Practical Guide to Populating and Maintaining Provider Directories for Health Information Exchange

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Prepared for:

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DISCLAIMER

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Contents

INTRODUCTION

Provider directories play a key role in health information exchange. This guide is designed to provide guidance and support to organizations looking to establish a provider directory to support health information exchange. The guide was compiled from input gathered during interviews with leaders of several active state HIEs and provider directory vendors in November and December 2011, and from materials developed by the "Data Populating Workgroup" as part of the ongoing work of the ONC Community of Practice for Provider Directories.

The steps below offer suggested approaches to establishing and maintaining a provider directory, and provide insights from experienced HIEs regarding critical success factors and lessons learned during their implementation of provider directories. Each step includes four sections: Considerations, Challenges, Potential Solutions, and Insights.

POPULATING THE PROVIDER DIRECTORY

Define the relevant Use Cases for the Provider Directory (PD)

Considerations

The defining parameters of a provider directory are dictated by the purposes that it is designed to serve. The content the provider directory should contain and the accuracy of that content depend on how the provider directory is going to be used. Provider directories are designed and used for many different purposes; the primary function within a health information exchange (HIE) is to facilitate secure electronic routing of clinical information among distinct healthcare entities.

The two most common use cases utilized by HIEs are: 1) to provide unambiguous electronic addresses of message/transaction senders and receivers, and 2) to make available security credential information (digital certificate and/or public key discoverability). Beyond these foundational use cases, some HIEs typically support additional functions such as *ad hoc* human lookup of physical addresses (street address, city, state, etc), specialties, etc. The addition of such functionality drives a broader set of provider directory content requirements.

A final category of use cases relates to the role of the provider directory in the HIE trust framework. Provider directories may be used to authenticate users. For example, they may publish a physician's medical license number, which allows other users to validate the physician. A provider directory that represents full end-user validation might include individual medical credential information, whereas a provider directory that relies on a federated trust framework might only include entity license/credential information (JCAHO, State license/certification, etc).

Some HIE organizations have envisioned provider directory use cases that extend outside of core HIE functions. For example, it has been suggested that provider directories could be used to support public health entities or health plans. The addition of such use cases requires further elaboration of the provider directory's design. A key point to remember is that *every* additional use case imposes additional requirements on what the provider directory must contain and how intensively it must be maintained.

The work of ONC's Standards and Interoperability (S&I) Framework Provider Directories (PD) Initiative should be considered the starting point for entities embarking on any effort in this space. The PD Initiative addressed the "challenge" articulated on its wiki[1]:

> *Health information exchange requires a mechanism to obtain a digital certificate or security information (public keys) and electronic service information including electronic addresses – such as Direct Address, NHIN Exchange Gateway Address, IP Address, SOAP service address, REST end point address, and other service addresses to facilitate secure exchange of health data. Today, this functionality is generally supported by consistent and standardized electronic means, but not adopted widely. A scalable and standardized solution will be needed in order to efficiently, accurately, and reliably query and obtain digital certificates or security information (public keys) and electronic service information including electronic addresses to enable health information exchange.*

The S&I Framework PD Initiative is currently focused on two Use Cases:

- Use Case 1 - Certificate discovery for Direct Project with a known Direct Address
- Use Case 2 - Electronic Service Information Discovery (including Electronic Addresses) with some known basic provider attributes

The Initiative has developed a general data model incorporating core datasets that would enable interoperability, and a schema to support the querying of provider directories to discover electronic service information including Direct addresses. The Data Model has been mapped to some existing standards (specifically LDAP, HPD, and X12). This data model incorporates the data elements and relationships necessary to handle queries for the Electronic Addresses of individual providers, organizations and their relationships, if any. The current version of the Electronic Service Information Discovery Data Model may be found here: http://wiki.siframework.org/Electronic+Service+Information+Discovery

Other S&I initiatives that involve the communication of information between healthcare entities or individuals are incorporating the specifications of the PD Initiative. For example, the electronic submission of Medical Documentation (esMD) workgroup has incorporated the ability

[1] http://wiki.siframework.org/Provider+Directories

to discover Electronic Service Information (ESI) from external provider directories using the PD transaction model. This CMS effort, which has been expanded to include all payers (e.g. Commercial, SSA-disability benefits, and Medicaid), provides for the electronic registration of providers to receive electronic Medical Document Requests (eMDRs). This effort will replace the current paper processes for medical documentation request letters with a fully electronic process utilizing the ESI information discovered in external provider directories for eligible providers.

Challenges

While provider directories can be built out to support a broad set of use cases, there is an incremental cost associated with both building the provider directory (a fixed cost) and maintaining it (ongoing costs). Additional use cases, such as centralized credentialing, Health Insurance Exchanges (HIX), public health registries, quality analysis, prescription drug monitoring programs, and emergency notification systems, require the inclusion of additional data elements. Tracking down these data elements and incorporating them into the provider directory requires additional time and resources, both in the creation and maintenance of the provider directory.

Potential Solutions

HIEs should carefully consider the range of uses for their provider directories and determine which specific use cases meet their near- and long-term needs. A careful business analysis of scope is necessary to ensure that the incremental benefits of expanded provider directories are equal to or greater than the incremental costs of building and maintaining the expanded features and data.

If the HIE will be using the provider directory for functions beyond the HIE, they will need to carefully examine the requirements for those other use cases. By way of example, the state of Vermont is creating a comprehensive state-level provider directory to be used by VITL (Vermont's state HIE) and other Vermont state entities, collectively known as the "Vermont Health Services Enterprise." This enterprise includes VITL, the new Medicaid eligibility and enrollment systems, public health registries, health insurance exchange (HIX), and components of the state Medicaid Management Information System (MMIS). The provider directory will be the authoritative source for the entire state. Appendix D provides a case study of Vermont's provider directory.

Insights

A guiding principle of the HIT Standards Committee is to "Keep it simple; think big, but start small; recommend standards as minimal as possible to support the business goal and then build as you go." This advice is applicable when implementing a provider directory.

The Data Model developed by S&I Framework can be used as a starting point for implementing Provider Directories. The Direct project and the Electronic Submission of Medical Documentation (esMD) Initiative in the S&I Framework, as well as the additional needs of the HIEs and other state entities, suggest there is an immediate need for a reasonably complete approach to provider directories. Thoughtful choices must be made about the design of a provider directory.

Determine the role of the Provider Directory in the Trust Framework

The Provider Directory CoP Data Maintenance Workgroup has outlined approaches to establishing a trust framework for provider directories. In digital identity systems, a trust framework encompasses the certification activities that enable a party who accepts a digital identity credential to trust the identity, security, and privacy policies of the party who issues the credential, and vice versa.

In establishing a provider directory, states have a wide spectrum of trust frameworks to choose from, ranging from a publish model with no validation of information to an environment with full trust where every entry in the directory has been certified. In between these two extremes are a variety of other approaches that provide varying levels of trust in the accuracy of information included in the directory.

States should consider the two elements required to establish trust:

1. Validation: Ensuring that information submitted by the individual is accurate (information is correct)
2. Identity proofing: Confirming that the validated information belongs to the individual registering ("I am who I say I am")

Outlined below is a subset of trust models for states to consider that address both of these needs. Not all models necessarily accomplish both validation and identity proofing; however if

identity proofing is accomplished, it is likely the information is also validated as a result of the Certificate Policy of the identity proofing process. The list of models is not exhaustive.

1. Publish with no third party validation - Providers publish information to the directory with no validation of the information. This approach is at the low end of the trust framework with participants having limited reasons to trust information included in the directory. Due to existing privacy and security requirements in health care, a model with no validation is unlikely to be used.

- Example: Completely open directory where anyone could self-publish their information. Providers could go to the registration page and enter their information to be displayed in the directory. No validation of the information is provided. This approach is similar to how Facebook works.
- Key considerations:
  - This approach allows an organization to get started rapidly and is low cost (e.g. if the objective is to just to make available a human readable directory, like a phone book).
  - Participants have no basis for trusting entries in the directory, as no validation or ID proofing is done.
  - Potential exists for various data quality problems including duplicate or misrepresented entries on a single provider or organization.

2. Validate subset of elements combined with identity proofing - Certain data elements provided by a participant during registration are validated using third party data sources (information is correct). Validation of information submitted needs to be combined with an approach to ID proofing ("I am who I say I am").

- Example: In Florida when a provider registers for their Direct Secure Messaging (DSM) service they must provide their NPI and Florida licensure number. The providers NPI is checked against the NPPES and the Florida HIE sends a code to the FAX number associated with the provided NPI in NPPES. The individual then has to enter the code they received via fax. Next Florida checks the individual's license number against the

state licensure database; if it matches, the provider is notified via email they have been approved.

- Key considerations:
  - Provider is rejected if there is conflict with any information presented and third party data sources being used to validate data elements.

3. Validity score - After a provider registers with the directory, the information entered is validated against multiple data sources. A score is calculated based on the number of data elements entered by the provider that match information in the data sources and should also be weighted based on the strength of the specific source.

- Example: A provider directory could check the state license number, NPI, address, and phone number given by a provider during registration against multiple data sources. In this example the provider directory uses four data sources to validate again these data elements. For license number, NPI, and address, all of the data sources contain the same information that was given at registration. The phone number matched in three of the four data sources. Based on policies established by the provider directory this outcomes leads to a validity score above the minimum required to validate information given. A separate step is still needed to do ID proofing of the provider.
- Key considerations:
  - Information is validated against multiple sources. The validity score approach differs from validating a subset of data elements because in the subset approach a single data element that doesn't match with a validating data source will eliminate the provider. The validity score approach allows for using data from multiple sources.
  - Policies need to be established up front for how the validity score will be calculated and what the minimum requirements are for a provider entry to be considered valid.

- Policies need to be established for how to address inconsistent information from data sources. Can providers go to the data sources and update information that is out-of-date and register again?
- Users of this approach need to establish policies for how to deal with providers whose scores fall below the minimum validity score established by the directory.

4. Organizational certification - In this approach a provider directory relies on the certification of individual participants and end points by an organization (i.e. a hospital or health system) to enter them into the directory. The organization must have policies and procedures for validating individuals and endpoints. The provider directory could establish requirements for what these policies and procedures need to cover, or could rely on the certification of peer review organizations, like JCAHO, to confirm that a hospital has sufficiently strong policies and procedures for credentialing staff. The organizations attesting on behalf of individuals and endpoints for inclusion in the directory are required to maintain the entries. In this approach, organizations would be required to have certificates (therefore undergoing ID proofing and validation) while individuals would not be required to have certificates.

- Example: As hospitals become participants in the health information exchange, they are asked to provide demographic and identifying information from their provider credentialing system. Specifications are provided for the content and format for the information. The facility provides the information and it is imported into the provider directory. The information is considered to be valid from this source and is not subject to additional validation. This step occurs after a data sharing agreement and business associates agreement are signed between the facility and the HIE. The information is provided to the HIE by the authorized personnel who manage the hospitals credentialing system. There are also models where there is a single provider directory for a state, and therefore, the HIE is not involved in organizational certification.

- Key Considerations:
  - This approach allows population of the provider directory in a fairly quick and easy manner. Organizations like hospitals already have requirements and strong business incentives for validating and maintaining accurate information

on their participating providers. This approach distributes the responsibility for ID proofing across organizations and reduces the burden on the provider directory to do ID proofing.

- While the approach is good at addressing large organization, it is not a comprehensive solution for all providers (i.e. small provider offices do not fit under this model). An approach utilizing organizational certification will need to be paired with another approach that addresses the needs of other providers.
- For organizations that are not certified by a trusted entity like JCAHO, the provider directory will need to establish a manner for ensuring the organization has adequate policies and procedures for validating providers and endpoints and follows the policies and procedures.
- In distributing responsibility for maintaining information strong consideration needs to be given to what will incent organizations to keep information up-to-date.

5. Full endpoint certification - Every participant and endpoint in the directory (organizations and individuals) is validated and undergoes ID proofing. The validation and ID proofing can be done by the provider directory or another organization (i.e. certificate authorities, hospitals, health systems or other trusted entities). One approach that would fit well with many state HIE strategic and operational plans would be to require every provider and organization in the directory to have a digital certificate. The provider directory would need to establish the baseline requirements for ID proofing and validation of participants to become certified and receive a digital certificate. The authority to certify and issue a digital certificate could be delegated to a single or multiple third parties (i.e. certificate authorities, hospitals, health systems or other trusted entities) or could be centrally operated by the provider directory.

