners like hospitals and labs. It is likely that other communities have solved the same, or a similar, problem and can serve as helpful examples.

Finding these examples will take some research – some efforts are discussed in peer-reviewed literature, but more often they can be found in non-peer reviewed whitepapers and project reports. Inquire at national associations and federal agencies. Lists of generic requirements documents are also available,^{xxxiii} and it is recommended that applicable documents be reviewed before designing local projects from scratch. Finding a pioneer that has gone before will almost always be worth the effort.

Now that some near-term project possibilities have been identified, it is time to assess whether the selected HIE options are practical and sustainable. The Public Health HIE Project Risk Appraisal Tool in the next section will assist health departments in assessing the readiness and risks associated with both the potential HIE service provider and the health department.

C. Public Health HIE Project Risk Appraisal Tool

Assessing risks to project success and sustainability

Once potential use cases for health department-HIE projects have been identified, it is time to assess potential risks to project success or to the sustainability of the relationship.

Key Considerations

Assessing risk is not always straightforward. HIE standards, business models and organizations are still at an early and uncertain stage of development,^{xxxiv} and there are several perspectives to consider:

- Some HIOs have failed to deliver promised functions; others have gone broke.^{xxxv} In order to identify the best candidates for long-term survival, look for those deriving sustainable revenues from a broad base of participants, enlisting a high proportion of local healthcare providers, and improving the clinical workflow of members.^{xxxvi}
- There must also be goodness-of-fit between an HIE service provider and the health department. For example:
 - HIE information-sharing restrictions may limit HIE utility for certain public health goals (e.g., an HIE that always requires patient consent in advance of any sharing might not be suitable for legally-mandated public health reporting or for developing a complete and unbiased statistics of health events in the community).
 - The HIE provider may not have the will or capability to prioritize public health projects.
 - The health department may lack the capability to put electronic HIE to good use.
- When considering a commodity service, up-front investment may be minimal and the health department could switch providers at any time. However, if a health department will be investing major labor or capital into creating or joining an exchange, then assessment of risk assumes greater importance - especially if the desired functions could not be readily switched to another organization if necessary.

The Public Health HIE Project Risk Appraisal Tool consists of two sets of questions:

- **Tool 5: HIE Service Provider Risk Assessment** (page 40)
- **Tool 6: Health Department Risk Assessment** (page 42)

These tools are included in their entirety in this section, but you may also [download a formatted \(printable\) version of each tool from the toolkit online](#).¹⁹

¹⁹ See <http://www.himss.org/public-health-hie-toolkit/downloads> for downloadable versions of all tools in this Toolkit.

Ideally, both assessments will be based more on hard data than good intentions. Look for evidence of actual performance, written commitment or, at minimum, demonstrated capability to address an issue.

Answering the following questions will help to:

- assess how risky a “go-ahead” decision might be;
- identify obstacles that may need to be overcome by either the HIE service provider or the health department; and
- project whether the health department will receive the desired return on investment.

This exercise is *not* intended to find zero-risk solutions. These do not exist. Rather than eliminate risk, the goal of this exercise is to assess it for three key reasons:

- 1) To determine whether some HIE opportunities might have lower risk than others. For example, exchanging sensitive health information about identified individuals will typically carry higher risk than anonymized or aggregated information.
- 2) To identify risks that could be reduced through planning and/or negotiation.
- 3) To assure that the risks of engagement are sufficiently controlled, and that a failure is not likely to be catastrophic to the health department.

Public Health HIE Project Risk Appraisal Tool

TOOL 5: HIE SERVICE PROVIDER RISK ASSESSMENT

Answer the HIE questions using materials collected during your environmental scan (**Tool 2: Locating HIE Services**, page 32, and **Tool 3: HIE Data Gathering**, page 33), as well as data obtained from the **HIMSS HIE Evaluation Checklist**²⁰ if used. Follow-up questions may be needed, especially for issues that might be unique to the health department.

²⁰ Download the HIMSS HIE Evaluation Checklist from the HIMSS HIE Toolkit at <http://himss.files.cms-plus.com/FileDownloads/2009-11-01-HIEEvaluationChecklist.pdf>.

Matching Priorities | Will the HIE organization include the health department's goals in its priorities?**1) Do the mission and business plan accommodate health department goals?**

If your needs are not visible in the business plan, the organization may be ambivalent, or might go broke trying to meet them. Business plans are revised often, and may need to be revisited in order to accommodate your needs in a thoughtful and strategic manner.

2) Would the health department goals violate the data use agreement of the HIO?

Sometimes these documents are originally written for narrow clinical purposes, and might require renegotiation with members.

3) Do the management and board acknowledge health department goals?**4) Do other, more powerful members have conflicting goals and deadlines?**

For example, will the HIO be able to adopt projects that go beyond Meaningful Use objectives and CMS quality incentives in the next few years, or must it remain focused on these issues to the exclusion of others?

5) May the health department assume, as needed, an appropriate role in governance?**6) Is the health department bringing value to the HIO, and is that value recognized?**

This value may be in the form of fees, funding, endorsements, access to unique information, etc.

Sufficient Access | Can the HIO provide access to the healthcare providers and information the health department needs?**1) Is there evidence of good trust between healthcare providers and the HIE service provider?****2) Are providers committing to HIE participation?**

Does commitment appear to be short-term or long-term?

3) Is the HIO recruiting the right types of providers in the right geographic areas to meet the health department's needs?**4) What types of information are healthcare providers expected to make available, or to receive?****5) To what extent is information exchange dependent on patient consent?**

Are these consent rules compatible with health department project needs?

6) Will the appropriate users have necessary access to information under the existing or planned Data Use agreements?

