Agenda

Title / Purpose:	MiHIN Technical Workgroup Meeting		
Meeting Date:	Mar 22, 2010	**Facilitator:**	Mike Gagnon
Place:	Conf Call and Web-ex	**Time:**	9:00 AM – 11:00 noon
		Conf Call #:	1-888-394-8197 Passcode: 869479
		Web Link	https://premconf.webex.com/premconf/j.php?ED=103286962&UID=0 Password: mihin-tech11

Topic 1:	**Attendance, Review and Approve Minutes**	**10 Min**
Materials:	Meeting Minutes	
Presenter:	Ken Theis and Rick Warren	
Topic 2:	**Update on VTCT**	**10 Min**
Materials:	None	
Presenter:	Mike Gagnon	
Topic 3:	**Review Strategic Plan**	**20 Min**
Materials:	MiHIN Technical Section of Strategic Plan	
Presenter:	Mike Gagnon	
Topic 4:	**Review Security Use Cases**	**30 Min**
Materials:	None	
Presenter:	Rick Brady and Mike Gagnon	
Topic 5:	**Review Preliminary MiHIN Operational Budget**	**40 Min**
Materials:	MiHIN Budget Spreadsheet	
Presenter:	Mike Gagnon	
Topic 7:	**Public Comment Period**	**10 Min**

Meeting Minutes

Title / Purpose:	MiHIN Technical Workgroup Meeting		
Meeting Date:	Mar 8, 2010	**Facilitator:**	Mike Gagnon
Place:	Conf Call and Web-ex	**Time:**	9:00 AM – 11:00 noon
		Conf Call #:	1-888-394-8197 Passcode: 869479
		Web Link	https://premconf.webex.com/premconf/j.php?ED=102412537&UID=0 Password: mihin-tech10

Topic 1:	**Attendance, Review and Approve Minutes**	**10 Min**
Materials:	Meeting Minutes	
Presenter:	Ken Theis and Rick Warren	
Topic 2:	**Report from Latest Governance Workgroup Meeting**	**10 Min**
Materials:	none	
Presenter:	Beth Nagel	
Topic 3:	**Update on VTCT**	**10 Min**
Materials:	None	
Presenter:	Mike Gagnon	
Topic 4:	**Imaging Standards for HIE**	**10 Min**
Materials:	None	
Presenter:	Mike Gagnon	
Topic 5:	**Discuss NHIN Direct**	**20 Min**
Materials:	None	
Presenter:	Mike Gagnon	
Topic 6:	**Other updates from HIMSS**	**10 Min**
Materials:	None	
Presenter:	Mike Gagnon	
Topic 7:	**Public Comment Period**	**10 Min**

DISCUSSION	**Topic 1: Attendance, Review and Approve Minutes**
Roll Call of Voting Members –Doug Dietzman, Mark Tuthill and Bruce Weigand were absent.	
Motion to approve meeting minutes from February 8, 2010 was seconded and meeting minutes were approved.	

Motion to approve meeting minutes from February 22, 2010 was seconded and meeting minutes were approved.

ACTION ITEMS	PERSON RESPONSIBLE	DEADLINE
None.		

DISCUSSION	Topic 2: **Report from Latest Governance Workgroup Meeting**

Beth reported on the March 4 Outcomes of the Governance Meeting. A summary is listed below.

- There will be statewide shared services such as a Master Patient/Provider Index and Record Locator Services, Security Services, Messaging Gateway that can be utilized by all Health Information Exchange initiatives in Michigan
- Starting with cross sub-state HIE Lab Results Delivery and integration with public health as initial use cases makes sense.
- HIE in Michigan today is not always “local” nor “regional” since HIE initiatives are forming in natural partnerships across the state and not bound by geography. A better descriptor may be “sub-state” HIE as opposed to regional or local HIE.
- The term backbone can be misleading. It may be better to refer to core services that compose the current statewide technical architecture as “statewide shared services”.
- Since mostly HIE initiatives in Michigan will connect and use the “shared services” then it is important for the sub-state HIEs to take the lead role in Governing and Financing these shared services. This holds to the guiding principle that “those who benefit should pay” and further holds to the decision that those who will utilize the system are central to governing the system.
- There is a role for state government as part of governance since public health communication is a core functionality and the state is paying significant costs for the matching funds.
- Next Steps were identified.
- Next steps and details can be found in the document posted on Workzone.

ACTION ITEMS	PERSON RESPONSIBLE	DEADLINE
Make the report available to Technical WG members.	Sharon	Mar 10

DISCUSSION	Topic 3: **Update on VTCT**

4 Subgroups are active on the wiki:

1. Overall architecture
2. Security
3. Standards
4. HIE interoperability

Rick Brady is facilitating the Security Subgroup and Huzaifa Jamali is facilitating the Interoperability Subgroup. Mike Gagnon is facilitating the other two.

Security and Architecture subgroups have deliverables to produce.

A voting member asked if communicating with other states will require a duplicate architecture. Mike’s answer is that no, it would not require a duplicate architecture because it would most likely be implemented via a set of standards allowing one to one communication (i.e., one state communication with another). There could be some complexity but not so that you would need a broker, i.e., backbone. When it comes to federal shared services or communicating across multiple states, some additional architecture might be needed. What we learn at the state level will inform the national level.

A voting member asked which vendors are participating and the answer is that the list of participants will be published on Workzone. However, there is not an even amount of participation from each participant. Mike will attempt to encourage broader participation.

ACTION ITEMS	PERSON RESPONSIBLE	DEADLINE

Provide workgroup members with the list of vendors participating in the VTCT.	Sharon	Mar 10

DISCUSSION	Topic 4: **Imaging Standards for HIE**

Imaging standards are becoming more robust. Two vendors have products that exchange images using XDS-I which involves a registry of images and the report link to the image. This is very similar to XDS.b which is the standard for document interchange.

ACTION ITEMS	PERSON RESPONSIBLE	DEADLINE
None.		

DISCUSSION	Topic 5: **Discuss NHIN Direct**

NHIN Direct is a new initiative from the ONC was announced at the conference. They are trying to simplify the way a physician can meet meaningful use requirements with their electronic health records. They portrayed user stories such as a primary care provider referring patient… It is a more standardized method of point to point communication.

The intention is good but there may be reason to worry about implementation. If this simplifies a physicians ability to meet meaningful use requirements by allowing them to send documents directly to another provider, why would the provider ever want to connect to the HIE or MiHIN? It is a non-technical concern about the policy. Point to point communications should be done carefully so policy and technology are not moving backward. Technically this may not fit will with what is being proposed for the MiHIN. A voting member points out that it comes down the business model that is going to entice physicians and HIEs to join the statewide network. Perhaps the MiHIN initiative could get involved and make this an opportunity by participating in the overall process.

ACTION ITEMS	PERSON RESPONSIBLE	DEADLINE
None.		

DISCUSSION	Topic 6: **Other updates from HIMSS**

Interoperability Showcase demonstrated 60 interoperable use cases. It is the result of IHE Connectathons where vendors with specific use cases to solve send their engineers to test software and hardware interoperability. Once interoperability is proven, these vendors can then enter the use case in this Interoperability Showcase at the HIMSS conference.

For example, one vendor demonstrated public health reporting of immunizations and then produced a C78 and pushed it up to system acting like a backbone. Another did a query for vaccination. The learning was that the MiHIN initiative *will* get a vendor that can supply a system to do what we want it to do.

Another learning from the HIMSS conference was other states proving out the value of the network. Virginia has an interesting financial sustainability model involving a connection to the Social Security Administration. And in Maine, – Orion and 3M have been up and running for almost a year and declaring 2-3 million dollars a year in savings from better coordination of care.

Vermont uses the concept of a 'primary care medical home' in what they call the Blueprint for Health where the four insurers in that state stopped or cut back on their own care improvement programs and redistributed funds to getting a state network set up. It is a strategy that affects technology choices.

Axolotl was able to report that they have a cross- community interoperability where one HIE is communicating with another HIE that has a different vendor in Buffalo, NY.

ACTION ITEMS	PERSON RESPONSIBLE	DEADLINE
None.		

DISCUSSION	Topic 7: **Public Comment Period**

No Comments.

ACTION ITEMS	PERSON RESPONSIBLE	DEADLINE
None.		

