Michigan State Medicaid HIT Plan

Version 1.2

05/10/2011
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1. **Purpose**

The State Medicaid Health Information Technology Plan (SMHP) describes the activities Michigan will be engaged in over the next 5 years relative to implementing Section 4201 Medicaid provisions of the American Recovery and Reinvestment Act (ARRA). These activities will fall in three main areas:

1. *Administer the incentive payments* to eligible professionals and hospitals;
2. *Conduct adequate oversight of the program*, including tracking meaningful use by providers; and
3. *Pursue initiatives to encourage the adoption of certified EHR technology* to promote health care quality and the exchange of health care information.

This document will describe how Michigan intends to:

- Administer the Electronic Health Record (EHR) incentive payments to eligible health providers.
- Monitor EHR incentive payments to eligible health providers.
- Coordinate all ongoing Health IT (HIT) initiatives including; Medicaid EHR Incentive Program, Statewide Health Information Exchange (HIE) initiatives and Regional Extension Centers supported by the Office of the National Coordinator for HIT (ONC) and other programs.
- Outline various sources of funding for HIT initiatives including; HITECH Implementation-APD or a MMIS APD.

The SMHP consists of the following main sections:

- Michigan’s “As-Is” HIT Landscape
- Michigan’s “To-Be” HIT Landscape
- Michigan’s Medicaid EHR Incentive Program Implementation Plan and Audit Strategy
- Michigan’s HIT Roadmap

1.1. **About this Document**

The SMHP will be a “living” document and will be reviewed and updated as needed. Revisions will be submitted to CMS for their approval approximately once a year. The most current approved version will be available at both the MDCH website and [www.MichiganHealthIT.org/smhp/](http://www.MichiganHealthIT.org/smhp/).

1.2. **Public Input**

Public input is welcomed on this document. Comments will be accepted on an ongoing bases. Comments should be directed to MDCH-EHR@michigan.gov with the subject of SMHP Comment. Meaningful comments will be responded to and incorporated into the next version as appropriate.
2. Michigan “As-Is” HIT Landscape

Understanding that technology could have a revolutionary impact on health care, Michigan has been exploring and implementing Health Information Technology and Exchange (HIT/E) for several years. Michigan, both state government and other health care stakeholders, has a long and distinguished history of using HIT/E to improve quality of care and monitor population health. This history includes five years of Health Information Exchange (HIE) activities, over two years of encouraging e-prescribing and over a dozen years of using technology to track and monitor population health issues. In recent years, both hospital and health care professionals have been achieving huge advancements in adopting Electronic Health Records (EHR) and improving interoperability between HIT systems and health care organizations.

2.1. HIT/E Stakeholders

Realizing the potential benefits that HIT could provide, Michigan’s health care leaders have been collaborating for many years. In addition to very active informal stakeholders groups, Michigan has two formal groups. Both groups have broad stockholder involvement and are described below.

Stakeholders from both inside and outside the State government were involved in the drafting of this plan. State government included staff for all parts of Medicaid, public health and the HIT/E office inside Michigan Department of Community Health (MDCH), as well as, staff from the Michigan Department Technology, Management and Budget (MDTMB). External stakeholders have been involved through individual or group meetings both with professional organizations or associations and individual providers. External stakeholder coordination included meeting with Michigan Tribal Health Directors Association, Michigan Primary Care Association (MPCA) representing Federally Qualified Health Centers (FQHC), Michigan Center for Rural Health (MCRH) representing Rural Health Clinics (RHC), Critical Access Hospitals (CAH) and other rural providers and many others.

2.1.1. Michigan Health Information Technology Commission

The Michigan HIT Commission was created by an act of the state legislature in 2006. The HIT Commission is an advisory committee to the Michigan Department of Community Health (MDCH), and its mission is to facilitate and promote the design, implementation, operation, and maintenance of an interoperable health care information infrastructure in Michigan. Each of the 13-members of the Commission, appointed by the Governor, represents a different health care stakeholder.¹ The Director of MDCH, also the Single State Agency, is a member of the HIT Commission. Staff from Medicaid participates in the meetings and provides status updates on a regular basis. These meetings are public and many stakeholders attend these meetings. Currently the Commission is comprised of:

¹ Learn more at http://www.michigan.gov/mdch/0,1607,7-132-2946_44257--,00.html
Gregory Forzley, M.D., of Grand Rapids represents doctors of medicine and is the Medical Director of Informatics for St. Mary’s Hospital in Grand Rapids, MI. Dr. Forzley is also the chair of the Michigan State Medical Society Board of Directors.

Joseph Hohner of Canton represents nonprofit health care corporations and is the Senior Vice President, Chief Information Officer and Chief of Staff of Blue Cross Blue Shield of Michigan.

Toshiki Masaki of Canton represents purchasers and employers and is the Public Policy Manager for the Ford Motor Company.

Kimberly G. Ross-Jessup of Dewitt represents pharmaceutical manufacturers and is the Manager of Governmental Relations for Pfizer.

Mark Notman, Ph.D., of East Lansing represents schools of medicine and is an Associate Professor and Chief Financial and Technical Officer for the Michigan State University College of Osteopathic Medicine.

Janet Olszewski of Williamston is the Director of the Michigan Department of Community Health.

Thomas Lauzon of Shelby Township represents health plans and other third party payers and is the Executive Vice President and Chief Information Officer for Health Plan of Michigan.

Dennis Swan of Okemos represents hospitals and is the Chief Executive Officer for Sparrow Hospital.

Ken Theis is the Director of the Michigan Department Technology, Management and Budget.

Larry Wagenknecht, R. Ph., of Haslett represents pharmacists and is the Chief Executive Officer of the Michigan Pharmacists Association.

Robert Paul of Novi represents members of the health information technology field and is the Chief Operating Officer and President of Compuware Corp.

R. Taylor Scott, D.O., of Williamston represents doctors of osteopathic medicine and surgery and is an Assistant Professor and Director of the Learning and Assessment Center at the Michigan State University College of Osteopathic Medicine.

Robin Cole of Detroit represents consumers and is the Chief Operating Officer for ProCare Health Plan.

2.1.2. MiHIN Workgroups

Building off the highly successful MiHIN Conduit to Care workgroups from 2006, MDCH has recently reconvened similar workgroups to help guide the state HIE planning efforts. The Governance and Finance Workgroup developed an integrated governance approach involving key stakeholders in addressing the most important clinical, technical, financial and performance measurement aspects of HIE. The Technical Workgroup was responsible for providing input towards the development of technical deliverables for the statewide HIE effort and collaborating with the other workgroups to ensure that clinical and measurement capabilities are built into the infrastructure. The Business Operations Workgroup focused on accelerating
adoption of Health Information Technology in the State of Michigan in order to lower costs, improve quality and increase the overall satisfaction with care. Medicaid was involved in these workgroups.

2.2. State Health IT Systems

The state government has numerous IT systems that are directly and indirectly used in the health care environment. Health IT systems are primarily used in Medicaid and public health monitoring. This section outlines the current state of the state government HIT systems. Although there is some interaction between these systems now, this plan calls for acceleration in interoperability and interaction to improve efficiency and quality of care, as well as, support meaningful use.

2.2.1. Medicaid IT Systems

Medicaid has always been an early adopter of IT systems and it currently well positioned to leverage existing systems to advance HIT/E in Michigan. Michigan has two primary Medicaid systems, the Community Health Automated Medicaid Processing System (CHAMPS) is the MMIS for Michigan Medicaid and the Data Warehouse.

2.2.1.1. CHAMPS

In April 2006 the State of Michigan began a significant initiative to replace its 30+ year old Medicaid Management Information System (MMIS). The legacy system was a COBOL-based system originally written in 1972, with rewrites in 1975 and 1985 and HIPAA remediation completed in 2003.

The State partnered with software vendor CNSI for design, development and implementation (DDI) of its state of the art web-centric, component based system. The new system, CHAMPS, was implemented in phases and as of June 2010 the major phases were complete. There are over 100 interfaces responsible for data transmissions in and out of CHAMPS with other external systems.

Figure 1 - CHAMPS Phased Implementation Timeline

2 Learn more at www.michigan.gov/mihinworkgroups/
Web Portal – Major Release R-1

The first major CHAMPS release occurred December 2006. It was a rewrite of the Department of Community Health (DCH) web site specific to the provider community. The effort restructured and reorganized the content of information pushed out to providers and prepared for the eventual capability of providers accessing CHAMPS via the web portal to conduct Medicaid business.


The second major release was implemented in July 2007. The enhanced electronic document management system (EDMS) was designed to significantly decrease the volumes of paper generally required to manage a State Medicaid program, improve work flow, and improve customer service.

Provider Enrollment – Major Release R-3

The third release was the implementation of the first core CHAMPS subsystem, Provider. This provider enrollment functionality was available to Michigan Medicaid fee-for-service providers March 2008.

The Provider subsystem facilitates storage of comprehensive provider information with an efficient means of accessing, viewing, and modifying the information.

The term “provider” is used to describe the full scope of the provider communities supported within the Medicaid program and its MMIS. This includes, Managed Care Organizations (MCO) and health plans, billing agencies, clearinghouses, and other organizations supporting providers.

Fee-for-Service and Managed Care Processing – Major Release R-4/5

In September of 2009 the State implemented the largest of all the releases, fee-for-service and managed care payment processing. This release activated all the core functionality of CHAMPS utilizing the additional MMIS subsystems. Some of the key features and functionality of these subsystems are provided below.

Benefits Administration and Reference

The benefits administration functional component of CHAMPS supports a variety of customized benefit programs and modes of delivery of services. Each benefit plan encompasses a unique set of eligibility criteria, provider network, reimbursement rules, medical policy, and cost sharing components.

Reference and rate data are date and time specific and are never deleted. Reference and rate data are regularly sent to the Data Warehouse (DW) for analytical processing and
reporting. Online functionality within the reference component allows an authorized user to inquire, add, and update individual codes, code attributes, and rates.

**Eligibility and Enrollment Subsystem**

The Eligibility and Enrollment (EE) business area is responsible for maintaining beneficiary eligibility and health plan enrollment, in accordance with State and Federal regulations, for eligibility verification and to ensure proper payment of claims processed in CHAMPS for Medicaid healthcare programs.

**Prior Authorization Subsystem**

The Prior Authorization (PA) subsystem is a key component of CHAMPS. PAs are used by the State to review, assess, pre-approve, or deny selected medical or other services prior to payment. The PA process serves as a cost containment and utilization review mechanism, and quality assurance to support payment for treatments and services that are medically necessary, appropriate, or cost-effective.

**Claims Subsystem**

CHAMPS Claims subsystem processes claims from initial entry through final disposition and payment determination. Each transaction is edited against data maintained by other subsystems to ensure that the content is valid and can be fully adjudicated. The CHAMPS claims subsystem provides enterprise-wide capabilities and is able to process an extensive variety of required transactions.

**Contracts Management Subsystem**

Contracts Management (CM) is the subsystem for managing direct services contracts, typically Managed Care and other contractually purchased services such as transportation, in-home care, and mental health and substance abuse services. The domain of these contracts is limited to contracts for services to eligible populations of the State of Michigan, as distinguished from administrative services contracts.

**Financial Services Subsystem**

The Financial Services subsystem includes a set of business processes to ensure that the CHAMPS business events are recorded in a timely and accurate manner, in accordance with Generally Accepted Accounting Principles (GAAP) in the State’s financial system.

**Customer Relationship Management/Member Services**

CHAMPS includes a customer relationship management (CRM) system that provides customer service representatives (CSRs) with a comprehensive view of the contact’s information. The system is capable of recording provider and beneficiary, and other contact
interactions such as general inquiries, grievances and complaints, appeals, claim status, MiHealth card replacement requests, and protected health information requests.

**Common Components Subsystem**

Common components provides the functionality for common services required by the various sub-systems. This functionality includes navigation/display, application security, backup and recovery and correspondence generation, single sign-on (SSO), application auditing and system auditing.

**Encounters – Major Release R-6**

The final major release of CHAMPS was implemented June 2010. Encounters processing uses all of the functionality previously released. Encounters are processed through the claims processing stream and includes shadow pricing of claims. Managed care providers must submit encounter data using the electronic HIPAA X12 4010A 837 Health Care Claims transactions via the data exchange gateway.

**Benefits**

There have been many realized benefits of CHAMPS since implementation. The new technology uses MITA design standards, JAVA and XML in order to be object oriented, web-
centered and real-time. It is based on reusable JAVA components and is optimized for efficient performance and maximum functionality delivered to the user via the web browser. It has demonstrated improved customer service and support, reduced claims processing time and automation of many previously manual processes. As a result of CHAMPS many policy changes are user maintained. For example new programs or changes to programs or pricing that may be required as a result of State or Federal legislation can be implemented in the core system as a series of user maintained changes.

2.2.1.2. Data Warehouse

MDCH has developed an MMIS IT Architecture that provides the program required data to the analyst, manager, or end user. Michigan implemented a data warehouse solution as a component of the MMIS IT Architecture to meet the challenge of tracking individual clients and expand its decision support capability. It began in 1994 with a Medicaid-only database containing 36 months of Fee-for-Service (FFS) claims information, including providers and beneficiaries; 50 MDCH users had access to the data warehouse. The data warehouse was organized into models for ease of use and retrieval of data. In 1998 when Michigan implemented its Managed Care Encounter System, the data warehouse was expanded to handle all encounter data processing and storage, enabling MDCH to conduct data quality reporting and health plan analysis. By 2001, 66 million encounters were loaded into the data warehouse, and 100 MDCH staff had access to the data warehouse.

In 2002, the Unique Client Identifier (UCI) was implemented to integrate data from a range of data sources including immunization registry, WIC, and vital records data. The net result was a level of integration among the MDCH’s various program data sets that had never been achieved before. The assignment of a UCI to each individual loaded into the system enabled development – in a secure and confidential manner – of a comprehensive picture of service delivery and health outcomes among Medicaid clients. The UCI has been expanded over the years to integrate additional MDCH data sources (Medicaid and non-Medicaid), as well as data sources from other state departments and federal agencies.
Figure 3 – MDCH Data Warehouse Environment
An example of how the data warehouse allows integration of Medicaid and non-Medicaid data is illustrated below:

The MCIR application directly queries the data warehouse to access data needed to display the following:

- lead results
- a high risk indicator alerting that a child may be at risk for flu complications
- well-child visits
- an indicator specifying whether services are up-to-date based on established schedules.

The Data Warehouse Expansion project began in 2004, which included: rewriting the data warehouse MMIS data model for HIPAA compliance (837 format); reengineering the Encounter System to integrate into the FFS structure; storing pended and rejected claims; and implementation of the NCPDP format for pharmacy encounters. By the end of this project in 2006, the data warehouse included six years of data, five additional data sources, and over 400 MDCH users had access to the data warehouse.

MDCH has incrementally expanded its capabilities through a series of targeted project implementations. Most recently, the State of Michigan embarked on the implementation of two major systems: MMIS and Eligibility Determination for all of Michigan’s social service programs including Medicaid, food stamps, and cash assistance. These initiatives resulted in significant changes to business processes, rules, and data sets. Because the data warehouse is a critical component of Michigan’s Medicaid program management, it required significant enhancements to accommodate data source
changes. As of 2010, MDCH has completed a major project of integrating 12 separate health-related agencies and 34 data sources into a single integrated environment, and over 500 users have access to the MDCH data in the warehouse.

Table 1 – Growth of the Data Warehouse

<table>
<thead>
<tr>
<th>Statistic Description</th>
<th>1994</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program areas in data warehouse</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Data sources in data warehouse</td>
<td>3</td>
<td>34</td>
</tr>
<tr>
<td>Physical size of data warehouse</td>
<td>2,317 GB</td>
<td>3,521 GB</td>
</tr>
<tr>
<td>Claims in data warehouse (in millions)</td>
<td>210</td>
<td>472</td>
</tr>
<tr>
<td>Encounters in data warehouse (in millions)</td>
<td>0</td>
<td>272</td>
</tr>
<tr>
<td>Years of history in data warehouse</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Number of Departments with data on data warehouse (includes federal)</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Number of data warehouse users</td>
<td>50</td>
<td>515</td>
</tr>
</tbody>
</table>

MDCH is using the enterprise data warehouse as the foundation for integrating related program data together and for conducting advanced data analysis. In so doing, MDCH is able to interpret patterns and gain insights into outcomes, or put another way, determine what has happened and why, and most importantly, what will happen in the future.

Table 2 – Data Warehouse Sources Programs

<table>
<thead>
<tr>
<th>DATA SOURCES/PROGRAMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicaid</td>
</tr>
<tr>
<td>Fee-for-Service</td>
</tr>
<tr>
<td>Claims</td>
</tr>
<tr>
<td>Reference</td>
</tr>
<tr>
<td>Beneficiary Eligibility</td>
</tr>
<tr>
<td>Managed Care</td>
</tr>
<tr>
<td>Medicaid, Prepaid Inpatient Health Plans, CHIP</td>
</tr>
<tr>
<td>Contracts</td>
</tr>
<tr>
<td>Payments</td>
</tr>
<tr>
<td>Encounters</td>
</tr>
<tr>
<td>Provider</td>
</tr>
<tr>
<td>License</td>
</tr>
<tr>
<td>Health Plan Network Providers</td>
</tr>
<tr>
<td>DEA/CLIA</td>
</tr>
<tr>
<td>MI Choice Minimum – Home and Community Based Service Waiver</td>
</tr>
<tr>
<td>Habilitation Support Waiver</td>
</tr>
<tr>
<td>Maternal and Infant Health Program (MIHP)</td>
</tr>
<tr>
<td>Pharmacy</td>
</tr>
<tr>
<td>Claims</td>
</tr>
<tr>
<td>NDC</td>
</tr>
<tr>
<td>DATA SOURCES/PROGRAMS</td>
</tr>
<tr>
<td>-----------------------</td>
</tr>
<tr>
<td>MAC</td>
</tr>
<tr>
<td>CMS rebate</td>
</tr>
<tr>
<td>Medicare Modernization Act/Part D</td>
</tr>
<tr>
<td>Third Party Liability</td>
</tr>
<tr>
<td>EPSDT</td>
</tr>
<tr>
<td>Home Help</td>
</tr>
<tr>
<td>Michigan Care Improvement Registry (MCIR)</td>
</tr>
<tr>
<td>Immunizations</td>
</tr>
<tr>
<td>Women, Infant and Children (WIC)</td>
</tr>
<tr>
<td>Childhood <strong>Lead Poisoning Prevention Program</strong> (CLPPP)</td>
</tr>
<tr>
<td>Long Term Care</td>
</tr>
<tr>
<td>Home Care</td>
</tr>
<tr>
<td>Nursing Home</td>
</tr>
<tr>
<td>OASIS</td>
</tr>
<tr>
<td>Vital Records</td>
</tr>
<tr>
<td>Birth</td>
</tr>
<tr>
<td>Death</td>
</tr>
<tr>
<td>Paternity</td>
</tr>
<tr>
<td>Children Special Health Care Services</td>
</tr>
<tr>
<td>Mental Health</td>
</tr>
<tr>
<td>QI (Eligibility and Demographics)</td>
</tr>
<tr>
<td>Encounters</td>
</tr>
<tr>
<td>Substance Abuse</td>
</tr>
<tr>
<td>TEDS (Eligibility and Demographics)</td>
</tr>
<tr>
<td>Encounters</td>
</tr>
</tbody>
</table>

In short, the data warehouse has become a critical tool to help MDCH improve its delivery of health care services, evaluate program effectiveness, detect fraud and abuse, and prioritize opportunities to improve the health and well-being of the populations served by Medicaid.
2.2.2. Public Health Systems

Michigan has a long history of using health IT to improve public health issues. Michigan Child Immunization Registry (MCIR, now called the Michigan Care Improvement Registry) started in 1998 and Michigan started work on the surveillance systems in 2004. These systems have been continually improved over the years and provide an excellent base to build the new meaningful use requirements on.

2.2.2.1. Michigan Care Improvement Registry (MCIR)

The Michigan Care Improvement Registry (MCIR) is an immunization information system (IIS) developed in 1998 by the State of Michigan to assist immunization providers in their efforts to increase the immunization levels in Michigan and is currently maintained by the Michigan Department of Community Health (MDCH) Division of Immunization. A goal in this development process was to ensure the creation of a reliable, accessible software tool, which allows for the consolidation and assessment of immunization records of children on a state-wide basis. Consolidation and assessment of childhood immunization records provides the foundation for accurate assessment of current and future vaccine needs and has resulted in the reduction of missed vaccination opportunities.

MCIR programming includes incorporation of the current immunization schedule. This provides for assessment of a child’s immunization status through analysis of the Advisory Committee on Immunization Practices (ACIP) currently recommended immunization schedule. This assessment feature has been well received by physicians due, in part, to the increasing complexity of the immunization schedule. The immunization schedule continues to experience increases in complexity as additional vaccines and combination vaccines are introduced. The MCIR is designed to afford immunization providers, both public and private, with accessibility of immunization records from anywhere in the state. The MCIR is populated with birth data submitted directly from the State’s electronic birth certificate system. It should be noted, that to ensure the availability of data retrieval for timely review as well as to facilitate receipt of data, the MCIR is operational on a continual basis 24 hours a day throughout the calendar year.

The MCIR has proven to be extremely effective as a centralized repository for all immunizations administered in the state. As of June 2010, the MCIR contains over 72 million shot records and 6.5 million patient records. The MCIR system consolidates immunization data from all providers for each patient into a single, easily accessible record. This data is highly useful in a variety of ways. There are currently approximately 5,100 healthcare facilities (hospitals, pediatric clinics, family practice clinics, OB/GYN, migrant and tribal clinics) 400 public health clinics as well as schools and daycares, which utilize the immunization information stored in the MCIR. In 2005, the MCIR was enhanced to allow schools and childcare centers access to the system and in 2006 adults records were added. These programs currently utilize the MCIR to perform all required reporting of immunizations to health departments as required by the Michigan Public Health Code. As of January 2009, 4,587 (95%) of the schools and 3,787 (89%) of the childcare centers accessed the MCIR to report immunizations.
A key component in the future development of MCIR is to improve the delivery of healthcare through movement of immunization histories from paper medical records to electronic files. Advantages of maintaining immunization data in an electronic format are numerous. Electronic storage of historical records allows a practice to print immunization histories without the necessity of physically retrieving and reviewing a paper-based medical chart. An electronic format allows for an automated appraisal of those immunizations that are currently due based on the child’s age, history, and ACIP recommendations. Electronic storage also allows for immunization histories to be readily transportable. In circumstances in which an individual seeks care outside of the medical home, an electronic format allows for ease of access to the immunization history of the individual. An electronic format also facilitates a medical practice to assess immunization coverage levels and to generate recall notices at the practice level.

Use of MCIR is supported by Public Act 540, which requires healthcare providers to report childhood immunizations that they administer to the registry. At the 2003 National Immunization Registry Conference, the State of Michigan received two awards.

In summary the MCIR is a highly-developed and accessed statewide immunization registry that is used on a daily basis by over 13,000 users accessing the immunization records of children as well as adults. The MCIR affords generation of approximately 2.8 million reports annually concerning the assessment of key clinical data enhancing the health and wellness of Michigan citizens.

**Collaboration with Medicaid**

MCIR has a history of collaboration with Medicaid. In March 2001, an Advance Planning Document was approved by Medicaid for funding of the web application version of MCIR. Previously MCIR was a client/server software program that needed to be installed on individual computers. Users had to connect to MCIR via either the state network or use a dial-up connection via a modem.

The MCIR currently coordinates with Medicaid, allowing the Michigan Department of Community Health (MDCH) to measure all Medicaid children immunization coverage levels by county and health plan and throughout the state. It also assists in ensuring that all Medicaid children are appropriately screened and documented as eligible for the Federal Vaccines for Children program to ensure that they are not overlooked or miss an opportunity for childhood vaccinations. The MCIR provides a central collection of data for all Michigan health plans so they can report on Healthcare Effectiveness Data and Information Set (HEDIS) measures.

The Governor’s Lead initiative links to the MCIR. There is a pop-up window that informs immunization providers if lead screening should be done on their patients. It can be critical to children living in high-risk zip codes or who have Medicaid IDs.

Individuals under 20 years of age with a high-risk condition are identified using diagnosis codes from the Medicaid Data Warehouse. Currently MCIR will have the high-risk flag checked if a child has been diagnosed with Asthma and is on Medicaid. A high-risk pop up window will appear on MCIR notifying the provider that this person should be vaccinated for influenza.
Another feature that has been added to MCIR is an influenza screening notification field under the new heading High Risk Condition. This feature is on the general information page. MCIR users may check the influenza screening notification box if a patient in their clinic has a high-risk condition and should be vaccinated for influenza. This activates the pop up window to notify MCIR users to vaccinate this person for influenza vaccine. This flag notifies providers of the probable priority for vaccination, but does not provide any information about the type of health condition that resulted in the patient being identified. Seasonal reminder letters can be generated at the provider, local health department or regional level. Providers have the ability to generate lists of high-risk patients to facilitate appointment scheduling before the influenza season.

Other Partnerships and Data Integration

Woman, Infants, and Children (WIC) is another partner in immunization initiatives and an important population to capture in the MCIR. As with Medicaid, the MCIR allows MDCH to measure immunization coverage levels, and is an additional benefit at the WIC clinics when the MCIR is used on-site. WIC clinics can look up individual clients to assess immunization needs and avoid under/over vaccination of WIC children. Thereby, it directly reduces the disease burden of WIC children for vaccine-preventable disease.

In April 2009, the All Hazard function of MCIR was activated. This is a module that is used during a pandemic outbreak situation. It has been used to track administration of the 2009 Novel H1N1 Influenza vaccine as well as distribution of antivirals from the state and national stockpile. Reminder letters were generated from MCIR and mailed to persons that Medicaid and/or providers flagged as being at high risk for influenza.

MCIR is also integrated with:

- Vital Records (Electronic Birth Certificates are loaded into the MCIR to populate it with birthdates 1/1/1994 to present)
- EPSDT (Early Periodic Screening Diagnostic Treatment): once a Medicaid beneficiary is located in the MCIR system, a tab will display the history of preventive services and corresponding dates of service. This prevents duplication of services. See the screen print below.

![Figure 5 – MCIR: Early Periodic Screening Diagnostic Treatment Screen](image-url)
• Newborn Screening (NBS) provides a link to the Newborn Metabolic screening report that is mailed to the primary care provider. This helps to provide continuity of care, especially because the newborn does not often see the same primary care provider that the parent identified at birth, in the hospital. See screen print below:

![Figure 6 – MCIR: Newborn Screening Screen](image)

• Blood Lead Screening shows the results of blood lead tests performed by state laboratories on at-risk infants and children. It also provides a recommendation, based on the result, for next steps in the child’s care. See screen print below.

![Figure 7 – MCIR: Blood Lead Screening Screen](image)

• Early Hearing Detection & Intervention (EHDI) displays the results of newborn hearing tests that are performed at birth in every Michigan hospital.

![Figure 8 – MCIR: Early Hearing Detection & Intervention Screen](image)

Body Mass Index (BMI) tracking is currently being developed into MCIR. Pilot testing will begin in July 2010. This feature will allow providers to track their patients’ height and weight, as well as to view and print out growth charts.

**Interoperability**

Although MCIR draws information from several sources, currently it is not interoperable with EHRs. As part of the overall HIT plan, MCIR will be improved and expanded. Work is planned to incorporate HL7 messaging to MCIR to support the meaningful use requirements and allow interoperability with EHRs and HIEs. See section 3.2.3 for more details.
2.2.2.2. Michigan Disease Surveillance System (MDSS)

The Disease Surveillance system is an integrated surveillance system that can transfer appropriate public health, laboratory, and clinical data efficiently and securely over the Internet. The MDSS gathers and analyzes information quickly and accurately. This improves the state’s ability to identify and track emerging infectious diseases and potential bioterrorism attacks as well as to investigate outbreaks and monitor public health trends. MDSS will need some improvements and additional capacity to handle the new meaningful use requirements.

2.2.2.3. Michigan Syndromic Surveillance System (MSSS)

The Syndromic Surveillance system rapidly detects unusual outbreaks of illness resulting from either naturally occurring or intentional events that pose potential public health threats and emergencies. The system provides state and regional epidemiologists with early detection alerts and opportunities for rapid intervention. The systems tracks chief complaints of emergency-care patients in an effort to identify public health threats before confirmed diagnoses are available. Detection algorithms run every hour and send alerts to state and regional epidemiologists when deviations are found. Emergency Departments securely submit data elements electronically via HL7 or FTP. MSSS will need some improvements and additional capacity to handle the new meaningful use requirements.

2.2.2.4. State Bureau of Laboratories Systems

The Michigan Department of Community Health Bureau of Laboratories (BOL) utilizes STARLIMS (a COTS product) as its Laboratory Information System (LIMS) for microbiologic and environmental testing. Various Federal and State guidelines and regulations require that public health laboratories are able to respond rapidly and exchange health information with other public health partners. This enables local, state, and federal level partners to protect residents during an epidemic or other public health event due to naturally occurring or intentionally released agents. STARLIMS web-based system creates a seamless LIMS environment between Michigan’s eight Regional Reference Level LRN laboratory partners, located at local public health agencies, the Michigan Department of Agriculture and the Diagnostic Center for Population and Animal Health, enabling intra-network transfer of specimens and ability to track specimens and results during a surge incident. STARLIMS provides specimen tracking and management and real-time reporting of all Michigan reportable diseases (and influenza laboratory reports) to local, state and federal public health officials to control and prevent illness, disease and deaths. STARLIMS flags reportable disease conditions from all seven of Michigan’s regional laboratories, located in local health departments throughout the state, plus the State Laboratory in Lansing and its branch in Houghton and transmits a regular ongoing flow of electronic messages to the state’s disease surveillance system (MDSS). Work is under way to upgrade STARLIMS to the latest version. This will greatly increase interoperability. Even with this upgrade STARLIMS will need some other improvements and additional capacity to handle the new meaningful use requirements.

2.3. EHR Adoption

2.3.1. Current State of Health Care Providers

As part of the HIT P-APD activities, Michigan conducted a HIT survey of all Medicaid ambulatory practices. In addition to this survey, several additional recent HIT surveys were reviewed. The details of
these surveys, combined with the community feedback that was received from the outreach and listening sessions, is the basis for our assessment of HIT adoption of health care providers.

2.3.1.1. Hospitals

Most hospitals in Michigan have some level of HIT in their facility. This varies from a fully functional EHR to a limited EHR that may only be used in a few departments. An analysis of Michigan’s HIT and HIE environment was conducted by the HIT office within MDCH in the fall of 2009. Approximately 63 percent of those responding reported HIE to be one of the top five organizational priorities and 57 percent are or are planning to participate in a sub-state HIE. An overwhelming 90 percent of respondents reported that they plan to participate in the Medicare and Medicaid EHR Incentive Programs. A very high-level analysis of technical capabilities showed that 57 percent of respondents were utilizing a Certification Commission for HIT (CCHIT) certified EHR. Nearly 64 percent of respondents indicated use of e-prescribing functionality.

However, even the most technologically advanced hospitals have serious concerns about meeting meaningful use requirements as laid out in the proposed rule. (NOTE: the survey was conducted before the final rule was released; it is not known how the changes from the proposed rule would affect the results.) In a 2010 survey completed by the Michigan Health and Hospital Association, 90.7% of the respondents thought the HIT functionality requirements were moderate (50.7%) or significant (40%) burdensome and over 98% thought the clinical quality measures were moderate (32.3%) or significant (66.2%) burdensome. The respondents ranged from small rural hospitals to large urban facilities and all of them noted that they would have trouble meeting at least one of the proposed stage one meaningful use measures.

2.3.1.2. EPs

In the survey that was conducted as part of the HIT P-APD activities, the current state and future plans for EHRs of Michigan’s ambulatory Medicaid providers was reviewed. The survey was designed to identify how many providers might apply for the incentive, the range of practice sizes and types of practices from which providers will apply, the extent of current and future EHR use among responding practices, the ways in which EHRs are currently being used by practices, and the major concerns about EHR implementation among practices that do not currently have an EHR system in place. Surveys were mailed to 9,994 providers and practices. Responses were received from 2,187 practices.

A full copy of the survey findings is available in Appendix A (the survey instrument is also attached as Appendix B), only a few highlights are included here. Of the EPs likely to apply (interest expressed in the survey) for the incentive and are likely to be eligible (indicated over 30% Medicaid and not hospital-based on the survey) the average practice size is 5 providers. The vast majority (90.1 percent) have ten or fewer providers. The top three types of practice are primary care (43.9%), single

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3 Two important items of note: (1) Providers and practices located outside of Michigan were included in the mailing list, and (2) individual practices may have received more than one survey due to the structure of the database. That is, if a provider is listed in the database as a sole proprietor and is also part of a group, a letter would have been mailed to both the provider’s sole proprietor address and group address. However, the survey instructions clearly stated that only one survey should be completed per practice.
specialty (not primary care, 14.2%) and community health center (9.0%). In that same group, 67.9% currently use an electronic practice management system; 40.7% currently use an EHR system. Of those practices that use an EHR system, 43.6% report that it is certified by the Certification Commission for Health Information Technology (CCHIT). Smaller practices are less likely than larger practices to have either an electronic practice management system or EHR in place.

Table 3 - Practice Size to EHR Use

<table>
<thead>
<tr>
<th>Practice Size</th>
<th>Currently Use an Electronic Practice Management System</th>
<th>Currently Use an Electronic Health Record</th>
</tr>
</thead>
<tbody>
<tr>
<td>One or two providers</td>
<td>56.0%</td>
<td>31.6%</td>
</tr>
<tr>
<td>3 to 10 providers</td>
<td>74.2</td>
<td>33.3</td>
</tr>
<tr>
<td>11 or more providers</td>
<td>85.0</td>
<td>50.0</td>
</tr>
</tbody>
</table>

About two-fifths of the practices that are likely to apply and be eligible for the incentive are planning to implement an EHR either in the next 12 months (26.4 percent) or the next 13 to 24 months (16.0 percent). Those practices that have an EHR in place were asked to indicate which EHR functions are available in their EHR system and which functions are being used. With the exception of submitting data electronically to public health agencies, all of the functions listed in the table below are available and being used in a large majority of the EHR systems.

Table 4 - EHR Functions Currently in Use

<table>
<thead>
<tr>
<th>Function</th>
<th>Is the function available?</th>
<th>Is the function used?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conduct drug-drug, drug-allergy, and drug-formulary checks</td>
<td>65.4% 25.9% 8.6%</td>
<td>58.5% 41.5%</td>
</tr>
<tr>
<td>Generate lists of patients by specific condition</td>
<td>71.6 19.8 8.6</td>
<td>60.9 39.1</td>
</tr>
<tr>
<td>Generate patient reminders for guideline-based interventions and/or screening tests</td>
<td>62.5 17.5 20.0</td>
<td>62.7 37.3</td>
</tr>
<tr>
<td>Submit data electronically to public health agencies</td>
<td>37.3 34.9 27.7</td>
<td>33.3 66.7</td>
</tr>
<tr>
<td>Generate and transmit permissible prescriptions electronically</td>
<td>69.1 28.4 2.5</td>
<td>62.1 37.9</td>
</tr>
<tr>
<td>CPOE* for medications, labs, radiology/imaging, or referrals</td>
<td>58.2 31.6 10.1</td>
<td>47.7 52.3</td>
</tr>
<tr>
<td>Generate a clinical summary of office visits for patients</td>
<td>80.0 10.0 10.0</td>
<td>71.9 28.1</td>
</tr>
<tr>
<td>Maintain up-to-date problem list of active diagnoses</td>
<td>76.3 21.3 2.5</td>
<td>78.5 21.5</td>
</tr>
<tr>
<td>Maintain active medication allergy list</td>
<td>93.8 5.0 1.3</td>
<td>88.4 11.6</td>
</tr>
<tr>
<td>Maintain active medication list</td>
<td>82.7 16.0 1.2</td>
<td>75.0 25.0</td>
</tr>
<tr>
<td>Check insurance eligibility</td>
<td>63.8 25.0 11.3</td>
<td>57.1 42.9</td>
</tr>
</tbody>
</table>

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4 Survey was completed before details on the new ONC Certification were available.
The practices that do not currently have an EHR system in place were asked to indicate to what degree they are concerned with several issues related to EHR implementation. The primary concerns among those without an EHR system relate to the cost and potential for disruption to practice workflow.