- Example: Colorado First Responder Authentication Credential Standard uses full endpoint certification. First responders need to move and communicate easily across jurisdictions in the event of a terrorist or other all-hazards incident. Issuing credentials to first responders that comply with federal standards facilitates movement across jurisdictional boundaries, allowing more rapid response to a catastrophic event. After in-person identity proofing (done by Colorado departments or agencies) and performance

of background checks, identity cards are issued that contain digital certificates and biometric information for a high degree of confidence in responder identity. Additionally, the credentials contain information about responder qualifications and skills. This allows incident command to immediately know the types and quantities of the resources they have on-scene. This means more efficient and effective deployment of resources at the incident site. Key considerations:

- This model provides the highest degree of trust that can be achieved but comes with high cost and complexity to implement and maintain.
- Enabling the high level of trust gives participants comfort in using the provider directory to exchange health information.
- This model provides a comprehensive solution for organizations and providers but can present barriers to participation due to the cost and complexity to join and maintain.
- The structure of the certification process is a key decision point. Will the directory do it by itself, split the work with other organizations, or completely defer responsibility to those other organizations?

Determine which providers and associated entities will be included in the Provider Directory

Considerations

Depending on the HIE's use cases, the provider directory may include:

- Physicians only,
- Physicians, plus other clinician types,
- Organizations associated with physicians.

Today, the most common use cases focus on routing information to providers – either physicians (MDs and DOs) and/or other clinicians. However, to accurately route information to a provider, the provider's affiliations and associated electronic addresses must be known or

discoverable. A key success factor for many HIEs is the development and cataloguing of the individual-to-entity level relationships for individual providers.

Challenges

Maintaining an accurate and complete mapping of individual providers to their associated entities is challenging for a number of reasons. Most providers have several affiliations and practice locations. Providers frequently change affiliations. Also, the entities with which they are associated may change ownership or management.

Individual and entity level provider directories may be set up in different databases, making it harder to coordinate both the initial build and the frequent updates to the provider directory. More complex use cases may require inclusion of additional providers, entities, and associated data elements. This requires greater effort to both populate and maintain the provider directory.

Potential Solutions

The process of building and maintaining the provider directory may be simplified by including only the providers and the associated entities required for *current* use cases, while planning for future growth. The initial building of the database should identify each individual as a single and unique entity. Names and identifiers from multiple systems can be captured, normalized, and used as a cross-reference for the individuals. The individual can then be linked to associated entities.

The identification of the individual provider and associated entities can be assisted through the use of address normalization and identity management tools. However, for the initial build, the grouping of addresses and identification of entities and entity relationships may need to be done with manual/semi-automated review for many of the records. In most cases, the processes and interrelationships used for the initial database build will form the structure and approach to the ongoing maintenance process.

The Data Model developed by the S&I PD Initiative includes individual Providers, Organizations and the relationships between them, if any.

Insights

Carefully determine which providers must be included in provider directory. Several HIEs noted that it is better to have completely accurate information on the active providers in the HIE than inaccurate information on many providers, not all of which are active users of the HIE.

Determine which providers will be needed in the HIE and/or will provide added value for HIE exchange and target them for early participation and registration. Quality, not quantity is the key.

Determine which data elements are required

Considerations

There is a wide range in the number of data elements required for each clinician/entity by HIEs for data exchange. Simple "push" use cases typically require minimal provider data elements while "push/pull" use cases require additional data elements**.**

As noted above, the S&I Framework PD Initiative recently published a Data Model for Electronic Service Information Discovery. It defines the common data elements needed to be maintained in a Provider Directory that would enable the query and response for specific retrieval of Provider Information using various selection criteria. This model could be adopted and adapted by the states and other entities that will be implementing Provider Directories.

Challenges

Often the more complex the use case, the greater the effort and associated costs of creating and maintaining the provider directory. Collecting and validating even a small number of data elements can be labor intensive, as manual intervention is nearly always required to ensure the data is normalized and validated with a high degree of accuracy.

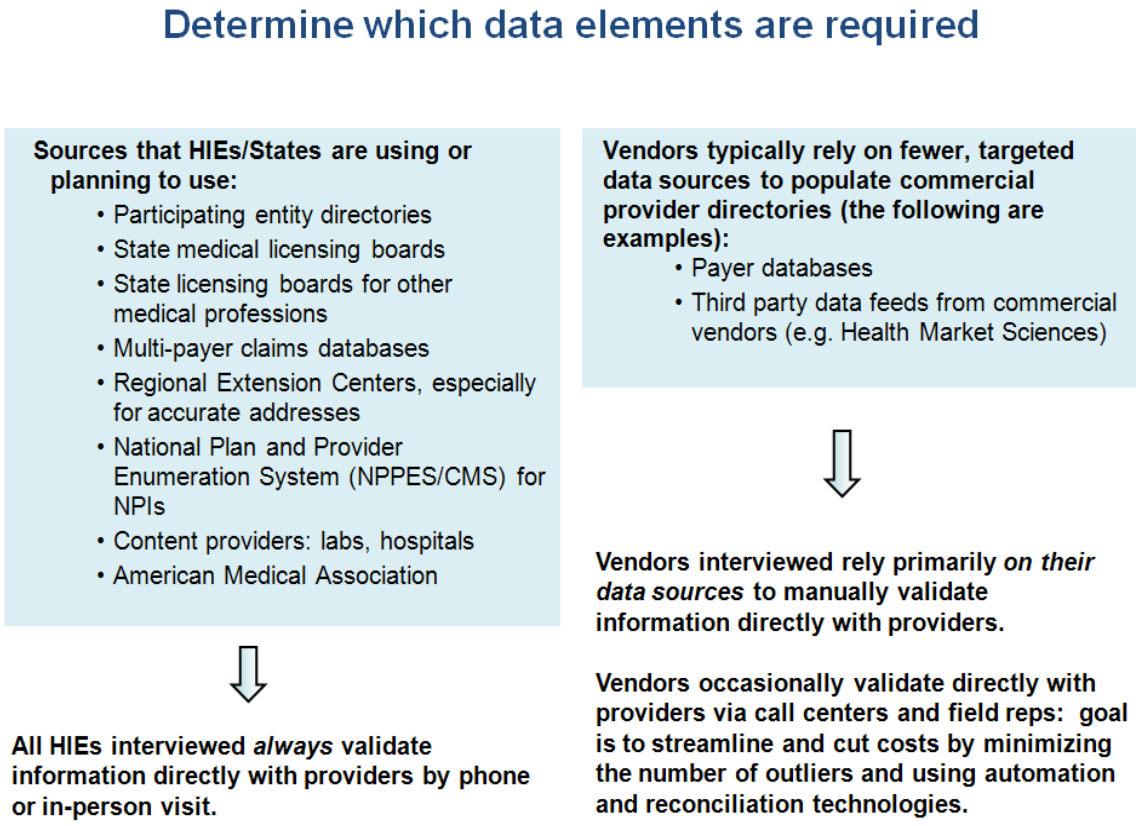
There is often a cost associated with locating and obtaining the data from key data sources that could be used to populate the provider directory. Typically there is no single data source that can supply every data element. While some information from existing data sources may be leveraged to create an HIE provider directory, manual intervention is nearly always required. HIEs will need dedicated staff to review, merge, and normalize data. Some HIEs rely completely

on visits and phone calls to provider offices to obtain all the data required to initially populate the provider directory. Other HIEs leverage data from a variety of sources as a starting point and use manual intervention to augment and validate the information. (For detailed examples of the use of data from a variety of sources, see the case studies and interview notes from HealthBridge, Vermont, Wisconsin Medical Society, and Florida HIE, in the appendices.)

Potential Solutions

States should carefully consider which data elements are needed for their current use cases and start with the minimum necessary data elements required for current exchange purposes. The S&I Framework Initiative defines the minimum data elements that may be required to enable query and response against a common data model incorporating provider information. Using this model will facilitate interoperability between different implementations of Provider Directories.

In the early phases of exchange, HIEs may be able to leverage existing provider directories from known entities (e.g. a state medical society) and augment it with any additional data elements required for exchange.



Insights

Focus on the core data set that is the "minimum necessary" for exchange, based on current use cases. The S&I provider directory model could be used as a basis to develop provider directories to meet minimal interoperability requirements.

Determine level of accuracy required

Considerations

A high level of accuracy - 99% - is typically required for the exchange of clinical information. Diagnostic reports, for example, have high requirements for accuracy and timeliness. Lower accuracy levels may be accepted if the provider directory is also used for purposes such as provider look-up (e.g. a provider locating another provider/specialist near a patient's requested geography).

If the provider directory will also be used outside of the HIE for other purposes such as claims payment, or credentialing, the level of accuracy needed may vary. For example, while claims payment should require nearly 100% accuracy, in reality the actual level of accuracy of provider directories used for claims payment is much lower than 100%. This results in payment delays and/or significant additional re-work to correct the data elements needed for accurate payment.

There is also variation in the accuracy needed for specific data elements, depending on the use case. For example, when exchanging most clinical information, it is critical that a provider's electronic address is correct, even if their physical address is not. (See Appendices E and G (case study on Wisconsin and interview notes from CAQH) for examples).

Challenges

Manual intervention is required to help ensure greater accuracy, and adds cost to populating and maintaining the provider directory. In theory, this means that the cost of data acquisition and maintenance increases exponentially as the required level of accuracy increases (see Figure 1). Automated solutions for data reconciliation and validation should also be considered when the relevant use cases require a high degree of accuracy.

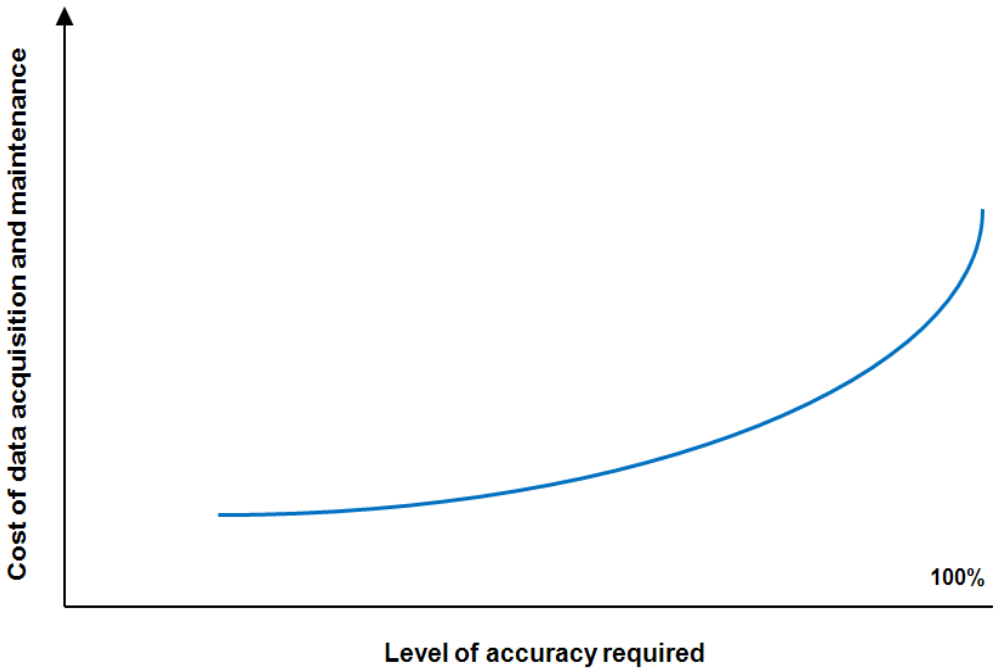


Figure 1: Cost of Accuracy of Provider Directory Information (illustrative)

Potential Solutions

HIEs should budget for the critical tasks associated with achieving a degree of data accuracy appropriate to the purpose being served. If a high degree of accuracy is required, they will likely need to designate staff to manually check, reconcile, and update the data.

Insights

To build ongoing trust with users, HIEs should be sure to adequately fund and staff the provider directory to carry out the tasks associated with ensuring a high degree of data accuracy.

Ensure policies and procedures are developed and in place

Considerations

Prior to launching the provider directory, HIEs should establish their governance structure, especially as it relates to policies and procedures for the provider directory:

- Authorization: Determine who has the right to access the provider directory.