For example, will public health nurses or sanitarians have access to the information they need? What about healthcare provider staff critical to the health department's needs, such as infection preventionists or discharge planners?

Long-Term Sustainability | Does the HIE solution have long-term sustainability?

- 1) Is there a business plan?**
Is it realistic? Does it indicate a measurable and transparent path toward long-term sustainability?
- 2) Does the HIO depend on major grants, major funders or investors?**
What is the long-term prospect for such funding and plans for its replacement?
- 3) Does the HIO leadership have previous experience in successful enterprises?**
- 4) Are critical stakeholders included in the governance structure in an appropriate manner?**
- 5) How might changes, such as the loss of a major supporter or failure to recruit members, influence the user fees for remaining HIO members?**
What protections are being taken to minimize risks in that situation?

Technical Support | Will the technology and technical staff support the health department's needs?

- 1) Have other agencies, members or HIOs – locally or in other cities/states – successfully established the desired public health functionality using the same technology?**
If not, has the feasibility and appropriateness of the approach been impartially assessed?
- 2) How would the HIO continue to provide service if its technology vendors fail or leave the partnership?**
- 3) What is the HIO's commitment to establish, maintain and repair services in a manner appropriate to the public health need?**
This is often summarized in a Service Agreement (see [Standard Documents](#) on page 46).
- 4) Is the HIO prepared to scale up messaging, query or other services to levels that might be needed in the event of a major outbreak or disaster?**
- 5) Is the HIO prepared to sustain operations in the event that an outbreak or disaster affects its staff or facilities?**

Privacy and Security | Is the HIO prepared to protect the privacy and security of both individual and health department information?

- 1) Do the standards and technologies satisfy any applicable rules for government systems?**
- 2) Are HIO rules relating to government transparency in conflict (e.g., sunshine or open-records laws)?**

TOOL 6: HEALTH DEPARTMENT RISK ASSESSMENT

In order to fully understand both the risks and potential rewards involved, hard questions must be asked of both the HIE service provider(s) and the public health organization. It cannot be assumed that access to information, by itself, will have a major impact on health department effectiveness or efficiency without assessing its capability to put the information to use. Anticipated savings and improved efficacy often rely on a redesign of business processes which, in turn, rely heavily on the knowledge, attitudes and skills of the affected workforce.

Matching Priorities | *Can the health department work with the HIO?*

- 1) Are the HIO's vision, mission, goals and corporate structure compatible with the health department's requirements?**
- 2) Are there obstructions, such as procurement rules or conflicts of interest, prohibiting a business relationship with the service provider?**
- 3) Can the health department comply with membership requirements?**
Consider fees; participation agreements; information sharing requirements for or about health department clients; standards for information formatting and vocabulary; interfaces with and/or modifications to health department systems; security and privacy rules; etc.
- 4) If the health department needs exceptions, can they be granted?**

Financial Capability | *Does the health department have the financial capability to participate in the exchange?*

- 1) Can the department afford up-front investments?**

These may include membership fees, necessary hardware/software/network changes, and workforce training and certification, among others.

- 2) Can the health department afford ongoing fees?**

These may include reasonably predictable increases if HIO recruitment is lower than expected, or if the costs of implementing HIE are higher than expected.

Technical Capability | Does the health department have the technical capability to participate in the exchange?

- 1) Do the HIO and health department use compatible information formats and vocabulary?
If not, who will normalize the data to the extent needed?
- 2) Can the department achieve the necessary project management for establishing exchange?
- 3) Can the department manage the alteration of public health information systems to use the new information or communication capabilities?
- 4) Can the department provide timely intervention if the connection to the HIO fails?

Information Stewardship | Does the health department have the information stewardship capability to meet legal, HIE and ethical requirements regarding the information it may share or receive?

- 1) Can the department meet all HIE, HIPAA, state and professional standards for privacy and security?
- 2) Will the workforce have the necessary knowledge, skills and attitudes to protect HIE confidential information continuously and appropriately?

Business Processes | Will anticipated changes to health department workflows and business processes be practical and meet expectations?

- 1) Do leadership and affected staff see ways to use HIE to improve the outcomes / effectiveness of the affected business processes?
- 2) Do leadership and affected staff see ways to use HIE to improve the cost-effectiveness (lower cost or higher productivity) of the affected business processes?
- 3) Can existing staff acquire the needed knowledge, attitudes and skills to implement the new work processes?
If so, how will training be done?
If not, how will staff with the needed attributes be obtained?

D. Go or No Go?

Putting together the business case

By following the guidance provided in this Toolkit, public health programs and departments will have answered the following questions:

- a) Who provides what types of HIE services in our jurisdiction?
- b) How do our priorities match local HIE capabilities?
- c) What could place our potential HIE projects at risk?

At this point for any projects that appear worth pursuing, the public health entity and the HIE service provider both need to assess the **feasibility, benefit, cost** and **risk** of the project(s) to both parties.

What is a Business Case?

The **business case** is a document frequently used to spell out assumptions and describe the benefits, costs and risks of specific HIE projects. Business case documents may range from simple overviews to extensive and highly quantitative analyses.²¹

In HIE, some project costs and benefits may be readily quantifiable - such as the cost of transmitting a lab result by two different methods - but others are not. Quantitative analysis may be straightforward when replacing one standardized software solution with another, but some benefits and costs elude clear-cut quantification. For example, how does one "value" improvements to overall community capability and resilience of having one HIE organization providing many exchange services to many users? How does one apportion that value to the health department's participation in the effort? Even if they are difficult to quantify, such value elements should also be explicitly described in the business case and considered in decision-making.