- For 94.3 percent of those without an EHR, the initial costs of implementation are either a major (81.4 percent) or medium concern (12.9 percent).
- For 91.3 percent of those without an EHR, the recurring costs of an EHR system are either a major (56.8 percent) or medium concern (34.5 percent).
- For 79.4 percent of those without an EHR, disruption to practice workflow is either a major (48.2 percent) or medium concern (31.2 percent).

In addition, these practices have significant concerns about which EHR system to purchase and are worried that the EHR they choose will become obsolete. The table below provides a detailed look at the concerns among practices that do not currently have an EHR.

<table>
<thead>
<tr>
<th>Table 5 - EHR Concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Issue</strong></td>
</tr>
<tr>
<td>Initial costs of implementation</td>
</tr>
<tr>
<td>Recurring costs of EHR system</td>
</tr>
<tr>
<td>Disruption to practice workflow</td>
</tr>
<tr>
<td>Unsure which EHR system to purchase</td>
</tr>
<tr>
<td>Worry that EHR choice will become obsolete</td>
</tr>
<tr>
<td>Familiarity with computer technology</td>
</tr>
<tr>
<td>Patient privacy</td>
</tr>
<tr>
<td>Internet access availability and reliability</td>
</tr>
<tr>
<td>No clear business value</td>
</tr>
</tbody>
</table>

In addition to the survey, during the Medicaid HIT Forums and other outreach events, providers expressed similar concerns about EHR costs and functionality. There was, and still is, a lot of confusion among the EP community about the incentive programs and certified EHR technology.

### 2.3.1.3. Federally-Qualified Health Center

Michigan has two HRSA funded Health Center Controlled Networks (HCCN); both have ongoing HIT/EHR initiatives. The Michigan Primary Care Association (MPCA) has two current HRSA grants for EHR use and adoption. Through their HIT Network project (HRSA H2LIT16865) they have been assisting Federally Qualified Health Centers (FQHCs), FQHC ‘Look-Alikes’, and other community-based providers adopt and use EHRs. MPCA handles the hosting and other technical aspects of implementing an EHR.

As part of their HIT Innovation Project (HRSA H2LIT16631), they are bringing technology and continuous quality management together through a point-of-care clinical tool. The goals of the project are to increase the number of chronic disease patients that are monitored and managed, achieve Healthy People 2010 objectives for the patient population, increase data accuracies by eliminating manual entry
of data, and increase efficiencies within Health Centers that maximize personnel, revenue, and time spent with patients. Details on all the projects can be found in Appendix C.

2.3.1.4. Veterans Administration and Indian Health Service
Veterans Health Administration (VHA) has 4 medical centers, 13 outpatient clinics, and 5 vet centers in Michigan. It is believed that all are using the VHA’s EHR but there is little to no interaction with state systems or other health care providers. It is hoped that the integration of MiHiN with NHIN will help improve this information gap.

There are 12 federally recognized tribes in Michigan. There are no Indian Health Services (IHS) facilities in Michigan, however there are 14 tribal health clinics throughout the state. The level of HIT adoption ranges widely between tribes, with all health centers having some level of electronic practice management system but very few with a fully functioning EHR.

2.3.2. EHR Adoption Encouragement
Medicaid has seen the benefits of its providers using HIT in the care of patients and has been actively encouraging adoption for several years.

2.3.2.1. E-Prescribing
E-Prescribing is one of the most cost-effective HIT options for early adoption. Medicaid has been encouraging e-prescribing since 2008. In a 2010 study by Surescripts,5 Michigan ranked second in the nation for e-Prescribing with over 11 million prescriptions ordered through e-Prescribing. There is now over 5,600 providers e-Prescribing in Michigan. The following initiatives have played key roles in advancing e-Prescribing in Michigan.

- **Southeastern Michigan E-Prescribing Initiative (SEMI):** SEMI is a purchaser initiative aimed at increasing the adoption of e-prescribing in Southeast Michigan. Implemented in 2005, it is sponsored and funded by the local auto industry, BCBSM, and Medco. More than 3,800 physicians are currently enrolled in the program. Since 2005, more than one million prescriptions have been modified or cancelled due to adverse drug alerts.

- **e-Prescribing in Michigan Medicaid:** In 2008, the Michigan Legislature enacted legislation requiring MDCH to develop a three-year strategic plan for the implementation of electronic prescribing within the state’s Medicaid program. The department’s resulting plan focuses on two goals: (1) increase e-prescribing awareness and use in the Medicaid provider community, and (2) develop system capabilities to track and report Medicaid e-Prescribing transactions.

2.3.2.2. ARRA Related Projects

2.3.2.2.1. M-CEITA
The regional HIT extension centers (REC) are focused on assisting priority primary care providers with adopting and meaningfully using EHRs. Medicaid and the MDCH HIT/E office recognized the

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potential benefits the REC could provide to Medicaid providers and has been involved with Michigan’s REC, the Michigan Center for Effective IT Adoption (M-CEITA), since the beginning. This high level of involvement continues both Medicaid and the MDCH HIT Coordinator serve on the M-CEITA executive committee. There is ongoing coordination between the two projects. The Medicaid Incentive Program and M-CEITA have shared speaking engagements at conferences and have participated in several joint educational and outreach sessions throughout the state. M-CEITA presented at all of the HIT forums that Medicaid hosted around the state in April and May of 2010. Medicaid EHR Incentive Program team members have spoken at many of the M-CEITA events in the summer of 2010. Medicaid and M-CEITA worked jointly on informing and educating the health care community on both the incentive programs and meaningful use.

2.3.2.2.2. Coordination of ARRA Projects

The three main ARRA related HIT initiatives, Medicaid EHR Incentive Program, MiHIN – the HIE corporative agreement and M-CEITA – Michigan regional extension center, are being closely coordinated. As noted in section 2.4.1 Medicaid staff was heavily involved in the MiHIN planning workgroups and will have a seat on the MiHIN Shared Services board (Section 2.4.1.1). Medicaid is likewise represented on the M-CEITA executive and steering committees. In order to ensure that all the related HIT projects are working together, a Michigan HIT Coordination workgroup has been established. The workgroup meets monthly and includes the project leadership from the Medicaid EHR Incentive Program, MiHIN – Michigan’s State HIE Cooperative Agreement, and M-CEITA – Michigan’s Federally-designated Health IT Regional Extension Center. The workgroup is working to coordinate all aspects of the projects. As part of these efforts, many of the outreach activities are combined efforts with two or more of the projects.

2.3.3. Broadband

Access to reliable, affordable and high-speed Internet access still presents an issue for some of Michigan’s providers. This is primarily a problem for rural providers but some urban providers have also reported issues with reliability and affordability. As more professionals and even some smaller hospitals adopt EHRs through the Software as a Service (SaaS) model, a reliable connection is required. Health care providers utilizing a SaaS EHR cannot lose their Internet connection. If lost, they lose all access to their medical records. In the Medicaid EHR Provider Survey mentioned above, 61.3% of the respondents reported Internet access availability and reliability as a concern when implementing an EHR system.

The State of Michigan has been working to coordinate projects to successfully secure funds from the two ARRA Broadband programs. To-date over $180 million ARRA dollars to be dedicated to Michigan to expand broadband infrastructure and public computing centers. The infrastructure that is put in place as a result of these investments will enable data to be moved and shared at higher rates of speed between health care providers where bandwidth has been limited in the past, as well as help make it possible for more citizens to monitor health care from within their homes.
The State of Michigan has worked with many partners on a $24 million FCC Rural Health Care Pilot Project. The Project will aim to connect approximately 100 rural health care sites via an affordable fiber connection to help foster the movement of health data to and from their clinics. The ability to reach the most rural clinics will help to improve the health care and reduce the costs of offering specialized care in rural and remote areas of the state. The project is currently in the request for proposal stages and is planning to have a contractor begin construction on the network as early as summer of 2011.

2.4. Health Information Exchange (HIE)

2.4.1. MiHIN

The Michigan Health Information Network (MiHIN) is the state of Michigan's initiative to improve health care quality, cost, efficiency, and patient safety through electronic exchange of health information. The MiHIN is a joint effort among MDCH, the Michigan Department of Technology, Management and Budget (MDTMB), and a broad group of stakeholders from across the state of Michigan.

The MiHIN is essential to ensuring that Michigan's health care providers can utilize Electronic Health Records or EHRs in a meaningful way that allows for a patient's health information to be available when they need it most - at the point of care. The MiHIN is fundamentally the infrastructure that mobilizes existing electronic health information in a manner that allows healthcare providers to access and exchange it regardless of individual technology choices.

The MiHIN Conduit to Care report of 2006 represented the first iteration of a Strategic Plan by establishing a vision of HIE across Michigan that continues to hold true today: reducing the overall cost of care while increasing quality and patient safety.

The MiHIN Strategic Plan, submitted to ONC in spring of 2010, seeks to close the gap between the Conduit to Care report and the guidelines from the State HIE Cooperative Agreement as well as update Michigan’s plan for statewide HIE that leverages the progress of sub-state HIEs in Michigan. The MiHIN Strategic Plan describes the incremental approach for advancing appropriate and secure health information exchange, implements a model that encourages public private partnership and develops a scalable open technology approach that would complement the activities of the sub-state HIEs. The MiHIN Strategic, Operational Plans and Amendment 1, as submitted to ONC, are available is Appendix D, E and F of this document and at http://www.michigan.gov/mihin.

To accomplish these goals a series of evaluations and environmental analyses were undertaken to assess current HIE capacity in Michigan that can be leveraged, to identify HIT resources that can be used, and to determine opportunities for collaboration. This information was also used to inform the work of the stakeholders involved in a comprehensive workgroup process that formulated this Strategic Plan. More than 100 stakeholders have been involved with planning and developing the approaches to implementation and evaluation activities by serving on workgroups that are directly aligned with the five domains of governance, finance, technical architecture, business/technical operations and legal/policy. There was Medicaid representation on the majority of the MiHIN planning work groups. The Director of
Medicaid Program Operations and Quality Assurance, is an executive steering committee member of the MiHIN Program Office, served as co-chair of the MiHIN Business Operations Work Group and was a voting member of the MiHIN Governance Work Group. The Director of Medicaid Data Management Division was a member of the MiHIN Privacy and Security Work Group and other Medicaid staff was on the MiHIN Technical Work Group.

These activities have been complemented by integrating the MiHIN planning work with Medicaid, Medicare, other federally-funded, state-based programs particularly public health surveillance and other American Recovery and Reinvestment Act (ARRA) programs to include the Regional Extension Center (REC), workforce development initiatives and broadband mapping and access initiatives.

This approach has resulted in a strategy that uses the State HIE Cooperative Agreement funding in a comprehensive public/private partnership to advance the stakeholder organizations toward obtaining meaningful use.

### 2.4.1.1. MiHIN Governance

Michigan’s approach to governance is to create a coordinated governance model that emphasizes public/private partnerships. Toward that end, a coordinated Governance model has been developed that uses the existing legislatively mandated Health Information Technology (HIT) Commission to set broad statewide policy initiatives. In addition to leveraging the HIT Commission, a separate not-for-profit entity called the MiHIN Shared Services will be created to act as the State Designated Entity. The governing board of this entity will consist of stakeholders from the sub-state HIEs, payer organizations and three members from the State of Michigan. The state government members will include one seat for Medicaid, Public Health and a member of the HIT Commission. A legislative change will be sought to add a member of the MiHIN Shared Service Governance Board to the HIT Commission.

The MiHIN Shared Services Governance Board will be primarily responsible for governing the business and technical operations of the technology infrastructure and have authority over the shared services including the financing structures required to enable MiHIN Shared Services to be self-sustaining.

#### 2.4.2. State of Michigan HIE (SoM HIE)

In an effort to streamline the meaningful use reporting requirements to state public health and Medicaid systems, MDCH, in partnership MDTMB, is connecting all the state systems that are part of the meaningful use requirements to a mini-HIE. By bringing all the state “meaningful use” health systems into a HIE environment, all of the systems can leverage the same HIE technology and providers will have a single point of contact to access or report to these systems. Envisioned as a mini-HIE internal to the state government, State of Michigan Health Information Exchange (SoM HIE), will allow complete interoperability based on national standards, easily share information within the state in a secure way and leverage technology investments made by other programs and departments. In addition to the two main Medicaid systems, CHAMPS and the Data Warehouse, all of the other state government health
related systems would be connected to SoM HIE. See section 3.1.2 and 3.2.5 for more details on SoM HIE.

2.4.3. Other HIE Activities

The state has been encouraging HIE activities for several years and several HIEs or HIE-like organizations are currently active in Michigan. These include success stories from the first round of MiHIN grants from 2007:

Capital Area RHIO: Capital Area Regional Health Information Organization (Capital Area RHIO)—a coalition of public and private community members, including physicians, health systems, businesses, health plans, and academic institutions from the Clinton, Eaton, and Ingham tri-county area of mid-Michigan—has selected Axolotl Corp. of San Jose to deploy its RHIO and has begun implementation with data being exchanged in the initial phase.
http://www.capitalarearhio.org/

Upper Peninsula Health Care Network: The Upper Peninsula Health Care Network (UPHCN) serves the 319,000 residents of Michigan's Upper Peninsula. Collaborative efforts among the network include sponsorship of the Upper Peninsula Poison Crisis Network, joint purchasing, mobile MRI services, education, publication of the physician directory, the U.P. Medical Library Consortium; the U.P. Teleradiology, Teleconferencing and Telemedicine Networks; and a reference lab network. The UPHCN continues to develop the Upper Peninsula–wide integrated information systems network to connect the U.P. hospitals, providing a cost-effective mechanism to access patient information and streamline patient care delivery.
http://www.uphcn.org/

Other community organizations have engaged in efforts to build sub-state HIEs. There are six community initiatives that are implementing key functions including e-prescribing, laboratory ordering and results delivery, prescription-fill status and medication-fill history, clinical-care coordination, and quality reporting.

A3HIE: The Ann Arbor Area HIE (A3HIE), serving the greater Ann Arbor area, comprises 220 physicians and 50 physician assistants from four primary care and specialty practices caring for more than 800,000 active patients. Currently, the practices share the following patient information: demographics, medications, allergies and current problems, and diagnoses lists. Physicians enter information into their practice’s electronic medical record systems, and relevant details are "pushed" to the central data repository, where other partners can access and import them securely. There are more than 400,000 patient records in the repository.
http://www.a3hie.org/

Jackson Community Medical Record (JCMR): JCMR is a joint venture of Allegiance Health and the Jackson Physicians Alliance. It was formed to improve the quality of patient care through IT and lower the total cost of ownership of an EHR system. JCMR currently connects 140 Jackson county physicians, who represent more than 80,000 patients.
http://www.jc_mr.org/
**Michiana Health Information Network (MHIN):** MHIN is a community HIE that serves more than 600 physicians and 2,500 clinical health care providers in northern Indiana and southern Michigan. MHIN provides secure, single-source access to patient clinical information, and connects health care providers with a clinical data repository, results delivery, clinical messaging, interfaces, and a fully integrated EHR. NOTE: MHIN spans state lines.  
http://www.jcmr.org/

**MSMS Connect:** MSMS Connect is an electronic portal that was released in January 2009 by the Michigan State Medical Society (MSMS). This convenient, single-sign-on portal is a free benefit to MSMS members that securely connects physicians to patient information and each other for referrals and consultations, as well as to labs, patient registries, and other resources.  
http://www.msms.org/

**My1HIE:** Based in southeast Michigan, My1HIE enables physicians to share vital patient information and collaborate on patient care with other providers. My1HIE connects users to multiple clinical applications, including electronic prescribing, patient registry tools, e-labs, document managers, health plans, and more. All of these applications are interconnected and can be accessed with a unique user ID and password from any location with an Internet connection. Currently, 1,000 physicians use My1HIE. http://www.my1hie.com/

**Michigan Health Connect:** A nonprofit corporation founded by Spectrum Health, Trinity Health, Metro Health, Lakeland Regional Health System, and Northern Michigan Regional Health System with a purpose to advance the delivery and coordination of health care through collaboratively leveraging Medicity’s information technology and clinical data exchange platform. Currently the organization has connected over 460 provider offices and 1,700 providers across 14+ Michigan counties with results delivery as well as laboratory and radiology orders. Other community hospitals and health systems have indicated they will engage with MHC to evolve a comprehensive health information exchange across Michigan.  
http://www.michiganhealthconnect.org/

**Thumb Health Information System (THIS):** THIS is an initiative to electronically connect hospitals in Michigan’s “thumb” region. THIS will enable the secure sharing of patient information electronically, demonstrating how critical access hospitals and the hospitals to which they transfer patients use technology to deliver better care. Participating THIS hospitals initially include Deckerville Community Hospital, Harbor Beach Community Hospital and Mercy Hospital-Port Huron, but the scope is intended to more than double, growing to several other critical access and tertiary hospitals in the region.

Additionally, several of Michigan’s health systems and hospitals have made considerable progress in the development of IT systems that form integrated delivery networks.
2.5. Miscellaneous

2.5.1. Other Activities

There are several other on-going and planned activities that might influence the EHR Incentive Program, these include:

- **Michigan Provider Credentials Center**

  In 2008 the Federal Government awarded MDCH a Medicaid Transformation Grant to implement a one-source credentialing service for providers. DCH contracted with vendor Medversant. The first phase of the project was to develop in collaboration with the Bureau of Health Professionals a one source credentialing solution for professional licensing. MDCH has initiated a second phase of work that includes on-line licensing and renewals for licensing through the Bureau of Health Professionals. MDCH also wants to enhance existing CHAMPS Medicaid provider enrollment functionality through integration of its new MMIS, CHAMPS, and the MiPCC (Michigan Provider Credentials Center).

  To further automate and streamline the Medicaid provider enrollment process MDCH is working toward MiPCC to become the data verification source and provide the data to CHAMPS. CHAMPS would receive the CLIA, DEA, License, State and Federal Death Files, NPPES, EPLS and OIG file data from MiPCC through real-time web service calls. DCH is targeting this exchange to be implemented by March 2011. More details on this project are available in Section 2.5.3.6.

- **HIPAA 5010/ICD-10**

  On January 16, 2009, The United States Department of Health and Human Services enacted the rule for adopting X12 Version 5010 for HIPAA transactions. The compliance dates for Version 5010 for all covered entities, is January 1, 2012. Michigan Medicaid will be transitioning their existing X12 Version 4010A1 transactions (837 claims and encounters, 835 remittance, 276/277 claim status request and response, 278 prior authorization request and response, 270/271 eligibility request and response, 834 enrollment, 820 capitated payment, and TA1 acknowledgement) as well as adopting the new 999 acknowledgement transaction. MDCH is in the process of defining the system requirements and designing the required system changes that will ensure their compliance with the mandate effective January 1, 2012.

  In addition, the Department of Health and Human Services (HHS) announced in August 2008 that it is transitioning the health care industry to the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) and the International Classification of Diseases, Tenth Revision, Procedural Classification System (ICD-10-PCS) for coding and billing. The implementation was originally set to be by October 1, 2011. However, the Centers for Medicare and Medicaid Services (CMS) extended the date of ICD-10-CM into the HIPAA mandated code set to October 1, 2013. This initiative will have a huge impact on Medicaid business operations. In terms of system impacts CHAMPS must have the capability to accept and process the new structure of the code set, as well as Michigan anticipates business rule changes that will be required to facilitate accurate claims adjudication. The degree of specificity of the codes themselves will make CHAMPS a rich
input source of healthcare data that can be used toward care management and substantiation of meaningful use.

- **Data Warehouse**

Now that MDCH has implemented CHAMPS, the corresponding data warehouse activities need to be completed so the MDCH can continue to use the data warehouse for comprehensive complex analysis. The data warehouse interacts with other applications and systems and is an integrated component of MMIS.

The integration of data within the warehouse provides MDCH the ability to monitor the cost and care associated with a single individual across multiple programs, and has been instrumental in: improving the administration of health care services; conducting advanced data analysis to determine patterns; assessing which programs are most effective; detecting and reducing fraud and abuse; improving and interpreting disease management and epidemiological patterns; and for Health Information Exchange.

Michigan submitted an Advanced Planning Document – Update (APDU) to its regional CMS office on August 9, 2010 to enhance the State’s Decision Support System (DSS). Under this APDU, Michigan has included fifteen (15) new projects which we want to initiate in order to enhance the DSS related to new CHAMPS projects, HIPPA 5010, ICD-10 and Medicaid EHR Incentive implementations.

Improvements – With the implementation of new technology, comes new opportunities to improve efficiency and reduce costs. Some of the planned Data Warehouse improvements include:

- Analysis of CHAMPS data warehouse usage will be performed to determine areas for improvement (e.g., rewrite queries, add statistics, add/remove indexes to align with user access to data, compress databases). Solutions will then be identified, developed and implemented to address the identified areas for improvement.
- The Unique Client Identifier (UCI) will be replaced with a COTS product. Replacing the UCI with a COTS product has several benefits. While the UCI has been reliable and stable over the years, replacing it with a COTS product will align with HIE initiatives and improve MDCH’s ability to maintain this functionality in the future.
- The Data Warehouse Security form/process will be completed using a web-based security application. This will significantly shorten up the approval/denial processing time as well as maintaining a strong audit trail of all the approvals in the process. There are plans to add additional programs requiring security approvals to the security application utilizing the same frame work that is used in the Data Warehouse Security form.
- Enhance architecture to align with MITA by developing data exchanges between the data warehouse and health plans. By making additional data available to health plans, these secure data exchanges promote efficient and effective data integration and sharing for purposes of improving health care outcomes for Medicaid beneficiaries. These data exchanges are adaptable and will be used to help drive the Michigan Health Information Exchange (HIE) initiatives. Additionally, Expand the data warehouse to include data needed to support EHR (e.g., additional provider data, NLR data).
• **CHAMPS finalization and certification**
  Michigan's new Medicaid Management Information System (MMIS) called CHAMPS is the first completely web-based system of its kind in the U.S., and is revolutionizing Medicaid in Michigan.

Since going live with its major system components in September 2009, CHAMPS has exceeded expectations, handling millions of dollars a day in reimbursements for doctors, dentists, hospitals and nursing homes across the state. The system has not missed a single payment cycle and is expected to process 56 million claims and encounters, totaling $10 billion in payments on an annual basis for both fee-for-service and managed care recipients.

Michigan is currently in the process of preparing its third deliverable for the certification process which is brief narratives for all certification criteria. Once this is submitted and approved Michigan will be in a position to request the formal certification site visit to occur. Michigan expects to submit a letter to CMS requesting the formal review process in early FY 2011. Once this letter is submitted, the site visit will occur no sooner than 6 months after delivery to CMS. The date of the weeklong visit is a negotiated item between MDCH and CMS. Michigan could have a certified MMIS system as early as spring 2011.

2.5.2. **Changes to State Laws**
There have been no recent state laws or regulations that will affect the implementation of the EHR Incentive Program. There are no foreseen changes to state laws or regulations required to the implement the EHR Incentive Program. However, there may be some minor changes required to fully implement MiHIN.

2.5.3. **Other Recent HIT-Related Grants**
There are a few other recent HIT-related grants that should be noted.

2.5.3.1. **HIE Cooperative Agreement**
The Michigan Health Information Network (MiHIN) is the state of Michigan's initiative to improve health care quality, cost, efficiency, and patient safety through electronic exchange of health information. The MiHIN is a collaborative effort between the Michigan Department of Community Health, the Michigan Department of Technology, Management and Budget and a broad group of stakeholders from across the state of Michigan.

The MiHIN is essential to ensuring that Michigan's health care providers can utilize Electronic Health Records (EHRs) in a meaningful way that allows for a patient's health information to be available when they need it most - at the point of care.

Through the American Reinvestment and Recovery Act of 2009, the Office of the National Coordinator (ONC) for HIT allocated $14,993,085 for the MiHIN project to facilitate the creation of a statewide technical infrastructure supporting health information exchange (HIE) services. In February of 2010, Michigan entered into a cooperative agreement for State Health Information Exchange with the ONC.
In April of 2010, the MiHIN Shared Services Strategic and Operational Plan were completed. The strategic plan identifies the vision, goals, objectives and strategies for addressing statewide health information exchange (HIE). The strategies outlined in the plan are designed to execute on the vision of developing an open architecture that complements the progress made by sub-state HIEs and leverages statewide shared services to accelerate health information exchange.

The MiHIN Shared Services Operational Plan will serve as the State of Michigan’s roadmap for statewide health information exchange. The plan outlines the activities, timelines and financial aspects of implementing the strategic plan over the next four years.

2.5.3.2. CDC-Enhancing the Interoperability of EHR and Immunization Information Systems (ISS)

In September of 2010 the CDC awarded the Michigan Department of Community Health $1,050,000 to support the development of a data exchange environment between the Michigan Care Improvement Registry (MCIR) and EHRs. MCIR is an immunization information system developed by the State of Michigan to assist immunization providers with increasing immunization levels in Michigan. The funding for this two year project will provide the resources needed to enhance the MCIR’s electronic data exchange capability.

MDCH Division of Immunization will partner with the Michigan Health Information Network (MiHIN) to create an ONC endorsed standards based test environment for certified EHR vendors supporting meaningful use. MCIR will also implement a quality assurance certification process for EHR vendors messaging with the registry. These efforts will allow the State to experience an increase in the number of practice-based EHR interfaces with the registry, increase the number of immunization transactions reported to the MCIR and improve the timeliness of immunization reporting.

2.5.3.3. CDC - Enhanced Electronic Laboratory Data Exchange

In September of 2010, the Michigan Department of Community Health Bureau of Laboratories will enter into a cooperative agreement of $587,680 with the Centers for Disease Control and Prevention (CDC) to enhance the electronic data exchange between health partners and public health. Funding for this two year project will provide the resources needed to enhance the State’s laboratory information management system, STARLIMS, and the Michigan Disease Surveillance System (MDSS).

STARLIMS provides specimen tracking and management and real-time reporting of all Michigan reportable diseases and influenza laboratory reports to local, state and federal public health officials to control and prevent illness, disease and deaths. STARLIMS flags reportable disease conditions from all seven of Michigan’s regional laboratories, located in local health departments throughout the state, plus the State Laboratory in Lansing and its branch in Houghton and transmits a regular ongoing flow of electronic messages to the state’s disease surveillance system (MDSS).

MDSS is the State Of Michigan’s system used to identify and track emerging infectious diseases and potential bioterrorism attacks. It allows for the investigation of outbreaks and the monitoring of public health trends at a local, regional and state level. MDSS also enables physicians and clinical
laboratories to electronically report the occurrence or suspected occurrence of disease, conditions or infection required by the Michigan Communicable Disease Reporting Rule.

STARLIMS will implement the nationally recognized standards of the Public Health Laboratory Interoperability Project (PHILIP) enabling bi-directional communication between the CDC and other local and state agencies. MDSS will be enhanced to allow for an increase in the number of laboratories and electronic health record (EHR) systems reporting through the current process and for the transition of reporting through the Michigan Health Information Network (MiHIN) infrastructure.

2.5.3.4. Southeast Michigan Beacon Community Collaborative

The Southeastern Michigan Health Association (SEMHA) was chosen on September 2, 2010 to receive funding under the U.S. Department of Health and Human Services’ (HHS) new Beacon Community Cooperative Agreement Program. Southeast Michigan Beacon Community Collaborative (SEMBCC) is a diverse 60+-member multi-stakeholder consortium led by the Southeast Michigan Health Information Exchange (SEMHIE) and its fiduciary, SEMBA. Membership in SEMBCC includes six major health systems, payers, employers, providers, quality organizations, safety-net providers, and healthcare professional associations. SEMBCC will leverage existing and additional technologies across health care settings to improve information process flow, continuity of care, and to accelerate improvement in the quality and safety of care, specifically for underserved patients with diabetes. By decreasing costs and improving the quality of care, a self-sustaining health information exchange serving Southeast Michigan will be achieved.

The Beacon Community Program was established through funding by the American Recovery and Reinvestment Act to accelerate the development of a nationwide health information technology (HIT) infrastructure. Selected communities use funding to identify the most prevalent health issues affecting local residents, and then use HIT tools to link health providers and other community resources in new and innovative ways, and to share best practices and lessons learned with other communities who want to implement similar strategies.

SEMHA will receive $16.2 million over three years from HHS through the Program. SEMHA and its partners in the greater Detroit area will use HIT tools and strategies to improve diabetes care in Detroit by facilitating the sharing of medical information among health systems, physicians, Community Health Centers, health insurers, and laboratories.

2.5.3.5. Medicaid Transformation Grant – Vital Records

The current database (BRS) has been developed to contain birth data for Michigan births, to issue official certified copies of vital records, to enable official amendments to the recorded data and to generally serve as the official source of legal “prima facie” information on the facts of each birth. The database currently contains full or partial records on nearly 9 million Michigan live births. This large database has been constructed by uploading legacy data that had been captured over a nearly 50 year period and under 13 different data file formats and four distinctly different processing systems. This significant effort to standardize these data into a single and uniform database has been very successful.
but has important limits. These limits do affect the value of the data and the ability to rely on the
database to make appropriate administrative decisions on Medicaid cases.

The major goals of this project are to address the following database issues:

- Birth record data prior to 1989 contains only limited “index” information on the birth. This can
  significantly reduce the likelihood of a case worker positively locating a birth record.
- Records have been identified that are missing within the database. This means an unsuccessful
  search of the file is not conclusive evidence that the birth facts supplied are incorrect.
- The birth records within the files are not all properly linked to corresponding death record data.
- The current birth data interface screens were designed prior to the significant upgrades to the
  BRS, and were not originally designed to be used by Medicaid staff. This upgrade will enhance
  the ability of a case worker to perform citizenship validation online and avoid unnecessary effort
  and expense by the recipient or applicant.

The project had four specific outcomes and objectives relative to database improvement:

1. **Improve DHS Citizenship Validation Capability** – Revising the DHS Medicaid eligibility intake
   worker interface to BRS to improve birth fact validation from approximately 70% to 90-95%.
2. **Improve the reliability of Medicaid BRS search results** – Identifying and resolving missing
   BRS birth data will raise DHS online case verification rates and ensure reliable search results.
3. **Link Death Records to Birth Records** – Provide Medicaid intake and quality improvement
   staff a source of death information to identify applicants using false identity.
4. **Upgrade Interface Screens** – Increase the ability of Medicaid staff to properly locate and
   confirm birth facts in BRS.

This project is complete.

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2.5.3.6. **Medicaid Transformation Grant – One Source Credentialing**

2006-7 CMS Medicaid Transformation Grant Award: $5,208,759

The focus of this project is to utilize available technology to optimize capture, processing, and
management of health care provider data (credentials, licenses, sanctions, disciplinary actions). This will
provide administrative simplifications by reducing processing time and costs associated with
redundancies, provide the ability to electronically share health care provider information, and increase
the overall quality of the state healthcare provider pool through more accurate assessment of
healthcare provider eligibility using continuously monitored information.

The project targets manual, repetitive, redundancies currently in place for the capture,
processing, management and sharing of Michigan healthcare provider data. The concept began with the
understanding that health care providers are credentialed by, on average, 12 different entities, all of
which use unique and often paper application forms, request similar or the same information, follow
manual, paper-based processes and provide limited to no ability to quickly and efficiently share
information.

**The OneSource Credentialing Project and Sub-Components**

The Credentialing Service: Michigan Provider Credentials Center (MiPCC)
This is a vendor-based solution (Medversant Technologies LLC) offers an off-the-shelf service that utilizes technology and standard practices to manage health care provider data. The service is NCQA certified as a CVO, URAC certified, and adheres to The Joint Commission guidelines. The service will utilize existing licensing data captured by the Bureau of Health Professions database. The initial pilot included Fee-for-Service Medicaid healthcare providers. Medicaid eligible healthcare provider data has been shared with MiPCC and continuous monitoring is currently being piloted. Outreach is currently underway or planned for the following state agencies:

- Bureau of Health Professions (primary source verification and related support kicked off July 7, 2010)
- DCH Mental Health (primary source verification) (Outreach is underway)
- Health Professional Recovery Program (Outreach is planned)
- Department of Corrections (Outreach is underway)

Subcomponent: Disciplinary Documents File Conversion

This subcomponent was designed to establish and implement processes and procedures to share public health care provider disciplinary documentation electronically to state agencies (through IRMA) and to the public (via the web). The scope includes:

Phase 1: Conversion of historical documents (FY2000 to present) from paper to electronic form; and development and implementation of ongoing processes and procedures for conversion (Completed and Closed).

Phase 2: Posting public disciplinary documents to the website: Verify a License

This will reduce costs associated with manual, labor intensive processing of Freedom of Information Act (FOIA) requests as well as reduce the time to surface (find and/or share) this information both internally and to the public. (Currently in the testing phase in preparation for cut over anticipated Q4FY2010).

Subcomponent: Michigan Health Care Provider Records Enhancement

This subcomponent was designed to ensure that existing health care provider records in the licensing database contain all the required data, this component included: 1) identification of essential data elements; 2) analysis of existing records/data for accuracy and completeness; and 3) update of health care provider records as necessary. (Completed and Closed)
3. Michigan’s “To-Be” HIT Landscape

In general, Michigan has always been an early adopter of technology to improve health care, simplify health administration and monitor public health. MCIR is a state-of-the-art registry that has expanded to include tracking health information beyond immunizations and has received numerous awards and national recognition. Michigan was one of the first states to develop and utilize a data warehouse to consolidate disparate data sources into one system and use that system to assist program effectiveness and quality-of-care. Michigan also has some of the most advanced public health surveillance systems in the nation and uses them to monitor and track all public health issues statewide. Building on this history will be vital to moving Michigan forward and achieving the state’s HIT/E goals.

3.1. HIT/E Initiatives

Over the next five years, Medicaid will focus on three administrative initiatives and three HIT/E initiatives. The administrative initiatives are the pending HIPAA 5010 and ICD-10 conversions and the Affordable Care Act related initiatives. Although these are not directly related to this plan, they will have an impact as all have some technology components and will require changes to Medicaid systems, and all will require substantial staff resources. The three HIT/E initiatives are administration of the Medicaid EHR Incentive Program including encouraging the adoption of EHRs, increasing the interoperability of state systems to support meaningful use and HIE, and encouraging and facilitating HIE in Michigan.

3.1.1. Encouraging the Adoption of EHRs

The adoption and meaningful use of EHRs across all care settings has the potential to achieve national improvements in the quality and value of health care through financial incentives for providers. It will be vital to encourage all eligible providers to adopt EHRs and utilize them in a way that will improve care. Michigan will encourage providers to adopt EHRs in three ways.

First, the Medicaid EHR Incentive Program will provide financial incentives to providers. It is the state’s intention to make information about the incentive program available to all providers through a wide-reaching outreach program. This outreach program will include information on the MichiganHealthIT.org, mailings to providers and live and web-based training on Medicaid EHR Incentive Program registration. Additionally, the registration process for the Medicaid EHR Incentive Program will be as streamlined as possible to lessen the burden on the providers. Registration will occur through the CHAMPS system that many provider practices access on a daily basis.

The second planned method to encourage adoption is to provide general information and education to all providers in Michigan on the benefits of an EHR and how it can improve all aspects of their practice. This will include continued updates on MichiganHealthIT.org, speaking at meetings and conferences, informational mailings and coordinated efforts with M-CEITA and other provider organizations.
Lastly, the state will improve several key systems to ensure the data in them is available to providers at the point of care. This will include informing the providers what data is available, the benefits to care that can be realized through access and how to access the different sources. At the same time, these systems will be enhanced to improve secure access to the systems and interoperability with EHRs. More details on these improvements are below in section 3.2.