Attendance list

George Boersma	MiHIN PCO
Rick Brady	MiHIN PCO - Consulting Team
Nathan Bunker	Member
Lee Castiglioni	Member
Marcus Cheatham	Voting Member
Kelly Coyle	Member
Doug Dietzman	Voting Member
Darrell Dontje	Member
Christine Fend	Member
John Hazewinkel	Member
Jeff Hawley	General Public
Paul Groll	Member
Huzaifa Jamali	MiHIN PCO – Consulting Team
Patrick Klima	Member
Troy Lane	Member
Thomas Lauzon	Voting Member
Harry Levins	Member
Linda McCardel	Member
Paul G. Miller	Voting Member
Robert Moerland	Member
Deb Mosher	Member
Amber Murphy	MiHIN PCO – Consulting Team
Beth Nagel	MiHIN PCO
Harvey Organek	Member
Laura Rappleye	MiHIN PCO
Randall Rothfuss	Member
Pradip Sengupta	Member
Kathy Smith	Member
Dan Stross	Voting Member
Rick Warren	Co-chair
David West	Member
Ernest Yoder	Voting Member

Strategic Plan

MICHIGAN DEPARTMENT OF
dit
INFORMATION TECHNOLOGY

Michigan Department of Community Health
MDCH
Jennifer M. Granholm, Governor
Janet Olszewski, Director

Table of Contents

2.4 Technical Infrastructure

Technical Infrastructure Overview

The overarching goal of the MiHIN Technical Architecture is the secure and efficient exchange of patient's health care information to improve operational efficiency and patient care. The MiHIN is designed as a network of networks with local providers connecting to Community or Private HIEs which connect to the MiHIN Shared Services Bus (SSB; previously called the backbone) and then to the NHIN. The following goals and guiding principles are the basis for our architecture design.

GOALS

The Technical Workgroup was tasked with the following:

1. Put current and comprehensive patient information in the hands of practitioners at the point of care.
2. Electronically exchange clinical information between disparate health care information systems (e.g., hospitals, laboratories, physician offices, ambulatory treatment centers, and pharmacies) while maintaining the integrity and meaning of the information being exchanged.
3. Facilitate delivery, access and retrieval of clinical data to provide safe, timely, efficient, effective, equitable, patient-centered care.
4. Drive quality improvements and be patient-centered as opposed to driven by efficiency or cost reduction.
5. Make HIE and HIT are compatible and interoperable
6. Institute business process and behavior changes at the provider level to facilitate the sharing of information.
7. Align HIE and HIT incentives for the adoption of such technologies
8. Free clinical data from their silos, transform it and deliver it securely, rapidly and reliably to the patient's caregiver;
9. Aggregate and organize clinical data to inform physicians and other caregivers about the patient's complete history and treatment, thereby enhancing quality and patient safety;
10. Promote the development of statewide master patient and provider indices and a record locator service (RLS)
11. Identify and develop HIT and HIE solutions for medically underserved areas, technology challenged areas or areas falling between naturally occurring regional HIEs
12. Promote national standards to guide the sharing of information and electronic data interoperability.
13. Safeguard privacy and security of personal health information.
14. Leverage existing health information systems.

GUIDING PRINCIPLES

This section contains an overview of the Guiding Principles and includes are statements about how the MiHIN must behave to fit into the existing business and technical environment. One of the initial decisions made within the Technical Workgroup was that the MiHIN would be

designed to be an open, scalable and extensible infrastructure. The guiding principals were revisited and tested several times during workgroup discussions, debates and the various perspectives considered in the design. The guiding principles acknowledge the MiHIN will:

1. Be built from numerous vendor products which must interoperate
2. Be vendor agnostic
3. Support multiple communication protocols within reason (FTP, SOAP, Sockets, etc).
4. Be a hybrid architecture that will not be entirely federated or centralized
5. Comply with the latest interoperability standards but be practical enough to get something working
6. Undertake an incremental approach to implementing a statewide architecture
7. Be consistent with Industry Standards (web services, etc) when not in conflict with our design
8. Focus on designing Information Exchange, not end-user applications
9. Interoperate with existing state and regional healthcare delivery systems
10. Interoperate with Community HIEs
11. Interoperate with existing state systems
12. Use web services for real-time communications where feasible
13. Interoperate with the NHIN
14. Be highly secure and HIPAA compliant for all external communication paths
15. Maintain the privacy of patient data
16. Be extensible (capable of adding new functions or services easily)
17. Be scalable (capable of adding more users, transactions or other volumes of work easily)
18. Support delegated user authorization, authentication & administration
19. Support auditing
20. Be able to support data and analytical capabilities
21. Be cost-effective to maintain

Technical: Strategic Direction based on Planning Process

This section describes the strategic approach to the technical architecture design for the MiHIN based on the priorities identified in the ONC Guidance for Meaningful Use and guidance from the Michigan HIT Commission. The MiHIN is an infrastructure design that enables widespread interoperability among disparate healthcare systems. This design is both vendor agnostic and technology agnostic, and focuses on technical standards, protocols, and architectural patterns. The architectural design framework will guide detailed requirements definition, vendor selection and the implementation of the MiHIN shared services bus.

Many business process, design and technology issues regarding HIT and HIE still need to be resolved, and much of the technology is still emerging and maturing. The intent of this technology infrastructure design is to look long-term at networking infrastructure and business models that support many different needs for information exchange and act short-term beginning with a few kinds of information exchange that encourage provider and organizational

participation and generate cost savings that lead stakeholders to accept long-term financial participation in the networks.

The architectural details specified here are intended to accommodate implementation of a State of Michigan shared services bus and local Health Information Exchange (HIE) projects while providing a framework that sets boundaries on the dimensions of technical implementation to ensure interoperability and consistent operation. The MiHIN design supports healthcare transactions and interactions among a variety of entities that are healthcare data sources (e.g. – hospitals, physician practices, insurance plans, etc.) and healthcare data consumers. Relevant interactions between the MiHIN Shared Services Bus and Community or Private HIEs are described in this section.

Since standards are critical for long-term viability of the MiHIN the architecture has an overarching goal to be compliant with the national standards for healthcare interoperability recognized by the Secretary of the Department of Health & Human Services (HHS). Specifically, HHS recognizes interoperability specifications containing harmonized standards published by the Healthcare Information Technology Standards Panel (HITSP), and as such, the MiHIN is being designed as a HITSP-compliant and HITSP-consistent (where no direct conformance criteria exist) architecture. The approach to accomplish that goal will be described in this section.

As national standards for interoperability and data exchange are developed and adopted, MiHIN will advocate, promote, align with state standards and foster adoption of national standards by all Michigan HIEs. The use of such standards will provide organizations with the interoperability necessary to electronically move clinical information between disparate provider organizations.

BACKGROUND

This section contains an overview of the background for our technical architecture and includes the planning and requirements approach, participants, the starting point, rules of engagement and the results of the planning process during the course of the time allotted for the design effort.

The approach to the technology design effort was a workgroup effort recommended in the Conduit to Care report in 2006. The workgroup was assembled to provide recommendations regarding possible technical architectures that can be used to facilitate health information exchange (including Master Patient and Provider Indexes, security protocols and options, network robustness, disaster recovery, etc.) and to provide guidance/guidelines on national and developing standards.

The MiHIN Technical Workgroup was formed along with other workgroups for Governance, Finance, Privacy & Security and Business Operations. Members consisted of representatives from hospitals and health systems, local public health, behavioral/mental health, Federally Qualified Health Centers (FQHCs), health plan/insurer/payers, health research, laboratory systems, multispecialty group practices and pharmacy systems. Starting in December 2009 the workgroup met regularly for four months to interact and leverage the collective business and

technical expertise addressing issues and developing a technical architecture design for the MiHIN.

As a starting point the workgroup members studied the Conduit to Care report, the HIE Early Adopter and Technical Environment Analysis from the fall of 2009 and the list of deliverables to be produced by the workgroups. Vendor presentations provided members with an up to date assessment of the maturity of the technology in this space, core competencies and capabilities vendors foresee in their solution in the near to distant future. Each workgroup was informed of the expected deliverables of the other workgroups and the timing for touch-points when information and results would be exchanged. A timeline was developed so each workgroup could stay on track with their own deliverables while being dependent on the deliverables of another workgroup. For example, the technical workgroup would be provided the prioritized business use cases defined by the Business Operations workgroup.

ENVIRONMENT

This section contains an overview of internal and external factors affecting the technology design decisions, including the strengths that could be leveraged with the proposed design

Geographic / Demographic Environment

Michigan has two geographically separate peninsulas and a smaller one in the form of the "Thumb", land borders with four states and three border crossings with Canada, and a balance of urban to rural population above the national average. Southeast Michigan is very diverse and functionally equivalent to several regions. The geography, history, demographics and evolution of health markets has resulted in distribution of population and services that initially is best served by multiple regional HIE initiatives.

Business and Political Environment

The Michigan Department of Information Technology (MDIT) has an established and extensive cross-boundary (XB) program, with shared cross-jurisdictional governance in multiple areas. The Office of Technology Partnerships was established to foster technology collaboration and partnerships with business, K-12, universities, non-profits, and local units of government. IT Plan goals call for sharing, collaboration and a statewide community of partnerships. MDIT developed a formal cross-boundary strategic and operational framework, bridging internal and external IT solutions.

An HIE Early Adopter and Technical Environment study in 2009 determined the Health Information Exchange (HIE) is occurring on a limited scale in Michigan. Health information is being captured electronically and some capacity to exchange health information has grown organically. Health Systems have created the ability to send data to and from its users: providers, labs, hospitals. This benefits Health Systems by introducing efficiencies (e.g. reducing paperwork, reducing transaction times). Providers or provider groups are using HIE to get incentive funds from eRx and Patient Centered Medical Home initiatives.