Health departments should consider starting with one high-value, low-risk HIE project, rather than attempting multiple or complex projects, then build incrementally on the trust and knowledge gained.

Identifying and Planning for Risks

If you completed the preceding tools in this Toolkit, you already have most of the information to answer the questions in **Tool 7: HIE Project Business Case Tool** (page 47). However, there will be some additional information needs to be discussed with a potential HIE partner.

²¹ Useful models include the Business Case templates from the Centers for Disease Control and Prevention Unified Process. www.cdc.gov/cdcup.

The **Public Health HIE Project Risk Appraisal Tool** (pages 39-44) helped you generate a list of potential risks that may confront your project. Risks can be mitigated in various ways. For example:

- Hold-harmless clauses, service level agreements, and limits on maximum cost-exposure can be negotiated in contracts.
- Policies, procedures, technology and training can mitigate security and privacy risks.
- Redundancy can mitigate risks to continuity of operation.
- Guaranteed participation in governance can mitigate the risk that an HIE organization's mission and business plan veer away from health department needs.

Focus on the most important risks identified using the Public Health HIE Project Risk Appraisal Tool. Risk mitigation strategies should be identified for each of these in the business case.

Ensuring Mutual Benefit

Many aspects of HIE are potentially negotiable, particularly for a highly valued HIE partner. Thus items like fees and governance structure should not be considered written in stone.

Health departments are unique organizations within the community and can bring many types of value to an HIE organization. These may include influential endorsement, neutral convening, population-level data, and access to public health funding. HIE grant-funding opportunities, for instance, may depend on health department participation. Public health participation is also needed to ensure that healthcare providers can earn Meaningful Use incentives.

This is a good point for the health department to assess if it wants to **purchase services, invest in exchange, or join an exchange organization as a strategic partner** (or all three). Public health investment or commitment might be reciprocated by a prominent role in governance, and/or discounted participation fees or costs for interface and interoperability services.

The health department and HIE service provider should assess the many ways in which each party can provide value to the other, and use that information to establish a division of costs and benefits that will be appropriate and sustainable to both.

Standard Documents

The commitment to implement a relationship will typically involve several **documents**, such as the following.

- **Exchange membership agreement** – The public health HIO member commits fees, data and possibly other elements of value to the exchange. This may include an

understanding about the role of the public health entity in the governance of the project and/or of the exchange.

- **Data use agreement** – This details whether and how exchange information may be used and shared by the health department, and vice versa.
- **Service level agreement** – In this document, the HIO (and sometimes the public health entity as well) accepts responsibility for things like peak volume capabilities, minimum network speeds and recovery time for network failures.

Reviewing such agreements is part of the risk assessment process, and risk mitigation strategies may include specific changes to these documents.

These documents may be executed separately or combined. It is important to identify and understand each part fully, for all potential HIE partners.

HIE Project Business Case Tool

With the above information in mind, a health department can work through the following set of questions and, when obstacles appear, potentially negotiate to a reasonably safe and affordable project. With each successful project, the trust, understanding and skill of the partners are enhanced so that each additional project is often more successful and lower risk than the ones that came before.

TOOL 7: HIE PROJECT BUSINESS CASE TOOL

A simple **HIE Project Business Case Tool** is provided in **Appendix F: Public Health HIE Project Business Case Template** (page 68) in the form of a slide presentation to management. Many government organizations and businesses have a prescribed format for business case documents, and these will need to be completed as prescribed locally. The slide deck provided here will assist project leaders to help raise, organize and discuss important business case elements before they are finalized in a text document.

Appendix A: Public Health Use of HIE – Case Study #1

Indianapolis Communicable Diseases Surveillance and Emergency Preparedness

The **Indiana Network for Patient Care (INPC)**, founded at the Regenstrief Institute, Inc., began standardizing and linking information across multiple hospital systems in 1994. Thus it has “grandparent” status among HIE organizations, and began well before **electronic health records (EHRs)** were common practice. INPC is now the core registry at the center of the **Indiana Health Information Exchange (IHIE)**, which, like the **Marion County Public Health Department**, is centered on Indianapolis.

Early Efforts

Like many early HIE organizations, IHIE focused first on receiving and storing information about patient care from multiple organizations, enabling statistical analysis as well as queries about care received by individual patients across multiple providers when appropriate. This near-real-time collection of electronic data about emergency visits and admissions enabled **syndromic surveillance**, or statistical tracking of the numbers of patients presenting for care with various symptom combinations.

Building a Partnership

In 2004, the system partnered with the Indiana State Department of Health to implement such surveillance, which now includes more than 110 hospitals. Marion County has used this data for a wide range of applications, including:

- to track seasonal and pandemic influenza,
- to assess the possible impact of other outbreaks,
- to detect carbon monoxide threats, and
- to assess the severity of heat wave health effects.

IHIE also began providing “push” delivery of laboratory results and other messages and documents in the early 2000s in a program called “Docs4Docs.” Once these data streams were established, IHIE could detect and route reportable disease laboratory results to the Marion County health department. This increased the speed and the quantity of reportable lab results received, while reducing the reporting workload on laboratories.

Working Toward Greater Efficiency

To facilitate rapid, accurate public health classification of electronic reports, IHIE adds key provider and patient demographics (like phone numbers) to reports. It is also using natural language processing to improve the detection and reporting of reportable conditions. To further automate case management, IHIE is piloting the use of its Clinical Decision Support system to provide partially pre-filled case reports to physicians for completion and submission to Marion County.