The last two efforts will start as informational/educational and then migrate to a more direct support role. Once Medicaid providers are aware of the benefits of EHRs, they will need additional support and technical assistance around adoption and meaningful use of certified EHR technology. All of these efforts will be closely coordinated with M-CEITA and MiHIN, as well as, key health care stakeholders from across the state. More details on these activities will be in a later version of the SMHP.

3.1.2. Increasing the Interoperability of State Systems to Support Meaningful Use & HIE

Many of the state’s systems will need improvements and enhancements before they can support both meaningful use and HIE. Michigan’s approach is to establish a mini-HIE for all state systems to connect to. This State of Michigan HIE (SoM HIE) will then connect to MiHIN and through that to both NHIN and the sub-state HIEs that are being developed. By building HIE technology internal to the state will ensure that all the state systems are interoperable using the national standards, easily share information within the state in a secure way, leverage technology investments made by other programs and departments, and make state systems securely available to providers to assist in meeting the meaningful use requirements. SoM HIE will also be vital in tracking and verifying providers’ meaningful use status.

In addition to the two main Medicaid systems, CHAMPS and the Data Warehouse, all of the other state government health-related systems would be connected to SoM HIE. These state systems are referred to as State of Michigan Systems (SoM Systems) and the systems that are included in round one integration with SoM HIE are:

- Medicaid Systems
  - CHAMPS (MMIS)
  - Data Warehouse
- Public Health Systems
  - MCIR
  - MDSS
  - MSSS
  - State Labs
- Administrative Systems
  - SoM Single Sign On (SSO)
  - MDCH Bureau of Health Professions licensing database
Additional systems will be added later, details on these will be in a later version of the SMHP. Figure 9 below is an early draft conceptual design of how SoM HIE would streamline interoperability and interface with MiHIN. More detail is in Section 3.2.5.

3.1.3. Encouraging and Facilitating HIE in Michigan

As one of the largest payers and sources of health information in the state, Medicaid will take a very active role in encouraging and facilitating HIE activities in Michigan. Medicaid clearly sees the benefits to wide-spread adoption of HIE by the health care professionals who serve Medicaid beneficiaries. In addition to the items above, Medicaid is engaged in both MiHIN, at the state-wide level and the sub-state HIEs. As mentioned in section 2.4.1.1, Medicaid will hold a seat on the MiHIN governing body and is requesting HIT I-APD funding to assist in the creation of both MiHIN and the sub-state HIEs. These funds will be combined with other federal funding, provider, payer and other contributions to establish and enhance HIE functionality in Michigan. In a future HIT I-APD, Michigan will seek funds to support this activities. These funds will be used by the MiHIN Governing Board, under the supervision of Medicaid, to establish and enhance HIE activities that would directly benefit Medicaid beneficiaries and providers.
3.2. Future State IT System Architecture

3.2.1. Changes to CHAMPS

In addition to the non-EHR and non-HIT items mentioned in sections 2.5.1, CHAMPS will be the primary system that is used for provider registration and payments for the EHR incentive program. This will require a new “EHR” sub-system inside of CHAMPS and some modifications to existing sub-systems. This will also require some changes to the interface between CHAMPS and the data warehouse. Current plans also have CHAMPS, in conjunction with SoM HIE, being the meaningful use and clinical quality measures (CQM) reporting system. See Section 4.3.1 for more details.

Managed care (MC) providers are not currently fully enrolled in CHAMPS, only fee-for-service (FFS) providers are currently required to complete the full enrollment process. However, many of the MC providers do have some limited information pre-populated in CHAMPS from a feed provided by the managed care organizations (MCO). Non-FFS providers who wish to participate in the EHR Incentive Program will have to complete an additional provider registration step before completing the EHR Incentive Program registration and attestation. This provider registration step will closely follow the existing FFS provider enrollment process. This was done for three reasons. First the provider demographic information items required for the EHR Incentive Program registration are almost identical to the demographic information FFS provider enrollment process and this allowed us to reuse and leverage the extensive development that went into the FFS provider enrollment sub-system in CHAMPS. Secondly, the FFS provider enrollment sub-system in CHAMPS already automatically does all of the provider verifications and good standing steps that are required in the EHR Incentive Program and reusing this sub-system was the easiest approach to accomplish this. Lastly, by collecting all the same information that is required for a FFS provider, if a non-FFS provider wants to enroll as a FFS provider it will be very easy to migrate the provider. That being said, non-FFS providers (such as a MC provider) are not required to become FFS to participate in the EHR Incentive Program. These providers will be flagged in CHAMPS with an EHR only indicator that will prevent any FFS claims being paid to the non-FFS providers. We are expecting several hundred non-FFS providers to participate in the EHR Incentive Program. It is not clear how many will elect to become FFS providers or remain flagged as EHR only. Completing either application only takes about 10 to 15 minutes for the provider to complete. Once completed and submitted it takes less than 30 days for approval or denial. Providers will not be able to enter the EHR Incentive Program registration and attestation modular until they are approved. Unfortunately, due to the limited development time available for this program, this new EHR only provider registration will not be ready until the same time as the EHR Incentive Program registration and attestation modular, currently slated for January 21, 2011. However, providers who want to get a head start in the program could elect to complete the FFS enrollment process now. These options will be articulated in forthcoming policy bulletin(s) and informational material made publicly available including posting on the www.MichiganHealthIT.org.

3.2.2. Changes to Data Warehouse

The Data Warehouse is a vital system for most Medicaid operations and will continue to be improved and enhanced. Currently the old UCI is being replaced with a new Master Patient Index (MPI).
The new MPI is much more powerful and will allow for better matching and tracking of individuals across all programs.

In addition to the MPI replacement, and as part of the SoM HIE implementation, the data warehouse will be mined for data to create a new Continuity of Care Document (CCD) based on the HL7 standards. This CCD will combine all the items known to the state about a patient in a single, easy-to-use and standard-based document that can be shared with EHRs and HIEs. See Section 4.3.2 for more details.

3.2.3. MCIR
MCIR will need enhancement to support the immunization meaningful use items, take advantage of the new MPI and fully connect to SoM HIE. Currently MCIR does not support HL7 messaging that is required to electronically exchange records with EHRs and HIEs. This functionality will be added. MCIR also currently uses an internal proprietary patient index system. This will be replaced by integrating MCIR into the new MPI. There are also several improvements required to enable MCIR to connect to the new HIE standards that will be utilized in SoM HIE.

3.2.4. Other Public Health Systems
The Michigan Disease Surveillance System (MDSS) and the Michigan Syndromic Surveillance System (MSSS) will also be enhanced to support the public health meaningful use items. MSSS already supports HL7 messaging but needs several improvements required to enable it to connect to the new HIE standards that will be utilized in SoM HIE and needs increase capacity as it will grow from receiving reports only from emergency rooms to receiving reports from all the providers (both hospitals and EPs) in the state. MDSS does not currently HL7 messaging that is required to electronically exchange records with EHRs and HIEs. This functionality will be added. MDSS also currently uses an internal proprietary patient index system. This will be replaced by integrating MDSS into the new MPI. There are also several improvements required to enable MDSS to connect to the new HIE standards that will be utilized in SoM HIE. Similar to MSSS, MDSS will also see an increase in utilization as more providers report into the system, and will require additional capacity to handle the increase demanded generated by meaningful use. Additional, STARLIMS, the State Bureau of Laboratories system, will need some improvements to connect to the new HIE standards that will be utilized in SoM HIE.

3.2.5. Establishment of SoM HIE
SoM HIE will utilize all of the national HIE standards, as outlined by the ONC, to insure that it is interoperable with certified EHRs and other HIT systems. SoM HIE will also connect to MiHIN using these same standards to connect to sub-state HIEs and providers and ultimately NHIN. The current draft design calls for an XDS-based query for documents and repository systems, a PIX/PDQ patient identity service, a SAML-based security service and an interface engine to connect to the SoM systems. Many of the SoM systems will need upgrades to the new interoperability standards. For example, MCIR will need upgrades to be able to send and receive immunizations records. In the short-term, there will also be a web service interface for providers to use while MiHIN and the sub-state HIE are finalized.

SoM HIE will be a group of state systems operated by the Michigan Department of Technology, Management and Budget (MDTMB). MDTMB will work closely with MDCH and Medicaid to insure that
SoM HIE will meet the needs of the departments. SoM HIE will be housed in the secure state data centers will all the appropriate security, both physical and network, and redundancy to ensure secure and continual operations.

In addition to interconnecting all the SoM systems, SoM HIE will include three main services; Patient Identity Service, Security Service, and Query for Documents Service. The Patient Identity Service will use the national standards (PIX and PDQ) and leverage the Master Patient Index (MPI) that is currently being integrated with the Data Warehouse. The Security Service will again use the national standards (mainly SAML) and integrate with the existing SoM Single Sign On and the pending Master Provider Index. The Query for Documents Service (a.k.a. Record Locator Service) will support XDS query and responses from two sources. This includes a web services server that early adopters will be able to use until general HIE (the second source) is readily available from MiHIN.

### 3.3. Populations with Unique Needs

Medicaid, working closely with M-CEITA has been and will continue to do targeted outreach to providers who care for patients with unique needs. These include pediatricians, rural providers, providers in FQHC and Rural Health Clinics and others. Both Medicaid and M-CEITA are working closely with the Michigan Primary Care Association (MPCA) to leverage their experiences deploying EHRs in FQHCs from their HRSA HIT/EHR funding. MPCA has wealth of knowledge and lessons learned from all the years of EHR work and has been and will continue to be a resource for Michigan Medicaid.

Medicaid also work closely with M-CEITA to define “other underserved” option for priority primary care providers to help ensure that providers who serve populations with unique needs receive M-CEITA assistance in selecting, implementing and achieving meaningful use of EHRs. See Appendix G for the full definition as approved by ONC.

### 3.4. Goals and Outcomes

Health IT and the EHR Incentive Program have an enormous potential to improve care and outcomes. Medicaid has identified several key areas, along with, related goals and outcomes.

#### 3.4.1. EHR Incentive Administrative Goals and Outcomes

Ensuring that as many providers who are eligible participate in the EHR program is a primary goal. Medicaid will work hard toward this goal by, providing education and outreach activities, minimize the barriers to participating where possible, streamlining the registration process and providing registration training and assistance to the providers. It is anticipated the approximately 3,000 EPs with participate in the Medicaid EHR Incentive Program.

<table>
<thead>
<tr>
<th>Year</th>
<th>EP Registration Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>200</td>
</tr>
<tr>
<td>2012</td>
<td>500</td>
</tr>
<tr>
<td>2013</td>
<td>500</td>
</tr>
<tr>
<td>2014</td>
<td>500</td>
</tr>
<tr>
<td>2015 and later</td>
<td>1,300</td>
</tr>
</tbody>
</table>
It is anticipated the approximately 130 of the acute care hospitals in the state will participate in the Medicaid EHR Incentive Program.

Table 7 - EH Registration Goals

<table>
<thead>
<tr>
<th>Year</th>
<th>EH Registration Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>35</td>
</tr>
<tr>
<td>2012</td>
<td>45</td>
</tr>
<tr>
<td>2013</td>
<td>25</td>
</tr>
<tr>
<td>2014</td>
<td>15</td>
</tr>
<tr>
<td>2015 and later</td>
<td>10</td>
</tr>
</tbody>
</table>

Once a provider is registered and has completed implementation or upgrade of an EHR, the next major goal is to achieve meaningful use. Medicaid, in partnership with M-CEITA and other health care stockholder groups, intends to ensure that the majority of the providers achieve meaningful use in a timely manner. Medicaid, with its partners, will continue to provide education, training and outreach activities to assist providers in achieving meaningful use. These activities will continue to ensure providers maintain meaningful use.

Table 8 - Meaningful Use Achievement Goals

<table>
<thead>
<tr>
<th>Years to Meaningful Use</th>
<th>Meaningful Use Achievement Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>70%</td>
</tr>
<tr>
<td>2</td>
<td>80%</td>
</tr>
<tr>
<td>3</td>
<td>90%</td>
</tr>
</tbody>
</table>

There are several other administrative and timeline goals. These are:

- Anticipated completion of NLR testing – December 15, 2010
- EP and EH registration go-live – mid-January 2011
- First EP payment – February or early-March 2011
- First EH payment – March 2011
- Meaningful use collection and tracking system go-live – October 2011

3.4.2. EHR Incentive Oversight Goals and Outcomes

Program oversight is broken into three categories for the EHR Incentive Program. The first is provider eligibility verification, this includes the random eligibility verification audits. This process will kickoff concurrently with registration, with a goal of having the first eligibility verification audit complete within 90 days of registration opening. The second category is meaningful use verification. This process will begin once the Meaningful use collection and tracking system is ready and providers start to apply for their second participation year. As with any new program, general program integrity will naturally
lag behind kick-off. This is the third category and includes several related goals including monitoring for waste, fraud, and abuse. One main factor that is outstanding is the sampling rate for program integrity, the goal is to have this finalized once clearer participation levels are available and no later than 18 months after registration opening.

3.4.3. Encouragement of EHR Adoption Goals and Outcomes
The numerous benefits of EHRs are only realized if the majority of the health care providers utilize the technology. Medicaid, in partnership with M-CEITA and other health care stockholder groups, intends to ensure that all Michigan health care providers understand the benefits of adopting an EHR, what resources are available to assist them, such as M-CEITA, and know of and understand the EHR Incentive Programs, both Medicaid and Medicare. This will be accomplished through an intense educational and outreach plan. The goal is to inform all Michigan providers by mid-2011.

3.4.4. HIT/E Related Goals and Outcomes
There are several foundational items that have to occur to ensure that Michigan’s health care community is ready and capable of securely exchanging electronic health information. Medicaid has an important role in these efforts. One of the first items that has to happen in increasing the interoperability of State systems to support meaningful use and HIE. Many of the State systems are either required for meaningful use, vital for HIE or both. These systems need to be made interoperable and accessible to providers. This will largely be enabled by the establishment of SoM HIE and the implementation of the new MPI. SoM HIE will be phased in over time.

SoM HIE timeline and goals:

- Complete design and requirements – early 2011
- Implement security and messaging service to receive immunization information – summer 2011
- MDSS receive notifiable laboratory results from sub-state HIEs – late 2011
- Implement XDS repository to send immunization histories via MiHIN Shared Services – early 2012
- STARLIMS send lab results via MiHIN Shared Services – summer 2012
- Full MPI integration – late 2012
- Full Provider Index integration – early 2013
- State data CCD available – late 2013
- All currently planned SoM systems integrated – early 2014

There is a lot more to HIE then just the state systems. Here again Medicaid, as one of the largest payers in the state, has an important supporting role in encouraging and facilitating HIE development. MiHIN will enable and support the ability of Michigan’s providers to accomplish and demonstrate meaningful use by advancing cross-community exchange. The current plan calls for the completion of the shared services core infrastructure by summer 2011 and the security services by the fall 2011. By early 2012, sub-state HIEs will be connected to the MiHIN Shared Services allowing health information exchange to occur within and across state borders. The timelines in the MiHIN plan (Appendix D, E and F) were based on a July 2010 ONC plan approval date. We estimate the current timelines will be pushed-out 6 months pending ONC approval.
Just like EHR adoption, the benefits of HIE is only realized when the majority of the health care providers utilize the technology. So in addition to sub-state HIE connectivity to the MiHIN Shared Services, Medicaid is also focusing on minimizing the providers barriers’ to connect to the sub-state HIEs.

3.5. Funding Outline

Several sources of funding have been identified and will be used to implement this plan. These include CMS funding in the form of MMIS and HIT APD funding, ONC funding from the HIE Cooperative Agreement, CDC funding for the public health systems and State funding for the required matches and other items.

EHR Incentive Program administrative items will be CMS funding, with the required state match. Changes to CHAMPS and the Data Warehouse will flow through updates to the MMIS APDs. This will include changes for registration, payments of incentives, interoperability upgrades, and other items required for provider to achieve meaningful use, as well as, for Medicaid to track and verify meaningful use. Staffing and general administrative task for the EHR Incentive Program administration will fall under the HIT I-APD funding mechanism. Outreach and educational activities for the EHR Incentive Program and encouraging EHR adoption will also be included in the HIT I-APD. Funding support for encouraging and facilitating HIE development will also be in the HIT I-APD.

Interoperability upgrades and other items required for provider to achieve meaningful use other systems, such as MCIR, that historically received CMS funding, will be included on the relative MMIS APD on a proportional basis. With other funding coming from the CDC funding in Section 2.5.3.2, as well as, the ONC HIE Cooperative Agreement.

Interoperability upgrades and other items required for provider to achieve meaningful use other systems, such as MDSS and MSSS, which are required for meaningful use but have not historically received CMS funding, will be included on the relative HIT I-APD on a proportional basis. With other funding coming from the CDC funding in Section 2.5.3.3, as well as, the ONC HIE Cooperative Agreement.

Funding, on a proportional basis, for the core SoM HIE development will also be in the HIT I-APD. Additional funding for core SoM HIE development will also be coming from the ONC HIE Cooperative Agreement.
4. Michigan’s Medicaid EHR Incentive Program Implementation Plan and Audit Strategy

4.1. EHR Incentive Program Registration and Verification

Michigan Medicaid intends to use CHAMPS to register providers for the EHR Incentive Program. By utilizing this existing systems we can speed-up go-live, leverage existing information and processes, keep the new registration system in a user interface that most providers are familiar with and streamline the verification and payment processes.

4.1.1. Eligible Professional

Eligible Professionals (EPs) will be directed to the National Level Repository (NLR) to start their registration processes. Once Medicaid receives a valid EP request from the NLR, that provider will receive a letter that is automatically generated by CHAMPS inviting them to log into CHAMPS and complete the additional information that is required. For existing fee-for-service providers, they will be given an opportunity to update any demographic information and then directed to complete the new EHR information module (described below). Non-fee-for-service providers (such as providers who only provide care under one or more of the Medicaid managed care organizations), will be instructed how to gain access to CHAMPS, complete the provider enrollment process (to collect demographic information) and then directed to the new EHR information module. This is required because non-fee-for-service providers currently have limited information in CHAMPS and do not access CHAMPS. As part of the provider enrollment process, all providers are subject to a thorough review. This includes a license check, death records check and sanction check. The system will check all providers on a routine basis to ensure that any recent changes are flagged. Once flagged, the system will not allow any payments of any kind, including EHR incentives, to be made to the provider until the flag is removed. Providers registering for the EHR Incentive Program will also be required to complete a base-line survey on general EHR issues and concerns. They will also be required to complete an annual update survey when they re-register each program year.

Michigan Medicaid will qualify providers as defined in the Final Rule Medicare and Medicaid Programs; Electronic Health Record Incentive Program. As specified under section 1903(t)(2)(A) of the Act, Medicaid participating providers who wish to receive a Medicaid incentive payment must meet the definition of a “Medicaid Eligible Professional.” The EP definition (1903(t)(3)(B) of the Act) lists five types of Medicaid professionals: Physicians, dentists, certified nurse-midwives, nurse practitioners, and physician assistants practicing in an FQHC or RHC that is so led by a physician assistant. EPs enrolling in Michigan Medicaid EHR Incentive Program must have a practice physically located within Michigan or have more than 30% of the Medicaid encounters covered by Michigan Medicaid.

CMS does not define the EP, “pediatrician” referenced in the patient volume section of the Final Rule. Pediatricians in the Final Rule are allowed to receive 2/3rd of the incentive payment if the Pediatrician
meets a Medicaid patient volume of only 20 percent. For the purposes of the EHR Incentive Program, Michigan Medicaid defines Pediatrician as:

Medical doctors who diagnose, treat, examine, and prevent diseases and injuries in children. A pediatrician must hold a four-year Doctor of Medicine (M.D.) or Doctor of Osteopathy (D.O.) degree.

AND

Hold a current and in good-standing board certification in Pediatrics through either the American Board of Pediatrics (ABP) or the American Osteopathic Board of Pediatrics (AOBP).

OR

Focuses on treating patients 18-years old and under, and at least 50% of the EPs total patient population is 18-years old and under.

4.1.1.1. New EHR Modular in CHAMPS

As part of the planned changes to CHAMPS to implement the EHR Incentive Program, a new EP EHR module will be created. This new module will collect all the required information and attestations for the EHR Incentive Program. This will include:

- Provider Demographic Information – This will largely be pre-populated by NLR and provider enrollment data
  - Name
  - NPI
  - Address
  - Provider type
  - Pediatrician Status
  - Email
- Medicaid Volume Information
  - Reporting Period
  - Practice Setting and Volume Information
    - Ambulatory setting (i.e., private practice, clinic, etc.)
      - Medicaid encounter volume
      - Total encounter volume
    - Hospital inpatient setting
      - Medicaid encounter volume
      - Total encounter volume
    - Emergency department/room setting
      - Medicaid encounter volume
      - Total encounter volume
    - FQHC/RHC
      - Medicaid encounter volume
      - Other Medical assistance (SCHIP, etc.) encounter volume
      - Uncompensated care encounter volume
• Sliding scale encounter volume
• Total encounter volume

• Certified EHR Technology Information
  o ONC Certification Number – this will be confirmed with the ONC web service
  o Vendor/Company
  o Product
  o Version

• Attestations

Additional Items for Participation Year 1
• Adopt, Implement or Upgrade Information
  o What status the provider is claiming
  o Providers will be instructed on how to provide proof of AIU status as needed
    ▪ Providers will be able to fax or mail hardcopies or scan and email electronic copies of required AIU proof

Additional Items for Participation Years 2 to 6
• Meaningful Use Information – this will adapt as meaningful use changes

4.1.1.2. Verification
In order to ensure that only eligible providers receive EHR incentive payments, a series of verifications will take place. Wherever possible existing systems and processes will be used.

Good Standing Verification: Providers will be checked on a nightly basis to ensure that they remain in good standing. This will include; having a current and valid license and no sanctions by the Michigan Bureau of Health Professions; do you appear on the state or federal death lists; and no sanctions by Medicare or Medicaid. This check automatically occurs through CHAMPS and any provider that is flagged, is “end-dated” so no payments are released and Medicaid staff can investigate the issue(s).

Hospital-based Provider Verification: CHAMPS will automatically check the provider reported volume information and flag any providers that exceed the hospital-based provider threshold. A statistically valid sample of all registering EPs will go through an additional review of claims history to ensure program integrity. This review will pull all of the claims, both fee-for-service and managed care encounters\(^6\) will be included, that contain the provider’s NPI under place of service (POS) Codes 21 (Inpatient Hospital) and 23 (Emergency Department) and compare those results to the provider reported numbers. A small margin of error will be allowed to adjust for incompleteness of the information available to Medicaid.

Medicaid Volume Verification: CHAMPS will automatically check the provider reported volume information and flag any providers that do not meet the Medicaid volume threshold. A statistically valid sample of all registering EPs will go through an additional review of claims history to ensure program integrity. This review will pull all of the claims that list the provider’s NPI and compare those results to

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\(^6\) Both fee-for-service and managed care encounters are available and will be used.
the provider reported numbers. A small margin of error will be allowed to adjust for incompleteness of the information available to Medicaid.

**Practices Predominately in FQHC/RHCs Verification:** CHAMPS will automatically check the provider reported volume information and flag any providers that report more than 50% of their total encounters in the FQHC/RHC setting. These provider NPIs will be compared to a list of NPIs collected from the FQHCs and RHCs who participate in Michigan Medicaid. FQHCs and RHCs who participate in Michigan Medicaid will be asked to provide a list of all the providers who practice in their organizations along with an estimated full-time equivalent for each provider. A statistically valid sample of all registering EPs who meet the FQHC/RHC threshold, based on provider reported number, will go through an additional review of claims history to ensure program integrity. This review will pull all of the claims that list the providers NPI and compare those results to the provider reported numbers. A small margin of error will be allowed to adjust for incompleteness of the information available to Medicaid.

**Certified EHR Verification:** In addition to the automatic check that CHAMPS will do comparing the provider reported ONC Certification Number to the ONC web service, a statistically valid sample of all registering EPs will be asked to provide written proof of what certified technology they are using.

**Adopt, Implement or Upgrade Verification:** A statistically valid sample of all registering EPs in participation year 1 will be asked to provide written proof of adoption, implementation or upgrade.

**Meaningful Use Verification:** A statistically valid sample of all EPs will be audited. These audits will take two forms. The first will be an offsite review where only items that can be verified without a site visit will be conducted. This will include checking with state systems, MiHIN and other state department and/or programs to verify meaningful use elements. The second will be an in-depth onsite audit. The onsite audit will only be conducted in cases where the offsite audit turned up issues or when there are other indications of issues.

**Out-of-State Volume Inclusion:** EPs will be asked if they want to include any non-Michigan Medicaid data for eligibility consideration. The inclusion of out-of-state encounters will initiate an eligibility verification audit so Medicaid staff can contact the other state(s) to confirm data.

### 4.1.1.2.1. Eligibility Verification Audits

As mentioned above a statistically valid sample of all EPs will be audited for eligibility verification criteria. The sample size will be finalized once the participation level is understood but will not be any less than 1 out of every 100 registrations. If randomly selected, the provider will be processed through all the additional verification steps and asked to provide the required additional items. Payment will be withheld until eligibility verification audit is complete. Medicaid would reserve the right to conduct an on-site inspection as needed. These eligibility verification audits will be conducted by Medicaid EHR program staff.

### 4.1.1.3. Encounter Calculation

As noted in Section 4.1.1.1., each EP will have to provide and attest to encounter data in all the different practice settings. These include:
- Ambulatory setting (e.g., private practice, clinic)
  - Medicaid encounter volume (Title XIX programs)
  - Total encounter volume
- Hospital inpatient setting, where EP is servicing or discharging provider
  - Medicaid encounter volume (Title XIX programs)
  - Total encounter volume
- Emergency department/room setting, where EP is servicing or discharging provider
  - Medicaid encounter volume (Title XIX programs)
  - Total encounter volume
- FQHC/RHC setting
  - Medicaid encounter volume (Title XIX programs)
  - Other medical assistance encounter volume (Title XXI programs)
    - Limited to Children’s Health Insurance Program (CHIP, known as MIChild in Michigan) or a CHIP demonstration project approved under section 1115 of the Social Security Act
  - Uncompensated care encounter volume
  - Sliding scale encounter volume
  - Total encounter volume

By collecting each of these items individually, all the various encounter thresholds can be calculated. For example, comparing total encounters in the FQHC/RHC setting to the sum total in all settings will establish if an EP is practicing predominantly in the FQHC/RHC setting. It will also allow for the Medicaid encounters in the FQHC/RHC setting to still be counted in the EP’s Medicaid encounters if the EP fails to meet the predominantly threshold. This approach also allows for identifying hospital based providers, by collecting both the hospital inpatient emergency department/room setting encounters. EPs will also be asked if they are including any out-of-state encounters, and if so, what state(s). The inclusion of out-of-state encounters will initiate an eligibility verification audit so Medicaid staff can contact the other state(s) to confirm encounter data. EHR Project staff would contact the Medicaid agency in that/those states and work with the other states on a case by case basis. For other states that need to contact Michigan Medicaid to verify Michigan encounter data, contact information will be available at www.MichiganHealthIT.org.

4.1.1.3.1. Encounters by Patient Panel Assignments

Only EPs who are primary care providers (PCP) that see Medicaid managed care patients will be allowed to use the encounter by patient panel assignment calculation. These providers will be allowed to use the total Medicaid managed care patients assigned to the provider as a PCP during the eligibility reporting period (90 days in year 1 and the entire preceding year in later years) with at least one encounter in the previous calendar year PLUS the total unduplicated Medicaid patient encounters during the eligibility reporting period as the numerator in their encounter calculation. The denominator would consist of the total patients assigned to the provider as a PCP by any payer during the eligibility reporting period with at least one encounter in the previous calendar year PLUS the total unduplicated patient encounters during the eligibility reporting period. For EPs in a FQHC or RHC, both the panel
assigned and unduplicated encounters in the numerator could also include charity care, sliding fee scale and other medical assistance patients.

4.1.1.3.2. Encounter – Special Cases

Not every episode of care in all health care settings results in an easily identified “encounter”. Several special cases of encounter have already been identified and will be addressed in pending policy. These include mass charity care by a non-profit health care provider outside an FQHC or RHC. For example, local public health agencies in Michigan routinely run mass vaccination clinics where their do not charge any payer or even track patient insurance coverage. In these cases, Michigan will not count this as an encounter, neither in the Medicaid or total encounter categories. Similarly, not every payer pays for the same care in the same way. An example of this is prenatal care, some payers pay for the individual prenatal care office visits, while others, including Medicaid, roll these costs up into the delivery payment. In these cases, Michigan will allow each episode of care (i.e., office visit) that occurs during the eligibility reporting period even if the resulting “rolled-up” payment happens at a later date. This must be applied uniformly against all payers. Additional special cases may be identified at a later date and will be included in later versions of the SMHP.

4.1.1.3.3. Encounter Volume by Practice/Organization Proxy

EPs will be allowed to use the organization or organizations that practice in encounter volume as a proxy to their own individual encounter volume. EPs that elect this option will be required to provide the group NPI(s) of the practice they are using as their proxy. This will facilitate verification and later audit, if needed.

In order to use this proxy option, all of the following criteria must be met:

1) The clinic or group practice’s eligible patient volume is appropriate as an eligible patient volume methodology calculation for the EP.
2) There is an auditable data source to support the clinic’s or group practice’s eligible patient volume determination.
3) All EPs in the group practice or clinic must use the same methodology for the payment year.
4) The clinic or group practice uses the entire practice or clinic’s eligible patient volume and does not limit eligible patient volume in any way.

4.1.1.4. Annual Re-Registration and Reporting

All participating EPs will have to re-register with CHAMPS every year. This will ensure the EPs report on meaningful use, re-attest to volume information and other administrative information. They will also be required to complete an annual survey that will address general EHR issues and concerns. This, combined with the base-line survey taken at initial registration, will allow Michigan to track additional EHR usage, issues and concerns in addition to the required meaningful use and reporting elements. This data will be used by the state for HIT planning.
4.1.1.5. Communication with EPs

Once Medicaid receives notification from NLR of an EP’s interest in the Michigan program, a letter will be mailed automatically to the address that is provided in the NLR feed. Additionally, an email will also go to the email address from the NLR feed, if available. This first letter will invite the EP to complete the additional information in the new EHR modular in CHAMPS, provided information on how to complete the registration process and where additional information can be found. Providers will be able to log back into the EHR modular at any time to see the status of their application. Additionally, an email will go out at the time of approval or denial (with reason for denial) of eligibility for the EHR Incentive Program if an email address was provided. Providers will receive notification of EHR incentive payments through the normal remittance advice process.

A call center for the EHR Incentive Program has been setup for general information and assistance. An email list will be created as new providers register and will be used to send updates and program changes to all participating providers. A program website has been created and will house all program information and updates.

Training on how to register for the EHR Incentive Program will be available to the providers. This training will be available in three forms. The first of which is a written instruction guide available on the web, the second will be a pre-recorded webcast of an instructor lead session. Both of these will be available at the time that registration goes live. The third form will be live in-person training sessions around the state. Current plans call for training in about twelve locations all over the state starting in late January or early February 2011.

4.1.1.6. EP Timeline

Michigan will give 30 days from issuance of the welcome letter (see Section 4.1.1.6.) to complete their EHR registration. Michigan will review and issue an approval or denial of an EP EHR incentive registration within 30 days of the completed application being submitted. Once an EP is deemed eligible and the duplicate payment check is complete with NLR, a gross adjustment will be issued for the full year’s amount. The payment will be issued in the next payment cycle.

Providers who are not already an established provider in the CHAMPS system or if they are selecting a TIN that is not established in CHAMPS and the Michigan Department of Treasury systems will be given an additional 30 days to complete these tasks because they are prerequisites of completing EHR incentive application. A prepared provider should be able to complete their provider registration in roughly 10 (ten) minutes. Provider enrollment staff will then make a provider registration determination within 30 days. Upon approval, the provider will be notified that they need to now enter the EHR module in CHAMPS to complete their EHR enrollment. Michigan intends to encourage providers to pre-complete these prerequisites elements before NLR submission, however these processes may not be ready for use until early 2011 in conjunction with the planned go-live of the new EHR modular. EPs that choose to include out-of-state encounters may also take longer than 30 days to process through the review and approval process. Additionally, the first few months of the program may see longer review and approval timelines.
4.1.1.7. Appeal Process

EPs will be able to appeal provider eligibility determinations; adopt, implement or upgrade and meaningful use determinations; and incentive payments through the existing appeal process. Providers will also be able to request and administrative review, short of a full appeal, to correct or submit corresponding/supporting information or documentation to address any provider eligibility determinations; adopt, implement or upgrade and meaningful use determinations; and incentive payments.

4.1.2. Eligible Hospital

Eligible hospitals (EHs) will be directed to the National Level Repository (NLR) to start their registration processes. Once Medicaid receives a valid EH request from the NLR, the Medicaid hospital staff will pull the relevant information from its sources (namely the Medicaid Cost Reports and Quarterly Updates) and start the review process. EHs will also have to log into CHAMPS and provide a few additional items including information specific to certified EHR technology. Only hospitals that file a cost report with Michigan Medicaid will be allowed to apply for the Michigan Medicaid EHR Incentive Program.

4.1.2.1. Verification

In order to ensure that only eligible providers receive EHR incentive payments, a series of verifications will take place. Where ever possible existing systems and processes will be used.

Good Standing Verification: Hospitals will be checked on a nightly basis to ensure that they remain in good standing. This will include no sanctions by the Michigan Bureau of Health Professions and no sanctions by Medicare or Medicaid. This check occurs automatically in CHAMPS and any provider that is flagged, is “end-dated” so no payments are released and Medicaid staff can investigate the issue(s).

Certified EHR Verification: In addition to the automatic check that CHAMPS will do comparing the provider reported ONC Certification Number to the ONC web service, a statistically valid sample of all registering EPs will be asked to provide written proof of what certified technology they are using.

Adopt, Implement or Upgrade Verification: A statistically valid sample of all registering EHs in participation year 1 will be asked to provide written proof of adoption, implementation or upgrade.

Meaningful Use Verification: A statistically valid sample of all EHs will be audited. These audits will take two forms. The first will be an offsite review where only items that can be verified without a site visit will be conducted. This will include checking with state systems, MiHIN and other state department and/or programs to verify meaningful use elements. The second will be an in-depth onsite audit. The onsite audit will only be conducted in cases where the offsite audit turned up issues or when there are other indications of issues.

4.1.2.2. Eligibility Verification Audits

As mentioned above a statistically valid sample of all EHs will be audited for eligibility verification criteria. The sample size will be finalized once the participation level is understood but will not be any less than 1 out of every 25 registrations. If randomly selected, the provider will be processed through all the additional verification steps and asked to provide the required additional items. Payment will be
withheld until eligibility verification audit is complete. Medicaid would reserve the right to conduct an on-site inspection as needed.

4.1.2.3. Medicaid Volume Calculation

MDCH will utilize data derived from the Medicaid Quarterly Hospital Reports to verify qualifying patient volume thresholds for the Medicaid EHR Incentive Program. The Quarterly Hospital Report will provide information specific to a ninety day continuous period, including total number of Medicaid patient encounters and all patient encounters within the described period. MDCH proposes to use total number of patient discharges or inpatient days when calculating hospital encounters. To verify hospital eligibility as an acute care hospital, MDCH will verify the CCN number listed on the Medicaid Quarterly Report. To calculate hospital average length of stay eligibility, data derived from line S3, Part 1 of the most recently filed Michigan Medicaid Forms/CMS 2552 Cost Report will be utilized.

4.1.2.4. Annual Re-Registration and Reporting

All participating EHs, will have to re-register within CHAMPS every year. This will ensure the EHs report on meaningful use, re-attest to volume information and other administrative information. They will also be required to complete an annual survey that will address general EHR issues and concerns. This, combined with the base-line survey taken at initial registration, will allow Michigan to track additional EHR usage, issues and concerns in addition to the required meaningful use and reporting elements. This data will be used by the state for HIT planning.