- Authentication: Verify that an individual who has been authorized and is seeking to access information is who he or she claims to be (identity proofing). Authentication procedures create technical security safeguards for protecting the Provider Directory from unauthorized access.
- Access: Determine when and how provider directory information may be accessed by individuals. These policies are designed to reduce unauthorized access and ensure information is only used for authorized purposes.
- Audit: Record and examine when information is accessed and by whom. Audits verify compliance with access controls and identify instances of unauthorized access to information.

In addition, the HIE should address the following policy and governance questions:

- Who can change/modify data elements?
- Who can access the provider directory (only HIE staff, all sites that provide data for the provider directory, etc.)?
- How will certificates and certificate expiration be handled?
- Will the provider directory become a source of revenue?
- Will the HIE provider directory be used by other entities?

Examples of how different organizations have approached these policy decisions are included in the case studies in the appendices.

To ensure compliance with established policies and procedures, HIEs will need to determine what agreements/contracts need to be put in place for providers, entities, and vendors (participation agreements, business associate agreements, data sharing agreements, user-level agreements, service-level agreements, etc.).

Challenges

Creating policies and procedures can be a time-consuming and challenging process. While input and representation from multi-stakeholders may provide valuable assistance in creating policies and procedures, the use of a collaborative approach can be cumbersome. In addition,

agreements for use of the provider directory will need to be developed and implemented, sometimes adding unplanned legal fees to the effort.

Potential Solutions

Time spent up front doing the hard work of collaboration on policies, procedures, and governance will likely save time and effort in the long run. States should anticipate and budget for legal assistance to create policies and to help determine what agreements are needed. Legal assistance should be considered a necessary cost of doing business.

Insights

Allow ample time for development of policies, procedures, and agreements for use of the HIE provider directory.

Select data sources for the Provider Directory

Considerations

Once HIE members have agreed on all of the previously described steps (what are the use cases, trust framework, etc.) then they can proceed to selecting the appropriate data sources for their provider directory.

The first priority in this process is understanding the capabilities and limitations of any potential data source:

- What data elements are available in this data source?
- What data elements are missing or unavailable?
- What is the original source of the data (provider, office administrator, payer claim files, designated entity, licensing database, etc.)?
- How accurate is the data?
- How frequently is the data updated by the data source?
- What specific fields are updated by the data source?
- Who are the primary customers for this data source?

- What data formats are available for initial feed and ongoing maintenance (batch, real-time)?
- What is the associated cost of the data?
- How trustworthy is the data (what is the 'trust framework' of the data source)?

Common data sources include:

- Providers
- Labs/hospitals
- Medical licensing and registration boards
- Credentialing databases, both local and national (e.g. CAQH)
- Multi-payer provider databases (e.g. Availity)
- NPI (NPPES)
- PECOS (Medicare Provider Enrollment, Chain, and Ownership System)
- Medical practice boards
- Medicaid and Medicare all payer claims databases
- State Medicaid Management Information Systems files (MMIS)
- State multi-payer claims databases (standard APCDs have a limitations of three hierarchy fields for provider affiliations)
- Regional Extension Centers (for current addresses)
- AMA provider files

Challenges

While certain data sources may be useful for populating and maintaining HIE provider directories, most are created for other purposes. Therefore, they may not necessarily contain the minimal data set required for most HIE use cases. Alternatively, data sources may contain

hundreds of data elements that are not required in the provider directory, making it challenging to populate the provider directory efficiently. Data sources may be updated infrequently or at different rates (e.g. annually for credentialing databases, quarterly for payer claims databases), potentially making the reconciliation and synchronization of data more difficult.

While it may be useful to use a variety of data sources to create a "complete" provider dictionary for a specific use case, there may be higher costs associated with using multiple data sources (costs for various data sources, costs for staff required to manage data sources, normalize, merge, and reconcile data, etc.).

A challenge facing the large national databases is the maintenance of accurate hierarchies for providers (e.g. individual to entity relationships). Because this information changes frequently, it is very difficult to maintain accurately, especially when a database is populated using third party sources.

The following are examples of specific positive and negative attributes for particular data sources:

- Licensing boards are the source of truth for license number and license status but are poor sources of address information.
- Credentialing databases tend to have limited information on practice and entity relationships.
- NPPES (NPIs) is known to have a noticeable incidence of errors and the downloadable data file is only updated monthly.
- PECOS (and other payer databases) is built primarily to support claims payment and billing. Therefore, information on provider billing address and lockbox is typically accurate, while the actual physical address may not be. This is because there is little incentive for a provider to update address information as long as claims are being paid.
- MMIS files are generally known to have a higher degree of inaccurate provider addresses and provider eligibility data. This is in part because provider address information often does not accurately reflect multiple provider locations and other affiliations.

- AMA data is a source of truth for medical education numbers. However, it is a poor source for practice addresses, with up to 50% of provider addresses being for home residences.

Potential Solutions

States must determine the best approach to populating their provider directories, balancing the costs and efficiencies of using outside data sources with the other approaches such as provider "self-registration." Because most HIEs today require only minimal data sets with a very high degree of accuracy, many are requiring providers to self-register. This allows direct verification with the provider and creates an accurate provider directory from the outset. It also allows the provider directory to collect accurate data on a provider's affiliations – one of the most challenging issues in the creation of provider directories.

Once the complete set of data has been obtained and set up for a provider, HIEs frequently use a combination of outside data sources to validate the provider's information and to complete the process of identity proofing. Commonly used data sources for identity proofing include state licensing and regulation boards, National Plan and Provider Enumeration System database from CMS (NPPES), multi-payer claims databases for Medicaid and Medicare, PECOS, and medical malpractice insurance renewals.

Such "solutions," however, can have their own challenges. As noted earlier, the state of Florida uses NPPES for validation of a provider's NPI number. The difficulty with NPPES is that the downloadable file of the database is only updated monthly. This has been a challenge for Florida because providers may need to change their information in NPPES in preparation for registering for Direct Secure Messaging. This delays the ability of the state to validate such providers' NPI numbers. (See Appendix F for detailed interview notes of the Florida HIE.)

Once data is scrubbed and validated, it may be re-purposed by other state organizations or departments as stand-alone data or as a provider directory. When provider directories are shared and/or re-purposed by others, the HIE may be able to leverage financial or staff resources from these organizations/departments to purchase and support the use of certain data sources.

Several vendors have substantive provider directories but many HIEs are reluctant to rely on them to populate their provider directories:

Pros of using vendor PDs	Cons of using vendor PDs
• HIEs could save time and money by streamlining process of creating and populating their own PD. • Vendors have deeper pockets to purchase automation tools for creating, reconciling and maintaining data, so that HIEs may not need to purchase their own 'tools' to manage the PD. • PDs are large and widely used, which promotes data accuracy.	•Vendor PDs are national, so perceived as less accurate and/or unreliable compared to local data sources. • Vendor PDs created for different purposes than HIEs (e.g. credentialing) so data elements may be missing or out of date. • No formal synchronization between payer databases (data sources), so risk of duplicates or faulty information is higher. • Difficult for vendors to maintain accurate affiliations and hierarchies for providers.

Insights

Providers themselves are often the best source of truth. Provider directories may be able to re-purpose their data for other state or local entities requiring provider directories, such as MMIS and the federal insurance exchanges.

Determine the role of the HIE vendor (if applicable)

Considerations

Most HIEs utilize vendors to create and manage the required HIE technology and functions. These vendors typically have their own tools and technologies available to create the provider directory. However, they may choose to partner with a provider directory vendor for this purpose (e.g. IBM Initiate, Oracle). The HIE could choose to work with their vendor to leverage tools, resources, and partners to create, populate, and manage the HIE provider directory.

Some HIEs utilize a modular approach. This means that they use a provider directory that was developed, populated, and maintained elsewhere. An example of this approach is the State Master Provider Directory, which will be used by the entire "Vermont Health Enterprise." This will include the Vermont Agency of Human Services (AHS) shared services (such as the eMPI and master provider directory), the health insurance exchange, the new Medicaid eligibility and

enrollment systems, public health registries, and state Medicaid Management Information Systems (MMIS), and Medicaid IT Architecture (MITA) components.

Challenges

Most HIEs use multiple vendor technologies to support information exchange. The provider directory is typically a central point of integration in the HIE architecture and may be impacted by changes made to surrounding HIE technologies. Strong project management is needed to successfully coordinate changes in the HIE and/or in vendor products that may impact the provider directory.

Even when reusing existing sources of provider data, manual intervention will likely be required to ensure that highly accurate and clinically appropriate data is delivered.

Potential Solutions

HIEs should work closely with their HIE vendor to coordinate outside technologies, tools, and resources. The HIE must determine their approach to establish a trust framework for the provider directory and should work with their HIE vendor to actualize it. HIEs may be able to lower costs by using internal staff to customize the provider directory and manage vendor software.

Insights

States should closely monitor vendor involvement with the development of the provider directory to ensure it meets HIE requirements for an appropriate trust framework and follows HIE policies and procedures.

Import, merge, validate, and publish data

Considerations

HIEs will determine the best approach to populating their provider directories based on their specific needs. The provider directory may be populated via provider self-registration, through existing databases, or by contacting the provider office directly. Database tools may assist in streamlining the process of creating and modifying the resulting data sets initially added to the provider directory.

Challenges

Merging and matching data from various data sources may be cumbersome. Matching tasks include eliminating duplicates, linking provider records across source systems, and locating key missing information.

The task of establishing one-to-many relationships that will automatically update is challenging for some. Providers frequently have multiple affiliations, making it difficult to accurately track any changes in these affiliations. Manual intervention is nearly always necessary to reconcile, scrub, and validate data. This remains true when importing, merging, and publishing data. While it may be costly, it is considered a necessary expense in the provider directory world.

There are no standards currently established for provider directories for interoperable exchange. Tracking provider affiliations is very challenging due to frequency of provider and entity changes and moves. In some states, the individual and entity-level provider directories may be set up in different databases with different architectures, making it harder to coordinate frequent updates. In addition, many data sources have their own unique naming and numbering schema.

Potential Solutions

The use of manual intervention to identify, gather, and validate provider information is key. However, automation tools are becoming more sophisticated and may prove to be increasingly helpful in the process of building provider directories and in validating information. The design of the provider directory should be flexible enough to accommodate hierarchical information and future growth. Investment in a modular system has many benefits and should be weighed against designing and building a more traditional system. Standards for provider directories should be used as they become available.

Insights

States should be diligent about data accuracy. There is no substitute for manual review and intervention. Advice from one state HIE: "Be patient! It's a daunting challenge to get it right."

MAINTAINING THE PROVIDER DIRECTORY

Establish a strategy for content maintenance and updates

Considerations

To maintain a high degree of data accuracy and trust by the state's HIE community, provider directory content should be verified and updated on a regular basis. Content may be updated in a variety of ways:

- Content providers (e.g. labs and hospitals) may send their address books to the HIE to perform a one-by-one comparison of every provider. This approach allows validation of the provider's affiliations with each hospital, lab, etc.
- HIEs may also obtain regular or just-in-time downloads from key data sources. As data sources acquire new information on providers, they may pass along known changes in real-time or in batch modes.
- When new providers enter a community, they are identified and asked to register with the provider directory. Initial registration could be accomplished through a provider portal or with provider relations staff.
- HIEs will learn of changes to provider data as their data sources add/delete and update data.

Challenges

HIEs may not be aware of new providers in the community. Data sources may be updated on an infrequent basis, limiting their usefulness for HIE provider directories.

Tracking provider affiliations is also very challenging, due to the frequency of provider and entity changes and moves. In some states, the individual and entity-level provider directories may be set up in different databases with different architectures, making it harder to coordinate frequent updates. In addition, many data sources have their own unique naming and numbering schema.

Potential Solutions

States should obtain regular downloads from their chosen data sources. By scrubbing these data against data in the existing provider directory, any new records would be identified and changes could be made. They should also actively reach out to new providers in the community, and regularly confirm existing information on providers in the directory. (See the appendices for case studies and interview notes describing how data is updated in different states.)

Regional Extension Centers are proving to be an excellent source of provider information, due to the frequent ongoing contact by REC staff. Provider directory administrators would do well to consider leveraging this data source.

Insights

Formally designate staff to update and maintain the provider directory.