Marion County communicable disease nurses also now access cases' cumulative healthcare data on a secure IHIE portal, reducing the need for many phone calls and faxes to healthcare providers. Nurses find these processes are making reporting and case management more efficient. They are the product of several incremental projects funded by the Centers for Disease Control and Prevention (CDC) and the Agency for Healthcare Research and Quality (AHRQ), each building on the prior. Marion County has also used IHIE:

- to educate physicians about emergencies like H1N1 influenza,
- to identify high-risk patients for physicians during disease outbreaks, and
- to prompt emergency departments to take chest X-rays when hard-to-find people with positive TB screens show up for services.

Looking Forward

The partnership between Marion County and IHIE is far from a one-way street. Many of these projects have been supported through funding from the CDC and other public health organizations. Thus, public health support for these use cases has helped expand and deepen the development and maintenance of IHIE technologies. The close relationship between IHIE and a university informatics department also helps to fuel innovation.

Sources

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For More Information	<i>Shandy Dearth Epidemiology Administrator, Marion County Public Health Department sdearth@marionhealth.org</i>

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Appendix B: Public Health Use of HIE – Case Study #2

Performance Management of Chronic Disease Prevention in NYC and Denver

Tracking the performance of community chronic disease prevention programs often requires near-real-time, small area data. But in 2013 most health jurisdictions relied on occasional reports of large-area surveys like the National Health and Nutrition Examination Survey (NHANES) and the Behavioral Risk Factor Survey (BRFS). Meanwhile, risk factors like obesity, blood pressure and smoking are recorded daily in medical records across the community. HIE provides hope for access to more robust real-time, small-area data. Since the data originates from healthcare providers, this simultaneously creates opportunities to promote evidence-based prevention in both the clinic and the community.

New York City, New York

New York City's **Primary Care Information Project (PCIP)** is an extraordinary public health HIE leader. The city, in collaboration with the Community Health Care Association of New York State (CHCANYS), helped over 3,000 primary care providers to acquire and implement **electronic health records (EHRs)**, which were also linked to data centers at the NYC Health Department. This model later inspired the HITECH Act's national **Regional Extension Center (REC)** program for HIT support.

Information exchange was simplified because most participants used a single EHR system, facilitating data aggregation. This allowed the health department to monitor aggregated clinical statistics, by geographic area or by practice, and also to calculate comparable clinical quality measures. Thus, near-real-time small area metrics like Body Mass Index (BMI) or blood pressure became available for use in targeting and evaluating community interventions.

Meanwhile, individual healthcare practices receive dashboard feedback on their rates of providing needed clinical preventive services, a process which has been associated with significant clinical improvements. PCIP helps practices use

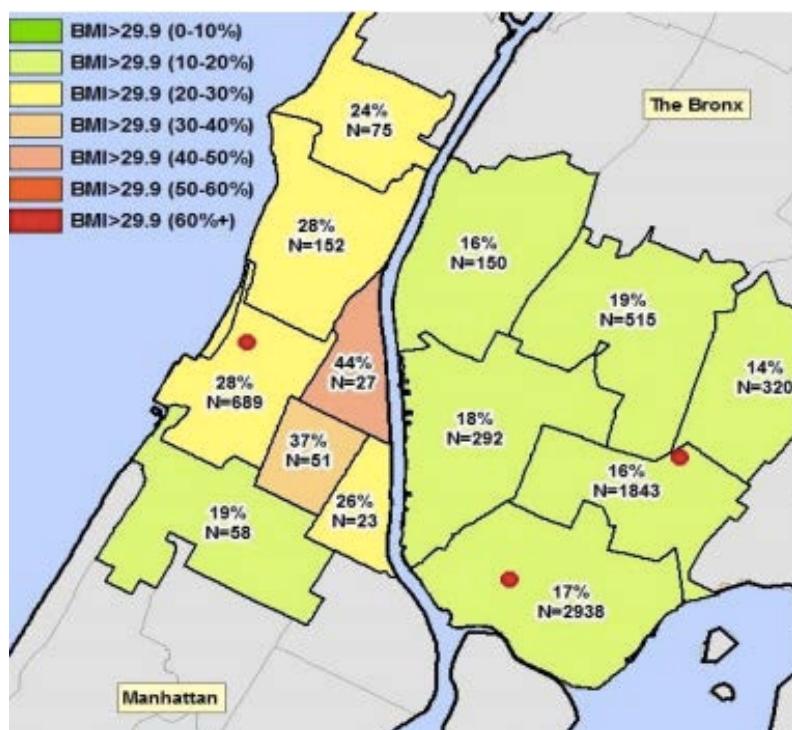


Figure i: NYC Mean BMI by Neighborhood

the EHR's clinical decision support systems to improve preventive care, and has also alerted clinicians of opportunities to improve individual patient care during real-time events, like outbreaks, through the EHR.