4.1.2.5. Communication with EHs

Due to the largely manual process that EHs will go through, Medicaid staff will contact each EH once notification is received via the NLR. EHs will be kept informed of their application status by and able to contact Medicaid staff directly with any issues.

An email list will be created as new providers register and will be used to send updates and program changes to all participating providers. A program website has been created and will house all program information and updates.

4.1.2.6. EH Payment Calculation

Once an EH is deemed eligible and the duplicate payment check is complete with NLR, a gross adjustment will be issued for the incentive amount. The payment will go out in the next weekly payment cycle.

4.1.2.6.1. Calculation

Medicaid staff will use information from the Medicaid Cost Reports to calculate the incentive payment amount according to the final rule formula. The Medicaid Cost Reports and Quarterly Updates represent the most accurate information available to base this calculation on and have been verified through the existing process.

MDCH will utilize data derived from Michigan Medicaid Forms/Medicare CMS 2552 Cost Report to calculate Medicaid aggregate EHR hospital incentive amounts. As required in the EHR Incentive Program Final Rule, MDCH will use hospital data from the hospital fiscal year that ends during the Federal fiscal year prior to the fiscal year that serves as the first payment year. Data elements used to
calculate hospital discharges and the Medicaid Share will be derived from the appropriate Michigan Medicaid Form or CMS 2552 Cost Report. EHR incentive payments will be paid over a three year period, not to exceed the amounts outlined at section 1903 (t)(5)(A) of the statute that requires that no more than 50 percent of the hospital’s aggregate incentive payment be paid in any one year. Likewise, over a 2-year period, the State will not pay more than 90 percent of the aggregate incentive.

4.1.2.6.2. Draw-Down

Hospital incentive will be paid out on a 3 year plan by default. The first year amount will be 50% of the total hospital EHR amount, the second year amount will be 40% of the total hospital EHR amount and the third year amount will be 10% of the total hospital EHR amount. Medicaid staff, using historical information, will ensure that the amount does not violate the draw-down previsions in the final rule or the total hospital EHR amount.

4.1.2.7. EH Timeline

All possible EHs are already established in CHAMPS and already receive payments through the CHAMPS system. All of the EHs will also file cost reports with Michigan Medicaid which is the key source of information to determine eligibility. EHs will be given 30 days to complete the registration process and the review and approval process will take up to 30 days. EHs that choose to include out-of-state information may take longer than 30 days to process through the review and approval process. Additionally, the first few months of the program may see longer review and approval timelines.

4.1.2.8. Appeal Process

EHs will be able to appeal provider eligibility determinations; adopt, implement or upgrade and meaningful use determinations; and incentive payments through the existing appeal process. Providers will also be able to request and administrative review, short of a full appeal, to correct or submit corresponding/supporting information or documentation to address any provider eligibility determinations; adopt, implement or upgrade and meaningful use determinations; and incentive payments.

4.2. Meaningful Use and Quality Reports Collection

Due to time constraints, Michigan does not intend to collect meaningful use (MU) or clinical quality reports (CQRs) in 2011. Instead, all providers will be enrolled in Medicaid EHR Incentive Program under Adopt, Implement or Upgrade (AIU). The only exception to this will be dually enrolled (Medicaid and Medicare) EHs that are deemed meaningful users by CMS under the Medicare program. MU and CQR items will be collected in 2012 through a newly designed system. This new system is likely to be a new sub-system inside of CHAMPS. This MU system will be designed to be flexible and expandable as the MU requirements change over time. In later years (2013 and later), this collection will move from a manual process of providers reporting to a more automatic collection and reporting using HIE technology. Planning for this new system is underway, additional details will be included in later version of the SMHP.

Building on the past success of the data warehouse, all MU and CQR data will be loaded into the data warehouse for analysis. This analysis will advise and inform Medicaid leadership and will help
understand current trends and areas of possible improvement. Additional details on the MU and CQR analysis will be included in later version of the SMHP.

4.3. Changes to Medicaid Systems to Implement the EHR Incentive Program

Many of the state systems will need to be modified and improved to fully implement the EHR incentive program. The two main Medicaid systems, CHAMPS and the data warehouse, will need to be enhanced to support their new direct roles in implementing the incentive program and they will also need upgrades to insure they are interoperable with EHRs and other HIT systems.

4.3.1. Changes to CHAMPS for EHR Incentive Program

CHAMPS, Michigan’s MMIS, will be the primary system that is used for provider registration and payments for the EHR incentive program. This will require a new “EHR” sub-system inside of CHAMPS and some modifications to existing sub-systems. CHAMPS will also be the system that interfaces with the National Level Repository (NLR). This will also require some changes to the interface between CHAMPS and the data warehouse. CHAMPS will also be a major part of the meaningful use collection and tacking systems in years two and later.

4.3.1.1. APDs

Some of the very preliminary activities for these changes were included in the MMIS APD request for 5010, submitted to CMS in June 2010. An updated APD to cover the additional items, such as LNR interfaces, changes from the final rule and collection of MU and CQM requirements, will be forthcoming. At the same time funding will also be requested to increase the interoperability of CHAMPS to ensure that it can interact with EHRs, HIEs and other HIT systems.

4.3.1.2. Interaction with NLR

CHAMPS will be the system that interacts and interfaces with NLR. The file transfer between CHAMPS and NLR will be the existing connection that is used for similar existing transfers, GenTran. These will be automated interfaces linking NLR to CHAMPS that will facilitate provider registration, provider approval/denial reporting, duplicate payment checks, payment reporting, along with a few other administrative functions.

4.3.1.3. Timeline for changes

Michigan will be part of the group 1 testers for the interfaces taking place with the NLR. Michigan has started end-to-end testing with the NLR so it can launch the program in January 2011. Michigan plans to utilize its MMIS system to administer the program, so there will be modifications that need to take place. We have already begun preliminary work with our MMIS contractor to identify the changes that are required.

4.3.2. Changes to Data Warehouse for EHR Incentive Program

The data warehouse will play an essential role in the administration and oversight of the EHR incentive program and will become one of the primary sources of information for HIEs in Michigan. The data warehouse will store all of the EHR sub-system inside of CHAMPS and will be used for quality and program integrity activities. This will also require some changes to the interface between CHAMPS and the data warehouse. The data warehouse will also be a major part of the meaningful use collection and
tacking systems in years two and later. The planned MPI implementation and data mining from the CCD summary are two of the major planned initiatives.

4.3.2.1. APDs
Michigan received approval an APDU that was submitted to its regional CMS office on August 9, 2010 to enhance the State’s Decision Support System (DSS). Under this APDU, Michigan has included fifteen (15) new projects which enhance the DSS related to new CHAMPS projects, HIPAA 5010, ICD-10 and preliminary Medicaid EHR Incentive implementation. It is possible that an updated APD may be required as new items are identified and increasing the interoperability of the data warehouse to ensure that it can interact with EHRs, HIEs and other HIT systems.

4.3.2.2. Timeline for changes
As soon as the funding is approved, Michigan will immediately begin the process of implementing the changes in order to stay on task of properly being able to administer the initiatives.

4.4. Changes to Meaningful Use
Michigan does not intend to make any changes to the meaningful use requirements. Michigan will use MCIR to enable the immunization meaningful use items and MDSS and MSSS to enable the public health reporting meaningful use items. These systems will be updated to the correct standards to enable meaningful use.

4.5. Reporting of Federal Funds

4.5.1. 90% FFP for HIT Administrative
Separate account codes within the state’s accounting systems have been established to track all expenses and relate the expenses back to the correct APD funding source. This includes correlating staff reported hours to the appropriate APD funding source.

4.5.2. 100% FFP for Incentive Payments
Separate account codes inside of CHAMPS will be established to track all incentive payments. These funds will be reported to CMS in the appropriate means.

4.6. Role of existing SMA contractors
The state intends to continue to use several existing contactors and bring on a few additional new contractors. CNSI will continue to be utilized as the principle MMIS contractor and will oversee all the changes to CHAMPS. Ingenix will continue to be utilized as the principle Data Warehouse contractor and will oversee all the changes to the Data Warehouse. MPHI will continue to be utilized and will provide program assistance for the EHR Incentive Program. This will include project management and subject matter experts. Additionally it is likely that additional contractors will be needed. In particular, contractors will be needed in relationship to SoM HIE and other technical aspects.
4.7. Assumptions

4.7.1. The Role of CMS
The state assumes that CMS will have the National Level Repository (NLR) live and available for all providers to access and register no later than January 3, 2011. The state further assumes that detailed information on how the states will interface with the NLR will be provided no later than October 2010 and that adequate time, CMS staff, and CMS resources will be made available for testing of this service no later than October 2010.

The state assumes that CMS will provide detailed educational and outreach material on the Medicare Incentive Program to the state no later than October 2010.

The state assumes that CMS will establish and staff at adequate level a provider help desk to field general incentive program questions and all aspects of the NLR and Medicare EHR Incentive Program.

The state assumes that CMS will provide outreach staff to speak at state conferences and meetings regarding the Medicare incentive program.

4.7.2. The Status/Availability of Certified EHR Technology
The state assumes that there will be a substantial number of certified EHR solutions (both comprehensive and modular) by October 2010 so providers have adequate time to select and implement.

The state assumes that ONC will have the web service for confirmation of the certification status of EHRs live by January 3, 2011. That state further assumes that detailed information on how the states will interface with this web service no later than October 2010 and that adequate time, ONC staff, and ONC resources will be made available to testing of this web service no later than October 2010.

The state assumes that the EHR vendor community will have adequate implementation staff to handle the anticipated increase in adoption of EHRs.

4.7.3. The Role, Approved Plans and Status of the Regional Extension Centers
The state assumes that M-CEITA will have an approved plan(s) and signed cooperative agreement no later than October 2010.

The state assumes that M-CEITA will have adequate implementation staff to handle the anticipated increase in adoption of EHRs.

4.7.4. The Role, Approved Plans and Status of the HIE Cooperative Agreements
The state assumes that the MiHIN will have approved plans and signed cooperative agreement no later than October 2010.

Medicaid assumes that the MiHIN Shared Services Bus will be available in accordance with the planned schedule.
4.7.5. **State-specific Readiness Factors**

As mentioned above, under state procurement rules, Medicaid was required to re-bid the data warehouse contract. If there is a change of platform or primary vendor, some of the data warehouse related items may be delayed.

4.8. **Audit Strategy**

4.8.1. **Methods to identify suspected fraud and abuse**

At enrollment and prepayment, all standard provider screenings will be applied to program participants. Providers will need to be in good standing with the program, be licensed with the state, have no sanctions reported on any of the national databases or other state licensing boards. Leveraging our investment in our Michigan Data Warehouse (MDW), we will look at the information we have requested from the provider regarding their practice volumes and do a reasonableness test using claims data for fee for service for medical and pharmacy claims. We will look at Primary Care Provider (PCP) assignments on our managed care populations supplementing encounter data from the MCO as necessary. In the out years we will look to our Michigan Care Improvement Registry (MCIR) for compliance with applicable Meaningful Use indicators. MCIR contains information on Immunization, lead screening, new born screening, hearing and vision, cycle cell, ESPDT, smoking status and BMI currently. This information has been moved to the MDW. The MMIS and the MDW are tightly integrated as well as the MDW produces most of the MMIS reporting. Because of this integration, we will be able to run analytical reports on EHR payments by various demographic profiles, NPI, Name, Provider Number, Tax ID, address, dollar amounts just to mention a few to be able to find trends or outliers.

4.8.2. **Tracking of payments**

All payments will be tracked by NPI and Tax ID and can be cross checked and linked to other identifiers and identification numbers. All payments under this program can be tracked via accounting and payment coding.

4.8.3. **Actions when Fraud and Abuse is Detected**

When fraud or abuse is suspected per normal protocol, the provider will be flagged and a file opened in program integrity unit. All relevant data on the provider and any other suspected provider entity connected with the suspected F&A will be collected. If the pursuant investigation determines F&A exists, several actions will be taken and all payments to the provider will be suspended for potential recovery. Other activity by that provider would be reviewed. The Attorney General’s (AG’s) office would be advised of the situation for a determination of an action on their part. At the conclusion of the investigation, the provider would be notified of the findings and the actions being taken and what their rights are. They would then be reported to all appropriate agencies and all avenues to recover monies owed the program would be pursued. Michigan can impose a summary suspension (i.e., in high-dollar or otherwise egregious cases of fraud) that temporarily abrogates the existing Medicaid provider agreement and freezes all Medicaid payments until a provider has exhausted all administrative remedies or has been convicted in a court of law. The passage of a State Whistleblower Law in 2005, which offers incentives to the public to report serious cases of fraud and abuse directly to the MFCU, has enhanced the State’s ability to combat fraud, waste, and abuse.
4.8.4. Data Sources for Meaningful Use Verification
As described above, Michigan is in a unique position because of the investments made in the Data Warehouse. Many systems interface into the warehouse allowing us to identify outliers across many different programs and indicators. The concept is similar to your IDS with a different data set.

4.8.5. Sampling Methodology
A sampling methodology will be determined based on the size of the EHR program population. Details will be in a later version of the SMHP.

4.8.6. Methods to reduce provider burden and maintain integrity and effective oversight
As indicated above, we will use our MDW to do analysis to validate information reported by provider and we will also look at where and to whom payments are being made. We will cross check that with how many providers we have at that location and cross check with NPI, license, and tax ID numbers.

4.8.7. Program Integrity Operations
Per executive Order no. 2010-17\footnote{http://michigan.gov/gov/0,1607,7-168-21975-231984--,00.html, accessed 9/9/10}, starting 10/1/2010, the Program Integrity Unit will move out of the Medical Services Administration department into the newly created Office of Health Services Inspector General. This new office is outside of the Medical Services Administration department but still within MDCH. Program Oversight will be shared between Program Integrity Unit and a new unit created under this plan to specifically oversee this program.

4.9. Miscellaneous

4.9.1. Disbursal of Incentive Payments through Medicaid Managed Care Plans
At this point in time, Michigan does not intend to disburse incentive payments through Medicaid managed care plans.

4.9.2. Entity Promoting the Adoption of Certified EHR Technology
At this point in time, Michigan does not intend to designate any entities who could receive incentive payments on behalf of a provider for promoting the adoption of certified EHR technology. This may change and will be detailed in a later version of the SMHP.

4.9.3. Payments Directly to Providers
Pending policy will assure that Medicaid provider payments are paid directly to the provider (or an employer or facility to which the provider has assigned payments) without any deduction or rebate. Any violation of this policy will be investigated through normal processes and may result in administrative action.
5. Michigan’s HIT Roadmap

In order to implement the EHR Incentive Program, encourage the use of HIT/E to realize its benefits and ultimately improve outcomes for all Medicaid beneficiaries, several state systems will have to be upgraded and enhanced, new processes and procedures will need to be put in place and a major shift in operations, both inside Medicaid and within the health care provider community, must be undertaken. These activities fall into five major categories. With the four initial categories all being foundational to the fifth and final goal of improving outcomes.

Figure 10 - HIT Roadmap

5.1. Conduct EHR Incentive Program Administration and Oversight

Implementing the EHR Incentive Program is a major undertaking, systems have to be designed, built and tested; Medicaid staff and the provider community have to be informed and educated; new policies, procedures and audit plans have to be developed, tested and implemented. Section 3.4.1 covers the EHR incentive administrative goals and outcomes.

5.1.1. Registration and Meaningful Use Tracking

Work has already begun on designing a new registration system and interfacing with the NLR. Design and requirements gathering will wrap up in early fall 2010. System development and testing will continue through the first quarter of 2011. The initial timeline, assuming NLR go-live of 1/1/2011, for the registration system is:

- Written instructions and recorded webcast of EHR Incentive Program registration training – early January 2011
• EP and EH registration go-live – mid-January 2011
• Live EHR Incentive Program registration training sessions around the state – February and March 2011
• First EP payment – February or early-March 2011
• First EH payment – March 2011

Once the registration system is complete, design and development of the meaningful use collection and tracking system will start with an anticipated go-live of October 2011. A more detailed description of this system and timeline will be available in future releases of the SMHP.

5.1.2. Program Oversight

Program oversight is broken into three categories for the EHR Incentive Program. The first is provider eligibility verification, which includes the random eligibility verification audits. This process will kickoff concurrently with registration, with a goal of having the first eligibility verification audit complete within 90 days of registration go live. The second program oversight category is meaningful use verification. This process will begin once the meaningful use collection and tracking system is ready and providers start to apply for their second participation year. Both of these verifications will require polling other systems to verify the information. For eligibility verification the main system that will be used is the historical information in the data warehouse. For meaningful use several systems, including the data warehouse, MCIR, HIE(s) and others, will have to be researched and verified. All of these activities will require additional staff and resources. Both SoM HIE and MiHIN will become vital in tracking meaningful use.

As with any new program, general program integrity will naturally lag behind implementation. This is the third program oversight category and includes several related goals. One main factor that is outstanding is the sampling rate for program integrity. The goal is to have this finalized once clearer participation levels are available and no later than 18 months after registration go live. Program integrity will provide an independent review of incentive activities and monitoring for fraud and abuse.

5.2. Encourage EHR Adoption

History has shown that health care providers need to be shown that there are clear benefits of any change to the practice of medicine; this is particularly true when the change involves new technology. Providers will need encouragement to adopt EHR, information on the benefits and support on the EHR journey. Medicaid, in partnership with M-CEITA and other health care stockholder groups, intends to ensure that all Michigan health care providers understand the benefits of adopting an EHR, what resources are available to assist them, such as M-CEITA, and know of and understand the EHR Incentive Programs, both Medicaid and Medicare.

5.2.1. Outreach Activities

Two years after ARRA was signed into law and more than three months after the release of the final rule for the incentive program, there are still providers who are unaware, confused or concerned about the EHR Incentive Programs. Continued outreach activities are needed to ensure that as many providers who are eligible participate in the EHR Incentive Program and realize the benefits of EHR adoption. This will include an intense educational and outreach plan. The plan calls for a combination of direct
mailings, training and educational sessions, speaking at professional conferences and online activities. The existing Medicaid provider outreach staff will be supplemented with EHR and meaningful use subject matter experts. These subject matter experts will be made available to speak to provider groups on the EHR Incentive Program, meaningful use, and the benefits of EHR adoption. Early efforts will focus on EHR Incentive Program information, with continuing efforts on meaningful use and the benefits of EHR adoption throughout the life of the program.

5.2.2. Partnership with M-CEITA

Both Medicaid and M-CEITA are working very closely to promote the ARRA funding projects and the benefits of an EHR. Additional activities will be detailed in later version of the SMHP.

5.3. Enable Meaningful Use

Many of the state’s systems will need improvements and enhancements before they can support both meaningful use and HIE. These systems will be brought up to the new interoperability standards and incorporated into SoM HIE to both enable providers to achieve meaningful use and facilitate tracking of providers meaningful use status. The early focus is on the main Medicaid systems and the public health systems that are required for meaningful use. In many regards, SoM HIE development will parallel MiHIN with SoM HIE activities getting the state systems up-to-speed and MiHIN linking the systems out to the provider community. The initial timeline calls for:

- Complete design and requirements – early 2011
- Implement security and messaging service to receive immunization meaningful use information – summer 2011
- MDSS to receive notifiable laboratory results via sub-state HIEs – late 2011
- Implement XDS repository to send immunization histories via MiHIN Shared Services – early 2012
- STARLIMS send lab results via MiHIN Shared Services – summer 2012
- Full MPI integration – late 2012
- Full Provider Index integration – early 2013
- State data CCD available – late 2013
- All currently planned SoM systems integrated – early 2014
- Additional systems will be added to increase information and value in the HIE and to comply with future meaningful use requirements (stage 2 and 3 of meaningful use), additional details will be in future versions of the SMHP

As mentioned above, these systems upgrades will help Medicaid facilitate tracking of provider meaningful use status. To accomplish this, advance analytics will be incorporated into SoM HIE to enable Medicaid staff to query, verify and monitor provider meaningful use compliance.

5.4. Enable Health Information Exchange

Good information leads to good care. Providing health care providers with accurate, timely, organized and complete information at the point of care will lead to better outcomes. Health Information Exchange with its ability to securely move and compile health information is vital to moving
health care forward. As one of the largest payers in the state, Medicaid has an important role to play in encouraging and facilitating HIE in the state. HIEs have been proven to reduce unneeded duplicative labs and other studies thus reducing costs that Medicaid would incur. This is just one of the many ways Medicaid will benefit from state-wide HIE adoption. Medicaid is also one of the largest sources of health information in the state. This information is important to be included in HIEs to ensure that a complete patient’s history is captured and made available to the provider. In the pending HIT I-APD, Michigan is seeking two dollars per beneficiary per year. These funds will be used by the MiHIN Governing Board, under the supervision of Medicaid, to establish and enhance HIE activities that would directly benefit Medicaid beneficiaries and providers. A full 50% of these funds would be set aside for the sub-state HIEs to insure that these benefits are realized at a local level. Medicaid intends to start this support in 2011.

5.5. Improve Outcomes

The widespread use of HIT systems including EHRs and health information exchange has the potential of drastically improving health outcomes. There is emerging evidence that use of HIT systems can have a profound impact on quality of service and patient outcomes if implemented in concert with recommended health improvement processes. The use of EHR systems permits participants to measure and report externally on a number of quality indicators and more importantly, to use these results internally to continually improve care delivery by more readily conforming to evidence-based clinical best practices. Use of an EHR system facilitates measurement of outcomes and evaluation of interventions in real-time rather than a retrospective environment, facilitating continuous improvement of the workflow and processes of clinical activities. It also facilitates communication and coordination of care among care team participants and allows tracking of patient health indicators over time (facilitating health indicator trending through charts and graphs).

Medicaid will be evaluating the possible areas that could see the most benefit from the use of HIT and developing plans on how to maximize the improved outcomes for the Medicaid population. Additional details will be in future versions of the SMHP.

5.6. Future Activities

Medicaid is already looking for additional ways to use HIT/E to improve the quality of care and administrative efficiencies. Additional state systems, such as the Maternal Infant Health Program (MIHP) data, health records of released prisoners from the Department of Corrections EHR and the planned Public Health and Prevention Registry, can be leveraged as another source of information but also can benefit from having more complete information by being included in SoM HIE. Planning for these items will begin soon with additional details on in later versions of the SMHP.

As part of meaningful use reporting, for the first time Medicaid will have access to detailed clinical quality measures. This wealth of data will help inform the current state of care and areas for improvement in ways that currently cannot be imagined. Similarly, HIEs will allow Medicaid more access to clinical information to help guide program improvements. All of these items, and many more, will be included in the SMHP as it evolves in future versions.
Appendix A: Findings of the Medicaid Provider Survey
Findings of the Medicaid Provider Scan

August 2010

Prepared For
Medical Services Administration
Michigan Department of Community Health

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Introduction

The Medical Services Administration (MSA) in the Michigan Department of Community Health (MDCH) engaged Public Sector Consultants (PSC) to conduct a survey of Medicaid providers in order to identify the extent to which these providers intend to apply for the Medicaid incentive for adoption of an electronic health record (EHR) system. Surveys were mailed to 9,994 practices of current Medicaid providers using a mailing list pulled from the Community Health Automated Processing System (CHAMPS).¹ The practices included in the list were identified based on the likelihood that providers in the practice would fit into an eligible provider category (i.e., physician, pediatrician, dentist, nurse practitioner, physician assistant, or certified nurse-midwife). Responses were received from 2,186 practices. Far more respondents completed the survey on paper (1,802) than did online (384).

Survey questions were designed to identify

- how many providers might apply for the incentive,
- the range of practice sizes and types of practices from which providers will apply,
- the extent of current and future EHR use among responding practices,
- the ways in which EHRs are currently being used by practices,
- and the major concerns about EHR implementation among practices that do not currently have an EHR system in place.

Eligibility for the incentive is based on two primary criteria. Eligible providers must have at least 30 percent of their patient volume attributable to Medicaid. In addition, eligible providers cannot be “hospital-based.” (Hospital-based is defined as providing 90 percent or more of care in a hospital or hospital-owned facility.) There are a few exceptions to these criteria. Pediatricians are only required to have 20 percent of patient encounters attributable to Medicaid. Providers who work predominantly in a federally qualified health center (FQHC) or a rural health center are not subject to the rule regarding hospital-based care; that is, 90 percent or more of the care they provide can be hospital-based. (However, providers who work predominantly in FQHCs and RHCs must have at least 30 percent of patient volume attributable to “needy individuals.”)

The findings in this report are divided into three categories:

- Practices with providers who are likely to apply and be eligible for the incentive;
- Practices for which it is uncertain whether any providers will apply; and
- Practices in which no providers are likely to apply.

While the MSA’s primary concern is with the first category, it is also helpful to have an understanding of the practices represented by the other two categories.

¹ Two important items are of note: (1) Providers and practices located outside of Michigan were included in the mailing list, and (2) individual practices may have received more than one survey due to the structure of the database. That is, if a provider is listed in the database as a sole proprietor and is also part of a group, a letter would have been mailed to both the provider’s sole proprietor address and group address. However, the survey instructions clearly stated that only one survey should be completed per practice.
The MSA believes that once eligible providers become more familiar with the EHR adoption incentive, they will be more likely to apply. For that reason, the report also provides an analysis of survey responses from all practices that indicated at least 30 percent of their annual patient encounters are covered by Medicaid, regardless of whether they indicated any plans to apply for the incentive. As described above, the proportion of encounters covered by Medicaid is not the only criterion by which providers will be deemed eligible, but it serves as a useful proxy for potentially eligible providers.

It is important to note that responses were not received from 7,808 practices. It is impossible to know whether any of the providers in these non-responding practices intend to apply for the incentive, much less whether they will be eligible for the incentive. However, the potential impact of this population is considered in the final section this report.
Key Findings

NUMBER OF PROVIDERS LIKELY TO APPLY AND BE ELIGIBLE

There were 593 respondents who reported that providers in their practice plan to apply for the Medicaid incentive for EHR adoption. Of these practices, 214 have providers who are likely to be eligible for the incentive. These practices reported that at least 30 percent of their annual patient encounters are covered by Medicaid and less than 90 percent of care provided by the practice is based in a hospital or hospital-owned facility. These 214 practices represent 1,086 providers. Of these providers, the reported estimates of those who plan to apply (981) are as follows:

- 519 physicians (other than pediatricians)
- 121 dentists
- 117 nurse practitioners
- 114 pediatricians
- 92 physician assistants
- 18 certified nurse midwives

Exceptions to the eligibility criteria may result in successful applications for the incentive from the following additional providers:

- 29 pediatricians
- 27 physicians (other than pediatricians)
- 10 physician assistants
- 5 nurse practitioners

Regardless of the intention to apply for the incentive, 615 practices (28 percent of all responding practices) reported that at least 30 percent of their annual patient encounters are covered by Medicaid, suggesting that their providers are potentially eligible for the incentive. These practices include the 214 above, and also any respondents who suggested that providers in their practice are not intending to apply or are uncertain whether they will apply. These practices represent 2,660 providers:

- 1,575 physicians (other than pediatricians)
- 285 nurse practitioners
- 275 dentists
- 258 physician assistants
- 229 pediatricians
- 38 nurse-midwives

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See the full report of survey findings for an explanation of these figures.
**PRACTICE SIZE**

The 214 practices with providers who are likely to apply and be eligible for the incentive are, on average, slightly larger (5 providers on average) than practices where either no providers plan to apply or it is uncertain whether any providers will apply (3 providers each, on average). A smaller percentage of the practices with providers who are likely to apply and be eligible for the incentive are solo practitioners (36 percent), compared to practices where either no providers plan to apply (51 percent) or it is uncertain whether any providers will apply (43 percent).

The average practice size among all 615 practices with providers who are potentially eligible for the incentive is 4 providers; 36 percent of these practices are solo practitioners.

**PRACTICE TYPE**

A plurality of the 214 practices with providers who are likely to apply and be eligible for the incentive (44 percent) are primary care practices. Another 9 percent of these practices are community health centers, which also deliver primary care services.

A plurality (34 percent) of the 615 practices with providers who are likely to be eligible for the incentive are also primary care practices. Another 6 percent are community health centers.

Practices where no providers plan to apply for the incentive or it is uncertain whether any providers will apply are more likely to be single specialty practices (52 percent and 44 percent, respectively) than primary care practices (32 percent and 29 percent, respectively).

**CURRENT USE OF AND FUTURE PLANS FOR EHR**

The 214 practices with providers who are likely to apply and be eligible for the incentive are more likely to currently use an EHR system than practices where either no providers plan to apply or it is uncertain whether any providers will apply (41 percent compared to 24 percent and 28 percent, respectively). Among the 615 practices with providers who are likely to be eligible for the incentive, 31 percent currently use an EHR system.

The following findings regarding EHR use held true across all categories of respondents:

- Larger practices are more likely than smaller practices to have an EHR in place.
- The majority of practices with an EHR system in place have and use most of the functions that constitute meaningful use.
- Practices that do not currently have an EHR system in place are concerned primarily with the cost of implementing and maintaining an EHR as well as the potential for an EHR to disrupt practice workflow.
Survey Findings

This section of the report provides detailed survey findings for the following three categories of respondents:

- Practices with providers who are likely to apply and be eligible for the incentive;
- Practices for which it is uncertain whether any providers will apply; and
- Practices in which no providers are likely to apply.

PRACTICES WITH PROVIDERS WHO ARE LIKELY TO APPLY

There were 593 respondents who reported that providers in their practice plan to apply for the Medicaid incentive for EHR adoption. Of these, however, only 483 (90 percent) reported that less than 90 percent of the care that their practice provides is based in a hospital or hospital-owned facility, and of these, only 214 reported that 30 percent or more of their practice’s annual patient encounters are covered by Medicaid. The analysis in this section of the report is focused on these 214 practices, which not only have providers who are likely to apply for the incentive, but are also the most likely to be eligible for the incentive.\(^3\)

These practices represent 1,086 providers:

- 548 physicians (other than pediatricians)
- 139 pediatricians
- 144 dentists
- 128 nurse practitioners
- 106 physician assistants
- 21 certified nurse-midwives

These practices estimated that the vast majority of their providers (981 out of 1,086) plan to apply for the incentive:\(^4\)

- 519 physicians (other than pediatricians)
- 121 dentists
- 117 nurse practitioners
- 114 pediatricians
- 92 physician assistants

---

\(^3\) These 214 practices do not include practices with pediatricians for whom 20 to 29 percent of annual patient encounters are covered by Medicaid, nor do they include FQHCs or RHCs where 90 percent or more of the care provided is based in a hospital or hospital-owned facility. The number of additional practices represented by these two categories is 9 and 4, respectively.

\(^4\) There are 26 additional pediatricians who may apply and be eligible for the incentive based on the lower required level of patient volume attributable to Medicaid for pediatricians. Additional providers who work predominantly in a FQHC or RHC and provide 90 percent or more of care in a hospital or hospital-owned facility who may also apply and be eligible for the incentive are as follows: 27 physicians, 3 pediatricians, 5 nurse practitioners, and 10 physician assistants. This results in a higher number of providers (1,052) who may be eligible for the incentive and reported they plan to apply.
18 certified nurse-midwives

Details regarding the practices in which these providers work are provided below.

**Practice Size**

The size of the practice for the providers who are likely to apply and be eligible for the incentive ranges from one to 104 providers. The average practice size is five providers. The median practice size is two providers. The vast majority (90 percent) have ten or fewer providers.

<table>
<thead>
<tr>
<th>Practice Size</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solo</td>
<td>36%</td>
</tr>
<tr>
<td>Two providers</td>
<td>22%</td>
</tr>
<tr>
<td>3–10 providers</td>
<td>31%</td>
</tr>
<tr>
<td>11 or more providers</td>
<td>10%</td>
</tr>
</tbody>
</table>

NOTE: Percentages do not total 100% due to rounding.

**Practice Type**

A plurality of practices with providers who are likely to apply and be eligible for the incentive (44 percent) represent a primary care practice. An additional 9 percent represent FQHCs and RHCs, which also mainly deliver primary care services. The following table shows the percentage of respondents by practice type.

<table>
<thead>
<tr>
<th>Type of practice</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary care practice</td>
<td>44%</td>
</tr>
<tr>
<td>Single specialty practice (not primary care)</td>
<td>14%</td>
</tr>
<tr>
<td>Community health center (FQHC, FQHC look-alike, RHC)</td>
<td>9%</td>
</tr>
<tr>
<td>Nursing home or long-term care facility</td>
<td>9%</td>
</tr>
<tr>
<td>Multi-specialty practice</td>
<td>6%</td>
</tr>
<tr>
<td>Community mental health center</td>
<td>3%</td>
</tr>
<tr>
<td>Home health agency or hospice agency</td>
<td>0%</td>
</tr>
<tr>
<td>Other</td>
<td>15%</td>
</tr>
</tbody>
</table>

**Current Use of and Future Plans for EHR**

Of those practices who are likely to apply and be eligible for the incentive, 68 percent currently use an electronic practice management system; 41 percent currently use an EHR system. Of those practices that use an EHR system, 44 percent report that it is certified by the Certification Commission for Health Information Technology (CCHIT). About one-fifth (21 percent) say their product is not certified by CCHIT, and 35 percent are unsure whether their EHR is certified by CCHIT.
Smaller practices are less likely than larger practices to have either an electronic practice management system or EHR in place.

<table>
<thead>
<tr>
<th>Practice size</th>
<th>Currently use an electronic practice management system</th>
<th>Currently use an electronic health record</th>
</tr>
</thead>
<tbody>
<tr>
<td>One or two providers</td>
<td>56%</td>
<td>32%</td>
</tr>
<tr>
<td>3–10 providers</td>
<td>74</td>
<td>33</td>
</tr>
<tr>
<td>11 or more providers</td>
<td>85</td>
<td>50</td>
</tr>
</tbody>
</table>

About two-fifths of the practices whose providers are likely to apply and be eligible for the incentive are planning to implement an EHR either in the next 12 months (26 percent) or the next 13 to 24 months (16 percent). Less than 1 percent (0.4 percent) report that the practice has decided not to implement an EHR. Approximately one-sixth (16 percent) report that the practice has not yet decided whether to implement an EHR.

**EHR Function Availability and Use**

Practices that have an EHR in place were asked to indicate which functions are available in their EHR system and which functions are being used. With the exception of submitting data electronically to public health agencies, all of the functions listed in the table below are available and being used in a large majority of the EHR systems.

<table>
<thead>
<tr>
<th>Function</th>
<th>Is the function available?</th>
<th>Is the function used?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain active medication allergy list</td>
<td>94% 5% 1%</td>
<td>88% 12%</td>
</tr>
<tr>
<td>Maintain active medication list</td>
<td>83 16 1</td>
<td>75 25</td>
</tr>
<tr>
<td>Generate a clinical summary of office visits for patients</td>
<td>80 10 10</td>
<td>72 28</td>
</tr>
<tr>
<td>Submit claims</td>
<td>79 13 8</td>
<td>76 24</td>
</tr>
<tr>
<td>Maintain up-to-date problem list of active diagnoses</td>
<td>76 21 3</td>
<td>79 22</td>
</tr>
<tr>
<td>Generate lists of patients by specific condition</td>
<td>72 20 9</td>
<td>61 39</td>
</tr>
<tr>
<td>Generate and transmit permissible prescriptions electronically</td>
<td>69 28 3</td>
<td>62 38</td>
</tr>
<tr>
<td>Conduct drug-drug, drug-allergy, and drug-formulary checks</td>
<td>65 26 9</td>
<td>59 42</td>
</tr>
<tr>
<td>Check insurance eligibility</td>
<td>64 25 11</td>
<td>57 43</td>
</tr>
<tr>
<td>Generate patient reminders for guideline-based interventions and/or screening tests</td>
<td>63 18 20</td>
<td>63 37</td>
</tr>
<tr>
<td>CPOE* for medications, labs, radiology/imaging, or referrals</td>
<td>58 32 10</td>
<td>48 52</td>
</tr>
<tr>
<td>Submit data electronically to public health agencies</td>
<td>37 35 28</td>
<td>33 67</td>
</tr>
</tbody>
</table>

*CPOE = computerized provider order entry

NOTE: Percentages may not total 100% due to rounding.
Primary Concerns about EHR Implementation

The practices that do not currently have an EHR system in place were asked to indicate to what degree they are concerned with several issues related to EHR implementation. The primary concerns among those without an EHR relate to the cost and potential for disruption to practice workflow.