Determine frequency and approach to update Provider Directory

Considerations

To maintain a high degree of accuracy, state HIEs maintain designated staff for customer support, including making updates to the provider directory. HIEs should be aware of the frequency associated with updates of data sources and augment as needed. It is important to know that provider affiliations change frequently and are challenging to document.

Challenges

While real-time updates will help keep data current, they are not available from most data sources. Data sources provide updates at different intervals, and often in a variety of formats. Just like with building a provider directory, automation can accelerate the process of data updates, but can be lacking in accuracy.

Potential Solutions

There are smart ways to use automation techniques that maximize their effectiveness. For example, some HIEs take advantage of automated tools to compare and reconcile data based on specific criteria. These criteria may be used to identify and target data that require direct manual intervention and/or direct verification and reconciliation with the provider; e.g., a new fax number may mean a new satellite office has opened. This can also be done with the

assistance of a third party vendor that can leverage tools and provide analysis to determine which data needs to be directly reconciled with the provider.

HIEs should create and enforce policies and procedures regarding frequency of updates. New and departing providers should be required to inform the HIE of changes in status.

HIEs should track the efforts of the S&I Framework for updates and guidance on technical standards. They are encouraged to pilot the S&I provider directory data model, which would support the process of moving toward standardization. If you are interested in conducting a pilot, please contact Victor Palli, Initiative Coordinator, S&I Framework (Victor.Palli@sframework.org).

Additional tactics:

- Establish inactivity reports/ticklers noting providers who have not opened results delivered to them in xx days, and follow-up with these providers.
- Send a report of active providers to affiliated entities (data sources) for validation on regular basis (daily, weekly, or monthly).
- Rely on local data sources (providers, hospitals, or RECs) to validate information – local information may be more reliable than national database.
- Contact the practice directly to validate information, as needed.
- Budget for staff resources required for optimal maintenance of the provider directory.
- Use automation tools as appropriate, and develop in-house expertise to manage tools and provider directory software.

Insights

Seek ways to streamline systems, lower costs, and avoid unnecessary intervention.

Determine funding sources and funding mechanisms

Considerations

Funding sources for provider directory development and maintenance include:

- Federal/state sources (HITECH)/public
- Subscription fees
- Transaction fees
- Grants
- Public assessment fee on claims
- Transfer of funds from different state agencies to support a centralized provider directory
- Consolidation of duplicative services in state agencies (e.g. medical licensure, health insurance exchanges, public health, etc.)

By consolidating functions, organizations may gain economies of scale and consistency of information. Leveraging the provider directory across multi-state initiatives may also contribute to economies of scale and a more favorable ROI.

Challenges

Provider directories are a necessary cost of doing business, and are not typically sources of revenue. The costs to create, populate, and maintain provider directories vary widely, depending on the potential costs associated with purchasing data, with acquiring and verifying the provider information, and with cleansing and matching data, to name a few cost factors.

Potential Solutions

To increase value for stakeholders, HIEs should ensure the HIE provides clear value to providers and patients alike. When possible, the HIE should establish a solid ROI for provider participation.

HIEs should consider using the provider directory for other purposes (i.e. a centralized or modular provider directory) to consolidate duplicative services in state agencies (i.e. Medicaid,

HIX, public health, etc.). The consolidation of certain functions may offer economic gains and data consistency, and may eventually create a new revenue stream for the provider directory.

HIEs should also assess the feasibility of multi-state initiatives, which offer economies of scale and potential new funding streams.

Insights

HIEs should ensure there is a strong ROI for all involved to incentivize providers to update their information in the provider directories and to actively participate in the HIE. The provider directory may also provide value for the esMD and other federal or state efforts that utilize the provider directory.

Develop approach to interoperating with other Provider Directories and HIEs

Considerations

There is currently limited sharing of provider directories across state or regional HIEs. MU Stages 2 and 3 will potentially require greater use of HIEs for data exchange and may provide a business reason for sharing of provider directories. Future uses of provider directories are somewhat dependent on government initiatives and available funding.

Challenges

Currently there is limited semantic interoperability. Standards are not yet mature and MU Stage 2 is not yet fully defined.

Potential Solutions

Some State HIEs are currently exchanging provider directory information in Excel formats. Guidance is being developed by the "Standards & Interoperability Framework - Provider Directory Workgroup," which is currently working on two work streams:

- Certificate discovery for Direct Project with a known Direct Address
- Electronic Service Information discovery (including Electronic Addresses) with some known basic provider attributes

The S&I provider directory data model should help enable the "exchange" of provider directory data between various "consumers."

ONC is also funding a project known as the Western States Consortium Project. The project has a specific focus on how provider directories and trust services originating in different states can be harnessed and potentially combined at the regional level to facilitate interstate exchange while respecting the demands of privacy and security. Delegates to the consortium represent Oregon, California, Arizona, Hawaii, Utah, Nevada, Alaska, and New Mexico. Additionally, Colorado, Washington, and Idaho have participated as "satellite states," which means their states have not signed a formal memorandum of understanding and thus their representatives only participate as witnesses to the consortium's activities. The project is supported via the State Health Policy Consortium, which is managed under a contract with RTI International.

Insights

Monitor federal developments to track ongoing guidance for data exchange and standards.

APPENDICES

Information contained in these appendices was gathered in November and December 2011. It should be considered current as of that date.

A. Provider Directory Interview Guide for HIEs

ONC Community of Practice: Provider Directories

Populating and Maintaining Provider Directories

November 2011

Interview Guide for HIEs

1. **Describe the scope and status of the provider directory(ies) used in your organization for health information exchange, including:**

    - *Providers included in provider directory, jurisdiction/geography covered, size of provider directory*
    - *Individual v. entity-level directory*
    - *How long in place*
    - *Specific provider directory content (data set) - demographics, sensitive identifiers (NPI, DEA#, license #, etc.)*
    - *Use case scenarios: push v. pull; clinics, hospitals, labs, public health*
    - *Support of directed exchange functions (send/receive , query/retrieve); allow for discovery of individual providers and practice locations*
    - *Support of Direct: current pilot v. planned (in release schedule)*

- *Additional uses of provider directory: e.g. research, surveys, all payer claims databases (APCD), credentialing, insurance exchange, licensure, payment reform (e.g. ACOs)*
- *Brief description of architecture and database structure (federated, repository, other)*
- *Users of provider directory: in-house users, provided to other entities for any other purposes*
- *User access: e.g. how accessed, access rights, user authentication, registration, security, audit controls*
- *Interoperability with other directories in region, state, etc.*
- *Sources of funding(include all uses of provider directory): subscription fees, transaction fees, grants, shared/ centralized fees with other stakeholders, revenue from selling data*
- *Future phases and planned uses*
- *State mandates for use of centralized source for provider directory; local policy 'levers' to incent for participation in individual provider directory*

2. **What "trust framework" exists in your organization for populating and maintaining provider directories?**

   Listen for/prompt for:

   - *Approach to identity proofing and data validation (authoritative sources v. validating sources, use of certificates, etc.)*
   - *Management of relationships between entities and individuals: who can update the data, parent/child relationships, etc.*
   - *Qualifications for listing (individual, entity)*

- *Policies and procedures:*
  - *for granting and management of permissions for access and use, including which data can be accessed (note policies regarding restricted access to sensitive information)*
  - *that provide a structured and secure mechanism for individual providers to enroll and verify information used to populate the provider directory (as appropriate)*
  - *to verify the information provided by individuals enrolling in the provider directory (as appropriate)*
  - *that require individuals to periodically update their information, including changes in practice locations and affiliations (as appropriate)*
  - *to establish appropriate linkages between individuals and entities*
  - *to ensure security that a) data contained in the provider directory is appropriately protected from unauthorized changes; b) authorized individuals have access to the data for purposes of updates/changes; and c) access to information contained in the provider directory by external users is appropriately managed*
  - *for audit trails to track access and use, and investigate inappropriate use and breaches*
- *Use of contracts, data use agreements, BAAs*
- *Management of risk and liability*

3. How do you populate the provider directory?

Listen for/prompt for:

- *Sources of data content: e.g. health plan credentialing files, health plan provider directories, health plan payment files, credentialing files, state boards of registration and licensure, APCDs, associations, 3rd party commercial databases, 3rd party credentialing vendors, other state-wide or federal repositories, providers (IDNs, hospitals, individuals, practices)*

- *Approach to integration of data sources; e.g. manual data matching, automated matching via algorithms, etc.*
- *Approach to identity proofing and data validation (authoritative sources v. validating sources)*
- *Accuracy*
    - *Level of accuracy required*
    - *Variation by data element*
    - *Acceptable level of inaccuracy*
    - *User tolerance for errors*
    - *Estimate of actual provider directory data accuracy - how measured?*
    - *Management of duplicates*
- *Use of standards (content storage, content delivery, directory structure, query/response messages, etc.)*
- *Use of vendors (specify vendors and tools used)*
- *Costs for data sources*
- *Incentives for providers/sources to participate*
- *Understanding of reasons for current approaches used to populate the provider directory; any false starts or course changes*

4. **What are the key issues and challenges you are facing in populating the provider directory?**

5. **How have you addressed these issues and challenges?**

6. How do you actively maintain the provider directory?

Listen for/prompt for:

- *Approach to receiving updates: e.g. electronic batch feeds, real-time feeds, manual input*
- *Who updates data: self attestation by provider, delegated authority, organization, payer, other*
- *Frequency of updates (e.g. real-time, quarterly, etc.); impact of timing of updates on data use*
- *Central management v. federated management*
- *Accuracy*
  - *Level of accuracy needed*
  - *Variation by data element*
  - *Acceptable level of inaccuracy*
  - *User tolerance for errors*
  - *Estimate of actual provider directory data accuracy - how measured?*
  - *Management of duplicates*
- *Level of effort required for maintenance; staff and other resources, staff roles*
- *Costs for maintenance – funding sources, who pays for maintenance and updates?*
- *Mechanisms for data corrections, de-listing, relisting*
- *Impact of governance structure on maintenance*

- *Use of vendors (specify vendors and tools used)*
- *Incentives for providers/sources to maintain their information*
- *Modification of and expiration of access rights for users*

7. **What are the key issues and challenges you are facing in maintaining the provider directory?**

8. **How have you addressed these issues and challenges?**

9. **Do you have any recommendations for best practices for populating and maintaining provider directories?**

   Listen for/prompt for:

   - *Key success factors*
   - *Lessons learned*
   - *Practical tips*

B. Provider Directory Interview Guide for Vendors/Data Sources

ONC Community of Practice: Provider Directories

Populating and Maintaining Provider Directories

Interview Guide for Provider Directory Vendors (Data Sources)

1. **Describe the scope and status of the provider directory (provider directory) services offered by and/or utilized by your organization, including:**

    - *Providers included in provider directory, jurisdiction/geography covered, size of provider directory*
    - *Primary uses of provider directory (claims payment, credentialing, etc.)*
    - *Individual v. entity-level directories*
    - *Customers/buyers of provider directories and services*
    - *Customer business purposes / use case scenarios: push v. pull; clinics, hospitals, labs, public health*
    - *How long have services been offered; relevant organizational history*
    - *Specific provider directory content available (data sets) - demographics, sensitive identifiers (NPI, DEA#, license #, etc.)*
    - *Additional uses of provider directories by customers: e.g. research, surveys, all payer claims databases (APCD), credentialing, insurance exchange, licensure, payment reform (e.g. ACOs)*

- *Customer support of directed exchange functions, if known(send/receive , query/retrieve); allow for discovery of individual providers and practice locations*
- *Customer support of Direct, if known: current pilot v. planned (in release schedule)*
- *Brief description of architectures and database structures, for vendor, and for customers if known (federated, repository, other)*
- *Customer users of provider directory: in-house users, provided to other entities for any other purposes*
- *Customer access, if applicable: e.g. access rights, user authentication, registration, security, audit controls*
- *Interoperability with other directories in region, state, etc.*
- *Fees and fee structure (subscription fees, transaction fees, etc.)*
- *Future product offerings*

2. What "trust framework" is used to populate and maintain provider directories?

Listen for/prompt for:

- *Approach to identity proofing and data validation (authoritative sources v. validating sources, use of certificates, etc.)*
- *Management of relationships between entities and individuals: who can update the data, parent/child relationships, etc.*
- *Level of assurance needed to assume high usage of provider directory*
- *Policies and procedures:*