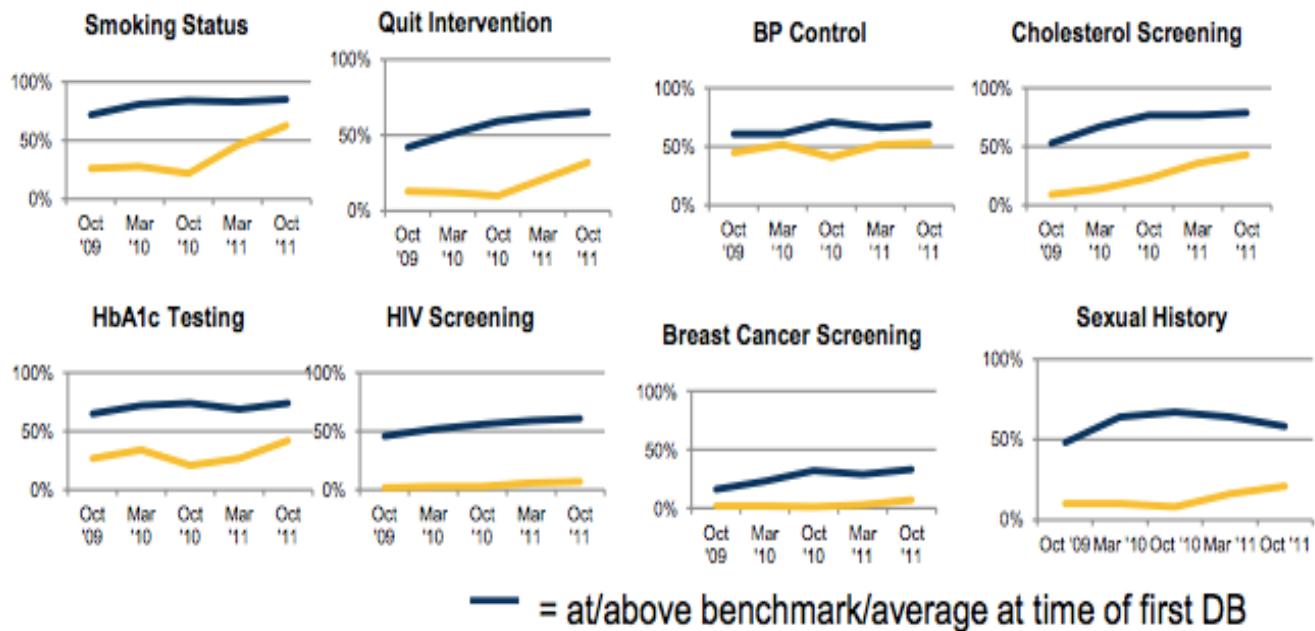


Figure ii: NYC PCIP Dashboards of Preventive Care

Denver, Colorado

Today, one does not need to give EHRs to every provider in order to begin using EHR information to improve chronic illness risk factors. In Denver, CO, Denver Health, Kaiser Permanente of Colorado, Children's Hospital of Colorado, the University of Colorado and the Colorado Department of Public Health and Environment are experimenting with querying several different **Electronic Medical Records (EMRs)** systems using a standardized open-source approach called PopMedNet.

This practice will allow data providers to supply de-identified, aggregated rates of elevated BMI and tobacco use for small area mapping, with little human effort and without actually transmitting individuals' personal health information. Once this is working well, organizers hope to extend such data collection to a larger number of healthcare providers by arrangement with the Colorado's Regional Health Information Organization (CORHIO).

Sources

Informants	Art Davidson, Denver Health Brent Stackhouse, New York Primary Care Information Project	
For More Information	Brent Stackhouse BStackhouse@health.nyc.gov	Art Davidson Arthur.Davidson@dhha.org

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PopMedNet

<http://www.popmednet.org>

Appendix C: Public Health Use of HIE – Case Study #3

Enabling Community-Based Care in Southeast Minnesota

While healthcare providers are receiving CMS incentive funding for **electronic health record (EHR)** adoption and information exchange, most community partners – like health departments, mental health agencies and school nurses – are not. The SE Minnesota BEACON demonstration project sought transformation from a provider-centric model to one that is patient-driven and incorporates community partners, partly by finding technological solutions to this mismatch.

Leveraging Infrastructure Across Multiple Needs

Providers in the SE Minnesota region can request and send **Continuity of Care Documents (CCDs)** with patient consent, using standards-based, secure CONNECT protocols across a peer-to-peer network. This helps important clinical information to “follow the patient,” while creating a foundational community of practice in which stakeholders can create new systems of information exchange leveraging shared data exchange agreements, standards and protocols.

Infrastructure built for the CCD exchange – governance, technology, data use agreements and patient consent management – was further leveraged to create the **Transitions of Care (TOC)** system. TOC notifies public health, mental health and social service case managers when a participating hospital admits a member on their caseload. These case managers can then collaborate with inpatient staff on discharge planning and outpatient health needs.

Clinical Data Repository

The project also created a **Clinical Data Repository (CDR)** of standardized EHR patient summary data using **Admission, Discharge and Transfer (ADT)** and clinical data feeds. Public health providers were going to view patient data as authorized using either a specialized public health EHR or human-readable versions on a secure portal.

The repository was also intended for use in community health assessment, research and public health surveillance (like heat-wave associated illness) when appropriately authorized by a standard statewide research authorization signed by the patient. Unfortunately, these plans could not be achieved because their complexity exceeded available funding and the architectural capabilities of the CDR platform.

Working with Schools

A “cocoon of asthma care” enables school nursing personnel, utilizing a secure portal, to:

- review children’s Asthma Action Plans (documents that define triggers for early asthma intervention);
- review children’s immunization records; and

- communicate clinically relevant incidents and needs to a child's healthcare provider using secure and confidential email.

These activities are enabled by prior parent consent. School personnel, clinicians, parents and children thus remain on the same page regarding personalized care plans. The portal supports population health management by providing school-level registry views at each school.

Achieving Synergistic Community Care

A more elaborate system of “synergistic community care” supports a higher degree of shared decision-making between patients with diabetes and their healthcare providers. Patients report quality of life concerns securely online, and can participate in choosing medications with their providers.

Evaluations of these projects are currently (June 2014) in process.

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For More Information	Dan Jensen Jensen.Dan@co.olmsted.mn.us

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Southeast Minnesota BEACON Blog

<http://semnbeacon.wordpress.com>

Appendix D: Public Health & HIE Goals Matrix – Instructions and Example

Matching Health Department Goals with HIE Capabilities

A health department has many needs, and local HIE options may offer a wide range of opportunities. The Public Health HIE Goals Matrix offers one approach to finding the "sweet spot" on which to focus your early efforts. An example is provided on the following tab of this workbook, and is explained at each step below in the grey boxes.