Other business and political considerations are:

- Nine medical trading areas (MTAs); 1 has a security framework implemented and is working to exchange data (Upper Peninsula); 1 has a contract and is in implementation (Capital Area RHIO); 7 are in various stages of planning.
- Some large stakeholders may not be participating in a region and some have the beginnings of Private HIEs
- Payer mix: Blue Cross Blue Shield (BCBS) (60%), Medicaid (state Medicaid plus some managed care companies) (20%), Medicare, other private payers, Priority Health, Physicians Health Plan (PHP). Delta Dental is also a player.
- BCBS and Medicaid using X.12 HIPAA transaction code sets. BCBS acts as a clearinghouse for many transactions.
- Large healthcare systems: Trinity, Spectrum, Henry Ford

Technical Environment

The Michigan Department of Information Technology fosters a foundation of experience and national caliber IT capabilities evidenced by the Center for Digital Government award that recognized Michigan as the number one digital state in 2004. The award was given for SOM's IT-based service delivery, architecture and infrastructure, collaboration, and leadership. Additionally, Michigan has had extensive experience with many health IT approaches and projects including telemedicine, vital records, immunization registry, disease surveillance, Medicaid management, pharmaceutical pricing and others.

In October 2009, a State of Michigan Systems Analysis provided a comprehensive report of the current and near future state of State of Michigan technology and systems environment as it relates to the MIHIN. The report detailed existing IT assets and assessed capabilities in terms of connecting and interactions with the proposed MiHIN and providing infrastructure or other benefits to it. This report was an essential tool in creating an architecture that both leverages existing State resources and insures the systems can connect to and benefit from it.

As mentioned above, one of the main categories in the ONC's mandate for "Meaningful Use" is Public Health Reporting and the SOM systems listed below fall squarely in this category.

1. The Michigan Care Improvement Registry (formerly the Michigan Childhood Immunization Registry) (MCIR) is an award winning, state-of-the-art electronic, statewide immunization tracking system for all citizens who receive, or are offered, immunizations anywhere in the state of Michigan. This system is accessible to both private and public providers and was just recently expanded to people of all ages.

2. The Michigan Disease Surveillance System (MDSS) has been in operation since December 2003 and currently receives 2500 emergency department registrations per day from over 20 facilities. The System is designed to facilitate public health rapid detection and response to unusual outbreaks of illness that may be the result of bioterrorism, outbreaks of infectious disease or other public health threats and emergencies.

3. The CHAMPS Medicaid Management Information System (MMIS) is a next generation, automated management and control system for the Michigan Medical Assistance

Program (Medicaid). MDCH and MDIT are currently engaged in an effort to replace the existing MMIS for the State of Michigan, which was first developed in the late 1970s. Michigan will be the third state in the nation to implement this cutting edge suite of products.

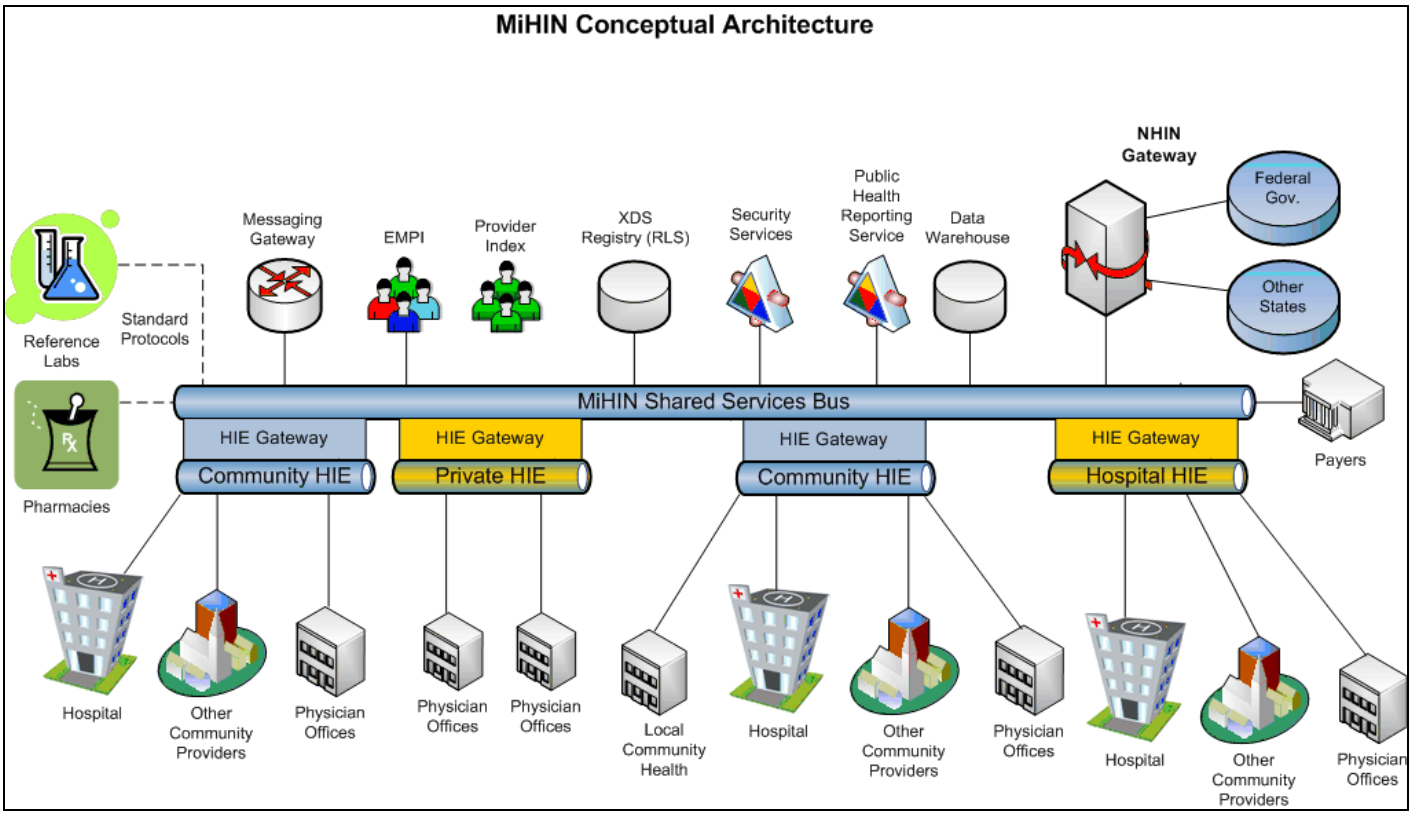
The SOM Systems Analysis report identified other factors that can be leveraged in the architecture design such as Data warehouse architecture and tools and platforms such as IBM Websphere (even while there are no current SOA standards). The report summarized the strengths, opportunities and challenges the State of Michigan will face as it moves forward with MIHIN integrates and leverages its existing systems and infrastructure resources.

PROPOSED CONCEPTUAL ARCHITECTURE

The MiHIN Architecture Design has three main parts:

- Connectivity to the NHIN
- The MiHIN state-wide shared services bus
- Interoperability with data sources and consumers

The MiHIN will be implemented using a service-oriented architectural paradigm (SOA), implemented through web services operating through an enterprise service bus (ESB), with a four-tier protocol stack. The Conceptual Architecture of the MiHIN is depicted in the figure below:



MIHIN Conceptual Architecture

Core Design Concepts

The design of the MiHIN Shared Services Bus is predicated on there being relatively few direct connections (<50). The idea is based on the common network design principle of segmentation for performance, security and reliability. We expect that a significant amount of the patient data that needs to be exchanged will be within Community or Private HIEs where the patient receives care. Just as networks use bridges, switches or routers to segment traffic we will expect that HIEs will segment traffic that can stay within the HIE and only route transactions to the MiHIN shared services bus that must cross HIEs.

The MiHIN Shared Services Bus architecture is designed to accommodate a vast majority of the administrative and clinical use cases that support broad Health Information Exchange by implementing four core services. Those services are:

1. Developing a Security Framework
   Allows for the authentication of systems (nodes) and users and manages patient consent. Also implements appropriate security policies for role-based access and auditing.

2. Messaging
   The ability to “push” messages from one node to another and accommodate data translations required for each site.

3. Subject Discovery
   Subject Discovery is the ability to perform deterministic and probabilistic searches for patients across HIEs.

4. Query for Documents
   Query for Documents is the ability to look up structured and unstructured data in the form of documents stored somewhere in the MiHIN network of data repositories.

Any use case which is predicated on connecting to a secure network and either pushing data or performing inquiries can be met with these core services. Of all the ONC priorities mentioned above the only one that could not be accomplished with these base services alone is ePrescribing which requires a fairly complex prescription ordering system.

Once the MiHIN is ready to move beyond these core services the shared services bus is designed to support more complex service interactions which we call Health Care Service Orchestration. An example might be performing clinical decision support services for a diabetic patient who had a high A1C lab test. The clinical decision support might be to look up other lab results or the patient current medications and recommend a course of action for the provider.

Data Exchange Components

NHIN Connectivity

This component provides communication to the Federal Government and other state backbones. This connectivity is effectively for communicating with anything outside the MiHIN. The first functions being supported on the NHIN are Security Services, Subject Discovery, Query for Documents and Retrieve Documents.