- *for granting and management of permissions for access and use, including which data can be accessed (note policies regarding restricted access to sensitive information)*
- *that provide a structured and secure mechanism for individual providers to enroll and verify information used to populate the provider directory (as appropriate)*
- *to verify the information provided by individuals enrolling in the provider directory (as appropriate)*
- *that require individuals to periodically update their information, including changes in practice locations and affiliations (as appropriate)*
- *to establish appropriate linkages between individuals and entities*
- *to ensure security that a) data contained in the provider directory is appropriately protected from unauthorized changes; b) authorized individuals have access to the data for purposes of updates/changes; and c) access to information contained in the provider directory by external users is appropriately managed*
- *for audit trails to track access and use, and investigate inappropriate use and breaches*

- *Use of contracts, data use agreements, BAAs, SLAs*
- *Management of risk and liability*

3. How do you create and populate the provider directory?

Listen for/prompt for:

- *Sources of data content: e.g. health plan credentialing files, health plan provider directories, health plan payment files, credentialing files, state boards of registration and licensure, APCDs, associations, 3rd party commercial databases, 3rd party credentialing vendors, other state-wide or federal repositories, providers (IDNs, hospitals, individuals, practices)*

- *Approach to obtaining and loading data (use of standards, real-time/batch, etc.)*
- *Approach to integration of data sources; e.g. manual data matching, automated matching via algorithms, etc.*
- *Approach to identity proofing and data validation (authoritative sources v. validating sources)*
- *Use of IDs (assign new ID, use source ID, etc.)*
- *Accuracy*
    - *Level of accuracy required*
    - *Variation by data element*
    - *Acceptable level of inaccuracy*
    - *User tolerance for errors*
    - *Estimate of actual provider directory data accuracy - how measured?*
    - *Management of duplicates*
- *Use of standards (content storage, content delivery, directory structure, query/response messages, etc.)*
- *Use of outside vendors (specify vendors and tools used)*
- *Fees for data sources*
- *Incentives for providers/sources to participate*
- *Understanding of reasons for current approaches used to populate the provider directory; any false starts or course changes*
- *Distribution to customers – critical functional specifications, integration requirements, etc.*

4. **What are the key issues and challenges you are facing in populating the provider directory?**

5. **How have you addressed these issues and challenges?**

6. **How do you actively maintain the provider directory?**

   Listen for/prompt for:

   - *Approach to receiving updates: e.g. electronic batch feeds, real-time feeds, manual input*
   - *Who updates data: self attestation by provider, delegated authority, organization, payer, other*
   - *Frequency of updates (e.g. real-time, quarterly, etc.); impact of timing of updates on data use*
   - *Central management v. federated management*
   - *Accuracy*
     - *Level of accuracy needed*
     - *Variation by data element*
     - *Acceptable level of inaccuracy*
     - *User tolerance for errors*
     - *Estimate of actual provider directory data accuracy - how measured?*
     - *Management of duplicates*

- *Level of effort required for maintenance; staff and other resources, staff roles*
- *Relative costs for maintenance ; fee structure for customers for maintenance and updates*
- *Mechanisms for data corrections, de-listing, relisting*
- *Use of other vendors (specify vendors and tools used)*
- *Incentives for providers/sources to maintain their information*
- *Modification of and expiration of access rights for users*

7. **What are the key issues and challenges you are facing in maintaining the provider directory?**

8. **How have you addressed these issues and challenges?**

9. **Do you have any recommendations for best practices for populating and maintaining provider directories?**

   Listen for/prompt for:

   - *Key success factors*
   - *Lessons learned*
   - *Practical tips*

C. Provider Directory Case Study: HealthBridge

OVERVIEW AND CURRENT STATE OF PROVIDER DIRECTORY EFFORTS

HealthBridge is a well-established organization that supports health information technology adoption and health information exchange to improve health care outcomes. Located in the Greater Cincinnati-Northern Kentucky tri-state area, HealthBridge was founded in 1997 and has grown to encompass more than 50 hospitals, 800 physician practices and 7,500 physicians in five different communities in three states. Roughly 3.2 million electronic messages per month are sent over its secure electronic network, including clinical lab tests, radiology reports and discharge summaries.

Current use case scenarios include results delivery, routing of billing information and push/pull functionality (query), a new service launched at the end of 2011. The HealthBridge results delivery service is based on information in the provider directory, which includes information on 7,000 providers and continues to expand. The provider directory includes participants at both the individual and the entity level: physicians, nurse practitioners and facilities (nursing homes and small clinics).

HealthBridge is also working with a group of greater Cincinnati partners on the Greater Cincinnati Beacon Collaboration. In this effort, HealthBridge coordinates the care of patients by associating patients with physicians that are not the "physician of record." The address book is used as the "source of truth" in this initiative, which includes fifteen nursing homes and ten other organizations.

Routing information in the provider directory cannot be seen by HealthBridge participants. However, some marketing-oriented information contained in the provider directory, such as practice hours, specialty, phone, etc., is visible to HealthBridge participants through a portal. Participants can search the directory by practice, provider name, or NPI. A provider affiliated with multiple entities has a separate listing for each of the entities. Participants can also look up whether or not a provider has an EHR as well as information on how the provider wishes to receive results (e.g. via fax, phone or directly to the EHR).

POPULATING THE PROVIDER DIRECTORY

HealthBridge uses a very manual process to create and update its provider directory. Both providers and content providers (labs, hospitals, etc.) are data sources for the provider directory. For new entities/practices, HealthBridge sends an implementation representative to visit the practice. Each new entity must sign the required legal agreements for participation and also designates an authorized point of contact for HealthBridge. During the visit, the representative obtains the names of all physicians being signed up as well as all the other information necessary to populate the directory (e.g. NPI, name, location, and basic demographics). HealthBridge then validates this information with the medical license number, and, once validated, adds the provider(s) to the provider directory.

For entities already participating in HealthBridge, the point of contact at the entity notifies HealthBridge when a new provider joins their group. Information is entered on the physicians NPI, name, location, and basic demographics. HealthBridge then validates this information with the medical license number. Once validated, the HealthBridge staff adds the new provider to the provider directory.

If a provider practices at multiple entities they will have a separate listing for each of the entries and a corresponding unique ID at each entity. Once providers are in the provider directory, HealthBridge customer service asks providers to note which hospital systems and labs they are affiliated with. Each instance of an individual provider in the provider directory has a unique ID assigned by HealthBridge that corresponds to a particular practice location. HealthBridge then maps its unique ID for the provider to the unique IDs used by all of the content providers. Nursing home information includes floor level information rather than individual information.

Hospitals send over their entire address books to HealthBridge, which then looks at every provider listed by doing a one-to-one comparison with the providers in the provider directory. If there is a match, these providers are then included in the database.

HealthBridge uses Axolotl for the master list and recently purchased Initiate for provider and patient list management (EMPI). Mirth Mail is used for routing. Some of HealthBridge's other applications are home-grown.

Data Accuracy

The required level of accuracy varies between information needed for routing versus marketing-oriented information. The level of data accuracy required for particular data elements also varies by how a provider receives information (e.g. via fax, phone, or directly to an EHR).

HealthBridge seeks a 100% accuracy rate for information needed to route results. If a provider receives results via fax or phone, then correct physical address information is more important than if the provider receives results directly into an EHR. For providers who receive results directly into the EHR, an accurate electronic address is critical. For example, a practice could move locations and their providers would still get the results electronically.

Trust Framework

As noted above, HealthBridge validates a subset of elements combined with identity proofing. Certificates are issued at the entity level. HealthBridge is moving to issuing certificates at the individual level, with a pointer to affirm the entity-level for each individual.

Legal Agreements

Users must sign user level agreements in order to participate (using a "click & grab" approach). Users of Direct sign a separate contract.

Access and Audit

All participants in HealthBridge can see the marketing-oriented information in the provider directory. Only HealthBridge staff has access to the entire consolidated address book, including the routing information.

To obtain access to clinical information hosted by HealthBridge, the practice point of contact must 'vouch' for the employee seeking access. HealthBridge will then grant the provider access; a user ID and password are required to access this information.

To obtain access to the portal (which contains marketing-oriented information) providers need to be set up by the practice or through HealthBridge. A separate user ID and password are required to log-in to the portal.

The provider directory is not published. All changes to the provider directory are auditable and can be traced to the individual who made the change.

Involvement with Direct

HealthBridge is involved with Direct. From a HealthBridge press release, August 11, 2011:

> *An outgrowth of the Nw-HIN development process, ONC initiated the Direct Project in March 2010, as a way to develop a simple, secure, scalable, standards-based way for participants to send authenticated, encrypted health information directly to known, trusted recipients over the Internet. HealthBridge participated in a national interoperability demonstration using Direct in February 2011. HealthBridge then installed its production Nw-HIN Direct and Health Information Service Provider (HISP) components in July 2011 and began connecting practices this week.*
>
> *"Our region is leading the nation in achieving a more connected, efficient, patient-centered approach to health care," Keith Hepp, interim Chief Executive Officer for HealthBridge. "This technology will allow authorized clinicians to share more complete patient information securely wherever and whenever it is needed for better patient care."*

Standards

HealthBridge established their own standard for the provider directory based on the data elements needed to operate their software, on the elements needed by HealthBridge to conduct business, and on the additional information providers wanted to have and share with referring providers.

MAINTAINING THE PROVIDER DIRECTORY

Initial set up of the provider directory is manual; ongoing updates and maintenance are then automated to the extent possible. HealthBridge uses a shared responsibility model for updating information in the provider directory. On a monthly basis, HealthBridge sends a report to the point of contact at each practice which lists all of their providers practicing at that entity. Each entity validates the list, and if there are changes to be made, the point of contact reaches out to

HealthBridge customer service to assist with making the changes. Information for results routing may only be done by HealthBridge staff.

Certain information (marketing-oriented information) can be directly updated by providers through the portal. HealthBridge also takes advantage of in-person meetings and trainings at various facilities to check the provider list with the facility.

There is no specific interval for updates. Updates occur when HealthBridge is informed of changes, such as when:

- A provider leaves a practice and they will inform HealthBridge.
- A new provider joins a practice; HealthBridge will check their current affiliations.
- An inactivity report is generated for HealthBridge indicating a provider has not opened a result in three days; HealthBridge customer service representatives will reach out to the point of contact at the entity to understand if there is a change in providers.
- The entity validates the providers listed in the monthly report sent from HealthBridge and notices a discrepancy.

HealthBridge also receives monthly downloads of hospitals and labs databases. The downloads are compared to the master files and changes are made as needed.

HealthBridge requires approximately 1.25 FTEs to maintain the provider directory. One FTE is required for updates to routing-related information while less than a quarter of an FTE is required for updates to non-routing information.

Funding

The cost for the provider directory is bundled into a subscription fee charged to hospitals. Some funding comes via government programs.

Interoperating

HealthBridge and the Indiana Health Information Exchange (IHIE) currently share provider directory information to facilitate exchange between providers in their networks. Directories are exchanged in Excel format, with IHIE essentially acting as another content provider to HealthBridge. HealthBridge will be exchanging directories with Kentucky and Ohio for Direct.

Future

HealthBridge does not plan to use its provider directory for research, surveys, and other purposes. It does not plan to do the very difficult work of semantic interoperability.

FINAL COMMENTS

HealthBridge recommends always looking for ways to cut costs and automate whenever possible. As a way to cut costs, they now run their HIE software (Axolotl) themselves and do their own custom programming. They also use some home-grown applications.
HealthBridge believes that there is no substitute for manual processes. It was stated during the interview that while it may seem "painful," manual diligence is key to a successful provider directory.

HealthBridge also believes that a provider directory is simply a "cost of doing business" and that it should be viewed as a piece of infrastructure, not as a revenue center.

Source: Keith Hepp, CFO and VP of Business Development, HealthBridge

D. Provider Directory Case Study: Vermont

OVERVIEW AND CURRENT STATE OF PROVIDER DIRECTORY EFFORTS

The state of Vermont is creating a comprehensive state-level provider directory to be used by VITL (Vermont's state HIE) and other Vermont state entities, collectively known as the "Vermont Health Services Enterprise." This enterprise includes VITL, the new Medicaid eligibility and enrollment systems, public health registries, the health insurance exchange (HIX), and components of the state Medicaid Management Information System (MMIS). The provider directory will be the authoritative source for the entire state.

Long term, the provider directory effort plans to align directories across state borders, both regionally and nationally. According to Hunt Blair, Deputy Commissioner, Health Reform, Department of Vermont Health Access, "this expansive approach brings value to the health care system as a whole and to comprehensive health care delivery system reform."