- For nine out of ten practices without an EHR, the initial costs of implementation are either a major (81 percent) or medium concern (13 percent).
- For a similar proportion, the recurring costs of an EHR system are either a major (57 percent) or medium concern (35 percent).
- Disruption to practice workflow is either a major (48 percent) or medium concern (31 percent) of practices without an EHR.

These practices also have significant concerns about which EHR system to purchase and are worried that the EHR they choose might become obsolete. The table below provides a detailed look at the concerns among practices that do not currently have an EHR.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Major concern</th>
<th>Medium concern</th>
<th>Minor concern</th>
<th>Not a concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial costs of implementation</td>
<td>81%</td>
<td>13%</td>
<td>2%</td>
<td>4%</td>
</tr>
<tr>
<td>Recurring costs of EHR system</td>
<td>57%</td>
<td>35%</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>Disruption to practice workflow</td>
<td>48%</td>
<td>31%</td>
<td>14%</td>
<td>7%</td>
</tr>
<tr>
<td>Unsure which EHR system to purchase</td>
<td>48%</td>
<td>17%</td>
<td>15%</td>
<td>20%</td>
</tr>
<tr>
<td>Worry that EHR choice will become obsolete</td>
<td>32%</td>
<td>23%</td>
<td>23%</td>
<td>22%</td>
</tr>
<tr>
<td>Patient privacy</td>
<td>18%</td>
<td>22%</td>
<td>38%</td>
<td>22%</td>
</tr>
<tr>
<td>No clear business value</td>
<td>14%</td>
<td>21%</td>
<td>19%</td>
<td>45%</td>
</tr>
<tr>
<td>Familiarity with computer technology</td>
<td>14%</td>
<td>36%</td>
<td>35%</td>
<td>16%</td>
</tr>
<tr>
<td>Internet access availability and reliability</td>
<td>12%</td>
<td>27%</td>
<td>24%</td>
<td>37%</td>
</tr>
</tbody>
</table>

NOTE: Percentages may not total 100% due to rounding.

PRACTICES WHERE IT IS UNCERTAIN WHETHER PROVIDERS WILL APPLY

A total of 905 practices were uncertain whether any of their providers plan to apply for the Medicaid incentive for EHR adoption. The practices represent a total of 2,885 providers:

- 1,986 physicians (other than pediatricians)
- 280 physician assistants
- 246 nurse practitioners
- 195 dentists
- 156 pediatricians
- 22 certified nurse mid-wives
While respondents were unsure about the plans of their providers to apply for the incentive, many still provided estimates of how many providers in their practice would apply, as follows:

- 573 physicians (other than pediatricians)
- 68 dentists
- 61 physician assistants
- 54 pediatricians
- 37 nurse practitioners
- 2 certified nurse midwives

Of these practices, however, only 31 percent (about 282 practices) report that 30 percent or more of their practice’s annual patient encounters are covered by Medicaid, and, therefore, have providers who are potentially eligible to apply. The vast majority (89 percent) indicate that less than 90 percent of the care that the practice provides is based in a hospital or hospital-owned facility.

**Practice Size**

Practices that are uncertain whether their providers will apply range in size from one to 194 providers. The average practice size is 3 providers. The median practice size is 2 providers. The vast majority (96 percent) have ten or fewer providers.

<table>
<thead>
<tr>
<th>Practice Size</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solo</td>
<td>43%</td>
</tr>
<tr>
<td>Two providers</td>
<td>22</td>
</tr>
<tr>
<td>3–10 providers</td>
<td>31</td>
</tr>
<tr>
<td>11 or more providers</td>
<td>4</td>
</tr>
</tbody>
</table>

**Practice Type**

A plurality (44 percent) of practices that are uncertain whether any providers will apply for the incentive are single specialty practices (not primary care). The next largest cohort are primary care practices (29 percent). The following table shows the percentage of respondents by practice type.

<table>
<thead>
<tr>
<th>Type of practice</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single specialty practice (not primary care)</td>
<td>44%</td>
</tr>
<tr>
<td>Primary care practice</td>
<td>29</td>
</tr>
<tr>
<td>Nursing home or long-term care facility</td>
<td>9</td>
</tr>
<tr>
<td>Multi-specialty practice</td>
<td>5</td>
</tr>
<tr>
<td>Community mental health center</td>
<td>2</td>
</tr>
<tr>
<td>Community health center (FQHC, FQHC look-alike, RHC)</td>
<td>2</td>
</tr>
<tr>
<td>Home health agency or hospice agency</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Other</td>
<td>9</td>
</tr>
</tbody>
</table>
Current Use of and Future Plans for EHR

Of those practices that are uncertain whether their providers will apply for the incentive, more than half (55 percent) currently use an electronic practice management system and 28 percent currently use an EHR system. Of those practices that use an EHR system, 24 percent report that it is certified by CCHIT, a similar proportion (27 percent) say their product is not certified by CCHIT, and nearly half (49 percent) are unsure whether their EHR is certified by CCHIT.

Smaller practices are less likely than larger practices to have either an electronic practice management system or EHR in place.

<table>
<thead>
<tr>
<th>Practice size</th>
<th>Currently use an electronic practice management system</th>
<th>Currently use an electronic health record</th>
</tr>
</thead>
<tbody>
<tr>
<td>One or two providers</td>
<td>55%</td>
<td>25%</td>
</tr>
<tr>
<td>3–10 providers</td>
<td>62</td>
<td>34</td>
</tr>
<tr>
<td>11 or more providers</td>
<td>66</td>
<td>38</td>
</tr>
</tbody>
</table>

About one-quarter of the practices that are uncertain whether any providers will apply for the incentive are planning to implement an EHR either in the next 12 months (12 percent) or the next 13 to 24 months (12 percent). A small number (3 percent) report that the practice has decided not to implement an EHR. Nearly half (47 percent) report that the practice has not yet decided whether to implement an EHR.

EHR Function Availability and Use

All of the functions listed in the table below, with the exception of submitting data electronically to public health agencies, are available and being used in a majority of the practices with an EHR system.

<table>
<thead>
<tr>
<th>Function</th>
<th>Is the function available?</th>
<th>Is the function used?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain active medication allergy list</td>
<td>Yes 79%</td>
<td>No 13%</td>
</tr>
<tr>
<td>Submit claims</td>
<td>Yes 77%</td>
<td>No 16%</td>
</tr>
<tr>
<td>Maintain active medication list</td>
<td>Yes 77%</td>
<td>No 15%</td>
</tr>
<tr>
<td>Maintain up-to-date problem list of active diagnoses</td>
<td>Yes 72%</td>
<td>No 16%</td>
</tr>
<tr>
<td>Generate a clinical summary of office visits for patients</td>
<td>Yes 68%</td>
<td>No 21%</td>
</tr>
<tr>
<td>Generate and transmit permissible prescriptions electronically</td>
<td>Yes 64%</td>
<td>No 28%</td>
</tr>
<tr>
<td>Generate lists of patients by specific condition</td>
<td>Yes 62%</td>
<td>No 21%</td>
</tr>
<tr>
<td>Generate patient reminders for guideline-based interventions and/or screening tests</td>
<td>Yes 57%</td>
<td>No 26%</td>
</tr>
<tr>
<td>CPOE* for medications, labs, radiology/imaging, or referrals</td>
<td>Yes 53%</td>
<td>No 30%</td>
</tr>
</tbody>
</table>
### Function Scan Findings

<table>
<thead>
<tr>
<th>Function</th>
<th>Is the function available?</th>
<th>Is the function used?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check insurance eligibility</td>
<td>Yes: 51%</td>
<td>No: 33%</td>
</tr>
<tr>
<td></td>
<td>Unsure: 16%</td>
<td>Yes: 51%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No: 50%</td>
</tr>
<tr>
<td>Conduct drug-drug, drug-allergy, and drug-formulary checks</td>
<td>Yes: 48%</td>
<td>No: 33%</td>
</tr>
<tr>
<td></td>
<td>Unsure: 19%</td>
<td>Yes: 58%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No: 42%</td>
</tr>
<tr>
<td>Submit data electronically to public health agencies</td>
<td>Yes: 26%</td>
<td>No: 42%</td>
</tr>
<tr>
<td></td>
<td>Unsure: 31%</td>
<td>Yes: 35%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No: 65%</td>
</tr>
</tbody>
</table>

*CPOE = computerized provider order entry

NOTE: Percentages may not total 100% due to rounding.

### Primary Concerns about EHR Implementation

As with the practices whose providers are likely to apply for the incentive, the primary concerns among practices that are unsure whether their providers will apply relate to the cost and potential for disruption to practice workflow.

- For nine out of ten of those without an EHR, the initial costs of implementation are either a major (79 percent) or medium concern (13 percent).
- For a similar proportion, the recurring costs of an EHR system are either a major (56 percent) or medium concern (33 percent).
- Disruption to practice workflow is either a major (44 percent) or medium concern (33 percent) for 77 percent of those without an EHR.

These practices also have significant concerns about which EHR system to purchase and are worried that the EHR they choose might become obsolete. This category of practices is more concerned that there is no clear business value associated with an EHR than practices whose providers are likely to apply and be eligible for the incentive. The table below provides a detailed look at the concerns among practices that do not have an EHR.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Major concern</th>
<th>Medium concern</th>
<th>Minor concern</th>
<th>Not a concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial costs of implementation</td>
<td>79%</td>
<td>13%</td>
<td>4%</td>
<td>5%</td>
</tr>
<tr>
<td>Recurring costs of EHR system</td>
<td>56</td>
<td>33</td>
<td>78</td>
<td>4</td>
</tr>
<tr>
<td>Unsure which EHR system</td>
<td>46</td>
<td>27</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>Disruption to practice workflow</td>
<td>44</td>
<td>33</td>
<td>17</td>
<td>6</td>
</tr>
<tr>
<td>Worry that EHR choice will become obsolete</td>
<td>31</td>
<td>28</td>
<td>24</td>
<td>18</td>
</tr>
<tr>
<td>No clear business value</td>
<td>23</td>
<td>23</td>
<td>21</td>
<td>33</td>
</tr>
<tr>
<td>Patient privacy</td>
<td>21</td>
<td>26</td>
<td>34</td>
<td>20</td>
</tr>
<tr>
<td>Familiarity with computer technology</td>
<td>16</td>
<td>27</td>
<td>36</td>
<td>22</td>
</tr>
<tr>
<td>Internet access availability and reliability</td>
<td>13</td>
<td>20</td>
<td>28</td>
<td>38</td>
</tr>
</tbody>
</table>

NOTE: Percentages may not total 100% due to rounding.
PRACTICES WHOSE PROVIDERS ARE NOT PLANNING TO APPLY

A total of 557 practices indicated that none of their providers are planning to apply for the Medicaid incentive for EHR adoption. The practices represent 1,662 providers:

- 1,255 physicians (other than pediatricians)
- 129 dentists
- 117 physician assistants
- 105 nurse practitioners
- 46 pediatricians
- 10 certified nurse mid-wives

Very few of these practices (12 percent; 67 practices) indicated that 30 percent or more of their annual patient encounters are covered by Medicaid. The vast majority (90 percent) indicate that less than 90 percent of the care that their practice provides is based in a hospital or hospital-owned facility.

Practice Size

The size of the practices whose providers are unlikely to apply ranges from one to 93 providers. The average practice size is 3 providers. The median practice size is one provider. The vast majority (96 percent) have ten or fewer providers.

<table>
<thead>
<tr>
<th>Practice Size</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solo</td>
<td>51%</td>
</tr>
<tr>
<td>Two providers</td>
<td>18%</td>
</tr>
<tr>
<td>3–10 providers</td>
<td>27%</td>
</tr>
<tr>
<td>11 or more providers</td>
<td>4%</td>
</tr>
</tbody>
</table>

Practice Type

About half of practices whose providers are unlikely to apply (52 percent) are single specialty practices (not primary care). About one-third (32 percent) are primary care practices. The following table shows the percentage of respondents by practice type.

<table>
<thead>
<tr>
<th>Type of practice</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single specialty practice (not primary care)</td>
<td>52%</td>
</tr>
<tr>
<td>Primary care practice</td>
<td>32%</td>
</tr>
<tr>
<td>Multi-specialty practice</td>
<td>6%</td>
</tr>
<tr>
<td>Nursing home or long-term care facility</td>
<td>2%</td>
</tr>
<tr>
<td>Community mental health center</td>
<td>1%</td>
</tr>
<tr>
<td>Community health center (FQHC, FQHC look-alike, RHC)</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Home health agency or hospice agency</td>
<td>0%</td>
</tr>
<tr>
<td>Other</td>
<td>7%</td>
</tr>
</tbody>
</table>

NOTE: Percentages may not total 100% due to rounding.
**Current Use of and Future Plans for EHR**

Among practices whose providers are unlikely to apply for the incentive, 52 percent currently use an electronic practice management system and 24 percent currently use an EHR system. Of those practices that use an EHR system, roughly equal proportions report that it is certified by CCHIT (36 percent), that it is not certified by CCHIT (34 percent), or that they are unsure whether their EHR is certified by CCHIT (31 percent).

Smaller practices are less likely than larger practices to have either an electronic practice management system or EHR in place.

<table>
<thead>
<tr>
<th>Practice Size</th>
<th>Currently use an electronic practice management system</th>
<th>Currently use an electronic health record</th>
</tr>
</thead>
<tbody>
<tr>
<td>One or two providers</td>
<td>45%</td>
<td>18%</td>
</tr>
<tr>
<td>3–10 providers</td>
<td>67</td>
<td>36</td>
</tr>
<tr>
<td>11 or more providers</td>
<td>71</td>
<td>48</td>
</tr>
</tbody>
</table>

About one-fifth of the practices whose providers are unlikely to apply for the incentive are planning to implement an EHR either in the next 12 months (10 percent) or the next 13 to 24 months (10 percent). A similar proportion (22 percent) report that the practice has decided not to implement an EHR. About one-third (33 percent) report that the practice has not yet decided whether to implement an EHR.

**EHR Function Availability and Use**

Among those practices that report having an EHR system in place, all of the functions listed in the table below with the exception of submitting data electronically to public health agencies are available and being used.
**Primary Concerns about EHR Implementation**

The primary concerns among practices whose providers do not plan to apply for the incentive, like those of the other two categories of practices, relate to the cost and potential for disruption to practice workflow.

- For 87 percent of those without an EHR, the initial costs of implementation are either a major (75 percent) or medium concern (12 percent).
- For a similar proportion, the recurring costs of an EHR system are either a major (59 percent) or medium concern (24 percent).
- Disruption to practice workflow is either a major (51 percent) or medium concern (28 percent) for 78 percent of those without an EHR.

These practices appear to be much more concerned with the lack of a clear business value for an EHR system than are the other two categories of practices. They also have significant concerns about which EHR system to purchase and are worried that the EHR they choose might become obsolete. The table below provides a detailed look at the concerns among practices that do not have an EHR.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Major concern</th>
<th>Medium concern</th>
<th>Minor concern</th>
<th>Not a concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial costs of implementation</td>
<td>75%</td>
<td>12%</td>
<td>5%</td>
<td>8%</td>
</tr>
<tr>
<td>Recurring costs of EHR system</td>
<td>59%</td>
<td>24%</td>
<td>9%</td>
<td>9%</td>
</tr>
<tr>
<td>Disruption to practice workflow</td>
<td>51%</td>
<td>28%</td>
<td>12%</td>
<td>10%</td>
</tr>
<tr>
<td>No clear business value</td>
<td>40%</td>
<td>20%</td>
<td>17%</td>
<td>24%</td>
</tr>
<tr>
<td>Unsure which EHR system to purchase</td>
<td>36%</td>
<td>24%</td>
<td>12%</td>
<td>28%</td>
</tr>
<tr>
<td>Worry that EHR choice will become obsolete</td>
<td>28%</td>
<td>29%</td>
<td>20%</td>
<td>23%</td>
</tr>
<tr>
<td>Patient privacy</td>
<td>26%</td>
<td>21%</td>
<td>29%</td>
<td>24%</td>
</tr>
<tr>
<td>Familiarity with computer technology</td>
<td>17%</td>
<td>27%</td>
<td>29%</td>
<td>27%</td>
</tr>
<tr>
<td>Internet access availability and reliability</td>
<td>15%</td>
<td>19%</td>
<td>28%</td>
<td>38%</td>
</tr>
</tbody>
</table>

*NOTE: Percentages may not total 100% due to rounding.*
Findings for All Practices with Potentially Eligible Providers

The MSA believes that once eligible providers become more familiar with the EHR adoption incentive, they will be more likely to apply. For that reason, survey responses have also been analyzed based on the responses from practices that indicated at least 30 percent of their annual patient encounters are covered by Medicaid, regardless of whether they indicated any plans to apply for the incentive. As described earlier, the percentage of encounters covered by Medicaid is not the only criterion by which providers will be deemed eligible, but it serves as a useful proxy for potentially eligible providers.

A total of 615 practices (28 percent of all responding practices) reported that at least 30 percent of their annual patient encounters are covered by Medicaid. Of these, 43 percent report that providers in the practice plan to apply for the EHR adoption incentive; 11 percent say that no providers plan to apply; and 46 percent are unsure whether any providers in the practice plan to apply for the incentive.

The practices that reported having at least 30 percent of their practice’s annual patient encounters covered by Medicaid represent a total of 2,660 providers:

- 1,575 physicians (other than pediatricians)
- 285 nurse practitioners
- 275 dentists
- 258 physician assistants
- 229 pediatricians
- 38 certified nurse-midwives

These practices estimate that 1,403 of these providers will apply for the incentive, as follows:

- 767 physicians (other than pediatricians)
- 162 nurse practitioners
- 160 dentists
- 148 pediatricians
- 146 physician assistants
- 20 certified nurse-midwives

**Practice Size**

Practices whose providers are likely to be eligible for the incentive range in size from one to 104 providers. The average practice size is 4 providers. The median practice size is 2 providers. The vast majority (92 percent) have ten or fewer providers.
<table>
<thead>
<tr>
<th>Practice Size</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solo</td>
<td>36%</td>
</tr>
<tr>
<td>Two providers</td>
<td>19</td>
</tr>
<tr>
<td>3–10 providers</td>
<td>37</td>
</tr>
<tr>
<td>11 or more providers</td>
<td>8</td>
</tr>
</tbody>
</table>

**Practice Type**

A plurality (34 percent) of practices whose providers are likely to be eligible for the incentive are primary care practices. Another 6 percent are community health centers, which also deliver primary care services. Nearly a quarter of the practices (22 percent) are single specialty practices. The following table shows the percentage of respondents by practice type.

<table>
<thead>
<tr>
<th>Type of practice</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary care practice</td>
<td>34%</td>
</tr>
<tr>
<td>Single specialty practice (not primary care)</td>
<td>22</td>
</tr>
<tr>
<td>Nursing home or long-term care facility</td>
<td>17</td>
</tr>
<tr>
<td>Community health center (FQHC, FQHC look-alike, RHC)</td>
<td>6</td>
</tr>
<tr>
<td>Community mental health center</td>
<td>6</td>
</tr>
<tr>
<td>Multi-specialty practice</td>
<td>4</td>
</tr>
<tr>
<td>Home health agency or hospice agency</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>11</td>
</tr>
</tbody>
</table>

**Current Use of and Future Plans for EHR**

Of those practices who are likely to be eligible for the incentive, 51 percent currently use an electronic practice management system; 31 percent currently use an EHR system. Of those practices that use an EHR system, 23 percent report that it is certified by CCHIT. About a third (31 percent) say their product is not certified by CCHIT, and 46 percent are unsure whether their EHR is certified by CCHIT.

About one-third of the practices whose providers are likely to be eligible for the incentive are planning to implement an EHR either in the next 12 months (19 percent) or the next 13 to 24 months (14 percent). A small number (5 percent) report that the practice has decided not to implement an EHR. Nearly a third (32 percent) report that the practice has not yet decided whether to implement an EHR.

**EHR Function Availability and Use**

As with the practice categories previously discussed in this report, all of the functions listed in the table below, with the exception of submitting data electronically to public health agencies, are available and being used in a majority of practices with an EHR system.
<table>
<thead>
<tr>
<th>Function</th>
<th>Is the function available?</th>
<th>Is the function used?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain active medication allergy list</td>
<td>Yes 84%</td>
<td>No 12%</td>
</tr>
<tr>
<td></td>
<td>Unsure 4%</td>
<td>Yes 88%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No 12%</td>
</tr>
<tr>
<td>Submit claims</td>
<td>Yes 78%</td>
<td>No 14%</td>
</tr>
<tr>
<td></td>
<td>Unsure 8%</td>
<td>Yes 76%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No 24%</td>
</tr>
<tr>
<td>Maintain active medication list</td>
<td>Yes 77%</td>
<td>No 18%</td>
</tr>
<tr>
<td></td>
<td>Unsure 5%</td>
<td>Yes 78%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No 22%</td>
</tr>
<tr>
<td>Maintain up-to-date problem list of active diagnoses</td>
<td>Yes 75%</td>
<td>No 19%</td>
</tr>
<tr>
<td></td>
<td>Unsure 7%</td>
<td>Yes 82%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No 18%</td>
</tr>
<tr>
<td>Conduct drug-drug, drug-allergy, and drug-formulary checks</td>
<td>Yes 54%</td>
<td>No 30%</td>
</tr>
<tr>
<td></td>
<td>Unsure 16%</td>
<td>Yes 58%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No 42%</td>
</tr>
<tr>
<td>Generate lists of patients by specific condition</td>
<td>Yes 65%</td>
<td>No 24%</td>
</tr>
<tr>
<td></td>
<td>Unsure 11%</td>
<td>Yes 62%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No 38%</td>
</tr>
<tr>
<td>Generate a clinical summary of office visits for patients</td>
<td>Yes 65%</td>
<td>No 22%</td>
</tr>
<tr>
<td></td>
<td>Unsure 14%</td>
<td>Yes 66%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No 34%</td>
</tr>
<tr>
<td>Generate and transmit permissible prescriptions electronically</td>
<td>Yes 61%</td>
<td>No 33%</td>
</tr>
<tr>
<td></td>
<td>Unsure 6%</td>
<td>Yes 55%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No 45%</td>
</tr>
<tr>
<td>Check insurance eligibility</td>
<td>Yes 56%</td>
<td>No 32%</td>
</tr>
<tr>
<td></td>
<td>Unsure 12%</td>
<td>Yes 56%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No 44%</td>
</tr>
<tr>
<td>CPOE* for medications, labs, radiology/imaging, or referrals</td>
<td>Yes 54%</td>
<td>No 35%</td>
</tr>
<tr>
<td></td>
<td>Unsure 11%</td>
<td>Yes 51%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No 49%</td>
</tr>
<tr>
<td>Generate patient reminders for guideline-based interventions and/or screening tests</td>
<td>Yes 54%</td>
<td>No 27%</td>
</tr>
<tr>
<td></td>
<td>Unsure 19%</td>
<td>Yes 56%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No 44%</td>
</tr>
<tr>
<td>Submit data electronically to public health agencies</td>
<td>Yes 38%</td>
<td>No 36%</td>
</tr>
<tr>
<td></td>
<td>Unsure 26%</td>
<td>Yes 41%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No 59%</td>
</tr>
</tbody>
</table>

*CPOE = computerized provider order entry
NOTE: Percentages may not total 100% due to rounding.

**Primary Concerns about EHR Implementation**

As with the other types of practice categories analyzed in this report, the primary concerns among practices that are likely to have eligible providers relate to the cost and potential for disruption to practice workflow.

- For 91 percent of those without an EHR, the initial costs of implementation are either a major (79 percent) or medium concern (12 percent).
- For a similar proportion, the recurring costs of an EHR system are either a major (57 percent) or medium concern (31 percent).
- Disruption to practice workflow is either a major (41 percent) or medium concern (33 percent) for 74 percent of those without an EHR.

These practices also have significant concerns about which EHR system to purchase and are worried that the EHR they choose might become obsolete. The table below provides a detailed look at the concerns among practices that do not have an EHR.
<table>
<thead>
<tr>
<th>Issue</th>
<th>Major concern</th>
<th>Medium concern</th>
<th>Minor concern</th>
<th>Not a concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial costs of implementation</td>
<td>79%</td>
<td>12%</td>
<td>3%</td>
<td>5%</td>
</tr>
<tr>
<td>Recurring costs of EHR system</td>
<td>57</td>
<td>31</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Unsure which EHR system to purchase</td>
<td>45</td>
<td>21</td>
<td>13</td>
<td>22</td>
</tr>
<tr>
<td>Disruption to practice workflow</td>
<td>41</td>
<td>33</td>
<td>18</td>
<td>9</td>
</tr>
<tr>
<td>Worry that EHR choice will become obsolete</td>
<td>31</td>
<td>24</td>
<td>23</td>
<td>22</td>
</tr>
<tr>
<td>Patient privacy</td>
<td>19</td>
<td>26</td>
<td>32</td>
<td>23</td>
</tr>
<tr>
<td>Familiarity with computer technology</td>
<td>17</td>
<td>28</td>
<td>35</td>
<td>19</td>
</tr>
<tr>
<td>Internet access availability and reliability</td>
<td>13</td>
<td>22</td>
<td>27</td>
<td>37</td>
</tr>
<tr>
<td>No clear business value</td>
<td>13</td>
<td>21</td>
<td>18</td>
<td>42</td>
</tr>
</tbody>
</table>

NOTE: Percentages may not total 100% due to rounding.
Other Considerations

It is important to note that responses were not received from 7,808 practices. (The total number of non-responding practices is certainly less than that, however, due to the potential for providers being mailed a survey both as a sole proprietor and as part of a group.) It is impossible to know whether any of the providers in these non-responding practices intend to apply for the incentive, much less whether they will be eligible for the incentive. It is also unknown whether the practices that did not reply are like the practices that responded (e.g., practice size and type or current use of EHR). However, a high estimate of the number of practices that may have providers who are eligible for the incentive can be calculated as follows.

As described in the body of the report, 28 percent of the practices that responded to the survey reported that at least 30 percent of their annual patient encounters are attributable to Medicaid. If 28 percent of the non-responding practices also have at least 30 percent of their patient volume attributable to Medicaid, an additional 2,186 practices may have providers who are eligible for the incentive. As noted above, there is no way of knowing how many providers or what types of providers are represented by these practices.

Based on responses to the survey described in this report, a minimum of 214 practices have providers who plan to apply for the incentive and are also likely to be eligible. However, if all of the practices that responded to the survey and appear to be eligible were to apply, this number will increase to 615 practices. If survey non-respondents are eligible for the incentive in the same proportion as those who responded to the survey, the number of practices whose providers apply for the incentive may be as high as 2,801.
Appendix B: Medicaid Provider Survey Instrument

Medicaid EHR Provider Scan

This information is being collected by the Michigan Department of Community Health (MDCH) to identify current interest in and use of electronic health records (EHRs) by health professionals in Michigan. The information will assist the MDCH in implementing the federal Medicaid EHR incentive program in Michigan. It will also help the MDCH develop a long-term state Medicaid health information technology (HIT) plan.

To best meet our planning needs, only one survey should be completed for each practice. If you are part of a group practice with multiple locations, complete one survey for each practice location. The information you provide is anonymous, no individually identifiable information is collected in this survey. Your participation is encouraged and appreciated. Please complete the survey and return it in the envelope provided.

If you prefer, you may complete the survey online by going to www.michiganhealthit.org.

1. Do any providers in your practice plan to apply for the Medicaid incentive for EHR adoption? (Individual providers can apply for either the Medicaid incentive or the Medicare incentive, not both.)
   a) Yes ........................................
   b) No ........................................
   c) Unsure ...................................

2. For each provider type listed provide a number for both columns.

   (A) Number of each provider type in your practice
   (B) Estimate how many of these providers plan to apply for the Medicaid incentive for EHR adoption

   1) Physician (other than a pediatrician) ........................................
   2) Pediatrician ........................................................................
   3) Dentist .............................................................................
   4) Certified nurse-midwife ......................................................
   5) Nurse practitioner ..............................................................
   6) Physician assistant ............................................................

   Please note: For each answer, the number in column B should not be greater than the number in column A.

3. Which best describes your practice? (Mark one)
   a) Primary care practice ...........................................................
   b) Single specialty practice (not primary care) .........................
   c) Multiple specialty practice ...................................................
   d) Community health center (FQHC, FQHC - look-alike, RHC)...
   e) Community mental health center ...........................................
   f) Home health agency or hospice agency ..............................
   g) Nursing home or long-term care facility .............................
   h) Other ................................................................................

4. What percentage of the care that your practice provides is based in a hospital or hospital-owned facility?
   a) Less than 90% .................................................................
   b) 90% or more ....................................................................

5. About how many patient encounters does your practice handle on an annual basis? (Please provide your best estimate.)

6. What percentage of your practice's annual patient encounters is covered by Medicaid?
   a) Less than 10% ................................................................
   b) 10–19% ...........................................................................
   c) 20–29% ...........................................................................
   d) 30–39% ............................................................................
   e) 40–49% ............................................................................
   f) 50% or more .................................................................

[SERIAL]
The following questions are about interest in and current use of electronic health systems in your practice.

7. Does your practice currently use an electronic practice management system?
   a) Yes .................................................
   b) No .................................................
   c) Unsure .............................................

8. Does your practice currently use an electronic health record (EHR) system?
   a) Yes .................................................
   b) No .................................................
   c) Unsure .............................................

The following question is for practices that currently have an EHR system in place.

Skip to question 12 if you do not use an EHR system.

11. Please tell us whether the following EHR functions are available in your EHR system and indicate whether the function is being used.

<table>
<thead>
<tr>
<th>Function</th>
<th>Is the function available?</th>
<th>Is the function used?</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Conduct drug-drug, drug-allergy, and drug-formulary checks ..........</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>b) Generate lists of patients by specific conditions .....................</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>c) Generate patient reminders for guideline-based interventions and/or screening tests</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>d) Submit data electronically to public health agencies (including Michigan Care Improvement Registry [MCIR])</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>e) Generate and transmit permissible prescriptions electronically (e-prescribing)</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>f) Computerized provider order entry (CPOE) for medications, labs, radiology/imaging, or referrals</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>g) Generate a clinical summary of office visits for patients ..........</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>h) Maintain up-to-date problem list of active diagnoses .................</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>i) Maintain active medication allergy list ..................................</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>j) Maintain active medication list ...........................................</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>k) Check insurance eligibility ................................................</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>l) Submit claims .........................................................................</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

The following question is for practices that do not currently have an EHR system in place.

12. To what degree are the following issues a concern for implementation of an EHR system in your practice?

<table>
<thead>
<tr>
<th>Issue</th>
<th>MAJOR CONCERN</th>
<th>MEDIUM CONCERN</th>
<th>MINOR CONCERN</th>
<th>NOT A CONCERN</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Unsure which EHR system to purchase .......................................</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Worry that EHR choice will become obsolete ................................</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Initial costs of implementation ...........................................</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Recurring costs of EHR system .............................................</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Disruption to practice workflow ...........................................</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) Patient privacy .....................................................................</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) Familiarity with computer technology ......................................</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h) Internet access availability and reliability ................................</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i) No clear business value ......................................................</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Thank You!
Appendix C: HRSA FQHC Funding Summaries

Michigan Primary Care Association HIT Network (HRSA H2LIT16865)
Michigan Primary Care Association

Program Dates: 9-1-09 – 8-31-11
Total Award Amount: $1,863,409

Members of the Michigan Primary Care Association (MPCA) have formed the Michigan Primary Care Association HIT Network (henceforth referred to as the “Network”). The MCPA is a non-profit 501(3) (c) organization who is the voice for Community Health Centers and other community-based providers in Michigan. Its member include 29 Federally Qualified Health Centers (FQHCs), 3 FQHC ‘Look-Alikes’, 3 community-based providers and six associate members. Their mission statement is, “To be a leader building a healthy society in which all residents have convenient and affordable access to quality health care”. Its mission is to promote, support, and develop comprehensive, accessible, and affordable community-based primary health care services to everyone in Michigan.

Virtual CHC is a service of the MPCA. It is an application services provider (ASP) providing Community Health Centers around the country with state-of-the-art information technology. MPCA Virtual CHC provides Community Health Centers with high quality software application using some of the most advanced online technologies. This project proposes to match technology through MPCA Virtual CHC with Community Health Centers through the Network to provide health center staff with an excellent user friendly Electronic Health Record (EHR) system, NextGen and sophisticated data warehousing systems that enable them to provide their patients with the highest quality care, while meeting their unique management and reporting requirements.

The project focuses on the implementation of a standardized Electronic Health Record (EHR), NextGen, a Certification Commission for Healthcare Information Technology (CCHIT) product, across all five participating health centers. The project will include a health outcomes benchmarking and ongoing evaluation of, Diabetes, Cardiovascular, and Childhood Immunizations. In addition, the project will include a process evaluation of the HIT Network effectiveness through data evaluation and benchmarking and customer satisfaction surveys. Through the use of a standardized EHR system supported by the Michigan Primary Care Health Information Network, known as Virtual CHC, Network members will integrate functions, share data to improve health center operations and maximize efficiencies.

The use of an integrated EHR system, NextGen, in conjunction with CS-Prime DATA WAREHOUSE systems hosted by the MPCA the HIT Network will increase the effectiveness, efficiency, safety, quality and patient centered-ness of care in all five of the project participants. The outcomes will be supported by data aggregated throughout the project period specific to these health outcomes: Immunization rates for children under 24 months HgbA1c results for diabetic patients B.P measurement <140/90 for patients diagnosed with CVD
In addition, the HIT network will measure its ability to operate efficiently and effectively in providing ongoing support to the participating health centers. This evaluative process will include data benchmarking and customer service surveys.

The members of the Network include five Community Health Centers, two Migrant Health Centers and two Homeless Health Centers. Members are: Baldwin Family Health Care (rural-CHC) Baldwin, Michigan, Cherry Street Health Services, Inc. (urban-CHC, Migrant Health Center and Health Care for the Homeless Center), Grand Rapids, Michigan, Family Medical Center of Michigan,(Community Health Center and Migrant Health Center) Carleton Michigan, and Ingham County Health Department (urban-CHC and Health Care for the Homeless Center), Lansing, Michigan and Oakland Primary Health Services (urban-CHC), Pontiac, Michigan.

**Health Center Controlled Networks - Health Information Technology (HIT) Grant**  
**HIT Innovation Project (HRSA H2LIT16631)**  
**Michigan Primary Care Association**

**Program Dates:** 9-1-09 – 8-31-11  
**Total Award Amount:** $730,053

MPCA and four of the HIT network members (East Jordan Family Health Center, Family Medical Center of Michigan, Sterling Area Health Center, and Ingham County Community Health Centers) are bringing technology and continuous quality management together through a point-of-care clinical tool. The goals of the project are to increase the number of chronic disease patients that are monitored and managed, achieve Healthy People 2010 objectives for the patient population, increase data accuracies by eliminating manual entry of data, and increase efficiencies within Health Centers that maximize personnel, revenue, and time spent with patients.