MiHIN Shared Services Bus

This component provides the shared services bus connectivity and state-wide services for Community HIEs, Private HIEs, ancillary data sources (labs, RxHub) and connection to the NHIN.

Community and Private HIEs

Some progress has already been made on establishing various models of Community and Private HIE's in Michigan, some sponsored by the state and some through private investment.

Community HIEs are locally supported, open to all providers and they can select their own vendor and run the HIE. The state would require compliance with standards from the Community HIE for MiHIN Shared Services Bus interoperability.

Private HIEs are supported by a private organization such as a vendor or hospital system often for profit or to promote the needs of a particular organization (hospital system) or affinity group (physician offices). Private HIEs allow private organizations to connect their affinity groups or affiliates.

Private HIEs will be encouraged to connect to the Community HIE for data interchange with other MTA providers. If the Private HIE opened itself up to all providers including competitors and is accepted by a majority of provider organizations, it would then become a Community HIE.

Private HIEs can connect directly to the MiHIN Shared Services Bus. In this case state would require compliance with standards for MiHIN Shared Services Bus interoperability.

INTEROPERABILITY

Our long term plan for the MiHIN state-wide network includes four core capabilities:

1. Aggregating data and interconnecting providers via Community HIEs
2. Connecting Community HIEs and providing a vehicle for the delivery of shared services
3. Sharing clinical and administrative services and applications
4. Providing NHIN connectivity for sharing data with other states and the federal government

This is a long term venture that will take substantial time and resources.

To enhance interoperability we will focus on several technical design paradigms:

- HITSP and other national and industry standards
- Vendor agnostic design
- NHIN design concepts
- "Shared Services Bus" to act as the broker for cross community interoperability
- Security framework that complies with state and federal regulations but is also straightforward to implement

Prioritized HIE Services

As stated in Section 2.3 Business Operations, the MiHIN initiative will focus on the use cases inherent in the ONC HIE Service Priorities and its goal of supporting Meaningful Use. To enable wide-spread adoption and in anticipation of an extended move by providers to meaningful use, the use cases have been written to support data creation and consumption by any standards compliant system. Such a system may be an EHR, an EHR light, an HIE (or its functional equivalent) acting on behalf of an EHR or other clinical system, a web portal capable of presenting standards based data in a human readable format or any other system commonly used which is capable of consuming or creating standards compliant data. The use cases use the term "EHR" to imply any of these systems.

The MiHIN initiative will focus on the Meaningful Use objectives for Stage I. The architecture can be expanded as stage one objectives are documented in use cases and requirements for Stage II grow nearer in time. The same strategy for stage three will apply when stage two is fully documented.

Stakeholder representatives from across Michigan have ranked both the implementation order of HIE Services and the use cases in those services. The MiHIN initiative will initially focuses on the highest ranked use cases in the highest ranked services. As these use cases are implemented, the business architecture will expand to cover all HIE services and their use cases. The following represents the ranking recommended by the Business Operations workgroup:

LAB ORDERS AND RESULTS

Lab Results Delivery

Structured: incorporate clinical lab-test results into EHR as structured data (MU)[1], Harmonized Electronic Health Record (Laboratory Result Reporting) (AHIC)[2]

Unstructured

Lab Orders: General Laboratory Orders (AHIC)

Radiology

Radiology Reports

Diagnostic Images

[1] Supports Meaningful Use Objective

[2] Documented in an AHIC use case

PUBLIC HEALTH REPORTING

Immunization Events and History: Capability to submit electronic data to immunization registries and actual submission where required and accepted (MU), Immunizations & Response Management (AHIC)

- Immunization event sent to MCIR
- Immunization history received from MCIR
- Vaccination forecasting data sent from MCIR

Syndromic Surveillance: Capability to provide electronic syndromic surveillance data to public health agencies and actual transmission according to applicable law and practice (MU)

Disease Surveillance: Capability to provide electronic submission of reportable lab results (as required by state of local law) to public health agencies and actual submission where it can be received (MU)

Public Health Case Reporting (AHIC)

Chronic Disease Registries

Medical Home: Problem Lists & Practice-Based Registries (AHIC)

- Newborn Screening (AHIC)
- Harmonized Biosurveillance (Visit, Utilization, and Lab Result Data) Use Case (AHIC)

QUALITY REPORTING

Incentive Metric Reporting

Report quality measures to CMS or the States (MU)

Research and Analytics

Quality (AHIC)

CLINICAL SUMMARY EXCHANGE FOR CARE COORDINATION

Record, Store, Retrieve, Manage Order Types (MU)

- Medications
- Laboratory
- Radiology/imaging
- Provider Referrals
- Blood Bank
- Physical therapy
- Occupational therapy
- Respiration therapy
- Rehabilitation therapy
- Dialysis
- Provider consults
- Discharge and transfer

Record demographics (MU)

Record and chart changes in vital signs (MU)

Record Smoking status (MU)

Provide patients with an electronic copy of their health information upon request (MU)

Provide patients with an electronic copy of their discharge instructions and procedures at time of discharge, upon request (MU)

Provide patients with timely electronic access to their health information (including lab results, problem list, medication lists, allergies) within 96 hours of information being available to the eligible professional (MU)

Provide clinical summaries for patients for each office visit (MU)

Capability to exchange clinical information among providers of care and patient authorized entities electronically (MU)

Provide summary care record for each transition of care and referral (MU)

Consultations and Transfers of Care (AHIC)

Emergency Responder — Electronic Health Record (AHIC)

Clinical Note Details (AHIC)

Patient - Provider Secure Messaging (AHIC)

ELIGIBILITY CHECKING AND CLAIMS TRANSACTIONS

Check insurance eligibility electronically from public and private payers (MU)

Submit claims electronically to public and private payers (MU)

Prior-Authorization in Support of Treatment, Payment, & Operations (AHIC)

EPRESCRIBING AND REFILL REQUESTS

Drug-drug, drug-allergy, drug-formulary checks (MU)

Generate and transmit permissible prescriptions electronically (eRx) (MU)

Maintain active medication allergy list (MU)

PRESCRIPTION FILL STATUS AND/OR MEDICATION FILL HISTORY

Maintain active medication list (MU), Medication Management (AHIC)

Perform medication reconciliation at relevant encounters and each transition of care (MU)

Medication Gaps (AHIC)

Stage I of the project will focus on designing and implementing the MiHIN Shared Services Bus and a limited number of shared services pilots. While the final decision on which shared services should be implemented may change, the current ones proposed are Lab Orders and

Results and Public Health Reporting for labs and immunizations. These pilots were chosen for several important reasons:

- Both of these pilot shared services are in the list of the seven ONC (Office of National Coordinator) HIE Meaningful Use (MU) priorities
- They provide significant clinical value to providers
- The data required for these pilots is already being captured electronically
- They will require and test much of the core technical infrastructure needed for the Shared Services Bus

NHIN

HHS has sponsored a large scale development effort to build a national health information exchange capability called the Nationwide Health Information Network (NHIN) that instantiates the HITSP standards into real networks and systems. The MiHIN will leverage the work of the NHIN effort in its architectural framework.

The MiHIN will support connectivity to the NHIN for data exchange with the federal government and other states with NHIN-compatible infrastructures.

We will support the NHIN core functions of Security Services, Subject Discovery, Query for Documents, and Retrieve Documents. NHIN Standards are mostly are still being tested but there is at least one case of limited production with the MedVirginia connection to the Social Security Administration using Connect Open Source. To meet these functional requirements we will follow the NHIN Trial Implementations specifications as follows:

- Authorization Framework Service Interface Specification v2.2
- Messaging Platform Service Interface Specification v 1.9.8
- Patient Discovery Service Interface Specification v 0.9
- Query for Documents Service Interface Specification v 1.6.10
- Retrieve Documents Service Interface Specification v1.6.8
- Health Information Event Messaging v1.5
- NHIN Services Registry Specification v1.3
- Access Consent Policy Specification v0.3
- HIEM Profile Framework

Interoperability with Federal Systems

Care for veterans

The MiHIN will work with the local Veterans Administration hospitals to develop mechanisms for these providers to connect to the MiHIN or perhaps to integrate this data by connecting to the NHIN. This will be a longer term project and will depend on how the VA System decides to integrate into nationwide HIE.

Social security disability benefits

We will look to work with the Southeastern Michigan Health Information Exchange (SEMHIE) who was recently awarded a $2.9M grant to connect to the Social Security Administration for disability benefits.

Tribal care

The MiHIN will work with the local Indian Health Services (IHS) providers to develop mechanisms for these providers to connect to the MiHIN or perhaps to integrate this data by connecting to the NHIN. This will be a longer term project and will depend on how the IHS decides to integrate into nationwide HIE.

Public health reporting

There are several use cases we are considering for the MiHIN that will support public health reporting. The Michigan Care Improvement Registry (MCIR) is a secure web-based statewide immunization information system accessed by more than 4,000 health care organizations. The Michigan Disease Surveillance System (MDSS) is a secure web-based statewide integrated surveillance system. MDSS has improved Michigan's ability to identify and track emerging infectious diseases and potential bioterrorism attacks.