Currently, Vermont's only provider directory is embedded in VITL's Medicity infrastructure. The new comprehensive provider directory is still in the planning phase, with go-live planned for mid-2012. The provider directory will support all use cases in state government and will be linked to VITL. For HIE purposes, the first phase will include results delivery, followed by minimal querying (targeted for summer 2012). Eventually the provider directory will also help the state track quality measures to the provider level.

On January 4, 2012, Vermont issued the first in a series of Health Services Enterprise RFPs. The focus of the first is implementation of an Enterprise Master Persons Index that will serve the entire Enterprise (and form the underlying kernel of the provider directory). The second RFP in the series will be for the provider directory and should be issued no later than February 2012.

CHALLENGES

Given the multiple uses planned for the provider directory, the state is faced with the challenge of keeping the provider directory up-to-date, current, and accurate. For claims payment purposes, for example, the provider directory must be nearly 100% accurate and refreshed on a

regular basis. With so many potential sources of data available to populate the provider directory, the state is also faced with the challenge of determining which data to use to populate the provider directory, how to validate this data, and how to determine which data trumps other data for updates.

POPULATING THE PROVIDER DIRECTORY

To meet these challenges, Vermont is creating a common, centralized directory that will be refreshed and authenticated from disparate state and non-governmental sources and integrally linked to the state HIE network's directory, messaging, and record locator services. Ideally the provider directory will be refreshed daily, but at minimum will be refreshed at least weekly. The provider directory will include all providers in the state (e.g. mental health providers, chiropractors) and not just HIPAA-defined providers. This "State Master Provider Directory" will be created as a service in the Agency of Human Services (AHS) enterprise infrastructure and will be populated by:

a) The current VITL directory (VITL's REC has the most accurate addresses).
b) An extract of the MMIS provider file (recently cleaned up and de-duped against a download of the CMS NPI file for VT providers and comparison with PECOS; however, there are still data integrity issues due to allowing providers to enter free text).
c) The Board of Medical Practice (M.D. licenses).
d) The Office of Professional Regulation (all other licensed and certified health professionals).

Eventually the multi-payer claims database (APCD) for Medicare/Medicaid will be linked to the provider directory. However, there are outstanding questions about how the data will fit together.

Outside credentialing sources will not be used to populate the provider directory. In Vermont, each entity does credentialing on its own, due to concerns about liability.

Vermont is using a phased approach to creating and populating the provider directory. They are issuing a series of RFPs for the "Vermont Health Services Enterprise," which includes core AHS SOA enterprise shared services such as the eMPI and Master Provider Directory. They have licensed the Oracle enterprise suite, which is close to being in production (as of January 2012). Vermont's overall strategy is to utilize the Oracle components (or a compatible alternative) to

create an eMPI, followed by a Master provider directory. The HIX and Medicaid eligibility and enrollment systems will be created next. However, the creation and phasing of these capabilities is dependent on the HIX procurement process for the New England States Collaborative for Insurance Exchange Systems (NESCIES), in which Vermont participates. (This is also known as the Massachusetts Early Innovator Cooperative Agreement and the Center for Consumer Information and Insurance Oversight (CCIIO) Innovation grant.)

Because VITL is effectively an extension of the AHS Enterprise, it will be able to draw on the services being created (eMPI and provider directory). In the meantime, however, VITL will operate on its own.

Data Elements

VT will be rigorous in creating a core data set that includes the minimum necessary data to keep VITL and the state harmoniously linked. The provider directory will track both individual and entity level data, with a focus on MDs to determine entity-level relationships. The detailed data set is still being finalized.

Data Accuracy

Accuracy of the State Master Provider Directory is very important and will vary by data element. For example, for the data element "provider type," there may be less information on non-billing providers than on billing providers. The State Master Provider Directory will be the "golden record" source for the correct phone number and address of providers, used to validate licensure status, etc.

Trust Framework

Vermont will use Medicaid/MMIS to provide the trust fabric for the provider directory. They are also currently developing an approach to the HISP-to-HISP trust fabric for identity authentication. Hunt Blair is working on this issue at the national level, and notes that HIX and HIE provider directories have closely aligned identity management use cases. The federal data hub is developing core services for identity proofing and identity authentication, ultimately to NIST Level 3. Vermont hopes to access those services through its' AHS enterprise and plans to use the core data set (currently in development) for HIX, HIE, and other IT systems in an interoperable identity management infrastructure.

Governance

Because of the phased development for the Vermont provider directory (VITL provider directory first, followed by Statewide Master Provider Directory), Vermont has delayed the finalization of certain governance and design parameters. A key issue to be resolved is who will trump whom for updates (e.g. VITL vs. other data sources). Even though the new provider directory will include accurate provider addresses and phone numbers, for example, the provider directory will not be allowed to update certain state databases, such as the Board of Medical Practice and Office of Professional Regulation (both data sources for the provider directory). This restriction is based on state statute, which only allows MDs and other licensed professionals to change their own data. Because most of these individual records are only refreshed every two years by the providers, the new provider directory would likely be able to provide the databases with more up-to-date information. Vermont has proposed a temporary solution where they would use the provider directory to pre-populate licensure renewal forms that, once validated by the MD or other licensed professional, would then update these files.

Access

Vermont is still determining how access to the provider directory will be handled. The VT Secretary of State mandates that all of the information is public. However, there is concern about sharing some data elements, such as cell numbers. The VT legislature will soon be addressing these issues. There may be publicly accessible "views" into the provider directory through web portals that will show some, but not all, of the information contained there.

Involvement with Direct

Vermont plans to participate in Direct. In addition to being the statewide HIE, VITL will become a HISP for Direct. VITL is implementing Direct through a third-party vendor that will build off of the Medicity infrastructure and Medicity provider directory. It is expected that the State Master Provider Directory will include Direct addresses for providers. However, this is not yet finalized.

Standards

Vermont acknowledges that standards are not yet in place. The state is following the federal work on health insurance exchanges.

MAINTAINING THE PROVIDER DIRECTORY

Vermont is actively sorting out overall governance issues for the provider directory, which will have a major impact on the approach to maintaining the provider directory. This includes issues such as who can update the data, how frequently the provider directory will be updated, what additional sources of data will be used to populate the provider directory, etc. The provider directory will only allow changes and updates through a governance structure that ensures only the most trusted source(s) can make the updates.

The State Master Provider Directory will have a dedicated FTE (1 to start) at the Department of Vermont Health Access (Medicaid funded) to oversee the update process and provide manual intervention as needed.

Funding

The provider directory will be funded in part by Vermont's Health IT Fund, which holds receipts from an assessment of 0.199 of one percent on all major medical claims paid in the state by insurance carriers and third-party administrators serving 200 or more covered lives. Created in 2008, the HIT fund raises approximately $3 million per year to fund HIE infrastructure, provide match to federal HIT funding, and support the IT infrastructure of a PCMH project.

The provider directory will use these funds from assessment fees to match other sources of funding—a combination of funds from Medicaid, HIT funding and other state government funding.

FINAL COMMENTS

The issues of identity authentication and management continue to be very challenging. Vermont is actively working with ONC and CMS to push forward a vision for using the newly developing federal data hub (to be used for HIX) for identity management services. This approach could help create a trust fabric of linked state HIE, sub-state HIE, and HISP provider directory's based off the federal data hub infrastructure.

Hunt Blair sums up the provider directory initiative as follows: "This is a long process. Be patient. It is dauntingly challenging to get it right."

Source: Hunt Blair, Deputy Commissioner, Health Reform, Department of Vermont Health Access

E. Provider Directory Case Study: Wisconsin Medical Society

OVERVIEW AND CURRENT STATE OF PROVIDER DIRECTORY EFFORTS

The Wisconsin Medical Society (Society) has a well-established provider directory, used for a variety of purposes within the state. Current uses for the Society provider directory include quality improvement, workforce planning, and performance measurement. The current provider directory contains detailed information on 14,000 physicians. The Society is currently expanding the provider directory to include all HIPAA providers in Wisconsin.

The Wisconsin Statewide Health Information Network (WISHIN) continues to expand its functionality and does not currently utilize the Society provider directory. However, WISHIN may leverage the Society provider directory as additional HIE functionality is rolled out. Implementation of robust, bi-directional query functionality (response/exchange) is currently in planning stages.

The Society and WISHIN are actively collaborating on a demonstration project to determine additional potential uses for the rich set of data in the Society provider directory. These may include leveraging the provider directory for care transitions and coordination, public health, and the Nw-HIN Gateway.

Wisconsin is a heavily wired state, with most providers in the state already using EHRs. 80% of referrals and other business stay within existing integrated delivery networks. The high degree of provider affiliation and of HIT saturation has an impact on the approaches for populating and maintaining the provider directory.

POPULATING THE PROVIDER DIRECTORY

The Society has a well-established and rigorous process for populating the provider directory. Two full-time staff are dedicated to verifying and updating physician data. During the month of October 2011 alone, 16,538 changes were made to the records in the database (new physicians/deletions/edits). The Society uses two software applications, one which is home-grown and is augmented by the use of commercial software for membership tracking purposes.

To populate the provider directory, the Society started with its existing database of member providers. It receives a quarterly dump from the Wisconsin Department of Regulation and Licensing (DRL), of all MDs and DOs - over 44,000 records total. This list is scrubbed against the Society database and any *new* records are added. Each provider is initially checked against thirteen discrete data elements. The data can be entered manually by the Society administrators, by a reviewed electronic feed, and by providers or their staff delegate**.**

The following entities and methods are used for validation of data elements for new records:

a. Department of Regulation and Licensing: Used to validate gender (if available), license granted date, and license status.
b. AMA Profile: Used for date of birth, medical education number, medical school, and medical school graduation date.
c. NPI: Used for NPI number, gender, and sometimes for clinic, phone, or fax.
d. ABMS/Certifax: Provides specialty, board, and certification type (specialty tracked by AMA specialty types).
e. Internet search: Used if practice location needs to be determined.
f. Clinic websites: Used to verify practice location; some websites also provide residency information.
g. Clinic: Call made to the clinic to verify that the physician works for the clinic.

If a change in license status is noted from the quarterly dump from DRL (e.g. status changed from current to not-current, or not-current to current), the provider information is tracked down to determine if they are new to Wisconsin (validated with NPI) or if they have retired or are deceased (checked with Social Security web site and AMA.)

The Society also uses other methods to both populate and maintain the provider directory:

- Annual Clinic Profiles: As part of the annual dues process, the Society invoices 270 clinics (from 2 – 1,500 providers). Each clinic sends a complete roster to the Society; WMS then uses this information for additions, deletions, or changes to the provider directory. The Society contacts providers and clinics directly, and uses internet searches, to validate certain information and fill in any gaps. These clinics pay annual membership dues for these physicians through one invoice.

- Quarterly rosters from large health systems: The Society receives quarterly rosters from nine large systems in the state. This information is validated against the provider directory and used for additions, deletions, or changes.
- Annual Dues Process: The Society sends a mass mail via postcard (first class) to all physicians in the state. This list is run through the National Change of Address database (NCOA); any changes noted or any returned postcards are updated in the database and followed up via phone, email, or fax to verify correct address.
- Annual Dues Process for individuals: The Society reaches out to approximately 7,400 practicing physicians in the state each year asking them to join or renew membership in the Society - approximately 20% join each year. Any returned mail from this mailing is followed up to verify correct address via phone, email, or fax. Between the group membership invoice and the individual membership over 9,000 active licensed physician memberships are tracked per year in this manner.
- Medical malpractice renewals: Annually physicians insured with ProAssurance complete renewal certificates. Those renewal certificates are reviewed by the membership staff to note any changes in physician information; changes are then made to the database.
- In addition to the above, the Society has numerous staff that updates information in real time as they hear of changes, through visits to the physicians/clinics, press releases, Google alerts, and many other sources.

Because the Society data is so robust, the all payer claims database (APDC) actually uses its data for matching physicians to the claims data. The Society sends a complete file of all practicing physicians with 22 fields populated on a bi-annual basis. It does not use the Council for Affordable Quality Healthcare (CAQH) data as input for the provider directory. CAQH has a very small presence in Wisconsin as most Wisconsin physicians delegate their credentialing to the affiliated organizations/IDNs with which they are affiliated.