STEP 1: Identify Priorities

First, identify the health department's information exchange priorities. Ideally, these priorities drive technology decisions, not the other way around.

INSTRUCTION 1

In the first column of the Goals Matrix, identify which goals best match your health department's current needs.

Try to limit your selections to the top FIVE goals based on the department's strategic plan, jurisdictional health improvement plans, other planning documents, and top program or administrative challenges.

NOTE: The goals provided in the Goals Matrix may not address all of your unique needs. Please feel free to add your own.

In the example on the Goals Matrix page, a fictional health department has selected five areas where HIE might help meet the priority goals. One goal was added to the list by the health department.

STEP 2: List HIE Service Offerings

Once the health department's priorities are identified, they can be matched against available HIE service offerings.

INSTRUCTION 2

At the top of the "HIE Option" table columns, list each locally relevant HIE opportunity discovered in your environmental scan.

Don't forget exchange capabilities offered by your own Electronic Health Record (EHR) or Laboratory Information System (LIS), as well as those made available to you through state or federal public health information systems.

In our fictional example, there are three HIE opportunities available to the health department:

- 1) A multi-function Regional Health Information Organization (RHIO) which permits an assembled "pull" view of a community health record, and also enables "push" messaging of laboratory results to providers AND of public health reports to the state's Immunization Information System (IIS) and Electronic Disease Surveillance System (EDSS).
- 2) The health department already owns both an EHR and LIS that bring their own information exchange capabilities.
- 3) The capabilities of the existing IIS and EDSS are also described.

INSTRUCTION 3

Under each HIE option (*column*), briefly describe the capabilities offered - now or in the planned future - relevant to each health department goal (*row*), in the cell where they intersect.

It may be helpful to use the knowledge and imagination of both program staff and HIE representatives in this process, and to address both priority and non-priority goals. Include capabilities that address non-priority goals as well, for reasons that will become clear in Instruction 4.

STEP 3: Match Priorities to HIE Service Offering

Finally, look at how available HIE capabilities compare to health department goals and priorities.

INSTRUCTION 4

Identify intersections that appear to address priority goals effectively and efficiently.

Take note of key points, such as:

- If one solution appears to be easier or less expensive to implement than another
- When one HIE function might serve multiple goals (e.g., in the example, HIO care summaries from many providers served multiple priority and non-priority goals)
- The extent to which one option strengthens not only health department capabilities, but also the quality, effectiveness, safety and resilience of the *entire jurisdiction's health system* (including healthcare providers and other partners).

The example illustrates several important aspects of how a basic HIE technology's value can vary widely, depending on participants in the network and which use cases are supported.

In this fictional jurisdiction, both the local RHIO and the health department LIS could "push" laboratory results to health department laboratory customers and the state EDSS. However, the RHIO has already established directories, secure messaging and information exchange protocols to many of the same customers and to the EDSS, thus eliminating major tasks needed to distribute results using the health department's "in-house" LIS.

The RHIO can "pull and share" a patient's care summaries from multiple providers that use many different EHR applications, while the health department's EHR vendor offers such exchange only with other providers using the same vendor. Thus, in this jurisdiction, the RHIO brings economies of scale, already-built networks, and a broader array of data sources than the in-house EHR solution.

It should be noted that this will not be the case everywhere, and future developments in EHR technology may make direct "push" exchange easier over time, even without an HIO at the center.

While joining the RHIO helps meet some of the fictional health department's pre-identified priorities, the same exchange functionality might meet other goals as well.

For example, the capability to pull patient care summaries from many providers supports the priority "Improve reporting and management of public health cases," but also addresses other lower-priority goals like "Improve cost-effectiveness of health department clinical care" and "Improve care coordination between healthcare providers and health department programs." Thus, an investment in one exchange solution for one priority created potential solutions for other goals as well. You may find that certain HIE capabilities help kill many birds with one stone, increasing your confidence in making the investment AND identifying opportunities to improve services that earlier may have seemed beyond reach.

Finally, if the health department joins the RHIO, it will help accelerate HIE availability and public health reporting for the larger community - an example of a **strategic partner**. This would not occur if the health department used only its own stand-alone systems to send messages.

The health department in this example will likely choose to join the RHIO, while continuing to use and benefit from its own EHR and LIS systems, as well as state information systems. The sample matrix illustrates that these systems provide fallback options in case the RHIO fails, becomes unaffordable, or otherwise disappoints.

Public Health HIE Goals Matrix - Example

HEALTH DEPARTMENT (HD) PRIORITIES	TOP 5	HIE OPTION 1	HIE OPTION 2	HIE OPTION 3	HIE PROJECT PRIORITIES
		<i>Our local RHIO</i>	<i>Current EHR & LIS exchange capabilities</i>	<i>State IIS & EDSS</i>	
Improve cost-effectiveness of HD clinical care		<i>Pull care summaries from many other providers</i> <i>E-prescribing</i> <i>"Push" to IIS</i>	<i>EHR: pull care summaries only from clients of same vendor</i> <i>"Push" reporting to LIS</i>	<i>IIS: view immunization history and decision support; manage VFC inventory</i>	●
Improve cost-effectiveness of HD diagnostic services (e.g., lab)	●	<i>Send & receive orders and results (directory provided)</i> <i>Electronic lab reporting to state surveillance systems</i>	<i>LIS: send results (must set up directory) but cannot receive orders</i> <i>Must set up reporting to state surveillance systems</i>	<i>EDSS: can receive notifiable reports from either RHIO or LIS (latter needs set-up)</i>	●
Improve care coordination between healthcare providers and HD programs (e.g., prenatal case management, elder home health services)		<i>Pull care summaries from many other providers</i>	<i>EHR: pull care summaries only from clients of same vendor</i>	<i>IIS: view immunization history</i>	●
Improve reporting and management of public health cases	●	<i>Pull care summaries from many other providers</i> <i>Enables both private providers & HD to push reports to EDSS & IIS</i>	<i>EHR: pull care summaries only from clients of same vendor</i> <i>EHR & LIS: Enables IIS and EDSS reporting (from HD only)</i>	<i>View electronic lab reporting</i> <i>View immunization histories</i>	●
Improve outbreak / disaster detection and tracking		<i>Enables private providers & HD to push reports to EDSS & IIS</i> <i>Clinician alerting in next software release</i>	<i>Only HD reports pushed to EDSS & IIS</i>	<i>EDSS: receive notification of reportable conditions; view immunization histories</i>	