We intend to integrate both of these systems into the MiHIN. Over time we will work with the federal government to use this system and the MiHIN to connect to the CDC and other federal agencies.

Emergency preparedness and response

The Michigan Syndromic Surveillance System (MSSS) is a real-time surveillance system tracking and monitoring the chief presenting complaints from emergent care settings allowing public health officials and providers to rapidly detect and track unusual outbreaks of illness that may be the result of bioterrorism, natural outbreaks or other public health emergencies.

The Michigan Health Alert Network (MIHAN) is a secure, Internet-based, communications and alerting system. The MIHAN contains a directory of over 4,000 participants from local health departments, hospitals, clinics and many other critical first responders across the state. It also includes many of Michigan's state government agencies. The MIHAN recently received Public Health Information Network certification from the CDC.

We intend to integrate these systems into the MiHIN. Over time we will work with the federal government to use this system and the MiHIN to connect to the CDC and other federal agencies.

Community health network initiatives

The Michigan Care Improvement Registry (MCIR) provides many services which can go beyond the main function of being an immunizations registry. In addition the MDCH is looking at

implementing a chronic disease registry which would track patients with one or more chronic diseases such as diabetes, heart disease, asthma and other conditions.

Interoperability with other States

The MiHIN will be designed using NHIN compatible standards and services which will allow us to perform cross-community services both within the MiHIN and to other states. As stated above we will support security, subject discovery, query for documents and retrieve documents services which will facilitate significant capabilities for inter-state HIE.

Medicaid and other State Systems

There are several State of Michigan Systems that could be connected to the MiHIN. We have reviewed all the use cases that play the largest role in meeting the Meaningful Use criteria and analyzed those SOM systems that help meet those criteria. Based on our analysis, we believe that the SOM Systems can be classified into two categories that represent the degree to which they would benefit from, contribute to, and impact the MIHIN.

The first category is SOM Systems that should be early services on the MIHIN. These are SOM Systems that require interaction with a number of providers across the state and benefit from two-way communication with those providers. These systems often provide information back to providers or act as a gateway to federal government agencies such as the CDC. These would be MCIR, State Lab System and Medicaid CHAMPS systems. These systems would eventually expose shared services which will be utilized by stakeholders of the MIHIN.

The second category is SOM Systems that can benefit from the MiHIN infrastructure. These are SOM Systems that can benefit from some of the MIHIN Shared Services Bus services or communication channels. They would benefit from automatic collection of relevant data or data exchanges with other SOM Systems. These systems, in general, provide little communications back to Michigan providers. The MDSS, MSSS, Birth Registry, and Death Registry would be in this category.

<u>Michigan Care Improvement Registry</u>

The Michigan Care Improvement Registry is a powerful registry tool that has grown far beyond its original scope of protecting communities from vaccine-preventable diseases and to assure that the population of Michigan is appropriately immunized and that required child health prevention screenings are completed with the most efficient use of program resources. The MCIR is now a full-fledged population management registry and in conjunction with the state data warehouse provides analysis of at-risk populations.

MCIR will interoperate with the MiHIN in several ways. First it will benefit by utilizing the master data management tools of the MiHIN specifically the EMPI for patient matching. Secondly it will benefit from the connection of EHR and other clinical systems into the MiHIN for reporting the vaccinations given to residents. Finally the MCIR can provide benefit to providers and patients by making vaccination records available to MiHIN users by populating a State of Michigan XDS repository that will be connected to the MiHIN.

<u>Michigan Bureau of Labs Systems</u>

The Bureau of Labs has one main lab system (StarLIMS) and a few other systems which provide lab data management and reporting for the State Lab.

The state labs will benefit from two-way communications over the MiHIN by being able to receive lab orders from providers and being able to report back lab results. In addition the state lab should benefit from being able to report lab results to the CDC and other organizations using the MiHIN. Finally the state lab will be able to use the same State of Michigan XDS repository as mentioned for MCIR to make lab results available to users of the MiHIN.

CHAMPS Medicaid System

The Community Health Automated Medicaid Processing System (CHAMPS) is full featured payer system which provides the State of Michigan with nearly all the features they need for Medicaid patients. The system went live in early 2009. CHAMPS is capable of supporting all HIPAA transactions including:

- 270/271 Eligibility requests
- 837 (P, I, D), 276/277 and 835 Claims set of transactions
- 834/820 set of Managed care transactions
- 278 PA transaction

In addition the CHAMPS system has a JAVA Composite Application Platform Suite (JCAPS) interface engine which supports all HL7 transactions. The system has significant features that support interoperability with the MiHIN Architecture including support for PIX and PDQ transactions which would allow it to use the proposed EMPI and the Continuity of Care Document for populating patient records into a claims-based Medicaid health record.

Michigan Disease Surveillance System

The Michigan Disease Surveillance System (MDSS) will benefit from the MiHIN by allowing labs in the state to report their notifiable-disease test results electronically. Lab results can come from the state lab or private labs and can then use the MiHIN for reporting to the CDCP.

Michigan Syndromic Surveillance System

The Michigan Syndromic Surveillance System (MDSS) will benefit from the MiHIN by allowing emergency departments in the state to report their notifiable-disease diagnoses. Diagnoses or chief complaints can come from each hospitals emergency department probably in the form of an HL7 encounter transaction (A01) and can use the MiHIN for reporting to MSSS.

Cross Community Interoperability

The MIHIN is built to enable interoperability within an HIE and cross community (i.e., HIE to HIE). The MiHIN Shared Services Bus is designed to enable HIE to HIE communications as long as the HIE follows the MiHIN standards and implements some core and “middleware” technology.

HIE to HIE

Much of the core infrastructure necessary for integrating into the MiHIN shared services bus must be in place to establish an HIE. On top of those core components will be a gateway layer which includes the services for interoperability with the MiHIN Shared Services Bus. The core components are:

Messaging Gateway

The messaging gateway or interface engine is the tool that provides network connections to data source and destination systems and can collect, translate and deliver messages. The messaging gateway is used inside the HIE and will be the infrastructure for sending and receiving messages from the MiHIN Shared Services Bus.

Enterprise Master Patient Index

The EMPI is the system used for collecting patient identities and resolving identity conflicts across HIE member organizations. Connection to the MiHIN EMPI will be through a Subject Discovery service as described below.

Record Locator Service

The Record Locator Service stores information on any data aggregated into the HIEs federated data repository. There are several models used for this purpose but a typical one is for each member organization to have an edge server for storing this data. The RLS can also look up this data based on a user query. The RLS will interact with the MiHIN through a Query for Documents service.

User Directory

Along with other security services that are internal to the HIE a User Directory must be maintained in order to authenticate users. The User Directory will connect to the MiHIN through a security service described below.

Along with these core services we will require each HIE to develop a set of gateway services which will allow that HIE to communicate across the shared services bus to other HIE's. These services will include:

- Security Services
- Patient Identity Feed
- Subject Discovery
- Query for Documents
- Retrieve Documents

HIE to State of Michigan Systems

Interoperability from HIEs to the State of Michigan (SOM) Systems will work much the same as HIE to HIE. The HIE will develop their gateway and the SOM must also develop a set of interfaces to expose their services as described above.

State to State

Because of our compatibility with the NHIN standards, we expect to be able to test and eventually go live with interstate connectivity. Our architecture will be capable of demonstrating state to state connectivity with any use case that depends on messaging and query-response technologies.

TECHNICAL ARCHITECTURE/APPROACH

Alternative Approaches Considered

As stated above the MiHIN is being designed with Community, Private and other HIEs which provide "last mile" connectivity to providers and State of Michigan systems that are connected to the shared services bus for cross community interoperability and NHIN connectivity. This design is not the least expensive nor is it the most technologically advanced but we believe it represents the best, most viable short term architecture with the most sustainable long term benefits.

We reviewed the following architectural models and recommendations were reviewed and not pursued for the reasons noted below:

Single HIE

1. This model has one HIE for the entire state and all provider organizations plug into this HIE
2. Used successfully in small states (Vermont, Delaware, etc)
3. Not recommended for Michigan due to the number and scope of providers and because there are already HIEs in progress

Single HIE Vendor for all State HIEs

1. Single HIE vendor that provides HIEs for regions and then provides a custom gateway between HIEs
2. Not the primary model in any state and only one vendor is doing this
3. Could be less costly but not recommended due to the proprietary nature of the gateway and long term interoperability

HIEs playing the role of both HIE and Backbone

1. Each HIE builds the infrastructure for connecting organizations as well as the cross-HIE capabilities as a shared services bus
2. This is the model being developed in New York and possibly California
3. Creates a highly interoperable and flexible network
4. Not recommended due to cost and complexity

Backbone with Stakeholder Organizations plugged in Directly

1. This is a Backbone with only standards compliant EHRs and other clinical systems allowed to connect
2. This is the Minnesota model
3. Depends on vendor EHR systems becoming fully standards compliant or organizations standing up the middleware (akin to our Private HIE)

4. Can be cost effective but vendors have made very slow progress towards being standards compliant
5. We are recommending this as part of our approach

Backbone with multiple HIEs

1. The HIE connects organizations and the Backbone connects HIEs
2. The closest model is in Virginia but many states considering
3. Creates a highly interoperable network but requires a middle layer to be developed for shared services bus connectivity
4. Keep standards at the core and pushes non-standards to the edges
5. This is our **recommended** approach because it promotes both standards-based interoperability and timely implementation

Components

This section describes the components of the MiHIN Backbone architecture. The symbols next to each component title reference the symbols used in Figure 1, the MiHIN Conceptual Architecture.