The project focuses primarily on three health management problems, Diabetes, Cardiovascular, and Childhood Immunizations. However, the network made the decision to make sure that all UDS and HRSA Clinical measures could be tracked through the use of Point-of-Care tablet computers and Cielo Clinic software. Providers and medical support staff are able to manage their patients in real-time, making treatment relevant and self management accessible. Current practice management systems are only able to identify patients based on CPT codes. This is often a very inaccurate method of patient identification for the purposes of health management. Patients who may require chronic disease management are missed because another billing code is used as “primary” for the sake of getting reimbursed for the encounter. In the same regard, a patient may be identified as a candidate for chronic disease management based on a CPT code that was used to rule out a problem. By capturing the data at the Point-of-Care, the health center and providers are focusing their attentions and resources on the true target populations.

Through the implementation of Cielo Clinic Point-of-Care software, computer tablets are loaded with patient information and expressed in real-time for patient education and self-management. Interfaces from Practice Management Systems to Cielo Clinic Point of Care software are allowing all patient demographic data to be entered into Cielo prior to patient visits. Interface for Cielo to the Michigan State Immunization Registry will be completed and well as lab interfaces. This has an incredible impact on the patient population in three ways. First, the right information and plan of care is available at the right time to the right patient. Second, by having real-time data available at the Point-of-Care, patient education can take place immediately and self-management can begin and be monitored with the team
that includes the patient. Third, when you have the right plan for the right patient at the right time involving the patient, research demonstrates that compliance goes up and benchmarks are met.
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1 Stakeholder Approval
The MiHIN Shared Services Strategic Plan was endorsed by the MiHIN Governance Workgroup by unanimous vote on April 22, 2010. Membership of the MiHIN Governance Workgroup is listed in Appendix 1 of the MiHIN Shared Services Strategic Plan. The MiHIN Shared Services Strategic Plan was endorsed by the Michigan Health Information Technology Commission by unanimous vote on April 22, 2010. Membership of the Michigan Health Information Technology Commission can be found in the Governance domain section in the MiHIN Shared Services Strategic Plan.

2 Executive Summary
The State of Michigan and the stakeholders across Michigan who have been involved in the development of the Michigan Health Information Network (MiHIN) over the past years, plan to capitalize on the progress and experience gained from this effort by responding to the opportunities under the State Health Information Exchange Cooperative Agreement Program.

The Michigan Health Information Network (MiHIN) Strategic Plan is intended to communicate the vision, goals, objectives and strategies for addressing statewide Health Information Exchange (HIE) development in Michigan. The strategies outlined in this plan are designed to execute on the vision of developing an open architecture that complements the progress made by sub-state HIEs and leverages statewide shared services to accelerate statewide health information exchange. Our intended outcome is to continuously improve and expand HIE services over time to result in improved quality and efficiency of health care for our citizens.

2.1 Historical Perspective
The MiHIN began in 2005 when Governor Jennifer M. Granholm charged the Michigan Department of Community Health and the Michigan Department of Information Technology with collaborating with stakeholders to utilize Health Information Technology (HIT) and HIE to improve quality and decrease the costs of healthcare in Michigan. In 2006 more than 200 stakeholders participated in developing a plan for guiding statewide health information exchange, titled the MiHIN Conduit to Care. The MiHIN Conduit to Care set forth a roadmap for ensuring that health information exchange would occur statewide, including rural and medically underserved areas. It also set the direction for an incremental or phased approach to HIE, provided resources for sub state HIE planning and implementation, and most importantly, set the expectation that stakeholder engagement is critical to long term success.

The MiHIN Conduit to Care represented the first iteration of a Strategic Plan by establishing a vision of HIE across Michigan that continues to hold true today: reducing the overall cost of care while increasing quality and patient safety.

Michigan’s pioneering approach included the identification of nine “medical trading areas” that cover all counties in the state in which HIEs would be developed, so as not to leave out any portion of the state. Michigan Department of Community Health (MDCH) used $10 million in
funding appropriated from state general fund dollars to sponsor one HIE initiative within each of the nine medical trading areas. Seven of the regional HIE initiatives received planning grants while two regions received implementation grants. Throughout the past several years other community organizations have engaged in efforts to build sub-state HIEs. These sub-state HIE initiatives and the nine medical trading area initiatives are described in Section 2.1 Environmental Scan.

A major milestone for HIT and HIE progress in Michigan occurred when the Michigan Legislature passed and Governor Jennifer M. Granholm signed the Michigan Health Information Technology Commission into law. The Michigan HIT Commission was created in 2006 as an advisory body to the MDCH. The HIT Commission is charged with facilitating and promoting the design, implementation, operation and maintenance of an interoperable health care information infrastructure as well as to advance the adoption of health information technologies throughout the state’s health care system.

### 2.2 Michigan’s Approach

This MiHIN Strategic Plan seeks to close the gap between the Conduit to Care and the guidelines from the State HIE Cooperative Agreement as well as update Michigan’s plan for statewide HIE that leverages the progress of sub-state HIEs in Michigan. The MiHIN Strategic Plan describes the incremental approach for advancing appropriate and secure health information exchange, implements a model that encourages public private partnership and develops a scalable open technology approach that would complement the activities of the sub-state HIEs.

To accomplish these goals a series of evaluations and environmental analyses were undertaken to assess current HIE capacity in Michigan that can be leveraged, to identify HIT resources that can be used, and to determine opportunities for collaboration. This information was also used to inform the work of the stakeholders involved in a comprehensive workgroup process that formulated this Strategic Plan. More than 100 stakeholders have been involved with planning and developing the approaches to implementation and evaluation activities by serving on workgroups that are directly aligned with the five domains of governance, finance, technical architecture, business/technical operations and legal/policy.

These activities have been complemented by integrating the MiHIN planning work with Medicaid, Medicare, other federally funded, state based programs particularly public health surveillance and other American Recovery and Reinvestment Act (ARRA) programs to include the Regional Extension Center (REC), workforce development initiatives and broadband mapping and access initiatives.

This approach has resulted in a strategy that uses the State HIE Cooperative Agreement funding in a comprehensive public private partnership to advance the stakeholder organizations toward obtaining meaningful use.
2.3 Strategy Highlights
This Executive Summary is intended to provide an overview that highlights each domain area. The subsequent sections of this document provide the details associated with Michigan’s strategy for accomplishing the MiHIN Shared Services vision and goals.

2.3.1 Governance
Michigan’s approach to Governance is to create a coordinated governance model that emphasizes public/private partnerships. Toward that end, a coordinated Governance model has been developed that uses the existing legislatively mandated Health Information Technology (HIT) Commission to set broad statewide policy initiatives. In addition to leveraging the HIT Commission, a separate not-for-profit entity called the MiHIN Shared Services will be created to act as the State Designated Entity. The governing board of this entity will consist of stakeholders from the sub-state HIEs, payer organizations and the State of Michigan (including a member of the HIT Commission). A legislative change will be sought to add a member of the MiHIN Shared Service Governance board to the HIT Commission.

The MiHIN Shared Services Governance Board will be primarily responsible for governing the business and technical operations of the technology infrastructure and have authority over the shared services including the financing structures required to enable MiHIN Shared Services to be self-sustaining.

The diagram below provides a graphic representation of the inherent collaboration in the coordinated governance structure.

![Figure 1. Michigan's Coordinated Governance Model](Image)
2.3.2 Technical Strategy

The MiHIN technical architecture will leverage Michigan’s existing HIE investments and create a technology model that enhances what the sub-state HIEs have either implemented or are implementing through the use of shared services. Shared services refer to a suite of services that can be utilized to connect Michigan’s sub-state HIEs and other data sources together for statewide communication. Shared Services functionality includes state level directories such as a Master Citizen Index, Master Provider Index and a Record Locator Service, Nationwide Health Information Network (NHIN) gateway, Messaging Gateway and other functions as needed.

MiHIN Shared Services technology will be based on a design that enables widespread interoperability among disparate healthcare systems. The design is vendor and technology agnostic and focuses on technical standards, protocols and architectural patterns. The resulting MiHIN Shared Services technology is based on a service oriented architecture paradigm and will be implemented through Web Services executing on an Enterprise Service Bus (ESB).

![MiHIN Shared Services High Level Conceptual Architecture](image)

Figure 2. MiHIN Shared Services High Level Conceptual Architecture
The objective of the MiHIN Shared Services Bus is to provide interconnectivity between the Sub-state HIEs, payer organizations and State of Michigan systems. 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.

2.3.3 Budget and Sustainability Strategy
The State HIE Cooperative Agreement Grant will provide funding to plan and implement the MiHIN Shared Services. To ensure long-term sustainability, MiHIN has adopted a sustainability funding mechanism that is built upon identifying the primary customers associated with the MiHIN Shared Service Bus and empowering them to play an active role in governance and finance. At present, the primary financing and governing organizations are sub-state HIEs, the State of Michigan and payers.

This strategic direction allowed Michigan to determine the expected contribution available from the customers of the MiHIN Shared Services Bus; Sub-state HIEs, Payers and the State of Michigan at between $1.5 and $2.0 million per year starting in 2012. Final dollar amounts are pending multiple variables including vendor negotiations.

The money available from the Cooperative Agreement, combined with the State of Michigan matching funding and member organization contributions allowed Michigan to set a budget of approximately $21.6M from 2010 through 2015 for creating a sustainable organization that executes on the strategy defined in this document.

The diagram below demonstrates how the expected grant expenditure and membership/other fees will ensure that Michigan create a sustainable model for the MiHIN Shared Services Bus.

![Michigan Statewide HIE Sustainability Goals](image)

*Figure 3. Projected MiHIN Shared Services Sustainability Model*
2.3.4 Business and Technical Operations
MiHIN Shared Services Entity will use a phased approach to incrementally build out technology that both satisfies use cases and implements fundamental components of the infrastructure that provide increasing capabilities.

Staffing requirements of the MiHIN Shared Services will initially be satisfied using a combination of contract, vendor and staff.

Phase 1 will consist of deploying technology that will enable two use cases that are related to Public Health Reporting. These uses case include: the transfer of lab results from the sub-state HIEs to the Michigan Department of Community Health’s Disease Surveillance System and the transfer of Immunizations from the sub-State HIEs and the Michigan Department of Community Health’s Immunization Registry. In order to satisfy these use cases the technology that will be deployed will include core services of master patient index, security services, and a provider directory.

Phase 2 deployments will further build out the technical infrastructure and enable the sub-state HIEs to extract data from the Immunization Reporting System and enable the transfer of Continuity of Care Documents (CCD’s) from the Sub-State HIEs to Emergency Departments and Physician Offices. The technology required to deploy these capabilities will build on that deployed in Phase 1 and add most of the remaining functionality of the core services including the Shared Services Bus, XDS Services and a Record Locator Service.

2.3.5 Legal and Policy
The Privacy and Security workgroup was tasked with creating a set of policies that balances the benefit of the HIE with ensuring the privacy and security of patient data.

The security policies will contain minimum standards for participation in MiHIN Shared Services. The privacy policies will also incorporate the minimum standards as well as offering comprehensive guidance for Michigan’s Sub-state HIEs. MiHIN Shared Services Governance Board’s work will provide the Sub-State HIEs with needed clarity, alignment and certainty- as they continue to evolve and develop.
3 General Components

3.1 Environmental Scan

Health Information Exchange (HIE) is advancing throughout Michigan in various forms with a wide array of functionality. The State of Michigan government has advanced public health reporting systems, health systems are moving information electronically to users, provider offices in Michigan are utilizing portal technologies, Electronic Health Records (EHRs) and are utilizing the services of sub-state HIEs.

An analysis of Michigan’s HIT and HIE environment was conducted in the fall of 2009 in two phases. First, with the use of a survey instrument, 32 health systems, hospitals, public health, behavioral health, physician offices and other healthcare delivery entities were assessed. Approximately 63 percent of those responding reported HIE to be one of the top five organizational priorities and 57 percent are or are planning to participate in a sub-state HIE. An overwhelming 90 percent of respondents reported that they plan to participate in the Medicare and Medicaid EHR Incentive Programs. A very high level analysis of technical capabilities showed that 57 percent of respondents were utilizing a Certification Commission for HIT (CCHIT) certified EHR. Nearly 64 percent of respondents indicated use of e-prescribing functionality.

The second phase analysis included a detailed technical assessment sent to 27 organizations. The recipients were identified through both the results of the first survey and subsequent follow – up interviews. Included were a diverse set of organization types (providers, payers, sub-state HIEs, public agencies) and geographic locations, while including organizations serving as much of the population as possible. The response pattern was consistent with the first survey’s finding and determined that the majority of Michigan’s health information exchange capability resides in collaboration with Michigan’s hospitals and health systems.

The details of this analysis are noted in the following “readiness” sections.

3.1.1 Clinical System HIE Readiness

MDCH awarded planning grants to seven organizations in 2007 and 2008. These initiatives have been focused on convening stakeholders to develop a collaborative approach to implementing regional HIE. Each of these initiatives is at a different stage of development.

- **Greater Flint Health Coalition:** This planning HIE initiative was awarded a MiHIN planning grant in 2007 and is focused on a three-county region in the Flint, Michigan area. This initiative is facilitated by the Greater Flint Health Coalition.
- **Health Current:** This region represents five counties in the mid-south area of the state and Altarum Institute received a MiHIN planning grant from MDCH in 2008.
- **Michigan Health Information Alliance:** This MiHIN planning grant was awarded in 2007 to the Central Michigan University Research Corporation. This region comprises 11 counties in mid-Michigan.
• **Northern Michigan HIE:** Organized by the North Central Council of the Michigan Health and Hospital Association, the Northern Michigan HIE received a planning grant in 2007 to cover the 21 counties of Michigan’s northern Lower Peninsula.

• **Southeast Michigan HIE:** The Southeast Michigan HIE (SEMHIE) planning grant was awarded in 2007 and is focused on five counties in the southeast Michigan area, which includes the greater Detroit area. This initiative is called SEMHIE. In February of 2010, SEMHIE received a $3 million grant from the Social Security Administration to accelerate the disability claims process using the National Health Information Network.

• **Southwest Michigan HIE:** The Southwest Michigan HIE (SWMHIE) is facilitated by ChangeScape Inc.; it received a MiHIN planning grant in 2008. This initiative focuses on a five-county region that that borders Indiana.

• **West Michigan HIE:** The MiHIN Planning grant for this 12-county region on Michigan’s west side was awarded to the Alliance for Health in 2007.

Along with the seven HIE planning grants, MDCH awarded grants to two organizations in 2007 to implement HIEs. Described below, each organization was able to build a sustainable business plan, select an HIE vendor, and begin exchanging data among regional stakeholders.

• **Capital Area RHIO:** Capital Area Regional Health Information Organization (Capital Area RHIO)—a coalition of public and private community members, including physicians, health systems, businesses, health plans, and academic institutions from the Clinton, Eaton, and Ingham tri-county area of mid-Michigan—has selected Axolotl Corp. of San Jose to deploy its RHIO and has begun implementation with data being exchanged in the initial phase.

• **Upper Peninsula Health Care Network:** The Upper Peninsula Health Care Network (UPHCN) serves the 319,000 residents of Michigan’s Upper Peninsula. Collaborative efforts among the network include sponsorship of the Upper Peninsula Poison Crisis Network, joint purchasing, mobile MRI services, education, publication of the physician directory, the U.P. Medical Library Consortium; the U.P. Teleradiology, Teleconferencing and Telemedicine Networks; and a reference lab network. The UPHCN continues to develop the Upper Peninsula–wide integrated information systems network to connect the U.P. hospitals, providing a cost-effective mechanism to access patient information and streamline patient care delivery.

Other community organizations have engaged in efforts to build sub-state HIEs. There are six community initiatives that are implementing key functions including e-prescribing, laboratory ordering and results delivery, prescription fill status and medication fill history, clinical care coordination, and quality reporting.

• **A3HIE:** The Ann Arbor Area HIE (A3HIE), serving the greater Ann Arbor area, comprises 220 physicians and 50 physician assistants from four primary care and specialty practices caring for more than 800,000 active patients. Currently, the practices share the following patient information: demographics, medications, allergies and current problems, and diagnoses lists. Physicians enter information into their practice’s electronic medical record systems, and relevant details are "pushed" to the central data repository, where other partners can access and import them securely. There are more than 400,000 patient records in the repository.

• **Jackson Community Medical Record (JCMR):** JCMR is a joint venture of Allegiance Health and the Jackson Physicians Alliance. It was formed to improve the quality of patient care through IT and lower the total cost of ownership of an EHR system. JCMR currently connects 140 Jackson county physicians, who represent more than 80,000 patients.
• **Michiana Health Information Network (MHIN):** MHIN is a community HIE that serves more than 600 physicians and 2,500 clinical health care providers in northern Indiana and southern Michigan. MHIN provides secure, single-source access to patient clinical information, and connects health care providers with a clinical data repository, results delivery, clinical messaging, interfaces, and a fully integrated EHR.

• **MSMS Connect:** MSMS Connect is an electronic portal that was released in January 2009 by the Michigan State Medical Society (MSMS). This convenient, single-sign-on portal is a free benefit to MSMS members that securely connects physicians to patient information and each other for referrals and consultations, as well as to labs, patient registries, and other resources.

• **My1HIE:** Based in southeast Michigan, My1HIE enables physicians to share vital patient information and collaborate on patient care with other providers. My1HIE connects users to multiple clinical applications, including electronic prescribing, patient registry tools, e-labs, document managers, health plans, and more. All of these applications are interconnected and can be accessed with a unique user ID and password from any location with an Internet connection. Currently, 1,000 physicians use My1HIE.

• **Michigan Health Connect:** A nonprofit corporation founded by Spectrum Health, Trinity Health, Metro Health, Lakeland Regional Health System, and Northern Michigan Regional Health System with a purpose to advance the delivery and coordination of health care through collaboratively leveraging Medicity's information technology and clinical data exchange platform. Currently the organization has connected over 460 provider offices and 1,700 providers across 14+ Michigan counties with results delivery as well as laboratory and radiology orders. Other community hospitals and health systems have indicated they will engage with MHC to evolve a comprehensive health information exchange across Michigan.

Additionally, as noted in the survey section above, several of Michigan’s health systems and hospitals have made considerable progress in the development of IT systems that form integrated delivery networks.

### 3.1.2 Administrative HIE Readiness

Michigan has a strong history of administrative HIE including electronic eligibility and claims transactions. The detail below describes three initiatives that are responsible for building the administrative HIE capacity in Michigan.

• **Blue Cross Blue Shield of Michigan Electronic Data Interchange (EDI) Clearinghouse:** The BCBSM clearinghouse has one of the highest rates of electronic claim submission in the nation. It processes more than 99 percent of facility claims and 92 percent of professional claims electronically. The BCBSM web portal is used by more than 95 percent of all Michigan providers, handling more than 70 million transactions in 2007. This web portal supports Michigan’s Medicaid eligibility verification, as well.

• **Community Health Automated Medicaid Payment System (CHAMPS):** CHAMPS is Michigan’s Medicaid Management Information System. The recently implemented system supports online provider enrollment, prior authorizations, claims submission, and beneficiary eligibility checking; it also provides an in-box for system alerts. CHAMPS processes and adjudicates all Medicaid claims. The new system is a secure Web portal that gives providers a single source for direct access to enrollment, claim information, and other Medicaid-based business functions.

• **Michigan Association of Health Plans (MAHP) Connect:** During 2009, MAHP launched an initiative to provide an Administrative Simplification Solution for MAHP members. This
solution enables the sharing of information from MAHP and MAHP members to their respective provider communities and provides. The overall objective is to capitalize on technology that will centralize common, non-competitive health plan related transactions performed by physicians and their staff. The MAHP Connect will provide: portal capability for providers to interface with multiple health plans; methods to increase the exchange of real-time administrative data between health plans and providers; and methods for integration of existing data exchange portals, practice management systems, and health plan websites to help reduce the need for 'double entry'.

3.1.3 E-Prescribing Readiness

In a 2009 study by Surescripts, Michigan ranked third in the nation for e-Prescribing with nine percent of Michigan prescriptions ordered through e-Prescribing. This percentage was more than double Michigan’s 2007 rate. The following initiatives have played key roles in advancing e-Prescribing in Michigan.

- **Southeastern Michigan E-Prescribing Initiative (SEMI):** SEMI is a purchaser initiative aimed at increasing the adoption of e-prescribing in Southeast Michigan. Implemented in 2005, it is sponsored and funded by the local auto industry, BCBSM, and Medco. More than 3,800 physicians are currently enrolled in the program. Since 2005, more than one million prescriptions have been modified or cancelled due to adverse drug alerts.

- **e-Prescribing in Michigan Medicaid:** In 2008, the Michigan Legislature enacted legislation requiring MDCH to develop a three-year strategic plan for the implementation of electronic prescribing within the state’s Medicaid program. The department’s resulting plan focuses on two goals: (1) increase e-prescribing awareness and use in the Medicaid provider community, and (2) develop system capabilities to track and report Medicaid e-Prescribing transactions.

3.1.4 Other HIE Readiness

An analysis that solely focused on the healthcare related systems within the State of Michigan government found a robust and well-functioning set of services and systems that will both provide a benefit and receive a benefit from interoperating with a statewide HIE system like the MIHIN Shared Services. The analysis evaluated a variety of systems, including public health (systems used to record and monitor population health), health analytics (the MDCH data warehouse, a system to aggregate data from various health-related systems and enable analytics), and infrastructure (systems for security, electronic data transfer, identity management, Extract Transfer Load (ETL) tools and Service Oriented Architecture platforms).

Public health systems surveyed included the Michigan Care Improvement Registry (MCIR), an immunization history registry; the Michigan Disease Surveillance System (MDSS), a system used to monitor lab results and process submission of reportable conditions; the Michigan Syndromic Surveillance Systems (MSSS), which receives patient admission information from emergency departments across Michigan to analyze reported chief complaints to detect outbreaks; and the Bureau of Labs, the sole provider of many critical lab tests not done in the private sector.

The MDCH data warehouse meets the challenge of tracking individual clients of more than 27 separate health related services administered through MDCH and providing decision support.
capability by integrating separate data sources into a single integrated environment. The integration of the separate program information has reduced health care fraud, increased the number of children tested for high blood lead levels, raised the number of children receiving immunizations, and improved the care coordination of Michigan’s Medicaid population.

3.2 HIE Development and Adoption

Michigan has a strong history of utilizing stakeholder involvement to set the direction for Health Information Exchange. Over 200 Michigan healthcare stakeholders successfully developed an initial Strategic plan called the MiHIN Conduit to Care in 2006. Michigan then implemented this plan with an appropriation from the Michigan Legislature to provide planning and implementation grants as defined in section 3.1.1 Clinical System HIE Readiness.

In the fall of 2009, the State of Michigan sought funding from the Office of the National Coordinator for HIT to support continued planning and the implementation of state-wide health information exchange. Michigan used an open and transparent approach that leveraged the success of the MiHIN Conduit to Care in developing this Strategic Plan.

One of the initial activities of the strategic planning process was to review and refine the original vision, goals and strategies from the MiHIN Conduit to Care. This Strategic Plan for achieving statewide HIE development and adoption has been grounded in a highly participatory stakeholder-driven process based on the following updated vision, goals, strategies and approaches to continuous improvement.

3.2.1 MiHIN Vision & Goals

The MiHIN Vision, which has remained constant since its inception, is to foster development of HIE that will reduce the overall cost of care while at the same time increasing the quality of care and patient safety. This Vision is supported by the corresponding MiHIN goals, which include:

- Improve the quality and efficiency of health care delivery for Michigan citizens by accelerating the adoption and use of a collaborative model including health information technology (HIT) and health information exchange (HIE)
  - Minimize redundant data capture and storage, inappropriate care, incomplete information and administrative, billing and data collection costs
- Promote evidence-based medical care to improve patient safety and quality
- Encourage patient-centered care: Connect health care providers – clinicians and facilities – to ensure continuity of care for every patient
  - Increase patient understanding and involvement in their care
  - Enhance communication between patients, health care organizations and clinicians
- Promote national standards to guide the sharing of information and electronic data interoperability
- Safeguard privacy and security of personal health information
- Leverage existing health information systems
- Create a business model that balances cost and risk
Implementing organizations must see sufficient value to justify their investment

3.2.2 MiHIN Strategy
The following domain-specific sections of the MiHIN Strategic Plan provide in-depth detail of the strategies that have been developed in support of ensuring that Michigan can realize the vision of the MiHIN. These strategies are summarized below:

Governance: Create a coordinated governance structure that leverages the Michigan HIT Commission to govern the statewide vision and creates a new entity to become the State Designated Entity made up of direct customers of the MiHIN Shared Services to govern the business and technical operations.

Finance: Create a self-sustaining organization by 2015 that relies on the direct customers of the MiHIN Shared Services, Sub-State HIEs and Payers, as its primary funding source.

Technical: Create a cost effective, scalable architecture, based on standards that provides for a set of statewide services that can be leveraged by all organizations that connect to the MiHIN Shared Services Bus.

Business and Technical Operations: Execute on a plan that provides value to Michigan consumers by incrementally deploying capability that satisfies the ONC clinical priorities and enables Michigan’s providers to meet meaningful use while building out components of the MiHIN Shared Services.

Legal and Policy: Create a set of Privacy and Security policies that ensures the security of the information that moves around the MiHIN Shared Services Bus that meet national standards of interoperability while not causing an undue administrative burden on providers and consumers.

3.3 Medicaid Coordination
Michigan’s Medicaid program has been a part of the Michigan (MDCH) since 1996. The integration of the Medicaid agency into MDCH has fostered many collaborative efforts improving the health care of Michigan citizens. One of the most effective initiatives implemented was the Medicaid supported data warehouse. The data warehouse is a component of the Medicaid Management Information System (MMIS) IT architecture.

Utilizing the data warehouse to improve the quality of care spurred Medicaid’s involvement in Michigan’s health information technology projects. The work group will also assist in the creation of a State Medicaid HIT Plan. The coordinated effort between the MiHIN and the Medicaid EHR Incentive Program provides an efficient means to advance EHR adoption and health information exchange. The Director of Medicaid Operations and Quality Assurance is an executive steering committee member of the MiHIN Program Office, serves as co-chair of the MiHIN Business Operations Work Group and is a voting member of the MiHIN Governance Work Group. There is Medicaid representation on the majority of the MiHIN planning work groups. The Director of Medicaid Data Management Division is a member of the MiHIN Privacy and Security Work Group and staff from the Medicaid Data Management Division is a member
of the MiHIN Technical Work Group. This collaboration with the MiHIN and the Medicaid agency allowed for the natural progression of coordination between the MiHIN project and the Medicaid EHR Incentive Program.

The Medicaid EHR Incentive Program is also led by the Director of Medicaid Operations and Quality Assurance. Several of the MiHIN Program Office staff are members of the Medicaid EHR Incentive Program planning initiative. The State’s HIT Coordinator is a member of the EHR Incentive Program planning steering committee. The MiHIN Project Lead is a member of the Medicaid EHR Incentive Work Group. The Medicaid EHR Incentive Work Group was charged with developing the Michigan Department of Technology Planning – Advanced Planning Document (HIT P-APD).

Through the coordinated planning process of the MiHIN and the Medicaid EHR Incentive Program, two shared objectives were identified. Both initiatives seek to accelerate Medicaid beneficiaries’ coordination of care and streamline eligible professionals’ meaningful use reporting requirements through the secure electronic exchange of health information.

The strategies Michigan will take to accomplish these objectives are:

1. To continue the coordinated planning efforts of the MiHIN and the Medicaid EHR Incentive Program
2. To leverage existing State of Michigan health information technology assets
3. To develop electronic services and directories shared between the MiHIN and the Medicaid agency.

Michigan will continue to have members from both initiatives participate in the planning and implementation efforts to ensure the shared objectives are accomplished. The project management of the implementation of the Michigan Medicaid EHR Incentives and the MiHIN implementation will be coordinated. An overall project plan will be developed to synchronize the timelines of the shared tasks and deliverables.

To improve the Medicaid beneficiaries’ coordination of care, MiHIN Shared Services will leverage the data warehouse integration capabilities and extract pertinent administrative and clinical information making it electronically available in a Continuity of Care Document (CCD) format to Medicaid providers through the Michigan Health Information Network. MiHIN Shared Services in partnership with the sub-state HIEs will also leverage the repository capacity and analytical capabilities of the data warehouse to support the quality reporting requirements.

Michigan’s Medicaid Management Information System (MMIS), Community Health Automated Medicaid Processing System (CHAMPS) will be enhanced to aid in the administration and monitoring of the Medicaid EHR Incentive Program. CHAMPS will also be leveraged to streamline eligible professionals’ meaningful use reporting requirements. Eligible professionals will be able to report directly from their EHRs, sending the data through the sub-state HIEs into the MiHIN Shared Services and then into CHAMPS.
The success of the interoperability between the data warehouse, CHAMPS and EHRs will be dependent upon the shared services and directories of the MiHIN. The Medicaid IT infrastructure will utilize the MiHIN’s core components such as the provider index, the enterprise master patient index and the security services. The sharing of the MiHIN core components will increase efficiencies and reduce the cost of the Medicaid EHR incentive program.

3.4 Coordination with other Federally Funded and ARRA Programs

Coordination with all ARRA programs in Michigan will continue to be accomplished largely through the facilitation of the State HIT Coordinator. The HIT Coordinator has convened a working group with members of all Michigan ARRA programs which includes: the State HIE Cooperative Agreement, the Regional HIT Extension Center, the Medicaid EHR Incentive Program, and the broadband initiatives. This group will continue to share information and leverage efforts to shared client communities in perpetuity.

The State of Michigan has been working to coordinate projects to successfully secure funds from the two ARRA Broadband programs. First round funding so far has resulted in over $50 million ARRA dollars to be dedicated to Michigan to expand broadband infrastructure and public computing centers. Planning for second round is underway and additional investments are expected in Michigan as a result of applications. The infrastructure that is put in place as a result of these investments will enable data to be moved and shared at higher rates of speed between health care providers where bandwidth has been limited in the past, as well as help make it possible for more citizens to monitor health care from within their homes.

The State of Michigan has worked with many partners on a $24 million FCC Rural Health Care Pilot Project. The Project will aim to connect over 500 rural health care sites via an affordable broadband connection to help foster the movement of health data to and from their clinics. The ability to reach the most rural clinics will help to improve the health care and reduce the costs of offering specialized care in rural and remote areas of the state. The project is currently in the request for proposal stages and is planning to have a contractor begin construction on the network as early as summer of 2010.

Benefits to the general health population are being increased by early implementation of public health use cases, lowering costs, increasing efficiencies, and raising the quantity and quality of data acquired for Michigan’s immunization registry, syndromic surveillance system and disease surveillance system. These public health services existing relationships with cross-state and federal organizations, including the Centers for Disease Control and Prevention (CDC), will benefit those agencies in the same fashion: lowering costs, increasing efficiencies, and raising the quantity and quality of data.

Where gaps exist in the coordination with other federal programs, it is the responsibility of Michigan’s HIT Coordinator to perform outreach throughout the state. The goal of the outreach is to identify issues of common concern and coordination plans will be devised and documented, both in the areas of population and organizational benefits.
4 Domain-Specific Components

With the support and funding provided through the State HIE Cooperative Agreement Program, the MiHIN will be able to maximize the public and private investments that have been made in HIT and HIE throughout Michigan. This funding will also assist in accelerating the implementation of the MiHIN vision by acquiring, implementing, and operating the technical and business infrastructure required to enable the secure exchange of health information within Michigan, with its neighbor states, and across the nation.

Beginning in the fall of 2009 more than 100 State and industry leaders and decision makers have led and molded the activities of the five domain-based MiHIN Workgroups. The result is this MiHIN Strategic Plan for acquiring, implementing, operating and sustaining the MiHIN Shared Services.

This section will present the MiHIN Strategic Plan by the domains based on the guidance of the State HIE Cooperative Agreement. Each domain will begin with an overview of the goals and guiding principles of that workgroup and conclude with the results of the planning process.

4.1 Governance

Full stakeholder engagement and buy-in of governance is critical to success of this and any other HIE initiative. Proper governance is needed to not only oversee business and technical operations of the MiHIN, but also to foster trust through transparency and inclusion, maintain a vision for Michigan and respond to public needs and concerns. The stakeholders of Michigan vigorously debated the full spectrum of governance options through the MiHIN governance workgroup. The following section details the strategy for the governance of the MiHIN Shared Services, which includes creating a new Governance Board and leveraging the experience and strong establishment of the Michigan HIT Commission.

4.1.1 Guiding Principles

The following guiding principles are based on the experience Michigan gained through the MiHIN Conduit to Care process and have been updated to reflect the current statewide and national HIT and HIE landscape. These guiding principles will serve as the foundation for the Governance of the MiHIN.

Guiding Principle 1: Michigan citizens are at the center of the MiHIN goals to improve patient care and population health.

Health information exchange in Michigan will be designed to benefit Michigan residents. Consumer privacy, security and confidentiality are paramount and as such the MiHIN will adhere to all federal and state laws regarding privacy and security to build trust.
Guiding Principle 2: The MiHIN will leverage existing and planned information technology.

Health information exchange will be made accessible to all naturally occurring and commerce-defined communities of providers by leveraging, and to the extent possible not duplicate, existing and planned information technology investments – State of Michigan, regional, community, private and other HIE initiatives.

Guiding Principle 3: Multi-stakeholder collaboration is needed to implement achievable and measurable initiatives.

Cooperation and collaboration on the implementation of health information exchange will drive innovation and change across the various stakeholders in the state as well as foster the sustainability and financial solvency of statewide HIE efforts.

Guiding Principle 4: The MiHIN will conform to applicable federal guidelines.

Statewide health information exchange will be designed and implemented to support Michigan priorities within the guidelines of the Office of the National Coordinator – Meaningful Use, standards, NHIN, etc. – in order to facilitate national health exchange and optimize funding.

Guiding Principle 5: Those that benefit should participate in paying the cost.

Long-term financial sustainability of the MiHIN will be dependent upon fair contribution from those who benefit.

Guiding Principle 6: Adoption and use of the MiHIN is critical to success

Since the benefit of statewide health information exchange comes from adoption and use, the MiHIN should be attractive to a broad range of healthcare stakeholders throughout Michigan and be designed and implemented in phases to deliver early results to support increased adoption.

4.1.2 Governance Model

The model for long term governance of the MiHIN was developed with the input of Michigan’s healthcare stakeholders and leverages existing organizations to fulfill all governance roles and responsibilities. The goal of the MiHIN governance model is to ensure broad-based stakeholder collaboration, oversight and accountability, efficiency and flexibility to align with nationwide HIE governance. The MiHIN long-term governance model will achieve these goals through a coordinated governance structure that includes utilizing the statewide vision and public structure of the existing Michigan HIT Commission and the creation a new MiHIN Shared Services Governance Board to allow those that directly benefit from and financially contribute to the MiHIN Shared Services to govern the business and technical operations.

4.1.2.1 MiHIN Long Term Governance Model

In May 2006, the beginning of Michigan’s long-term governance emerged when the Michigan Legislature created the Michigan Health Information Technology Commission as an advisory
The law creating the HIT Commission includes the requirement for 13 members that represent specific Michigan healthcare stakeholders including; Consumers, Doctors of Medicine, Non-profit Healthcare corporations, purchasers or employers, pharmaceutical manufacturers, schools of Medicine, the HIT industry, third party payers, Doctors of Osteopathic Medicine, hospitals, pharmacists and representatives from the Michigan Department of Community Health and the Michigan Department of Information Technology. The HIT Commissioners are appointed by the Governor.

The HIT Commission will uphold the tenants of transparency and inclusion since it is, by statute, subject to the Michigan Open Meetings Act of 1976. As such, the Michigan HIT Commission holds all meetings in a public location with the opportunity for public comment on each agenda and widely publishes the meeting schedule, meeting minutes and agendas. The Michigan HIT Commission must provide the legislature with an annual report.

Leveraging the establishment and experience of the Michigan HIT Commission is a natural choice for specific roles and responsibilities for Michigan’s Governance model. Since its involvement and integral guidance in Michigan’s Health IT and Health Information Exchange projects since 2006, the HIT Commission brings experience and sustainability to the coordinated governance structure as well as transparency and a level of trust among stakeholders.