Public Health HIE Goals Matrix - Example

HEALTH DEPARTMENT (HD) PRIORITIES	TOP 5	HIE OPTION 1	HIE OPTION 2	HIE OPTION 3	HIE PROJECT PRIORITIES
		<i>Our local RHIO</i>	<i>Current EHR & LIS exchange capabilities</i>	<i>State IIS & EDSS</i>	
Improve clinical revenues / cycle time			<i>Improves billing documentation & cycle time</i>		
Communicate with individual members of the public		<i>Community patient portal under consideration</i>	<i>EHR: Portal for HD patients only</i>		
Communicate with healthcare providers (e.g., alerts, prevention-oriented clinical decision support, marketing community-based programs)	●	<i>Alerting and decision support offered in next release</i>			<i>(longer range)</i>
Track / Analyze population health metrics		<i>Population reports under consideration</i>	<i>Data from EHR vendor customers and state systems</i>	<i>Some population reports</i>	
Satisfy provider demand for Meaningful Use (MU) public health reporting objectives		<i>Offers MU-compliant EDSS and IIS reporting</i>	<i>Only HD</i>	<i>Receives electronic lab reporting, IIS reporting, syndromic surveillance</i>	

Public Health HIE Goals Matrix - Example

HEALTH DEPARTMENT (HD) PRIORITIES	TOP 5	HIE OPTION 1	HIE OPTION 2	HIE OPTION 3	HIE PROJECT PRIORITIES
		<i>Our local RHIO</i>	<i>Current EHR & LIS exchange capabilities</i>	<i>State IIS & EDSS</i>	
Monitor healthcare quality or safety measures (external to HD)		<i>Quality metrics under consideration</i>		<i>Medicaid patients only (from State Medicaid office)</i>	
Establish community disease registries (surveillance and/or intervention)		<i>Registries under consideration</i>	<i>EHR: Registries of patients of EHR vendor customers only</i>		
Partnership to link clinical and community-based services		<i>RHIO Board interested</i>			<i>(longer range)</i>
Partnership for healthcare access / navigation		<i>RHIO Board interested</i>			
Partnership for healthcare quality / safety	●	<i>RHIO Board interested</i>			

Public Health HIE Goals Matrix - Example

HEALTH DEPARTMENT (HD) PRIORITIES	TOP 5	HIE OPTION 1	HIE OPTION 2	HIE OPTION 3	HIE PROJECT PRIORITIES
		<i>Our local RHIO</i>	<i>Current EHR & LIS exchange capabilities</i>	<i>State IIS & EDSS</i>	
Enhance clinical information sharing in jurisdiction		<i>Mission of RHIO</i>	<i>Stand-alone systems</i>		
Other (add your district's priorities below): <i>Care coordination between home health and skilled nursing facilities</i>	●	<i>RHIO has few home health and skilled nursing members, but can exchange with more if they join</i>	<i>EHR: Only for clients of same vendor</i>		(longer range)

Appendix E: Public Health & HIE Goals Matrix – Template

The following pages (64-67) provide a blank template for use in exploring and identifying the goals of both public health departments and HIE service providers.

Public Health HIE Goals Matrix

HEALTH DEPARTMENT (HD) PRIORITIES	TOP 5	HIE OPTION 1	HIE OPTION 2	HIE OPTION 3	HIE PROJECT PRIORITIES
Improve cost-effectiveness of HD clinical care					
Improve cost-effectiveness of HD diagnostic services (e.g., lab)					
Improve care coordination between healthcare providers and HD programs (e.g., prenatal case management, elder home health services)					
Improve reporting and management of public health cases					
Improve outbreak / disaster detection and tracking					

Public Health HIE Goals Matrix

HEALTH DEPARTMENT (HD) PRIORITIES	TOP 5	HIE OPTION 1	HIE OPTION 2	HIE OPTION 3	HIE PROJECT PRIORITIES
Improve clinical revenues / cycle time					
Communicate with individual members of the public					
Communicate with healthcare providers (e.g., alerts, prevention-oriented clinical decision support, marketing community-based programs)					
Track / Analyze population health metrics					
Satisfy provider demand for Meaningful Use (MU) public health reporting objectives					

Public Health HIE Goals Matrix

HEALTH DEPARTMENT (HD) PRIORITIES	TOP 5	HIE OPTION 1	HIE OPTION 2	HIE OPTION 3	HIE PROJECT PRIORITIES
Monitor healthcare quality or safety measures (external to HD)					
Establish community disease registries (surveillance and/or intervention)					
Partnership to link clinical and community-based services					
Partnership for healthcare access / navigation					
Partnership for healthcare quality / safety					

Public Health HIE Goals Matrix

HEALTH DEPARTMENT (HD) PRIORITIES	TOP 5	HIE OPTION 1	HIE OPTION 2	HIE OPTION 3	HIE PROJECT PRIORITIES
Enhance clinical information sharing in jurisdiction					
Other (add your district's priorities below):					

Appendix F: Public Health HIE Project Business Case Template

The template on the following pages can be used to develop a proposal for a collaborative effort between a public health department and an HIE service provider or group of providers. A digital version of this template in PowerPoint format is available for download from the HIMSS/NACCHO HIE Toolkit for Public Health at <http://www.himss.org/public-health-hie-toolkit/downloads>.