MiHIN Shared Services Bus

The MiHIN Backbone will be designed as an Enterprise Service Bus architecture. The ESB will be capable of supporting ESB nodes which can provide transaction services. The exact topology of the MiHIN ESB has not yet been designed (single instance or federated for example). The ESB will support one or more service registries for web services provided by secure nodes. Community HIEs will be required to be secure nodes and utilize a four level protocol stack for communication to the ESB.

EMPI/RLS

Enterprise Master Patient Index/Record Locator Service will be used for subject discovery (patient lookup) and content indexing services. This component can either be a single component or two separate components.

Provider Index

This is an index of all care providers in the state. This could be part of the EMPI listed above or could be implemented as a User Directory.

MESSAGING GATEWAY

Used for all transaction-based services such as Lab Ordering, Results Reporting and Eligibility Checking. Primary function with be interface transactions and message translation. Nomenclature normalization will be expected to happen at the HIE level.

DATA WAREHOUSE/REPOSITORY

Data repository would be used for centralized storage of data for Public Health Reporting, Quality Reporting, Medical Research and Chronic Disease Registries.

SECURITY SERVICES

Security services will provide user authentication, access, authorization and auditing services. The User Directory will be a federated design and the MiHIN User Directory will be built by aggregating users from all connected HIEs or State entities.

Standards

As stated in the section overview, the MiHIN architecture has an overarching goal to be compliant with the national standards for healthcare interoperability recognized by the Secretary of the Department of Health & Human Services (HHS). Specifically, HHS recognizes interoperability specifications containing harmonized standards published by the Healthcare Information Technology Standards Panel (HITSP), and as such, the MiHIN is being designed as a HITSP-compliant and HITSP-consistent (where no direct conformance criteria exist) architecture.

Since our intention is to follow the HITSP Standards we are recommending a strict adherence to standards for the MiHIN Backbone due to ONC guidance and also to promote an open and interoperable MiHIN.

There is a risk to this approach. Specifically many of these standards are not yet implemented in production vendor systems and this might slow our implementation and thus adoption. This is partly mitigated by our design concept of separating the functions of the shared services bus from those of the HIE. This allows the HIE to proceed with data aggregation and local HIE using whatever method is necessary while keeping the shared services bus highly standards compliant.

As for security, standard for the basis of the MIHIN security architecture is the NHIN Messaging Platform v1.9 and the HITSP Security and Privacy Technical Note TN900 v1.3. Most of the constructs we will use are described in TN900.

This specification is primarily concerned with the digital representations and mechanics of the security model. A trusted authority will issue digital certificates to all MiHIN nodes. These nodes use these digital certificates to construct encrypted and digitally signed messages between MiHIN nodes for sending, and to authenticate messages that are received. SAML tokens are used to transmit detailed information assertions about entities requesting information that are used to verify identity and check authorization and consent privileges. Auditable events are captured by each node and stored by that node. Auditable events can be retrieved using the NHIN Audit Log Query Service.

State-wide Shared Services

Statewide shared services are broken out into Core Backbone Services and Use Cases. While in the short term there will be additional costs to implement shared services bus core services, we believe that the potential to provide numerous state-wide shared services to Michigan providers and citizens will more than make up for the short term costs. These services represent the most significant long-term benefit of the architectural model we have chosen.

Core Shared Services

Patient Identity Feed

One of the primary functions of the EMPI will be the collection of patient demographics for Michigan residents. This will be accomplished by having each participating HIE or State of Michigan HIE send new patients and patient updates to the MiHIN EMPI in near real-time. In addition we will need to be able to process patient merge and un-merge messages.

Subject Discovery

Other primary services provided by the EMPI will be patient matching using deterministic and probabilistic algorithms and cross community (HIE) patient inquiries.

Master Provider (User) Index

The primary uses of the Master Provider Index will be as both a provider database and a user directory. We will investigate connecting the Provider Index with the National Plan and Provider Enumeration System (NPPES) which is a national source of providers National Provider Identifiers (NPIs).

Query for Documents (XDS)

The Query for Documents service will be the primary way that users perform inquiry for clinical and administrative documents over the MiHIN.

Security Services

Security services will include state-wide trusted certificate authority for issuing digital certificates for Public Key Infrastructure (PKI). The security services must also host security polices most likely based on user roles. This is known as Role Based Access Control or RBAC.

It is not yet clear whether we need the MiHIN to have the identity of every provider and their authenticating credentials stored in the Master Provider Index described earlier. User authorization could just as easily be accomplished by using SAML (security access markup language) assertions in each message or inquiry request to the MiHIN and trusting each domain to have already authenticated the user. Security services must also implement audit controls.

Use Cases

The following are the ONC HIE Priorities that will be considered for Stage I administrative or clinical use cases. The details of these use cases where described above.

1. Lab orders and results
2. Public health reporting
3. Eligibility checking and claims processing
4. Quality reporting
5. ePrescribing
6. Prescription Fill Status and Medication Management
7. Coordination of Care

Potential Future Shared Services

These are some examples of use cases for Stage II or later.

1. Medical research database
2. Chronic disease registries
3. Patient transfer to post acute care

Leveraging Existing State Resources

It is an important task when designing a new infrastructure such as the MiHIN to consider how to leverage existing resources. Considering the complexity and overall costs of building a state-wide Health Information Exchange infrastructure is it imperative to make sure we are not "reinventing the wheel." However, infrastructure put in place must match the business and functional goals, and adopt the standards necessary to support state-wide HIE.

We have identified four types of stakeholder or state assets that might be leveraged as part of the MiHIN and we must determine if they can truly be incorporated into the MiHIN. Just because a component exists does not mean it can or should be reused for the MiHIN. Once the details are revealed, it could become too costly, too limiting from an interoperability point of view, or politically unpalatable to reuse existing assets.

During our recent analysis the Project Control Office team has reviewed many stakeholder organization's and state systems to determine whether they can be leveraged as parts of the MiHIN. They include:

- Existing Value Added Networks such as the claims processing network
- Existing Components such as EMPIs at the state and other organizations
- State of Michigan systems such as the Michigan Care Improvement Registry
- Existing HIES whether Community or Private.

MiHIN ARRA Equipment & Software Budget

		Year 1						
Shared Services Bus Costs		**Equipment & Software Costs Details**			**Allocation**			
Item Description	**Unit Description**	**Units**	**Cost/Unit**	**Total Cost**	**Federal Funds**	**Non-Federal Cash**	**Non-Federal In-Kind**	**Total**
Pilot 1 Requirements								
SW Licenses								
Messaging Gateway License	**Servers**	2	$80,000.00	$160,000	$160,000	$0		$160,000
Provider/User Directory	**Core License**	1	$300,000.00	$300,000	$300,000	$0		$300,000
Certificate Server License	**Core License**	2	$50,000.00	$100,000	$100,000	$0		$100,000
Hardware								
Messaging Gateway Servers	**Systems**	3	$20,000.00	$60,000	$60,000	$0		$60,000
Certificate Server	**Systems**	2	$12,000.00	$24,000	$24,000	$0		$24,000
System Software	**Systems**	5	$3,000.00	$15,000	$15,000	$0		$15,000
Network Equipment	**Equipment**	6	$1,500.00	$9,000	$9,000	$0		$9,000
Implementation								
Security Services	**Hours**	1,040	$200.00	$208,000	$187,200	$20,800		$208,000
Messaging Gateway	**Interfaces**	2	$30,000.00	$60,000	$54,000	$6,000		$60,000
Vendor Implementation Staff								
Project Manager	**Hours**	256	$200.00	$51,200	$46,080	$5,120		$51,200
Solution Architect	**Hours**	128	$250.00	$32,000	$28,800	$3,200		$32,000
System Analyst	**Hours**	512	$200.00	$102,400	$92,160	$10,240		$102,400
Business Analyst	**Hours**	128	$175.00	$22,400	$20,160	$2,240		$22,400
Pilot 1 Subtotal				**$1,144,000**	**$1,096,400**	**$47,600**	**$0**	**$1,144,000**
Pilot 2 Requirements								
Implementation								
Messaging Gateway	**Interfaces**	2	$30,000.00	$60,000	$54,000	$6,000		$60,000
Vendor Implementation Staff								
Project Manager	**Hours**	64	$200.00	$12,800	$11,520	$1,280		$12,800
Solution Architect	**Hours**	0	$250.00	$0	$0	$0		$0
System Analyst	**Hours**	240	$200.00	$48,000	$43,200	$4,800		$48,000
Business Analyst	**Hours**	64	$175.00	$11,200	$10,080	$1,120		$11,200
Pilot 2 Subtotal				**$132,000**	**$118,800**	**$13,200**	**$0**	**$132,000**