Under the coordinated governance model, the HIT Commission is responsible for the more expansive roles of the MiHIN governance related to HIE and HIT development and adoption, including, building consensus on principles, development of public policies, overseeing statewide performance, aligning the statewide and national vision and monitoring implementation.

In addition to the Michigan HIT Commission, a new governance board will be created to perform a specific set of roles and responsibilities, which will complete the coordinated governance model. This new entity will be a 501(c)(3) corporation established as the State Designated Entity accountable for the implementation of the MiHIN Strategic and Operational Plans. The new board will enable close alignment with the existing and emerging sub-state HIEs where health information exchange begins. This new entity of the coordinated governance structure will be accountable for the more focused roles including day to day business and technical operations, coordination with state programs including public health and Medicaid, building the statewide technical infrastructure for shared services and implementing sustainable finance structures for the MiHIN activities.

The table below illustrates a high-level division of the roles and responsibilities in the coordinated governance structure. The Michigan HIT Commission has a broad and diverse role
of guiding HIT and HIE policies that affect the entire state, where the newly created governance board will focus on the business and technical operations of the MiHIN Shared Services, as described in the Technology and Business Operations sections of this plan.

<table>
<thead>
<tr>
<th>HIT Commission</th>
<th>MiHIN Shared Services Governance Board</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Setting consensus-based goals, objectives, and performance measures to achieve statewide coverage for all providers that relate to FOA requirements for HIE services</td>
<td>• Facilitating State Strategic and Operational Plan implementation</td>
</tr>
<tr>
<td>• Overseeing diverse ongoing health information exchange activities to ensure compliant HIE practices, meeting targets for interoperability, and demonstrating health care improvements.</td>
<td>• Ensuring the coordination, integration and alignment of efforts with Medicaid and Public Health programs through efforts of HIT coordinators.</td>
</tr>
<tr>
<td>• Navigating emerging opportunities and requirements to align state efforts with the NHIN, including standards and emerging governance.</td>
<td>• Facilitating the implementation of statewide HIE technical infrastructure according to the agreed upon respective roles and responsibilities of local, regional and state level stakeholders, vendors and state government.</td>
</tr>
<tr>
<td>• Monitoring the implementation of statewide HIE technical infrastructure according to the agreed upon respective roles and responsibilities of local, regional and state level stakeholders, vendors and state government</td>
<td>• Developing public and/or private financing strategies and ensuring a sustainable business model is developed that supports and incorporates different types of HIE across the state.</td>
</tr>
<tr>
<td></td>
<td>• Supporting business and technical operations as appropriate.</td>
</tr>
</tbody>
</table>

Figure 4. Role Delineation for the Coordinated Governance Structure

There are four major advantages of the coordinated governance structure. The structure leverages the success of the existing HIT Commission. It enables a broad, statewide view combined with a focus on the connection of sub-state HIEs. Keeping the two separate yet highly collaborative entities promotes efficient and effective decision making toward achieving the goals of statewide HIE while promoting broad stakeholder representation in accordance with the State HIE Cooperative Agreement requirements. The legislative oversight of the HIT Commission combined with the state representation on the MiHIN Shared Services Governance Board provide checks and balances by two branches of state government to the new, emerging statewide HIE.

4.1.2.2 GOVERNANCE MODEL: MEMBERSHIP AND DECISION MAKING AUTHORITY

As an advisory Commission to the Michigan Department of Community Health, the HIT Commission recommends policy and action to MDCH and provides recommendations to the Michigan Legislature annually, at minimum. The HIT Commission is made up of 13 members that are appointed by the Governor to represent stakeholders as specified in the legislation that created the Commission. Current members comprise:

- Gregory Forzley, M.D., of Grand Rapids represents doctors of medicine and is the Medical Director of Informatics for St. Mary’s Hospital in Grand Rapids, MI. Dr. Forzley is also the chair of the Michigan State Medical Society Board of Directors.
- Joseph Hohner of Canton represents nonprofit health care corporations and is the Senior Vice President, Chief Information Officer and Chief of Staff of Blue Cross Blue Shield of Michigan.
- Toshiki Masaki of Canton represents purchasers and employers and is the Public Policy Manager for the Ford Motor Company.
- Kimberly G. Ross-Jessup of Dewitt represents pharmaceutical manufacturers and is the Manager of Governmental Relations for Pfizer.
- Mark Notman, Ph.D., of East Lansing represents schools of medicine and is an Associate Professor and Chief Financial and Technical Officer for the Michigan State University College of Osteopathic Medicine.
- Janet Olszewski of Williamston is the Director of the Michigan Department of Community Health.
- Thomas Lauzon of Shelby Township represents health plans and other third party payers and is the Executive Vice President and Chief Information Officer for Health Plan of Michigan.
- Dennis Swan of Okemos represents hospitals and is the Chief Executive Officer for Sparrow Hospital.
- Ken Theis is the Director of the Michigan Department of Technology, Management and Budget.
- Larry Wagenknecht, R. Ph., of Haslett represents pharmacists and is the Chief Executive Officer of the Michigan Pharmacists Association.
- Robert Paul of Novi represents members of the health information technology field and is the Chief Operating Officer and President of Compuware Corp.
- R. Taylor Scott, D.O., of Williamston represents doctors of osteopathic medicine and surgery and is an Assistant Professor and Director of the Learning and Assessment Center at the Michigan State University College of Osteopathic Medicine.
- Robin Cole of Detroit represents consumers and is the Chief Operating Officer for ProCare Health Plan.

The MiHIN Shared Services Governance Board will have decision making authority over the business and technical operations of the MiHIN Shared Services. The MiHIN Shared Services Governance Board will be established through articles of incorporation and bylaws that will guide the specifics of voting, financing and membership terms. The MiHIN Shared Services Governance Board will include a maximum of 13 board members. The initial board will include the following seats:

- Sub-state HIE (up to 7)
- Payers (up to 3)
- State government (2, including the Michigan Department of Community Health and Medicaid)
- HIT Commission Representative (1)

Formal integration of the two entities that comprise the coordinated governance structure will be a member sitting on each other’s board. Currently, the categories of membership for the HIT
Commission is specified in legislation, so a legislative change will be sought to formally add a MiHIN Governance Board member to the HIT Commission.

4.1.2.3 Governance Model: Alignment with NHIN

The coordinated governance model is well positioned to align with the emerging NHIN and nationwide HIE governance. As the Michigan SDE, the MiHIN Shared Services Governance Board is a key stakeholder of the NHIN. In turn, board membership of the MiHIN Shared Services Governance Board includes the key Sub-state HIE stakeholders throughout Michigan, providing a direct and cascading connection from the national level to each local healthcare enterprise within the state expected to exchange health information. This alignment will enable health information exchange intra state and well as across state lines in accordance with NHIN strategies and policies as the MiHIN Strategic and Operational Plans are implemented.

A major strength for Michigan is the ability to accelerate the MiHIN Governance model by leveraging the existing and proven HIT Commission in a coordinated governance structure. The HIT Commission adds the breadth and depth of statewide HIE stakeholders along with direct connections to the Executive and Legislative branches of the State of Michigan government. The HIT Commission’s overarching vision for Michigan combined with the focus of the MiHIN Shared Services Governance Board over business and technology will ensure effective division of roles and give clear-cut domain responsibility. The current membership of the HIT Commission and proposed composition of the new MiHIN Governance Board enable optimum balance between broad stakeholder representation and flexibility to evolve in response to the evolving NHIN governance structure.

4.1.3 Accountability and Transparency

The coordinated governance structure is designed to optimize transparency and accountability. The coordinated governance structure of the HIT Commission and the MiHIN Shared Services Governance Board not only provides accountability through a checks and balance mechanism but also enables stakeholder buy-in and trust.

The Michigan HIT Commission is accountable to the Executive and Legislative branches of government as it falls under the auspices of to the Michigan Department of Community Health and is appointed by the Governor. Further, the HIT Commission provides recommendations and an annual report to the Michigan Legislature.

The MiHIN Shared Services Governance Board is also accountable to the Executive and Legislative branches of government as it will be created by designation as Michigan’s State Designated Entity, which is a designation that is made by the Governor.

Both the HIT Commission and the MiHIN Shared Services Governance Board will be accountable to one another. The HIT Commission will include a member of the MiHIN Shared Services Governance Board (pending Legislative action) and the MiHIN Shared Services Governance Board will include a member of the Michigan HIT Commission. Further, as a standing agenda item, the MiHIN Shared Services Governance Board will provide a monthly
update to the Michigan HIT Commission. This will ensure cross-coordination and the necessary level of checks and balances.

Under the coordinated governance structure, there will be a continual need for stakeholders to continue to directly participate in the formulation of MiHIN activities, policies and standards through multiple mechanisms. In a near-term example, working committees will need to form to assist in the development of privacy and security policies and interoperability standards. The direction and monitoring of the working committees will be conducted in the already established open and transparent meeting practices of the HIT Commission.

The HIT Commission is required to adhere to the Michigan Open Meeting Act, Public Act No. 267 of 1976. The purpose of the Act is to strengthen the right of all Michigan Citizens by requiring public bodies to conduct nearly all business at open meetings. Meeting notices and minutes are also required to be publicly available. The HIT Commission’s meeting schedule for the year as well as the meeting minutes and materials are posted on the Michigan Department of Community Health’s website. The agenda always permits time for public comment. The HIT Coordinator is responsible for the HIT Commission’s compliance to the Open Meeting Act.

4.1.4 State Government HIT Coordinator
The Michigan HIT Coordinator is a position that is housed within the Michigan Department of Community Health (MDCH), Health Information Technology Office and reports directly to the Chief Deputy Director of MDCH. With Michigan’s strong history of state government involvement in health information, this position has been in place for over three years and is well established in the MDCH organizational structure. Michigan’s HIT Coordinator is positioned to guide state government involvement in all Michigan HIT and HIE programs as well as related programs funded under the American Recovery and Reinvestment Act of 2009, including the federal broadband programs.

The role of the state HIT Coordinator will be to ensure that State of Michigan government is sufficiently represented and involved in HIE throughout Michigan. Michigan’s HIT Coordinator, Beth Nagel, is the manager for the Michigan HIT Commission and will play an integral role in ensuring that the Michigan HIT Commission fulfills all roles and responsibilities through the coordinated governance model. The HIT Coordinator is a key liaison and point of coordination between the Michigan HIT Commission and the State of Michigan and HIT Commission representatives to the MiHIN Governance Board.

The Michigan HIT Coordinator is also responsible for the integration of the State of Michigan’s public health reporting systems and the Medicaid information systems with the MiHIN. Further, the Michigan HIT Coordinator is charged with ensuring that the state of Michigan government is appropriately involved in all HIT and HIE related activities in Michigan.

The Michigan HIT Coordinator serves on Michigan’s Regional HIT Extension Center’s Executive Board and is a member of the Michigan Medicaid EHR Incentive Program steering committee, as well as a partner in Michigan’s HIT Workforce initiatives.
4.2 Finance
The combined efforts of the Michigan Departments of Community Health and Technology, Management and Budget and the many Michigan Health Information Exchange stakeholders have resulted in the establishment of the guiding principles, the overriding strategy, and the underlying approach to the financial sustainability of the MiHIN Shared Services. This foundation not only guided the decisions and efforts that were required to develop the Strategic and Operational Plans for the MiHIN Shared Services, but will provide the ongoing guidance for financial decision making by the MiHIN Shared Services Governance Board.

4.2.1.1 Financial Sustainability Guiding Principles
The Guiding Principles provide the fundamental framework for financial decision making for MiHIN, these are meant to shape all financial decisions for the MiHIN Shared Services through and beyond the State HIE Cooperative Agreement Program funding period, and in addition, these will influence other critical MiHIN business, technical, and operational decisions.

- Multi-stakeholder collaboration is needed for success
- The MiHIN Shared Services must be self-sustaining
- The MiHIN Shared Services business model must balance cost, value, & risk
- Stakeholders must see value to justify the investment
- The MiHIN Shared Services should leverage existing private and public HIT and HIE investments, and to the extent possible not duplicate these existing or planned investments
- Grants should be used to enable the launch and evaluation of a new value added service, but should not be relied upon for the long term sustainability of a service or for the MiHIN Shared Services itself
- Revenue should not be sought disproportionately from any one stakeholder or group of stakeholders; the Sub-state Health Information Exchanges and Healthcare Payers will be the initial and primary customers of the MiHIN Shared Services
- Those who benefit should participate in paying the costs; long-term sustainability will be dependent upon fair contribution from those who benefit including all who realize benefits such as those related to improvements in care, quality, patient safety, patient and provider satisfaction, reduced disparity in care, reduced redundancy in tests, admissions, visits and procedures, and improved communications resulting in cost reduction or avoidance
- The MiHIN Shared Services should be attractive to a broad range of stakeholders and be implemented in phases, as necessary, to deliver early results to promote adoption
- The MiHIN Shared Services must encourage adoption by being an open and non-proprietary network
- The MiHIN Shared Services must support participant access to non-MiHIN supplied HIT and HIE applications hosted by other participants or service providers
4.2.2 Financial Sustainability Strategy

The MiHIN Shared Services strategy for financial sustainability incorporates the guiding principles listed above and establishes the foundation for financial sustainability. The strategy is to implement a series of funding mechanisms that establishes an equitable and proportional allocation of costs across all MiHIN Shared Services customers. It directs the organization to utilize only those funding mechanisms that through an ongoing process of analysis and review achieve the following:

- Recognize that all who benefit from the values realized from the exchange of health information will equitably and proportionally participate in the financing and support of the statewide shared services network, and
- Optimize the use of the statewide shared services network by establishing a fee structure that encourages the adoption and use of HIT and the exchange of health information within and across Sub-state HIEs, thus further assisting eligible providers in achieving “meaningful use”, and
- Enable the extension and expansion of the capabilities, services, and benefits of the exchange of health information within the State of Michigan by ensuring that sustainable revenues are available to meet both current and future federal, state, and stakeholder service demands beyond the four years of the State HIE Cooperative Agreement funding (2010 – 2014).

4.2.3 Financial Sustainability Approach

The MiHIN Shared Services will evaluate and potentially utilize several different funding mechanisms to ensure the operational sustainability of the statewide shared services network beyond the HITECH grant funding period. The selected mechanisms will enable the equitable and proportional allocation of costs to the various stakeholders, will ensure that the pricing structures reflect the relative value of each service, and will as much as practical reflect the environmental, economic, and political circumstances affecting the delivery of healthcare in Michigan.

Startup & Pilot Stage - During this stage of initial operations (2010 and 2011) MiHIN financing will utilize funds provided through the State HIE Cooperative Agreement and the State of Michigan matching funds to cover planning, capital, operational startup, and pilot project implementation costs.

Production Stage - Beginning in 2012 with the first full year of production operations MiHIN will initiate the collection of access and usage fees from its primary customer base which includes the sub-state Health Information Exchanges and public & private healthcare payers. These fees will begin establishing the financial sustainability of the network. It is likely that the allocation of the fees to each of the primary customers will be based upon one or more factors that reflect some relevant aspect of its service base such as total population, number of hospitals, number of hospital beds, number of admissions, number of ER visits, number of ambulatory encounters, number of physicians, market share, number of covered lives, or other such statistical indicator.
of potential impact and benefit. This equation will be finalized by the MiHIN Shared Services Governance Board.

Each sub-state HIE will determine the methodology it will use to allocate their MiHIN Shared Services fees across their customer base. This process will significantly simplify the MiHIN Shared Services revenue administration activities, and will take advantage of the revenue processes already in place in each sub-state Health Information Exchange.

Additionally, during this initial production period the MiHIN Shared Services may institute the use of additional access and usage fees such as membership, subscription, sponsorship, transaction, and fee-for-service fees to accommodate the addition of new customers and new statewide shared services. This evolving fee structure and the growing customer base will provide the sustaining revenue required to operate the MiHIN statewide shared services network beyond the State HIE Cooperative Agreement funding period.

**Sustainable Production Stage** - Finally, beginning in 2014 at the end of the State HIE Cooperative Agreement period, the MiHIN Shared Services will have established the statewide shared services and the customer base to provide the sustaining revenues it requires for operations without dependence upon additional grant funding or State of Michigan government subsidies. While grant funding will no longer be required for operational support, it is anticipated that additional grant funding will be sought to support the acquisition, deployment, and piloting of new statewide shared services.

### 4.2.4 Financial Sustainability Modeling

The MiHIN Shared Services will utilize financial sustainability modeling in two distinct stages to analyze, establish, and refine the fee structures required to generate the sustaining revenues. The first stage was initiated to support the Strategic and Operational Plan development processes. The second stage will be undertaken by the MiHIN Shared Services Governance Board once it is established and upon receipt of notice of ONC approval of the MiHIN Shared Services Strategic and Operational Plans and the associated funding.

**Stage 1** modeling will utilize estimated operational and capital budgets generated from information and knowledge obtained from the analysis of existing operational HIEs, information obtained from an informal request for information process conducted with a few of the leading HIE software vendors, and from information obtained through the practical experience of the HIE consultants retained to facilitate this planning process. While these figures will certainly change once the MiHIN Shared Services undertakes its initial steps toward startup and implementation, they do provide a reasonable basis for these preliminary financial planning activities. The results of the Stage1 modeling are displayed in the table shown below, this includes operational and capital budget projections, and projections of the revenue required from each funding mechanism for each of the six years included in the modeling.
## MiHIN Capital & Operating Budget and Funding Mechanisms Revenue

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### Operating Budget

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<td>1,617,182</td>
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### MDCH Planning & HIT Commission Operating Budget

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### Total Grant & State Match Funding

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</tr>
</thead>
<tbody>
<tr>
<td>Total Funding</td>
<td>9,510,254</td>
<td>5,236,884</td>
<td>739,685</td>
<td>713,082</td>
<td>536,857</td>
<td>0</td>
<td>16,736,762</td>
</tr>
<tr>
<td>Total Federal HITECH Grant</td>
<td>8,712,754</td>
<td>4,802,652</td>
<td>636,466</td>
<td>479,881</td>
<td>361,305</td>
<td>0</td>
<td>14,993,058</td>
</tr>
<tr>
<td>State of Michigan Grant Match</td>
<td>797,500</td>
<td>381,432</td>
<td>103,219</td>
<td>233,201</td>
<td>175,552</td>
<td>0</td>
<td>1,690,904</td>
</tr>
</tbody>
</table>

**Figure 5. Stage 1 Capital & Operating Budgets and Funding Mechanisms Revenues**

**Stage 2** modeling will begin after the MiHIN Shared Services Governance Board has been created and upon receipt from ONC of the approval of the MiHIN Strategic and Operational Plans and the associated funding. In this phase the estimated operational and capital budgets developed during Stage 1 will be replaced with actual budgets that result from completing a
formal request for proposal process and from the implementation and ongoing support of the planned HIE pilot projects. This modeling is an ongoing process that will allow all factors including those listed below to be fully analyzed and periodically reviewed to ensure that the funding mechanisms remain aligned with the financing strategy and guiding principles, and that they continue to produce the required sustaining revenue.

- The impact, appropriateness, acceptability, and timing of each of these funding mechanisms as it relates to each stakeholder group
- The size and number of participants in each stakeholder group
- The timing of the delivery of each of the identified service priorities
- The extent to which the value of a given service can be determined and associated with one or more stakeholder groups
- The extent to which a given service has a directly associated ROI that can be associated with one or more stakeholder groups

Stage 2 modeling will enable MiHIN Shared Services Governance Board to finalize its initial revenue targets and establish the appropriate fee structures that will be incorporated into the stakeholder trust agreements thereby establishing the formal basis for financial support of MiHIN. Additionally, this modeling activity will allow MiHIN Shared Services Governance Board to develop a business plan that details the financial sustainability strategy and approach and submit it to ONC by the February 10, 2011 deadline.

4.3 Technical Infrastructure
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 Shared Services is designed as a network of networks with local providers connecting to sub-state HIEs which connect to the MiHIN Shared Services Bus (SSB) and then to the NHIN.

The technical architecture is designed to satisfy the following goals:

- Put current and comprehensive patient information in the hands of practitioners at the point of care.
- 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.
- Facilitate delivery, access and retrieval of clinical data to provide safe, timely, efficient, effective, equitable, patient-centered care.
- Drive quality improvements and be patient-centered as opposed to driven by efficiency or cost reduction.
- Make HIE and HIT compatible and interoperable
- Institute business process and behavior changes at the provider level to facilitate the sharing of information.
- Align HIE and HIT incentives for the adoption of such technologies
- Free clinical data from their silos, transform it and deliver it securely, rapidly and reliably to the patient’s caregiver;
- 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;
- Promote the development of statewide master patient and provider indices and a record locator service (RLS);
- Identify and develop HIT and HIE solutions for medically underserved areas, technology challenged areas or areas falling between naturally occurring sub-state HIEs;
- Promote national standards to guide the sharing of information and electronic data interoperability.
- Safeguard privacy and security of personal health information.
- Leverage existing health information systems.

4.3.1 Guiding Principles

This section contains an overview of the Guiding Principles and includes statements about how the MiHIN Shared Services must fit into the existing business and technical environment. The MiHIN Shared Services will be an open, scalable and extensible infrastructure that follows the following guiding principles:

- Be built from numerous vendor products which must interoperate
- Be vendor agnostic
- Support multiple communication protocols within reason (FTP, SOAP, Sockets, etc).
- Be a hybrid architecture that will not be entirely federated or centralized
- Comply with the latest interoperability standards but be practical enough to get something working
- Undertake an incremental approach to implementing a statewide architecture
- Be consistent with national industry standards (web services, etc)
- Focus on designing information exchange, not end-user applications
- Interoperate with sub-state HIEs
- Interoperate with existing state government systems like public health surveillance and reporting
- Use web services for real-time communications where feasible
- Interoperate with the NHIN
- Be highly secure and Health Information Portability and Accountability Act (HIPAA) compliant for all external communication paths
- Maintain the privacy of patient data
- Be extensible (capable of adding new functions or services easily)
- Be scalable (capable of adding more users, transactions, other volumes of work easily)
- Support delegated user authorization, authentication & administration
- Support auditing
- Be able to support data and analytical capabilities
- Be cost-effective to maintain
4.3.2 Technical Infrastructure Strategy

This section describes the strategic approach to the technical architecture design for the MiHIN Shared Services based on the priorities identified in the ONC Guidance for Meaningful Use and guidance from the State of Michigan. The MiHIN Shared Services is an infrastructure design that enables widespread interoperability among disparate 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.

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 the shared services bus while providing a framework that sets boundaries on the dimensions of technical implementation to ensure interoperability and consistent operation. Relevant interactions between the shared services bus and sub-state 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.

4.3.3 Proposed Conceptual Architecture

The MiHIN Shared Services 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 Shared Services is depicted in the figure on page 30.

4.3.3.1 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 sub-state 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:

- **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.
- **Messaging** - The ability to “push” messages from one node to another and accommodate data translations required for each site.
- **Subject Discovery** - The ability to perform deterministic and probabilistic searches for patients across HIEs.
- **Query for Documents** - 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.
Figure 6. MiHIN Conceptual Architecture
MiHIN Shared Services is being designed with sub-state 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 represents the best, most viable short term architecture with the most sustainable long term benefits. For a summary of alternative approaches considered, see Appendix 6.3 Alternative Approaches Considered.

4.3.3.2 DATA EXCHANGE COMPONENTS

NHIN Connectivity

This component provides communication to the Federal Government and other states. This connectivity is effective for communicating outside the MiHIN Shared Services.

MiHIN Shared Services Bus

This component provides the shared services bus connectivity and state-wide services for sub-state HIEs, ancillary data sources and connection to the NHIN.

Sub-state HIEs

Progress has already been made on establishing various models of sub-state HIEs in Michigan, some supported by public funding and some through private investment.

Since the sub-state HIE is central to MiHIN Shared Services architecture it is critical that a set of criteria be defined to designate an organization as a sub-state HIE. Designation as a sub-state HIE will allow an organization that agrees to adhere with the strategic and operational plans and optimize the use of statewide shared services to connect to MiHIN Shared Services.

Criteria were developed for each of the domains as follows:

- Governance
  - A sub-state HIE shall have a governance structure which includes representative members of participating stakeholder groups in the HIEs area of operations.
  - A sub-state HIE shall have a policy which addresses transparency and openness of its proceedings and decision making with the stakeholders it serves.
  - A sub-state HIE shall have a strategic plan

- Finance
  - A sub-state HIE shall agree to contribute on a monthly or otherwise designated frequency the apportioned MiHIN access and usage fees comprising their MiHIN Membership Fee.
  - A sub-state HIE shall provide MiHIN an annual report of its financial position

- Business Operations
  - A sub-state HIE shall commit to National (ONC, CMS, etc.) directives, standards and requirements regarding:
• Interoperating with EHRs certified by ONC approved certification bodies
• Meaningful use and associated timeframes
• HIE/RHIO certification
• Privacy & Security
• Audit

• Technical
  • A sub-state HIE shall be capable of all MiHIN technical specifications relevant to their operations, security policies and use cases. Minimum specifications include enabling subscribers to access patient clinical data including lab results and medication history and working towards providing all elements of CCD. MiHIN technical specifications will be published in Requirements Documents.
  • A sub-state HIE must be capable of supporting all MiHIN security specifications including the IHE Audit Trail and Node Authentication (ATNA) specifications for secure nodes and audit trails. The HIE must also support user authentication at the HIE level and the use of SAML assertions (of user identity) for all transactions across the MiHIN.
  • A sub-state HIE must be capable of supporting all MiHIN patient identity transactions.
  • A sub-state HIE must be capable of supporting all MiHIN Query for Documents (XDS.b & XCA) transactions and must deploy an XDS.b document repository.
  • A sub-state HIE shall enable bidirectional interoperability between locally connected health information systems (inpatient, ambulatory, pharmacies, clinician offices, health plans and the states) in areas of operation and provide the gateway to the MiHIN for "cross community" transactions.

• Legal and Policy
  • A sub-state HIE shall comply with all privacy and security requirements set by Federal and State law and MiHIN governance-approved policies. The compliance will be documented through written policies and procedures.
  • A sub-state HIE shall provide a written copy of their Data Use and Reciprocal Support Agreement in use

4.3.4 Interoperability

The long term plan for the MiHIN Shared Services Bus interoperability includes four core capabilities:

• Aggregating data and interconnecting providers via sub-state HIEs
• Connecting sub-state HIEs and providing a vehicle for the delivery of shared services
• Sharing clinical and administrative services and applications
• 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 the architecture focuses 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

4.3.5 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

4.3.6 Interoperability with Federal Systems

The table below specifies the approach MiHIN will take to develop interoperability with federal systems.

<table>
<thead>
<tr>
<th>System Purpose</th>
<th>Interoperability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Care for veterans</td>
<td>The MiHIN identify the sub-state HIEs that can work with the local Veterans Administration hospitals to develop mechanisms to connect to MiHIN or to the NHIN. This will be a longer term project and will depend on how the VA System decides to integrate into nationwide HIE.</td>
</tr>
<tr>
<td>Social security disability benefits</td>
<td>Investigate a working relationship with the Southeastern Michigan Health Information Exchange (SEMHIE) who was recently awarded a $2.9M grant to</td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Tribal care</td>
<td>The MiHIN will identify the sub-state HIEs that can work directly 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.</td>
</tr>
<tr>
<td>Public health reporting</td>
<td>There are several use cases are under consideration 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. Both of these systems are intended to integrate into the MiHIN. Over time, the MiHIN will work with the federal government to use this system and the MiHIN to connect to the CDC and other federal agencies.</td>
</tr>
<tr>
<td>Emergency preparedness and response</td>
<td>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. These systems are intended to integrate 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.</td>
</tr>
</tbody>
</table>

**Figure 7. Interoperability with Federal Systems**

### 4.3.7 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.

### 4.3.8 Medicaid and other State Systems

There are several Michigan Department of Community Health (MDCH) systems that could be connected to the MiHIN Shared Services. MDCH systems can be classified into two categories that represent the degree to which they would benefit from, contribute to, and impact the MIHIN Shared Services.

The first category is systems that should be early services on the MIHIN Shared Services. These are MDCH 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
Centers for Disease Control and Prevention. These would be MCIR, State Lab System and Medicaid CHAMPS systems.

The second category is systems that can benefit from the MiHIN Shared Services infrastructure. These systems would benefit from automatic collection of relevant data or data exchanges with other systems. The MDSS, MSSS, Birth Registry, and Death Registry would be in this category.

<table>
<thead>
<tr>
<th>State System / Medicaid</th>
<th>Interoperability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michigan Care Improvement Registry (MCIR)</td>
<td>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.</td>
</tr>
<tr>
<td>Michigan Bureau of Labs Systems</td>
<td>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.</td>
</tr>
</tbody>
</table>
| 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 record
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 (MDSS) | 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 | The Michigan Syndromic Surveillance System (MDSS) will benefit from the MiHIN by allowing emergency departments in the state to report their notifiable-disease |
### Interoperability

<table>
<thead>
<tr>
<th>State System / Medicaid</th>
<th>Interoperability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surveillance System (MSSS)</td>
<td>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.</td>
</tr>
</tbody>
</table>

**Figure 8. Interoperability with Michigan Department of Community Health Systems**

#### 4.3.9 Cross Community Interoperability

The MIHIN Shared Services is built to enable interoperability within an HIE and cross community (i.e., HIE to HIE). MIHIN Shared Services 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:

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Messaging Gateway</td>
<td>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.</td>
</tr>
<tr>
<td>Enterprise Master Patient Index</td>
<td>The EMPI is the system used for collecting patient identities and resolving identity conflicts across sub-state HIE member organizations. Connection to the MiHIN EMPI will be through a Subject Discovery service as described below.</td>
</tr>
<tr>
<td>Record Locator Service</td>
<td>The Record Locator Service stores information on any data aggregated into the sub-state 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.</td>
</tr>
</tbody>
</table>
| 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 MiHIN Shared Services 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 HIEs. These services will include:  
  - Security Services  
  - Patient Identity Feed  
  - Subject Discovery  
  - Query for Documents  
  - Retrieve Documents |

**Figure 9. MIHIN Shared Services Component Description**

**HIE to Michigan Department of Community Health Systems**

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

4.3.10 **Technical Architecture/Approach**

This section describes the components of the MiHIN Shared Services Bus (SSB) architecture. The symbols next to each component title reference the symbols used in Figure 1, the MiHIN Conceptual Architecture.

4.3.10.1 **MiHIN Shared Services Bus**

The MiHIN Shared Services will be designed as an Enterprise Service Bus (ESB) 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.

4.3.10.2 **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.

4.3.10.3 **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.

4.3.10.4 **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.

4.3.10.5 **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.
4.3.10.6 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 sub-state HIEs or State of Michigan entities.

4.3.10.7 STANDARDS

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 the intention is to follow the HITSP Standards there will be strict adherence to standards for the MiHIN Shared Services to promote an open and interoperable system.

For security, standard for the basis of the MIHIN Shared Services 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.

4.3.11 Statewide Shared Services

Statewide shared services are broken out into Core Shared Services and Use Cases. While in the short term there will be additional costs to implement shared services bus core services, 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.

4.3.11.1 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 sub-state HIE or State of Michigan HIE send new patients and patient updates to the MiHIN EMPI in near real-
time. In addition the MiHIN Shared Services 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 MiHIN Shared Services will need 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.

### 4.3.11.2 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 not to “reinvent the wheel.” However, infrastructure put in place must match the business and functional goals, and adopt the standards necessary to support state-wide HIE.

Simply 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. Four types of stakeholder or state government assets that might be leveraged as part of the MiHIN have been identified, which 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 sub-state HIEs
4.4 Business and Technical Operations

Well thought-out and carefully considered Business and Technical Operations of the MiHIN Shared Services will be integral to success. The following section describes the Business and Technical Operations strategies that will be carried out to successfully implement the technology required to provide the HIE service priorities on a statewide basis and to run the day-to-day operations of the MiHIN Shared Services.

4.4.1 Business Technical Operations Strategy

The selection of use cases for initial implementation on the MiHIN was the result of deliberation of the stakeholders in the MiHIN Business and Technical Operations Workgroup. The initial focus was on prioritizing the HIE service priorities documented by the ONC in the Funding Opportunity Announcement. Several factors in the prioritizing of these services were analyzed including the degree to which each service improved healthcare outcomes and the healthcare workflow. Also, each priority was evaluated based on the size of the population of Michigan that it would affect, whether it supported the proposed Meaningful Use criteria in 2011, if there were known financial sustainability models or if the service is needed to develop HIE capacity in Michigan.

With careful review, data collection, an environmental scan, and debate by numerous stakeholders, the ranking of the HIE Service Priorities is:

1. Electronic clinical laboratory ordering and results delivery
2. Electronic public health reporting
3. Quality Reporting
4. Clinical summary exchange for care coordination and patient engagement
5. Electronic eligibility and claims transactions
6. Electronic Prescribing and refill requests
7. Prescription fill status and/or medication fill history

4.4.2 HIE Service Priorities

Based on funding constraints and other factors, only the top two service priorities were assigned use cases. The prospective use cases were developed based on a ranking that included several factors: such as clinical value, prevalence, stakeholder interest and the degree to which there were already existing technical standards.

In the top two HIE service priorities the following use cases were selected for implementation in the initial stages of the MiHIN Shared Services:

4.4.2.1 ELECTRONIC PUBLIC HEALTH REPORTING

Listed below are the use cases for the Electronic Public Health Reporting service priority.

- **Immunization event to MCIR**: a provider has administered a reportable vaccine. The information is reported electronically to MCIR, the State of Michigan system for immunization tracking.
• **Reportable laboratory result to MDSS**: a laboratory encounters a result that is required to be reported to a public health agency. The laboratory sends the required information to the required public health agency in a structured format suitable for consumption by an electronic system. MDSS is the State of Michigan system for disease surveillance.

• **Immunization history from MCIR**: a provider queries for the immunization history of a patient. Access and consent policies are applied. If allowed, MCIR provides the requested history in a structured format suitable for consumption by an electronic system.

### 4.4.2.2 CLINICAL SUMMARY EXCHANGE FOR CARE COORDINATION AND PATIENT ENGAGEMENT

Listed below are the use cases for the Clinical Summary Exchange for Care Coordination and Patient Engagement service priority.

• **Continuity of Care Documents (CCD) to ED**: a patient presents to the Emergency Department (ED). For treatment purposes, the ED requests the patient's longitudinal health record from its sub-state HIE. The sub-state HIE aggregates patient medical information available locally and via the MiHIN shared services, and then delivers it to the ED via a CCD.

• **CCDs to Physician Offices**: A provider requests an update to a patient's longitudinal health record from their sub-state HIE. The sub-state HIE aggregates patient medical information available locally and via the MiHIN shared services, and then delivers it to the provider via a CCD.

### 4.4.3 Medicaid Coordination

Currently, Michigan’s Medicaid EHR Incentive program operations and technical requirements are being documented. Coordination between the MiHIN Shared Services and Michigan’s Medicaid EHR Incentive program has been focused on educating on capabilities, leveraging resources and exploring potential areas of mutual benefit. There is a high level of management and staff cross-over between the two initiatives and that has facilitated a higher level of collaboration.

A working group comprised of staff from the Michigan Department of Community Health, which houses both Medicaid and public health, the Michigan Department of Technology, Management and Budget has formed to continually assess the current state of coordination and to work toward the most efficient and appropriate level of interaction with the MiHIN Shared Services.

### 4.4.4 Leveraging Existing HIE Capacity

Leveraging existing HIE capacity will begin by documenting capacities existing and under development across Michigan. Periodic environmental scans of operational status and new projects will be conducted.
The MiHIN Shared Services will use existing services where technically feasible and appropriate. Under the technical architecture, the MiHIN Shared Services will leverage the sub-state HIE activities to collect and aggregate data on sub-state levels.

To leverage the existing HIE capacity in Michigan, analysis of state-wide HIE resources has already begun. Regular updates to the survey and analysis will be conducted.