Data Elements

The following data elements are tracked by the Medical Society:

Fields	**Data Elements**
Personal Information	First Name

	Middle Name
	Last Name
	Suffix
	Date of Birth
	Gender
	Affiliated County Medical Society
Professional Information	Primary/Secondary/Tertiary Specialty
	Medical Education #
	Medical School
	Medical School Grad Date
	Residency/Fellowship Training
	Residency/Fellowship Training Grad Date
	WI License Number
	WI License Status
	WI Medical License Granted Date
	NPI Number
	Board Certifications
Practice Information	Office/Practice Name (Company)
	Address/Suite
	City
	State
	County
	Nine-digit zip-code
	Office Phone
	Office Fax
	Second Practice Address information

Contact Information	Email Address
	Home Address

Data Accuracy

The Society aims for 99% accuracy, a goal that is important for Wisconsin's provider directory business purposes but expensive to execute. It targets entities whose business models are dependent on accuracy when they are determining sources for the provider directory. One of the biggest challenges noted for the Society is accurately tracking the one-to-many relationships of providers, as providers are frequently changing their affiliations.

Trust Framework

As noted above, the Society validates thirteen discrete data elements for each provider, obtained from various data sources. For Direct, each address has at least one digital certificate to securely transport (via SMTP) and receive information.

Involvement with Direct

Wisconsin is involved with Direct via their service called WISHIN Direct, which is powered by Ability Network™. WISHIN Direct allows providers to share a patient's medical history including lab results, discharge summaries, and other important information with other providers who have seen the patient—even if those providers are not part of the same practice or health system. WISHIN Direct does not use the Society provider directory (or any formal provider directory). WISHIN Direct allows users to create and maintain their own "contact list", similar to a contact list found in regular email systems. As is consistent with the Direct specifications, a WISHIN Direct user must know the recipient's Direct address, in order to send a Direct secure message to another Direct user.

The Society provider directory has been very useful to help target outreach for this service and to help understand the Wisconsin physician environment. It has been very helpful with Wisconsin's "white space" initiative, which targets providers in areas that do not have health information exchange options and who can benefit from understanding options for connectivity.

These providers are offered WISHIN Direct as an option. Providers self-register for WISHIN Direct as a minimal data set is needed.

MAINTAINING THE PROVIDER DIRECTORY

As noted in the "Populating the Provider Directory" section above, two full-time staff are dedicated to verifying and updating physician data. The Society gathers intelligence regarding changes in physician information in several ways:

- All email 'bounce-backs' are reviewed; staff reach out to physicians and clinics to verify correct email addresses and/or changes in practice.
- Physicians and clinics contact WMS directly on a daily basis to inform them of changes in their information.
- Physicians may update their information at any time via 'DR Connection' product, which allows real-time updates by administrator, providers, or authorized delegated staff.
- Quarterly updates are received from the state Department of Regulation and Licensing board, which prompts updates.
- The Society staff views the AMA website to note new providers; if a new provider is identified, the Society orders an AMA profile, to obtain date of birth, medical school information, etc.

FINAL COMMENTS

The Society notes that the process of populating and maintaining provider directories cannot be fully automated: it must be done manually, at least to some extent. The Society believes that if data is wrong, the trust in data quality goes down. They note that data maintenance is critical to a successful provider directory. However, they recognize that achieving high levels of data accuracy and data currency in the provider directory can be very costly.

The Society is aware of efforts toward a national data maintenance effort. In their opinion, this approach is not optimal for several reasons: every region practices medicine differently - these differences impact how data is collected and organized; NPIs are not always accurate; physician

affiliations are constantly changing, making it very difficult to stay current and accurate about these important relationships.

Source: Linda Syth, COO, Wisconsin Medical Society; Melissa Breen, Director of Membership, Wisconsin Medical Society; Executive Director, Waukesha County Medical Society; Jean Doeringsfeld, Project Director, WISHIN

F. Provider Directory Interview Notes: Florida HIE

Interview Guide for HIEs

FLORIDA HIE

Interview Date: 11/22/11

Interviewees:

- ***Christine Phillips, Technical Lead, Harris Healthcare Corporation***
- ***Lisa Stotz, Integration & Test Engineer***

1. **Describe the scope and status of the provider directory(ies) used in your organization for health information exchange, including:**

The Florida Health Information Exchange (Florida HIE) was awarded to Harris Healthcare Solutions in February 2012. Since that time, the Harris team has deployed both the Direct Secure Messaging (DSM) service, based upon the ONC Direct Standard, and the Express Patient Lookup service, based upon the ONC Connect standard. Rollout of the DSM services is going well. As of the interview date, 75 providers were registered (both individuals and organizations); they expect 100 providers by the end of 2011, and 500 by July 2012. While the intention is that the majority of providers will self-register, the Harris team is available to perform "facilitated registrations" which is especially useful for large organizations or those that are not particularly technically sophisticated. We also staff a knowledgeable help desk available to assist the on-boarding participant.

Harris has been involved with the Direct project, which is included in DSM. The email service offering was built with Squirrel Mail – an open source, standards-based webmail package written in PHP. The Mirth developed Provider Directory is using a "yellow pages" approach to supplement the secure email, which will only be used for treatment purposes, support for healthcare operations, public health, and reporting on clinical quality measures at this time.

In order for a provider to sign up for Direct Secure Messaging, and be listed in the Provider Directory, an extensive behind the scenes vetting process is required. Once the provider is proven to be a valid licensed or related participant, their data with organizational affiliation is entered into the Directory. DSM emails can only be sent between providers that have been vetted, so a participant can be assured that any entity that is listed in the Provider Directory has been through the same process they have, adding a layer of security.

Many providers in private groups have their own secure email and may eventually implement a Direct solution that will be able to connect to DSM. This implementation is commonly referred to as HISP-to-HISP. The Florida HIE solution will be able to connect to any private secure messaging system once that system is "Direct-Compliant" meaning that it uses the same Direct Standards.

The DSM service is available for any providers in Florida.

To participate in the service, providers must sign three documents:

1. DSM Subscription Agreement (for DSM services)

    - The Direct Secure Messaging (DSM) Agreement is signed by entities that register for the service, agreeing to use it for permitted purposes in sending health information to other authorized entities using DSM, such as physicians, hospitals, nursing homes, clinics, and other health care providers. The agreement covers all users affiliated with the signing entity who also register and are approved by the entity. (From FHIN.net web page.)

2. Participation terms and Conditions
3. Security Best Practices

Florida HIE is entering into a pilot in the spring for HISP-to-HISP functionality with other states.

The DSM and Provider Directory are centralized services. The Patient Look-Up service will be federated and will be hosted at each site where deployed, with security on each appliance. This will be deployed by the end of 2011 or January 2012.

2. **What "trust framework" exists in your organization for populating and maintaining provider directories?**

Florida uses an approach which combines validation of a subset of elements with identity proofing. Certain data elements that a participant provides during the registration process are validated using the CMS NPPES and the Florida DOH License Status data sources to confirm that the information is correct.

In order to access the provider directory (to search for clinicians or to use secure email), users must sign up for an account. This is done via a self-registration process. First the organization registers and then individual users register. Users (and organizations) sign the appropriate agreements. Next they provide the NPI for the organization (or individual) to the Florida HIE. The NPI is checked against the NPPES database (CMS) and their license number is retrieved and validated with the Florida state licensing board (the Florida HIE receives daily updates from the licensing bureau). Once the information is validated, a unique code is faxed to the number associated with the provider's NPI as recorded in NPPES. The provider organization then enters the code into the system and is notified via email when they have been approved. If an individual is registering as affiliated with the organization, the organization's account administrator must approve to complete the registration.

Harris uses a Secure Hosting Data Center for the Florida HIE, the same facility that hosts the FAA's telecommunication system. This facility monitors the system for performance and protects against security breaches. The FL HIE program is also implementing an application monitoring system to ensure that any issues are immediately addressed.

The FL HIE uses Server level certificates with X.509 Certificates issued for DSM.

Data is encrypted during transmission and at rest, and can only be accessed by the recipient.

An Audit log is kept which includes a record of every transaction between providers, only recording the sender, receiver, and timestamp. No PHI is recorded in the Audit Log. This Log can

be used by the facility's Privacy Manager to monitor traffic and analyze patterns to see if any privacy issues are present.

3. **How do you populate the provider directory?**

The adoption team (3 FTEs) reaches out to providers to describe the available services. During visits, they help with the registration/enrollment process (see above).

To validate providers, Florida HIE uses the NPPES database. They currently receive monthly updates but suggested it would be a huge benefit to get daily or real-time updates.

To denote provider specialties, Florida HIE uses the categories used by the Florida Agency for Health Care Administration (AHCA).

To register: organizations must register first, and then a provider can register. Someone in the organization must approve the providers request for the account.

Data elements: 20 data elements are collected and used. These are the same data elements used in NPPES files. They follow the HPD specs: http://www.ihe.net/Technical_Framework/upload/IHE_ITI_Suppl_HPD_Rev1-1_TI_2010-08-10.pdf

Florida is currently using SMIME with the Direct standards. Florida HIE will upgrade DSM to use current Direct specifications when available.

4. **What are the key issues and challenges you are facing in populating the provider directory?**

The CMS NPPES data may be out of date, and when a provider updates it in preparation for registering for DSM, it can take up to a month before CMS extracts the data and makes it available for the Florida HIE to download. Registration checks this file for verification.

5. **How have you addressed these issues and challenges?**

To date, all issues encountered with self-registration have been data issues. When the team knows that a facility is going to sign up, we do a pre-vet of their information against the CMS and FL licensing databases. We work with the provider to correct any erroneous information and assist them through the registration process. It would improve the registration process if two actions were taken:

- Providers are reminded of their legal responsibility to keep the data in the CMS NPPES database current.
- CMS either releases a downloadable file on a more regular basis so that updates to the database can be accessed quickly, such as the next day, or CMS provides an interface to allow the states to query the live system directly, such as web services.

Until the Federal Database issue is corrected, all states using the CMS NPPES database will have issues with vetting of providers which will ultimately affect adoption.

6. **How do you actively maintain the provider directory?**

Providers have the ability to update their own information. At times, it will be necessary to update the Subscription Agreement. When updates are needed, all users will be asked to re-sign. This will also be a good time for participants to update their information. The Florida HIE also uses a Help Desk to assist the users to keep their profile current.

7. **What are the key issues and challenges you are facing in maintaining the provider directory?**

The CMS database (NPPES) does not provide updates as frequently as Florida HIE would like. As HISPS connect to other HISPs, a key challenge is how each individual HISP Provider Directory can access another HISP. Currently, a provider in one HISP must know the HISP address of the intended recipient in another HISP, rather than being able to look it up.

8. **How have you addressed these issues and challenges?**

The HISP-to-HISP implementation will be piloted in the Spring of 2012 and many of the administrative functions of the system will need to be worked out then. This is a multi-state effort so it is hoped that universal best practices will be developed to handle this cross sharing

of information. In the short term, this is not a difficult problem due to the small number of participants. It is when the HISP-to-HISP grows to a large number that it will become difficult for maintenance so there is some time to analyze this problem and come up with an effective solution.

9. **Do you have any recommendations for best practices for populating and maintaining provider directories?**

When implementing at the state level, Florida HIE suggests that DSM participants think carefully about who their partners will be (or who they would like them to be) and carefully target them to sign on for DSM together so that they are able to exchange secure emails.

G. Provider Directory Interview Notes: CAQH

Interview Guide for Provider Directory Vendors (Data Sources)

CAQH (Council for Affordable Quality Healthcare)

Interview Date: 11/22/11

Interviewee:

- ***Christy Stroup, Sr. Sales and Business Development Manager for Universal Provider DataSource (UPD)***

1. **Describe the scope and status of the provider directory (UPD) services offered by and/or utilized by your organization, including:**

CAQH is a nonprofit alliance of health plans and trade associations that collaborate on initiatives to simplify healthcare administration. A key initiative of CAQH is the Universal Provider Datasource (UPD) - a well-established on-line registry of comprehensive self-reported provider information that is widely used for credentialing. The UPD is also used for claims processing, quality assurance, emergency response, and member services support.

CAQH is a multi-stakeholder organization that was launched in 2002. It provides information on providers to approximately 600 plans, hospitals, and managed care organizations. Over 800 different data elements are collected for each provider.