Variables	Assumed Match Yr 0	0%
	Assumed Match Yr 1	10%

ARRA Opertional Budget

		Year 1						
Shared Services Bus Costs		**Equipment & Software Costs Details**			**Allocation**			
Item Description	**Unit Description**	**Units**	**Cost/Unit**	**Total Cost**	**Federal Funds**	**Non-Federal Cash**	**Non-Federal In-Kind**	**Total**
Pilot 3 Requirements								
Implementation								
Messaging Gateway	**Interfaces**	1	$50,000.00	$50,000	$45,000	$5,000		$50,000
Vendor Implementation Staff								
Project Manager	**Hours**	64	$200.00	$12,800	$11,520	$1,280		$12,800
Solution Architect	**Hours**	0	$250.00	$0	$0	$0		$0
System Analyst	**Hours**	240	$200.00	$48,000	$43,200	$4,800		$48,000
Business Analyst	**Hours**	64	$175.00	$11,200	$10,080	$1,120		$11,200
Pilot 3 Subtotal				**$122,000**	**$109,800**	**$12,200**	**$0**	**$122,000**
Pilots 4-6 Requirements								
SW Licenses								
Services Bus (Prod/Test/Dev)	**ESB**	1	$500,000.00	$500,000	$500,000	$0		$500,000
MPI/RLS License	**Patients**	5,000,000	$0.40	$2,000,000	$2,000,000	$0		$2,000,000
NHIN Gateway	**Gateway**	1	$300,000.00	$300,000	$300,000	$0		$300,000
Hardware								
Backbone Servers	**Systems**	6	$20,000.00	$120,000	$120,000	$0		$120,000
Web (XDS Repository) Servers	**Systems**	2	$10,000.00	$20,000	$20,000	$0		$20,000
MPI/RLS Servers	**Systems**	3	$20,000.00	$60,000	$60,000	$0		$60,000
Implementation								
Services Bus Setup	**Hours**	1,040	$200.00	$208,000	$187,200	$20,800		$208,000
HIE Interfaces	**Interfaces (PIX/PDQ (3), QFD, Immunizations, Labs)**	12	$50,000.00	$600,000	$540,000	$60,000		$600,000
Messaging Gateway	**CCD Interfaces**	4	$30,000.00	$120,000	$108,000	$12,000		$120,000
XDS Repository Service	**Services**	1	$150,000.00	$150,000	$135,000	$15,000		$150,000
Service Implementation	**Services (QFD, Lab & Immunizations)**	4	$200,000.00	$800,000	$720,000	$80,000		$800,000
Vendor Implementation Staff								
Project Manager	**Hours**	512	$200.00	$102,400	$92,160	$10,240		$102,400
Solution Architect	**Hours**	1,040	$250.00	$260,000	$234,000	$26,000		$260,000
System Analyst (2)	**Hours**	2,080	$200.00	$416,000	$374,400	$41,600		$416,000
Business Analyst	**Hours**	512	$175.00	$89,600	$80,640	$8,960		$89,600
Pilots 4-6 Subtotal				**$5,746,000**	**$5,471,400**	**$274,600**	**$0**	**$5,746,000**
Total Shared Services Bus Costs				**$7,144,000**	**$6,796,400**	**$347,600**	**$0**	**$7,144,000**

ARRA Opertional Budget

		Year 1						
Use Case 1 Pilot Costs: Lab Results Delivery & MDSS		**Equipment & Software Costs Details**			**Allocation**			
Item Description	**Unit Description**	**Units**	**Cost/Unit**	**Total Cost**	**Federal Funds**	**Non-Federal Cash**	**Non-Federal In-Kind**	**Total**
HIE Funds								
SW Licenses								
Interfaces	**Organization Interfaces**	10	$20,000.00	$200,000	$180,000	$20,000		$200,000
Implementation								
Security Services	**Hours**	512	$175.00	$89,600	$80,640	$8,960		$89,600
SSB Interfaces	**Total Interfaces**	1	$50,000.00	$50,000	$45,000	$5,000		$50,000
HIE/Vendor Staff								
Project Manager	**Staff**	128	$175.00	$22,400	$20,160	$2,240		$22,400
System Programmer/Analyst	**Staff**	512	$125.00	$64,000	$57,600	$6,400		$64,000
HIE Business Analyst	**Staff**	256	$100.00	$25,600	$23,040	$2,560		$25,600
Total HIE Costs				**$451,600**	**$406,440**	**$45,160**	**$0**	**$451,600**
SOM Funds								
SW Licenses								
Interfaces	**System Interfaces**	1	$20,000.00	$20,000	$18,000	$2,000		$20,000
Implementation								
Security Services	**Hours**	256	$175.00	$44,800	$40,320	$4,480		$44,800
State Lab System Integration	**Interfaces**	4	$40,000.00	$160,000	$144,000	$16,000		$160,000
SOM/Vendor Staff								
Project Manager	**Staff**	64	$75.00	$4,800	$4,320	$480		$4,800
System Programmer/Analyst	**Staff**	512	$60.00	$30,720	$27,648	$3,072		$30,720
HIE Business Analyst	**Staff**	128	$50.00	$6,400	$5,760	$640		$6,400
Total SOM Costs				**$266,720**	**$240,048**	**$26,672**	**$0**	**$266,720**
Total SSB, HIE & SOM				**$1,862,320**	**$1,742,888**	**$119,432**	**$0**	**$1,862,320**

ARRA Opertional Budget

		Year 1						
Use Case 2 Pilot Costs: Immunizations Reporting		**Equipment & Software Costs Details**			**Allocation**			
Item Description	**Unit Description**	**Units**	**Cost/Unit**	**Total Cost**	**Federal Funds**	**Non-Federal Cash**	**Non-Federal In-Kind**	**Total**
HIE Funds								
SW Licenses								
Interfaces	**Organization Interfaces**	4	$20,000.00	$80,000	$72,000	$8,000		$80,000
Implementation								
SSB Interfaces	**Total Interfaces**	2	$50,000.00	$100,000	$90,000	$10,000		$100,000
HIE/Vendor Staff								
Project Manager	**Staff**	64	$175.00	$11,200	$10,080	$1,120		$11,200
System Programmer/Analyst	**Staff**	256	$125.00	$32,000	$28,800	$3,200		$32,000
HIE Business Analyst	**Staff**	128	$100.00	$12,800	$11,520	$1,280		$12,800
Total HIE Costs				**$236,000**	**$212,400**	**$23,600**	**$0**	**$236,000**
SOM Funds								
Implementation								
MCIR Integration	**Interfaces**	1	$40,000.00	$40,000	$36,000	$4,000		$40,000
SOM/Vendor Staff								
Project Manager	**Staff**	64	$75.00	$4,800	$4,320	$480		$4,800
System Programmer/Analyst	**Staff**	512	$60.00	$30,720	$27,648	$3,072		$30,720
HIE Business Analyst	**Staff**	128	$50.00	$6,400	$5,760	$640		$6,400
Total SOM Costs				**$81,920**	**$73,728**	**$8,192**	**$0**	**$81,920**
Total SSB, HIE & SOM				**$449,920**	**$404,928**	**$44,992**	**$0**	**$449,920**

		Year 1						
Use Case 3 Pilot Costs: Quality Reporting (JVHL)		**Equipment & Software Costs Details**			**Allocation**			
Item Description	**Unit Description**	**Units**	**Cost/Unit**	**Total Cost**	**Federal Funds**	**Non-Federal Cash**	**Non-Federal In-Kind**	**Total**
HIE Funds								
SW Licenses								
Interfaces	**Organization Interfaces**	10	$20,000.00	$200,000	$180,000	$20,000		$200,000
Hardware								
Core Servers	**Systems**	2	$10,000.00	$20,000	$18,000	$2,000		$20,000
Implementation								
Security Services	**Hours**	256	$175.00	$44,800	$40,320	$4,480		$44,800
SSB Interfaces	**Total Interfaces**	1	$50,000.00	$50,000	$45,000	$5,000		$50,000
HIE Staff								
Project Manager	**Staff**	128	$175.00	$22,400	$20,160	$2,240		$22,400
System Programmer/Analyst	**Staff**	1,024	$125.00	$128,000	$115,200	$12,800		$128,000
HIE Business Analyst	**Staff**	128	$100.00	$12,800	$11,520	$1,280		$12,800
Total HIE Costs				**$478,000**	**$430,200**	**$47,800**	**$0**	**$478,000**
Total SSB, HIE & SOM				**$600,000**	**$540,000**	**$60,000**	**$0**	**$600,000**