HIE Project Business Case

HIMSS/NACCHO HIE Toolkit for Public Health Business Case Tool

[INSERT ORGANIZATION NAME, DATE]

Project Name and Description

- **Project Name**
- **Description**
 - High-level description of:
 - The functional capabilities the project will create (e.g., electronic case reporting; community health profiles)
 - The solution used (e.g., HIE case detection and automatic generation of electronic reports; HIO generates periodic statistics of diagnoses and preventive services in jurisdiction)

Project Stakeholders

- Health Department programs or administrative functions that will use or provide information
- Other public health stakeholders (e.g., state, local, Tribal departments) affected by this information exchange
- Numbers of physicians / clinics / hospitals / labs / pharmacies / other stakeholders who would provide or receive information – estimate and list separately for:
 - Initial cross-section of stakeholders
 - 5-year estimate (needed for 5-year financials, tests of progress)

Business Goals Addressed

- Goals that this project will address
 - Use *Health Department HIE Goals Matrix* to complete
- Relationship to Health Department priorities
 - Link HIE goals to health department planning / priorities from Community Health Improvement Plan, departmental strategic plan or other sources

Business Impact: Program

- **Program Impact:** Describe how the tasks and workflows of different health department programs will be affected
 - Expected improvements
 - Include metrics if possible (e.g., time to report receipt; labor to create statistics)
 - Indirect impacts
 - E.g., relationships with partners, other community capabilities enabled
 - Impact on funding and accreditation requirements
 - Necessary program changes
 - E.g., workforce training, managing dual / multiple systems
 - Necessary stakeholder changes
 - What will other stakeholders be asked to do differently?

Business Impact: Financial

- Capital investments
- One-time costs (e.g., interfaces)
- Estimated annual costs (broken down over each of 5 years)
 - Membership fees
 - Estimated transaction fees (may rise as partners/transactions increase)
 - Software licenses
 - Trainings, etc.
- Estimated annual economic benefits (broken down over each of 5 years)
 - Saved labor (typically calculated as [\$ saved per transaction] X [estimated # of transactions])
 - Saved costs (mail, supplies, decommissioned systems)
 - Remember that until a significant proportion of partners use HIE, it may not be possible to decommission older methods
 - Avoided costs (e.g., prevention benefits)
 - Income opportunities (grants, contracts, incentives, fee-based services)
 - Indirect benefits (e.g., interoperability, ability to extend to other programs, impact on community health capabilities, accreditation)
- At the end of 5 years, with projected # of exchange partners:
 - What is the total cost of ownership?
 - What is the Return on Investment (ROI)?
 - Did / Will the investment pay back?

Alternatives Considered

- If one HIE option was chosen over others, describe each and why this was selected in terms of:
 - Program Impact
 - E.g., from the *Health Department HIE Goals Matrix*
 - Financial Impact
 - If calculated for multiple options, display 5-year financials compared to chosen option

Risk Management: The HIE / HIO

- Describe risks
 - Risks identified using *HIE Service Provider Risk Assessment*
 - Uncertain HIE commitment to health department goals
 - Uncertain access to needed exchange partners and data
 - Threats to HIE business sustainability
 - Feasibility of HIE technical Solution / Appropriate service level readiness
 - Threats to HIE privacy and security
- Proposed actions to mitigate each identified risk
 - **NOTE:** If actions have programmatic or financial impact, be sure they are reflected in earlier impact slides

Risk Management: The Health Department

- Describe risks
 - Risks identified using *Health Department Risk Assessment*
 - Capability to work with HIE organization
 - Financial capabilities
 - Technical capability
 - Information stewardship capability
 - Capability to adjust workflow to receive benefit
- Proposed actions to mitigate each identified risk
 - **NOTE:** If actions have programmatic or financial impact, be sure they are reflected in earlier impact slides

Summary

- Describe who has reviewed and approved the descriptions and assumptions presented in this deck:
 - Affected program leadership and staff
 - HIE/HIO leadership
 - Other public health stakeholders (e.g., statewide program staff)
 - External stakeholders (exchange partners) as applicable (e.g., labs, medical societies, hospitals)
 - Financial and Information Officers

Conclusions

- Net value of the project
 - How beneficial is the net projected Program Impact?
 - How beneficial is the net projected Financial Impact?
 - Do unmanaged risks outweigh the benefits?
- Recommendation
- For discussion:
 - Challenging cost and benefit assumptions
 - Adequacy of risk mitigation

Appendix G: Writings on Public Health and HIE

Writings on Public Health and HIE

The following publications are recommended for further reading:

- Foldy, S., and Ross, D. "Public Health Opportunities in Health Information Exchange: A resource for public health agencies and their health information exchange partners." Public Health Informatics Institute (PHII). 2005. <http://www.phii.org/resources/view/3734/Public%20Health%20Opportunities%20in%20Health%20Information%20Exchange>.
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- Phillips AB, Wilson RV, Kaushal R et al. Implementing health information exchange for public health reporting: a comparison of decision and risk management of three regional health information organizations in New York State. *J Am Med Inform Assoc* 2014;21:e173-177.

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