Currently there are 980,000 providers in the UPD, with approximately 8,000 new providers added each month. Three of every five physicians in the country participate in the UPD.

There is no cost to physicians or other healthcare professionals to use UPD. Fees are covered by the recipients of the data. The recipient credentialing organizations pay an annual participation fee and a fee to access the data:

- $5,000 the first year, plus $4.50/year for provider (MD, DO, dentist), $3.50 year for allied providers
- $3,000 every year thereafter

CAQH has proposed its database as a resource for populating HIE directories. They plan to assist HIEs in managing consent needed in an opt-in model where there is a need to identify providers in the network. Providers will need to opt-in for CAQH to share information.

2. What "trust framework" is used to populate and maintain provider directories?

Providers do not self-select the recipients of their data; rather, the data recipient/entity tells CAQH what data they want to receive (typically for credentialing purposes). The entity must attest that they have a relationship with the provider, and must supply minimum data used to a) determine if the provider has an existing record in UPD, then b) authenticate the identity of the provider. For example, a health plan's network enrollment coordinator obtains personal data from a physician. The health plan then submits the data to CAQH. CAQH uses matching logic to locate the record of the provider by matching personal information they have on file, resulting in a request to the provider to authorize release of his/her data.

In cases when there is no existing record, the minimum data is used to authenticate the provider identity. Providers unable to match the stored personal data are not permitted to create a unique login and password. Once a provider registers in the CAQH system, their identity has been authenticated. The provider's log-in and password becomes the electronic signature for subsequent attestations. When a provider opts in, they have already been vetted ('wet' signature on file).

As noted by Sorin Davis, Managing Director of UPD, "An additional reason that CAQH believes the UPD has been so widely adopted by providers has been its adherence to the foundational principles of access, accountability, trust, and transparency, as well as its not-for-profit status. The UPD business model is straightforward and transparent: providers have free access to the system and visibility and control over who is receiving their data. There are no hidden fees or special system or software investments required. The system is sustained by participating user

organizations that pay a nominal annual subscription fee based on the number of providers whose data they require."

3. **How do you create and populate the provider directory?**

Providers themselves are the primary data source for information. The medical office staff may also contribute business data to provider applications. Providers simply log in and fill out the form on-line. The provider retains ownership of their data and data is not shared with any sources that are not authorized by the providers.

Information in the UPD has been independently assessed to be 94% accurate. Planned system enhancements are expected to improve accuracy to greater than 98%. CAQH is changing the wording on some questions to improve accuracy.

4. **What are the key issues and challenges you are facing in populating the provider directory?**

A key issue for CAQH is how to obtain additional data needed for HIE purposes such as specific gateway addressing.

5. **How have you addressed these issues and challenges?**

CAQH is in the process of developing a pilot for digital certificates. They are considering a number of solutions and technologies, and may use multi-level authentication (e.g. attest to the business location, address, etc.). However, the provider must attest to specific sensitive information. At this time, CAQH has no specific gateway address requirements as they do not have 100% of what is needed for this. Many organizations have 60-80% of what is needed; however CAQH is still determining the best way to obtain the last 20 – 40% of the data needed to make the information complete and comprehensive.

One potential source of this information is within the Medical Staff Services departments at hospitals. Medical Staff Professionals do credentialing in hospitals and prepare applications for privileging committees. Many academic medical centers have a delegated relationship with payers; i.e. credentialing is delegated to hospitals. Therefore, while the hospital-based provider

data from the medical staff office would offer a lot of overlap with existing data, it would also potentially fill in many of the data gaps.

CAQH is working with the National Association of Medical Staff Services - NAMSS - to build a delegation profile of 75 data elements. The hospital administrators could then attest to this smaller data set, which could be shared with an HIE.

6. **How do you actively maintain the provider directory?**

CAQH sends reminders to providers to update and attest to their information at least three times per year. Providers or their delegates may update information at any time. More than 80% of providers routinely attest to their data every 120 days. Over 61% of those providers re-attesting have a data change, with the most common changes for malpractice information and for address changes.

Updates are sent daily or weekly to subscribing organizations. Credentialing clients receive updates of any changes with their daily or weekly updates, identifying the location of the change, the old data, and the new data. Information is delivered in XML or ASCI formats for electronic consumption, with changes being sent in a text file. Most clients receive a daily extract.

7. **What are the key issues and challenges you are facing in maintaining the provider directory?**

We have confirmed that the data we have is very good in terms timeliness and accuracy, however we do not have a way to confirm that we have all of the data – for example, if a provider has multiple locations, we are not certain that he has reported all of them.

8. **How have you addressed these issues and challenges?**

The Delegation Profile will be of great help. Additionally, our members and participants are assisting in directing providers to submit data changes to UPD, and are eliminating their legacy data collection (often paper) forms.

9. **Do you have any recommendations for best practices for populating and maintaining provider directories**?

The provider must be involved in reporting. They are the most authoritative source.

H. Provider Directory Interview Notes: Availity

Interview Guide for Provider Directory Vendors (Data Sources)

AVAILITY

Interview Date: 11/18/11

Interviewee:

- **Trent Gavazzi,** Senior Vice President and Chief Technology Officer
- **Jon Zimmerman,** Senior Vice President and General Manager, Clinical Solutions
- **Joy Fulton**, Operations Manager, Clinical Solutions

1. **Describe the scope and status of the provider directory (PD) services offered by and/or utilized by your organization, including:**

Availity and its subsidiary, RealMed, are national leaders in health information exchange that help the health care system run faster and better. They connect providers, plans and practice management systems with essential real-time business and clinical information to streamline care delivery, drive staff productivity, and lead to better patient experiences.

Availity optimizes information exchange among multiple health care stakeholders through a single, secure network. The Availity Health Information Network encompasses business and clinical services, supporting both real-time and batch electronic data interchange via the Web and business-to-business (B2B) integration. Key services include batch, clearinghouse, and real-time connections to patient responsibility and payment solutions as well as clinical health records and electronic prescribing. For more information, visit www.availity.com.

RealMed, an Availity company, is a national leader in revenue cycle management solutions for the health care industry. RealMed builds on the value offered by Availity's basic solutions by bundling and automating multiple functions that maximize bottom-line operational results. For more information, visit www.realmed.com.

Availity's provider directory is used primarily for claims payment and eligibility checking. The provider directory includes 200,000 physicians and providers of care, 1,000 hospitals, 1,300 health plans, and 450 industry partners. The company has been in operation since 2001. Primary data sources for the provider directory are the owner-health plans and select third party data feeds such as Health Market Science. The provider directory is not sold commercially.

The product roadmap includes products that combine clinical and transaction processing data for care profiles and quality purposes; services that connect UR nurses on the plan and provider sides; and claim attachments: electronic submission of medical documents (esMD).

Availity is supporting Direct by developing specifications for a standard-based way to establish universal health addressing and transport for participants to send encrypted health information directly to known, trusted recipients over the internet.

2. What "trust framework" is used to populate and maintain provider directories?

N/A

3. How do you create and populate the provider directory?

Availity's provider directory is populated with data from its health plans as well as third party data feeds such as Health Market Science. The process of populating the provider directory is highly automated, with manual follow-up for any outliers. There is no formal synchronization between the payers and Availity. Follow-up of outliers is done by deployment reps that call customers and occasionally do in-person visits.

No specific standards are used for the provider directory.

4. What are the key issues and challenges you are facing in populating the provider directory?

Availity is always refining and streamlining its approach to populating the provider directory.

5. How have you addressed these issues and challenges?

Availity uses various data sources and technologies to increase the accuracy and coverage of the provider directory.

6. How do you actively maintain the provider directory?

Updates to the provider directory vary somewhat by payer/plan. All plans do annual updates of providers, which are fed to Availity. Availity does monthly scrubs of data feeds they receive.

7. What are the key issues and challenges you are facing in maintaining the provider directory?

There is nothing significant enough to mention beyond normal data management and cleansing challenges.

8. How have you addressed these issues and challenges?

Availity uses extensive automation and reconciliation technologies.

9. Do you have any recommendations for best practices for populating and maintaining provider directories?

It takes a long time to build a robust provider directory and is only as good as the last update. Always continue to focus on streamlining the process of populating and maintaining the provider directory.

It's very important to offer value to providers and to have a clear ROI for the provider directory effort. Be specific about the business goals and work toward these goals.

Availity believes the track has already been laid for data exchange and is concerned that payers are being left out of HIE activity. They believe that Medicaid has created "a monster set of redundant infrastructure" by using the private rails that are in place today.

Availity has no plans to offer a stand-alone commercial provider directory offering.

I. Provider Directory Interview Notes: IBM Initiate

Interview Guide for Provider Directory Vendors (Data Sources)

IBM INITIATE

Interview Date: 11/28/11

Interviewee:

- ***Tim Capra, Account Executive***
- ***Stephen Devir, Account Executive***
- ***Chad Cosper, Product Manager***

1. **Describe the scope and status of the provider directory (provider directory) services offered by and/or utilized by your organization, including:**

Initiate is a vendor of provider directory technology and services that offers software to create and manage provider directories for a variety of customers. They partner with many HIE vendors for provider directory services.

Initiate offers three software products related to provider directories: Initiate Provider, Initiate Inspector, and Initiate Provider Direct. These products assist HIEs and other healthcare entities with the creation and maintenance of their provider directories. The tools help populate provider directories with data feeds from multiple data sources.

Initiate does not provide data sources to customers, but rather, uses their data sources. The sizes of the provider directories vary, depending on the customer.

The product line was started about twelve years ago. It was originally created as a software platform to develop EMPIs for healthcare. The tools are very flexible and can accommodate automated feeds. They are designed to automatically update the provider directory upon receipt of new information from data feeds.

Initiate can accommodate individual-to-entity relationships. This functionality is set up during the install. The architecture can be extended so that data attributes can support local use cases, such as credentialing and health information exchange.

Currently, Initiate has over 100 health care provider (hospital and IDNs) clients using the software for patients several of which also use it for providers, approximately ten HIEs using it for both patients and/or providers as well. Maine is using Initiate for a patient directory; NY is using Initiate for state health and human services agencies.

2. **What "trust framework" is used to populate and maintain provider directories?**

   N/A

3. **How do you create and populate the provider directory?**

Initiate tools help clients acquire and load data into provider directory from variety of sources. Data can be loaded from batch files. Initiate comes with tool sets that allow clients to load data themselves.

Data comes into Initiate and is then matched and linked across data sources, to create a complete historical record.

It is considered an enabling technology because it can take data from sources and create a "golden record." It can also create different views of the same record.

Initiate can match sparse data sets and allow a user to define the most trusted data. Initiate Inspector allows viewing and updating of potential matches.

Data accuracy is controlled by the customer. Initiate allows the user to utilize whatever matching algorithm they need and/or prefer.

Initiate adheres to IHE standards, as applicable. They are tracking ONC's work on defining the ways data is called/used in the implementation of Direct. Initiate is conforming to developing standards and helping to facilitate development of standards for provider directories.

4. **What are the key issues and challenges you are facing in populating the provider directory?**

A big challenge lies in integration issues, such as figuring out how to work with other vendors to help set up HISPs.

5. **How have you addressed these issues and challenges?**

(No answer provided.)

6. **How do you actively maintain the provider directory?**

Customers may update the provider directory daily. Source systems update directly into the hub.

If needed, the hub can be updated immediately, using a web-based tool.

Once set up, 90% of customers manage independently with no help from Initiate.

7. **What are the key issues and challenges you are facing in maintaining the provider directory?**

The biggest challenge for populating provider directories is data stewardship, such as duplicates, etc. Initiate software has a mature toolkit and can help manage data stewardship challenges with various tools and processes.

Initiate noted that data governance is a big issue for customers.

8. **How have you addressed these issues and challenges?**

IBM/Initiate has resources to assist customers with data governance issues if needed. They will help maintain and manage trusted information, help develop policies around governance, and help determine who is responsible for what.

9. **Do you have any recommendations for best practices for populating and maintaining provider directories?**

Use a platform that allows for easy flexible integration.

Use a flexible data model that accommodates both individual and entity providers.

Use a platform that has tools for data stewardship.

Ensure governance and policies are in place to govern and manage issues with the data, such as when the data will be available, who can access to data, etc.

J. Provider Directory Source Matrix

PD Source Matrix V0.6.xlsx

K. Provider Directory Interviewee Characteristics

PD Interviewee Characteristics Jan 2(