ARRA Opertional Budget

		Year 1						
Use Cases 4-6 Pilot Costs: Immunizations, Labs and Summary Queries		**Equipment & Software Costs Details**			**Allocation**			
Item Description	**Unit Description**	**Units**	**Cost/Unit**	**Total Cost**	**Federal Funds**	**Non-Federal Cash**	**Non-Federal In-Kind**	**Total**
HIE Funds								
SW Licenses								
Interfaces	**Organization Interfaces**	8	$20,000.00	$160,000	$144,000	$16,000		$160,000
Hardware								
Edge Gateways/XDS Servers	**Systems**	4	$30,000.00	$120,000	$108,000	$12,000		$120,000
Implementation								
Lab Interfaces	**Interfaces**	4	$50,000.00	$200,000	$180,000	$20,000		$200,000
Syndromic Interfaces (ADT)	**Interfaces**	12	$30,000.00	$360,000	$324,000	$36,000		$360,000
Physician Notes (CCD)	**Interfaces**	2	$50,000.00	$100,000	$90,000	$10,000		$100,000
Clinical Summaries (CCD)	**Interfaces**	2	$50,000.00	$100,000	$90,000	$10,000		$100,000
XDS Repository Service	**Services**	2	$200,000.00	$400,000	$360,000	$40,000		$400,000
HIE/Vendor Staff								
Project Manager	**Staff**	512	$175.00	$89,600	$80,640	$8,960		$89,600
System Programmer/Analyst	**Staff**	2,080	$125.00	$260,000	$234,000	$26,000		$260,000
HIE Business Analyst	**Staff**	512	$100.00	$51,200	$46,080	$5,120		$51,200
Total HIE Costs				**$1,840,800**	**$1,656,720**	**$184,080**	**$0**	**$1,840,800**
SOM Funds								
Hardware								
Messaging Servers	**Systems**	2	$20,000.00	$40,000	$36,000	$4,000		$40,000
Web (XDS Repository) Servers	**Systems**	4	$15,000.00	$60,000	$54,000	$6,000		$60,000
Network Equipment	**Equipment**	4	$1,500.00	$6,000	$5,400	$600		$6,000
Implementation								
MPI Integration	**Interfaces**	6	$50,000.00	$300,000	$270,000	$30,000		$300,000
MDSS Integration	**Interfaces**	4	$30,000.00	$120,000	$108,000	$12,000		$120,000
MICR Registry Integration	**Interfaces**	4	$30,000.00	$120,000	$108,000	$12,000		$120,000
XDS Repository Service	**Services**	1	$200,000.00	$200,000	$180,000	$20,000		$200,000
SOM/Vendor Staff								
Project Manager	**Staff**	512	$75.00	$38,400	$34,560	$3,840		$38,400
System Programmer/Analyst	**Staff**	2,080	$60.00	$124,800	$112,320	$12,480		$124,800
HIE Business Analyst	**Staff**	512	$50.00	$25,600	$23,040	$2,560		$25,600
Total SOM Costs				**$1,034,800**	**$931,320**	**$103,480**	**$0**	**$1,034,800**
Total SSB, HIE & SOM				**$8,621,600**	**$8,059,440**	**$562,160**	**$0**	**$8,621,600**
Grand Total				**$11,533,840**	**$10,747,256**	**$786,584**	**$0**	**$11,533,840**

MiHIN ARRA Equipment & Software Budget

			Year 1						
Maintenance and Ongoing Costs			**Equipment & Software Costs Details**			**Allocation**			
Item Description	**Unit Description**	**Units**	**Rate Basis**	**Maint. Rate**	**Total Cost**	**Federal Funds**	**Non-Federal Cash**	**Non-Federal In-Kind**	**Total**
SW Licenses									
Services Bus (Prod/Test/Dev)	**Months**	6	$500,000	20.00%	$50,000	$0	$50,000		$50,000
MPI/RLS License	**Months**	6	$2,000,000	20.00%	$200,000	$0	$200,000		$200,000
Messaging Gateway License	**Months**	6	$160,000	20.00%	$16,000	$0	$16,000		$16,000
Provider/User Directory	**Months**	6	$300,000	20.00%	$30,000	$0	$30,000		$30,000
Certificate Server	**Months**	6	$100,000	10.00%	$5,000	$0	$5,000		$5,000
NHIN Gateway	**Months**	6	$300,000	10.00%	$15,000	$0	$15,000		$15,000
Hardware									
HW Support (5 Yr)	**Servers**	20	$1,500	100.00%	$30,000	$0	$30,000		$30,000
Implementation									
Hosting	**Months**	12	$10,000	100.00%	$120,000	$0	$120,000		$120,000
Total SSB Maintenance Costs					**$466,000**	**$0**	**$466,000**	**$0**	**$466,000**

Variables

Assumed Match Yr 1 10%

Year 4

Year 4

Year 4

Year 4

ARRA Opertional Budget

MiHIN ARRA Equipment & Software Budget

			Year 2						
Maintenance and Ongoing Costs			**Equipment & Software Costs Details**			**Allocation**			
Item Description	**Unit Description**	**Units**	**Rate Basis**	**Maint. Rate**	**Total Cost**	**Federal Funds**	**Non-Federal Cash**	**Non-Federal In-Kind**	**Total**
SW Licenses									
Services Bus (Prod/Test/Dev)	**Months**	12	$500,000	20.00%	$100,000	$0	$100,000		$100,000
MPI/RLS License	**Months**	12	$2,000,000	20.00%	$400,000	$0	$400,000		$400,000
Messaging Gateway License	**Months**	12	$160,000	20.00%	$32,000	$0	$32,000		$32,000
Provider/User Directory	**Months**	12	$300,000	20.00%	$60,000	$0	$60,000		$60,000
Certificate Server	**Months**	12	$100,000	10.00%	$10,000	$0	$10,000		$10,000
NHIN Gateway	**Months**	12	$300,000	10.00%	$30,000	$0	$30,000		$30,000
Hardware									
HW Support (5 Yr)	**Servers**	0	$1,500	100.00%	$0	$0	$0	$0	$0
Implementation									
Hosting	**Months**	12	$10,000	100.00%	$120,000	$0	$120,000		$120,000
Total SSB Maintenance Costs					**$752,000**	**$0**	**$752,000**	**$0**	**$752,000**

Variables

Assumed Match Yr 2 14%

ARRA Opertional Budget

ARRA Opertional Budget

ARRA Opertional Budget

ARRA Opertional Budget

ARRA Opertional Budget

MiHIN ARRA Equipment & Software Budget

			Year 3						
Maintenance and Ongoing Costs			**Equipment & Software Costs Details**			**Allocation**			
Item Description	**Unit Description**	**Units**	**Rate Basis**	**Maint. Rate**	**Total Cost**	**Federal Funds**	**Non-Federal Cash**	**Non-Federal In-Kind**	**Total**
SW Licenses									
Services Bus (Prod/Test/Dev)	**Months**	12	$500,000	20.00%	$100,000	$0	$100,000		$100,000
MPI/RLS License	**Months**	12	$2,000,000	20.00%	$400,000	$0	$400,000		$400,000
Messaging Gateway License	**Months**	12	$160,000	20.00%	$32,000	$0	$32,000		$32,000
Provider/User Directory	**Months**	12	$300,000	20.00%	$60,000	$0	$60,000		$60,000
Certificate Server	**Months**	12	$100,000	10.00%	$10,000	$0	$10,000		$10,000
NHIN Gateway	**Months**	12	$300,000	10.00%	$30,000	$0	$30,000		$30,000
Hardware									
HW Support (5 Yr)	**Servers**	0	$1,500	100.00%	$0	$0	$0		$0
Implementation									
Hosting	**Months**	12	$10,000	100.00%	$120,000	$0	$120,000		$120,000
Total SSB Maintenance Costs					**$752,000**	**$0**	**$752,000**	**$0**	**$752,000**

Variables

Assumed Match Yr 3 33%

ARRA Opertional Budget

ARRA Opertional Budget

ARRA Opertional Budget

ARRA Opertional Budget

ARRA Opertional Budget

MiHIN ARRA Equipment & Software Budget

			Year 4						
Maintenance and Ongoing Costs			**Equipment & Software Costs Details**			**Allocation**			
Item Description	**Unit Description**	**Units**	**Rate Basis**	**Maint. Rate**	**Total Cost**	**Federal Funds**	**Non-Federal Cash**	**Non-Federal In-Kind**	**Total**
SW Licenses									
Services Bus (Prod/Test/Dev)	**Months**	12	$500,000	20.00%	$100,000	$0	$100,000		$100,000
MPI/RLS License	**Months**	12	$2,000,000	20.00%	$400,000	$0	$400,000		$400,000
Messaging Gateway License	**Months**	12	$160,000	20.00%	$32,000	$0	$32,000		$32,000
Provider/User Directory	**Months**	12	$300,000	20.00%	$60,000	$0	$60,000		$60,000
Certificate Server	**Months**	12	$100,000	10.00%	$10,000	$0	$10,000		$10,000
NHIN Gateway	**Months**	12	$300,000	10.00%	$30,000	$0	$30,000		$30,000
Hardware									
HW Support (5 Yr)	**Servers**	0	$1,500	100.00%	$0	$0	$0	$0	$0
Implementation									
Hosting	**Months**	12	$10,000	100.00%	$120,000	$0	$120,000		$120,000
Total SSB Maintenance Costs					**$752,000**	**$0**	**$752,000**	**$0**	**$752,000**

Variables

Assumed Match Yr 4 78%