4.4.5 NHIN Strategy
The State will utilize the NHIN for information exchange between states and with federal agencies by deploying a state-wide accessible NHIN gateway as part of a future phase.

4.4.6 Human Resources
To ensure adequate human resources for HIE in Michigan, the MiHIN Shared Services will document in the Operational Plan expected staffing requirements for deployment and ongoing support.

There are two critical components to MiHIN Shared Services acquiring and maintaining human resources across geographies and organizations: (1) during initial pilot implementations and (2) for ongoing development of HIE state-wide.

Workforce needs for deployment and ongoing operations for HIE state-wide will be evaluated and re-evaluated on a continual basis.

4.4.7 Vendor and Program Management
Vendor and program management will occur through an implementation staff that will be selected by the MiHIN Shared Services Governance Board. Policies for program and vendor management will be established by the MiHIN Shared Services Governance Board. The implementation staff will be guided by the policies set by the MiHIN Shared Services Governance Board. Implementation staff will be responsible for overseeing technology implementation in accordance with the Operational Plan to include day-to-day oversight of vendor(s) and system integrator(s).

4.4.8 Risk Management
Risk Management will occur through the creation of a risk plan, documenting risks and mitigation strategies. A risk analysis and mitigation plan will address:

- Technical risk – e.g., technology is not properly operating
- Process risk – e.g., method for deploying does not fit current needs
- Strategic risks – e.g., problematic choice of use cases or architecture/sustainability/governance
- User Acceptance risk – e.g., providers and consumers are slow to see value in the methods or information shared via HIE

4.4.9 Deployment Strategy
The MiHIN Shared Services deployment strategy involves piloting a series of use cases in incremental steps that build upon one another.

The initial projects are being grouped into three phases – deploy, pilot and production. Each phase will deliver a specific functionality and will be the basis for building the additional functionality of later use case implementations. Each phase implements a use case that falls under one or more of the seven HIE service priorities that were set by the State HIE Cooperative Agreement guidance and were prioritized by the MiHIN Business Operations workgroup.

Please note that only the first two phases are funded under the State HIE Cooperative Agreement and associated matching funds. It is expected that Phase 3 will be funded using other grants and alternative funding sources.

The two phases of deployment represent use cases that require similar technologies. Once the technologies, policies and operations of each phase are implemented successfully, the next phase will begin. The projects build on one another in a way that establishes base capabilities, before adding functionality. All deployment phases will have an early proof-of-concept period, testing the capabilities of MiHIN and participant systems to read, format, transform and move data as discrete activities, separate from each other and allows the documentation of system capabilities and potential errors in discrete units. The total deployment time for the two phases is expected to be 12 months. It is estimated that the third phase can be completed in 6 months once appropriate funding is identified and Phase 1 and 2 are completed.

In Phase one, scheduled from October 2010 through March 2011, two use cases will be implemented. Phase one also requires the MiHIN core capabilities of security services, MPI and provider directory. During this first phase, technologies for results interfaces, terminology normalization, and immunization and external repository interfaces will be deployed. The first use case is to report lab results to the Michigan Disease Surveillance System (MDSS) and will enable the mandatory reporting of lab results from appropriate organizations across the state. The second use case is immunization reports to the Michigan Care Improvement Registry (MCIR) and will enable the mandatory reporting of vaccinations from administrating providers through sub-state HIEs to the MCIR.

In phase two, scheduled from April 2011 through September, three use cases will be implemented. The second phase requires an MPI, Shared (SOA) Services Bus, and XDS services from the MiHIN core capabilities as well as the completion of Security Services. During this time, technologies for XDS inquiries, XDS repository interfaces and ADT interfaces will be deployed.

The third use case, immunization history from MCIR, enables the retrieval of electronic immunization histories. The fourth use case, physician notes via Continuity of Care Document (CCD), will enable the storage and retrieval of physician notes in the CCD format. This solves the problem of inadequate patient records during transfers of care and will result in better clinical outcomes. The fifth use case, clinical summaries will further enable clinical information
sharing between healthcare providers, solving the problems of inadequate patient records, resulting in better clinical outcomes.

In phase three, use cases six through eight will be implemented pending the identification of alternative funding sources other than the State HIE Cooperative Agreement and State of Michigan matching funds. The sixth use case, syndromic result to the Michigan Syndromic Surveillance System (MSSS), enables the transmission of emergency department admission to the MSSS. The seventh use case, lab results inquiry, enables a sub-state HIE to query across all persisted lab results, providing a central registry of lab results and enabling the transmission of the lab result from the repository to the sub-state HIE. The eighth use case involves the transferring of Medicaid Eligibility information.

The use cases will be deployed using the sub-state HIEs as pilot sites. Criteria will be developed by the MiHIN Shared Services Governance Board to select pilot participants. The criteria will cover technical, operational, financial and policy factors.

Deployed use cases will be limited to the pilot organizations for the initial deployment period. After three months of successful pilot operations, a six-month limited-production phase will occur. During the deployment phase, organizations interested in implementing the piloted use case will be solicited, evaluated, and selected for the subsequent phase, limited-production. During limited-production, a small number (less than 6) of organizations will implement the use case. This will allow the MiHIN to scale-up operations and test capacity before wide-scale adoption. Successful completion of the limited-production phase will occur when six months of critical-error-free operations have occurred. The use case and its deployed technologies will then be considered production and will be available to any interested organization. Piloting organization will receive funding to help offset the cost of implementing the use case.

The deployment strategy phases, implemented use cases and timelines are summarized in the figure ten on the next page.
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<th>Core Infrastructure Buildout</th>
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<td>Lab Results Inquiry</td>
<td>Feb-11</td>
<td>Mar-11</td>
<td>Apr-11</td>
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</tbody>
</table>

Funded Box: Items inside the box are funded by this State HIE Cooperative Agreement. Items outside the box would require additional funding from alternative sources to complete.

Figure 10. MiHIN Deployment Strategy
4.4.10 Outreach and Communications

The outreach and communications strategy of the MiHIN focuses on creating a message that can be delivered at 1) the provider level and 2) the consumer level. The Michigan HIT Commission will be responsible for determining the outreach and communications strategies for Michigan that have an overarching goal.

The provider level communications will be achieved by collaboration with other organizations, such as Michigan Regional HIT Extension Center - M-CEITA, the Michigan State Medical Society, and other healthcare provider organizations in Michigan. The provider-level communication will focus on the benefits of Health Information Exchange, the relationship between Health Information Exchange and the proposed Meaningful Use criteria, and the opportunities to engage in HIE in Michigan.

Communication and outreach at the consumer level will be done through utilizing community group meetings, public meetings, employer meetings and other available forums. Outreach on this level will be focused on assisting citizens in understand the direct benefits to their health of HIE, addressing privacy concerns, understanding potential impacts and educating on the privacy policies.

4.5 Legal/Policy

Michigan has been working on privacy and security policies for HIE since 2006. Utilizing a workgroup made up of a variety of stakeholders and volunteers has created the foundation for a shared vision that encompasses a unified approach to addressing security and privacy concerns.

4.5.1 Goals

The MiHIN Shared Services will focus on building consensus throughout Michigan by balancing the benefits of HIE and ensuring that privacy and security protections of health information appropriately protect consumers. The MiHIN Shared Services will build a statewide process for the ongoing development of legal guidance.

4.5.2 Guiding Principles

In order to manage the development of privacy and security as the MiHIN Shared Services grows, Michigan will rely on and prioritize the Nationwide Privacy and Security Framework principles that include; correction, openness and transparency, individual choice, collection, use and disclosure limitations, safeguards and accountability. As the MiHIN evolves, different principles will become more critical. The initial focus will be on openness and transparency, safeguards and accountability.

Additionally, Michigan will continue to build on its tradition of stakeholder input by continuing stakeholder involvement through the recommended creation of guidance bodies to address (1) privacy with a focus on policy, (2) security with a focus on technical standards and (3) sub-state HIE development.
4.5.3 Legal/Policy Strategy

Michigan will build on the foundation of accomplishments that began in 2006 with the MiHIN Conduit to Care project and the ONC’s nationwide HISPC (Health Information Privacy and Security Collaborative) project to enable health information exchange, while protecting consumer privacy and security.

Existing federal and state laws already provide strong legal protections for patient health information. Like many other states, Michigan’s legal protections expand upon those provided by federal law for protected classes of health information. The MiHIN Shared Services will ensure that a high level of security and accountability with appropriate protections for patient information are in place, while ensuring no unnecessary barriers to HIE exist.

The ongoing development of a privacy and security policy framework will help to balance the protection and integrity of patient information while allowing healthcare providers to obtain necessary health information in a timely manner without undue cost and administrative burdens—ultimately benefitting the patient.

The security policies will contain minimum standards for participation in the MiHIN Shared Services. The privacy policies will also incorporate the minimum standards as well as offering comprehensive guidance for Michigan’s newly developing sub-state HIEs. MiHIN Shared Services’ work will provide the sub-State HIEs with needed clarity, alignment and certainty— as they continue to evolve and develop.

4.5.4 The Legal Framework

Governance of Privacy and Security will require a dynamic and innovative approach. Privacy and Security of health information is of critical importance to fostering and maintaining consumer trust and confidence in health care providers.

- Shared vision and principles to guide planning
- Keep it reasonable and simple
- Plan short-term incremental implementation based on available resources
- Regularly review and evaluate progress

The Legal Framework’s foundation has been established through Michigan’s previous work on the MiHIN Conduit to Care Project and through the ongoing work of the Legal Workgroup and the HISPC project.

The workgroup is incorporating the HHS’ “Nationwide Privacy and Security Framework for Electronic Exchange of Individually Identifiable Health Information” as well as additional

guidance from the ONC, GAO\textsuperscript{5}, NGA’s State Alliance for eHealth \textsuperscript{6} and other recognized federal policy committees and workgroups, along with relevant federal and state laws that will be utilized as tools to assist in reviewing and analyzing State laws. The main focus of the Workgroup was to set foundational concepts in place, along with identifying risks and benefits so that ongoing Workgroup bodies have a clear understanding of the work already completed.

The framework will help the workgroup build consumer trust by laying very clear principles confirming the critical role of consumer privacy and security, and more specifically that information will only be shared for purposes permitted or required by law or otherwise authorized by the consumer.

General framework principles:

- Acknowledge that consumer privacy, security and confidentiality are paramount to health information exchange but that consumer empowerment and control will occur over time
- Balance legal and regulatory barriers with the sharing of electronic health information
- Facilitate statewide consensus of legal opinion
- Provide guidance and minimum standards for HIEs in Michigan
- Promote safe and secure intrastate and interstate exchange of electronic health information
- Establish a MiHIN Privacy Committee to focus on legal and policy related issues
- Establish a MiHIN Security Committee to focus on technical and security related issues

4.5.4.1 INTRASTATE

MiHIN Shared Services will work with existing HIEs and other organizations and associations within the state to ensure the legal framework is reasonable and broad enough to embrace all of Michigan’s Statewide HIE efforts. The workgroup will recommend Privacy and Security Officers from all of the existing sub-state HIEs actively participate in the ongoing work Privacy and Security work of the MiHIN.

Plans to address intrastate HIE include:

- Reviewing HIEs in other states
- Utilization of existing relationships within Michigan through other multi-state organizations and associations
- Update, review and analysis of Michigan’s Comparative Analysis Matrix
- Continued drafting and updating of Privacy and Security policies for Michigan’s sub-state HIEs that connect to the MiHIN Shared Services


Outreach and Education

The MIHIN conducted a survey among its stakeholders to identify issues that act as barriers to HIE. Armed with these preliminary findings, MIHIN can prioritize and begin to address the issues identified by the workgroup.

4.5.4.2 INTERSTATE

The MIHIN Shared Services will leverage agreements like the data use and reciprocal support agreement (DURSA) and the Inter Organizational Agreements (IOA) Trust Agreements (developed by the HISPC’s IOA Collaborative) to help negotiate disparate requirements in an interstate exchange environment.

Michigan, like many other states, is in the early stages of HIE development. Interstate exchange will require considerable preparation. State laws that protect the privacy of health information differ from state to state and often narrowly target a particular health condition that is referred to as a specially protected class of health information.

At first glance, state laws that provide patients with privacy and security protections and access rights that are greater than HIPAA would seem to be a positive benefit. However, the patchwork of medical privacy laws creates barriers to the exchange of health information. Barriers range from the inability to exchange patient information for treatment purposes in a timely manner to inconsistencies in public health reporting and disclosures.

4.5.5 State Laws

MIHIN will conduct an updated review, analysis and ranking of Michigan laws related to privacy and security using the Comparative Analysis Matrix. This will include incorporating any changes or new information regarding laws related to health information, including the recent HITECH Amendments to HIPAA\(^7\), the Confidentiality of Alcohol and Drug Abuse Patient Records Regulation (42 CFR Part 2)\(^8\), and the Family Educational Rights & Privacy Act\(^9\) (addresses privacy of information held by certain educational institutions).

A comprehensive review of Michigan laws affecting the exchange of health information was undertaken in 2007 as part of Michigan’s work on the HISPC project. The review was updated again in 2009, but will need to be re-analyzed given the many changes in health information exchange within the State and nationally. This review was developed by the Harmonization of Privacy Laws Collaborative and is also known as “the CAM”.

The CAM (see Appendix 6.2) includes an inventory of nearly 150 subject matter areas typically addressed by state and federal law that involve or may impact use and disclosure of health information.

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There are four principles of analysis identified through HISPC:

- Laws must be surveyed: A survey of state statutory and regulatory law involving or affecting the exchange of health information (whether paper or electronic) must be conducted.
- Laws must be organized logically: Identified laws must be organized into logical subject-matter areas for review and analysis.
- Laws must be analyzed in relation to HIE: Each law (or gap in the state’s law) must be reviewed and analyzed to determine whether a change in the law would facilitate HIE within the state.
- Feasibility of changing the law must be determined: For laws identified as requiring change, a consistent analytical process for determining the feasibility and priority of that change must be applied.\(^{10}\)

### 4.5.6 Policies and Procedures

The Michigan HIT Commission and the MiHIN Shared Services Governance Board will work in a collaborative manner to finalize the high level Privacy and Security policies that will serve as the minimum requirements for Michigan’s sub-state HIEs to connect through the MiHIN Shared Services. HIEs operating within the state will have to come to consensus on a minimum set of policies for how their participants will use the MiHIN Shared Services.

Enforcement of the policies regarding sub-state HIEs that are connected to the MiHIN Shared Services will be regulated by the MiHIN Shared Services Governance board. Under the MiHIN Shared Services Governance Board’s direction will be a Privacy Officer and a Security Officer and respective stakeholder workgroups. In addition, a body composed of sub-state HIE privacy officers and a body composed of sub-state HIE security officers would also serve the state well, to promote reasonable policy development that would also meet with all state and federal laws.

Obtaining legal opinion will also be a critical component, whether those legal opinions are issued from the State of Michigan government or from a health law attorney- it is clear that in some cases, legal opinion will be necessary to give the appropriate reassurances to participants regarding policy choices.

The following recommendations are based on stakeholder input and have been created as an initial direction for Michigan HIT Commission and the MiHIN Shared Service Governance Board to collaboratively continue to refine for implementation. The initial policy directions are as follows:

- Individual Participant Policy for Informed Opt Out. An “Informed Opt Out” form, as well as standard language will be incorporated into each MiHIN participants’ Notice of Privacy practices. The MiHIN Shared Services Governance Board must develop accompanying outreach materials for MiHIN participants. Generally the policy requirements are:

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\(^{10}\) Health Information Security and Privacy Collaborative Harmonizing state Law Collaborative Final Report. March 31, 2009
o Allow the individual’s health information to be shared through the MiHIN, unless and until the individual decides to “opt out”. (and explains what the consumer will be opting out of)

o Allow exceptions for the following:
  - “Break the glass” in case of a medical emergency
  - Public health reporting (only for legally permissible information)
  - One-to-one or direct transfers (movement of data via the MiHIN Shared Services that do not utilize the RLS functionality- or in other words, where data is being pushed out, rather than pulled in.)

o Require additional information be added to the NPP of all participating providers.

o Policy guidance calls for educational materials to be created and made available to consumers in a variety of media in plain English.

- Access- this policy will govern how and when PHI will be accessed.
- Authentication- this policy will govern how users are verified to be who they say they are.
- Authorization- this policy will govern the process for determining if the user has the right and ability to access the information they are requesting.
- Audit- this policy will govern the requirements for oversight and keeping logs of who has accessed information and when they accessed it.
- Breach- this policy will govern how HIEs will respond to breaches of health information. The HITECH amendments to the HIPAA Privacy Rule offer very specific guidance on reporting and these will be incorporated into the MIHIN policy.

4.5.7 Interstate Communication

In order to facilitate communication with other states, the MiHIN Shared Services will continue to build on the relationships it has formed with other states during the HISPC project. Michigan was one of 42 states and territories that worked in concert for 3 years, co-chairing two of the seven HISPC multi-state collaborative Workgroups.

Additionally, the MiHIN Shared Services will to leverage its participation in other interstate activities, including the Great Lakes Border Health Initiative (GLBHI), which includes Ohio, Indiana Pennsylvania, Minnesota, New York and Wisconsin. The GLBHI is focused on addressing public health concerns, the NGA’s work on the State Level Health Information Exchange and active participation in HIMSS.

Over several decades, states have passed laws to protect the privacy of health information. These laws differ from state to state and often narrowly target a particular population, health condition, data collection effort, or specific types of health care organizations. As a result, states have created a patchwork of privacy protections that are not comprehensive or easily understood.11

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Most states have enacted their own privacy laws that apply, in some cases unintentionally, to the electronic exchange of health care information. One of the impediments to interstate exchange is reconciling differing state laws and finding reasonable ways to facilitate exchange that both allows information to flow and meets the requirements of those differing laws.

The MiHIN Shared Services will address the following issues:

- Inconsistent laws addressing the disclosure or re-disclosure of information for treatment purposes.
- Inconsistent laws addressing the disclosure of “sensitive” patient information.
- Inconsistent laws addressing the disclosure of public health information (immunization records, communicable diseases, etc.) among states.
- Laws, designed for paper based HIE, which fail to address current modes of transmission and/or storage of electronic data. (Electronic Transmission/Electronic Signatures).
- Lack of uniform consent/authorization forms and policies

4.5.8 Trust Agreements

Data sharing agreements and data use agreements have been developed and the MiHIN Shared Services will utilize these agreements wherever reasonable. For health information exchange to take place among health care networks, all participants must adhere to a set of shared rules. In addition, the participants must define their relationships—community HIE to community HIE, state to state, and local and state to national—under state and federal law. Legal relationships are defined through data use, data sharing, or trust agreements or memoranda of understanding (MOU). These agreements or MOUs address the privacy and security responsibilities of the parties to the agreement.

Trust agreements or MOUs address the following (and other issues):

- The policies that establish who has access to health information
- What uses of information are acceptable
- The extent to which patients can give or withhold access to their information
- The design of privacy and security safeguards

The following intrastate and interstate agreements have been collected:

- National: DURSA¹²
- HISPC - Review agreements developed by the Inter-Organizational Agreements Collaborative¹³
- My One HIE (Southeastern Michigan based)

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• Capitol Area RHIO (Lansing, Michigan)

4.5.9 Stakeholder Endorsement
Stakeholder endorsement and alignment of MiHIN Privacy and Security goals is essential to ensure success of the project as a whole. For the MiHIN Shared Services that means “beginning with the end in mind,” and creating a vision of the project at its completion.

- Stakeholders value and understand the difference they are able to make through engagement.
- Stakeholder views feed into and influence strategic planning.
- Engagement is characterized by an open and honest dialogue

It will be the purview of the Michigan HIT Commission and the Michigan Department of Community Health (MDCH) to ensure stakeholder endorsement of the MiHIN Shared Services privacy and security policies and procedures. MDCH and the Michigan HIT Commission will undertake this activity with the MiHIN Shared Services Governance Board as the policies and procedures are further developed.

4.5.10 Oversight and Enforcement
Long-term policies will be developed and implemented to govern the oversight of statewide HIE and enforcement as the technology progresses. The Michigan HIT Coordinator is responsible for working with the MiHIN Shared Services Governance Board and the Michigan HIT Commission to develop a plan for complying with all applicable state and federal laws. This will be an evolving process as the applicable laws evolve and the privacy and security policies of the MiHIN Shared Services become finalized and formalized. The Michigan HIT Coordinator will explore multiple mechanisms for enforcing the applicable laws and will present this plan to the MiHIN Shared Services Governance Board and the Michigan HIT Commission for review, deliberation and approval.

Initially, oversight and enforcement for Michigan’s sub-state HIEs will be provided with assistance from a number of state and federal sources- primarily being federal regulations and laws and State HIE Cooperative Agreement guidance. The MiHIN Shared Services Privacy and Security Officers will oversee the day to day operations of privacy and security issues related to the MiHIN shared services, as well as offering privacy and security oversight to Michigan’s sub-state HIEs that are connected to the MiHIN Shared Services through the sub-state HIE Privacy and Security Officers. Primarily, the MiHIN will begin by focusing on federal laws, such as:

- HITECH, Health Information Technology for Economic and Clinical Health
- HIPAA, Health Insurance Portability and Accountability Act
- 42 CFR Part 2 Substance Abuse (Confidentiality of Alcohol and Drug Abuse Patient Records)
- FERPA, Family Education Rights and Privacy Act
• “Red Flag Rules” Part of the Fair and Accurate Credit Transactions (FACT) Act of 2003\textsuperscript{14}
• Stark\textsuperscript{15}
• Health Care Reform (Patient Protection and Affordable Care Act- H.R. 3590)

And State laws, such as:

• Michigan Social Security Number Privacy Act
• Michigan Identity Theft Protection Act
• Michigan Stark Rules

The MiHIN will assist sub-state HIEs in interpreting and complying with applicable federal and state laws by providing consistent outreach and guidance based on the priorities and challenges identified by the work group through the CAM and the Challenges Survey in the Operational Plan. In addition, policies, trust agreements and participant contracts will be developed and implemented to govern the enforcement of statewide HIE and sub-state HIEs.

\textsuperscript{14} The Federal Trade Commission (FTC), the federal bank regulatory agencies, and the National Credit Union Administration (NCUA) have issued regulations (the Red Flags Rules) requiring financial institutions and creditors to develop and implement written identity theft prevention programs, as part of the Fair and Accurate Credit Transactions (FACT) Act of 2003.

\textsuperscript{15} Three separate provisions, governs physician self-referral for Medicare and Medicaid patients. The law is named for United States Congressman Pete Stark, who sponsored the initial bill.
5 Summary / Conclusion

The MiHIN Strategic Plan is the result of a stakeholder workgroup driven process. The strategies contained in this plan have been based on the direction set by the 2006 MiHIN Conduit to Care and have been updated to align with the current HIE landscape in Michigan, the evolution of technologies and the State HIE Cooperative Agreement guidance.

Based on the investments and progress of health information exchange across Michigan, a strategy of establishing statewide shared services for the secure exchange of health information and NHIN connectivity has been developed. The MiHIN Shared Services will be designed as a network of networks with local providers connecting to sub-state HIEs which connect to the MiHIN Shared Services and then to the National Health Information Network.

This strategy will be realized by establishing the MiHIN Shared Services Governance Board that will hold the responsibility for finalizing the business plan for financial sustainability and implementing all the components of the MiHIN Operational Plan.
6 Appendix

6.1 MiHIN Workgroups

It is well recognized that stakeholder participation in the planning and implementation of HIE maximizes success. The State of Michigan can attest to this as the State successfully used this approach to develop the *Conduit to Care*, the initial version of the Strategic Plan, in 2006. At that time, over 200 stakeholders worked together to develop consensus on the initial direction for HIE planning in Michigan.

When the State of Michigan sought funding from the ONC to support further state-wide health information exchange in the fall of 2009, it was a priority for the State of Michigan to engage a broad mix of stakeholders for their feedback, input and buy-in. The State leveraged the success of the *Conduit to Care* in developing the MiHIN Strategic Plan and many of the same individuals have been in involved in both initiatives and a similar workgroup process.

To encourage adoption for statewide services, the State opted to conduct the Strategic Planning using the five ONC-based domains as the focus of Workgroups comprising stakeholders from across the state. This phase of the MiHIN initiative was launched on November 10, 2009, with the MiHIN Workgroup Kick-off meeting. Janet Olszewski, Director of the Michigan Department of Community Health and Ken Theis, the CIO of the State of Michigan hosted the event. Over 200 stakeholders representing all stakeholder organizations as well as the nine regions of the state were in attendance.

Workgroups based on the ONC domains were formed to make recommendations for the Strategic and Operational plans. The key roles of each Workgroup are listed below.

- **Governance** – Key role is to develop the Governance Model to be used to implement the MiHIN and approve all of the deliverables produced by the other workgroups to assure all stakeholders’ perspectives are appropriately represented.
- **Business Operations** – Key role is to recommend HIE business/clinical priorities, use cases to be included in the initial pilots and expected value.
- **Technical** – Key role is to recommend technical design, standards, architecture and approaches to HIE solutions.
- **Finance** – Key role is to recommend budgets and a financial sustainability model.
- **Privacy and Security** – Key role is to recommend HIE privacy and security protections of health information and on-going process for legal guidance.

The diagram below shows work structure, stakeholder input and interaction with and reporting to the State of Michigan. It also portrays how the Governance Workgroup was responsible for approving all the deliverables from the other Workgroups.
In addition to broad stakeholder representation and participation in the statewide HIE planning, the State of Michigan placed a high priority on conducting the work in a manner that is as transparent as possible. Workgroup meetings are conducted at least twice a month. Although only voting Workgroup members vote, all interested stakeholders are invited to meetings and encouraged to participate. All meetings are open to the public, meeting minutes were posted publicly and during the meetings time was set aside for public comment. The State has also established an online work space where all documents and information are readily available for review.

6.1.1.1 MEMBERS SELECTION PROCESS

At the MiHIN Kick-off meeting on November 10, 2010, all stakeholders were invited to attend the first meeting of the Workgroups. In addition to reviewing objectives and work plans for the MiHIN initiative, the Workgroup selection process was introduced. The selection process was designed to meet specific objectives:

- To create workgroups that have broad stakeholder representation covering all entities and regions and including skill sets essential to the work of the individual workgroups
- To enable broadest stakeholder opportunity to serve as WG members
- To provide the most ‘democratic’ process for selecting voting workgroup members, considering the project’s aggressive timeframe
- To provide broad stakeholder representation in the decision making for the MiHIN project as well as to align with ONC guidelines.
Roles and minimum requirements for each Workgroup were developed by the State of Michigan in advance of the Kick off session to include different types of stakeholders (providers, payers, public representatives), necessary skill sets (technical, finance, etc.) and geographic diversity (9 regions with mix of urban, rural representation). Co Chairs/Chairs for the Workgroups were appointed by the State in advance of the session. During the session, the 3 step selection process was announced and initiated:

1. All stakeholders throughout the state were invited to volunteer or nominate someone to serve in one of the roles required for each workgroup at the Kick off session, or within 1 week of the session.

2. Program staff collected the nominations, verified the nominees for each category and assembled the voting survey. Co-chairs were asked to review and nominate individuals to fill gaps in nominations for a geographic, organization type or skill set imbalance, to ensure a balanced, comprehensive representation of voting members.

3. Using Survey Monkey, the ballot was distributed widely and over 150 stakeholders cast a vote. The results were announced and posted on the MiHIN Website on November 24, 2009.
**6.1.1.2 GOVERNANCE WORKGROUP MEMBERS**

The Governance Workgroup was led by 2 co-chairs, 1 public, 1 private, who were appointed by the State of Michigan. The voting members and co-chairpersons are listed below along with the role and organization that they represent.

<table>
<thead>
<tr>
<th>Name</th>
<th>Voting Member Role</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Janet D. Olszewski</td>
<td>Co-Chairperson</td>
<td>Director, Michigan Department of Community Health</td>
</tr>
<tr>
<td>Larry Wagenknecht</td>
<td>Co-Chairperson</td>
<td>CEO, Michigan Pharmacists Association</td>
</tr>
<tr>
<td>John Barnas</td>
<td>Rural healthcare provider/clinic/hospital</td>
<td>Executive Director, MI Center for Rural Health</td>
</tr>
<tr>
<td>Bob Brown</td>
<td>Co-Chair of Business Operations Workgroup</td>
<td>Michigan State University / Kalamazoo Center for Medical Studies</td>
</tr>
<tr>
<td>Jocelyn Dewitt</td>
<td>Health System Executives</td>
<td>CIO, University of Michigan Health System</td>
</tr>
<tr>
<td>Helen Hill</td>
<td>Existing HIE Initiatives</td>
<td>Director IT Consulting &amp; HIE, Henry Ford Health System and Southeast Michigan Health Information Exchange</td>
</tr>
<tr>
<td>Denise Holmes</td>
<td>Michigan Employer</td>
<td>Associate Dean Government Relations and Outreach, Michigan State University</td>
</tr>
<tr>
<td>Paula Johnson</td>
<td>Existing HIE Initiatives</td>
<td>Director, Upper Peninsula Health Care Network</td>
</tr>
<tr>
<td>Jim Lee</td>
<td>Provider Trade Associations</td>
<td>VP, Data Policy &amp; Development, Michigan Health &amp; Hospital Association</td>
</tr>
<tr>
<td>Margaret Marchak</td>
<td>Chair of Privacy and Security Workgroup</td>
<td>Attorney, Hall, Render, Killian, Heath &amp; Lyman, PLLC</td>
</tr>
<tr>
<td>Sue Moran</td>
<td>Co-Chair of Business Operations Workgroup</td>
<td>Director, Bureau of Medicaid Program Operations and Quality Assurance, Michigan Department of Community Health</td>
</tr>
<tr>
<td>Richard Murdock</td>
<td>Insurer/Health Plan</td>
<td>Executive Director, Michigan Association of Health Plans</td>
</tr>
<tr>
<td>Patrick O'Hare</td>
<td>Health System Executives</td>
<td>SVP / CIO, Spectrum Health</td>
</tr>
<tr>
<td>Kim Sibilsky</td>
<td>Provider Trade Associations</td>
<td>Executive Director, Michigan Primary Care Association</td>
</tr>
<tr>
<td>Name</td>
<td>Voting Member Role</td>
<td>Organization</td>
</tr>
<tr>
<td>---------------</td>
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<td>---------------------------------------------------</td>
</tr>
<tr>
<td>Dennis Smith</td>
<td>Chair of Finance Workgroup</td>
<td>CEO, Upper Peninsula Health Care Network</td>
</tr>
<tr>
<td>Ken Theis</td>
<td>Co-Chair of Technical Workgroup</td>
<td>CIO, State of Michigan</td>
</tr>
<tr>
<td>Rick Warren</td>
<td>Co-Chair of Technical Workgroup</td>
<td>CIO, Allegiance Health / JCMR</td>
</tr>
</tbody>
</table>

The workgroup was facilitated by John Evans and Sue Frechette of s2a Consulting.
6.1.1.3 **Finance Workgroup Members**

The Finance Workgroup was led by a public chairperson appointed by the State of Michigan. The voting members and co-chairpersons are listed below along with the role they represent and the organization they are from.

<table>
<thead>
<tr>
<th>Name</th>
<th>Voting Member Role</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dennis Smith</td>
<td>Chairperson</td>
<td>Upper Peninsula Health Care Network</td>
</tr>
<tr>
<td>Timothy M. Jodway</td>
<td>Community hospital CFO</td>
<td>Northern Michigan Regional Health System</td>
</tr>
<tr>
<td>Donald Kooy</td>
<td>Health system CEO</td>
<td>McLaren Regional Medical Center</td>
</tr>
<tr>
<td>Stephan Ranzini</td>
<td>Banker/financier</td>
<td>University Bank</td>
</tr>
<tr>
<td>Valerie Glesnes-</td>
<td>Sub-state HIE</td>
<td>Capital Area Regional Health Information</td>
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<tr>
<td>Anderson</td>
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<tr>
<td>Janice Torosian</td>
<td>Payer/Insurer/Health Plan CFO</td>
<td>Health Plan of Michigan</td>
</tr>
</tbody>
</table>

The workgroup was facilitated by John Evans from s2a Consulting with assistance from David Allen from Dewpoint and Mike Mote also from s2a Consulting.
### 6.1.1.4 Business Operations Workgroup Members

The Business Operations Workgroup was led by 2 co-chairs, 1 public, 1 private, who were appointed by the State of Michigan. The voting members and co-chairpersons are listed below along with the role they represent and the organization they are from.

<table>
<thead>
<tr>
<th>Name</th>
<th>Voting Member Role</th>
<th>Position and Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sue Moran</td>
<td>Co-Chair</td>
<td>Michigan Department of Community Health, Bureau of Medicaid Program Operations and Quality Assurance</td>
</tr>
<tr>
<td>Bob Brown</td>
<td>Co-Chair</td>
<td>Kalamazoo Center for Medical Studies</td>
</tr>
<tr>
<td>Gary S. Assarian. DO</td>
<td>Laboratory representative</td>
<td>JVHL/Henry Ford Medical Laboratories</td>
</tr>
<tr>
<td>Leeland Babitch, MD, MBA</td>
<td>Chief Medical Information Officer</td>
<td>Detroit Medical Center</td>
</tr>
<tr>
<td>Christopher Beal, DO</td>
<td>Primary Care Physician</td>
<td>St. Johns, MI</td>
</tr>
<tr>
<td>Rebecca Blake</td>
<td>Provider Trade Association</td>
<td>Michigan State Medical Society</td>
</tr>
<tr>
<td>Michael Bouthillier</td>
<td>Pharmacy representative</td>
<td>Ferris State University</td>
</tr>
<tr>
<td>Bryan Dort</td>
<td>Hospital/Health System Representative</td>
<td>Alpena Regional Medical Center</td>
</tr>
<tr>
<td>Paul Edwards</td>
<td>Workforce development initiatives</td>
<td>Greater Flint Health Coalition</td>
</tr>
<tr>
<td>Mary Anne Ford</td>
<td>Existing HIE Initiative</td>
<td>Capital Area RHIO</td>
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<tr>
<td>Bernard Han</td>
<td>University health researcher</td>
<td>Center of WMU Health Information Technology Research and Services</td>
</tr>
<tr>
<td>Scott Monteith, MD</td>
<td>Specialty physician representative with EHR experience</td>
<td>Northern Lakes CMH/GTBM, PC</td>
</tr>
<tr>
<td>Betsy Pash</td>
<td>Public health representative</td>
<td>Michigan Department of Community Health</td>
</tr>
<tr>
<td>Timothy A. Pletcher</td>
<td>RHITEC representative</td>
<td>Central Michigan University Research Corporation</td>
</tr>
<tr>
<td>Sherri Stirn, BS, CPC</td>
<td>Rural Health Centers</td>
<td>Mecosta Heath Services</td>
</tr>
<tr>
<td>Deana M. Simpson, RN</td>
<td>Nursing</td>
<td>Detroit Medical Center</td>
</tr>
<tr>
<td>Name</td>
<td>Voting Member Role</td>
<td>Position and Organization</td>
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</tr>
<tr>
<td>Linda Young</td>
<td>Home health representative</td>
<td>Borgess Visiting Nurse and Hospice Services</td>
</tr>
<tr>
<td>Peter Ziemkowski, MD</td>
<td>Primary Care Physician</td>
<td>Kalamazoo, MI</td>
</tr>
</tbody>
</table>

The workgroup was facilitated by Shaun Grannis, MD from s2a Consulting and Rick Brady from Dewpoint.
### 6.1.1.5 Technical Workgroup Members

The Technical Workgroup was led by 2 co-chairs, 1 public, 1 private, who were appointed by the State of Michigan. The voting members and co-chairpersons are listed below along with the role they represent and the organization they are from.

<table>
<thead>
<tr>
<th>Name</th>
<th>Voting Member Role</th>
<th>Position and Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ken Theis</td>
<td>Co-Chairperson</td>
<td>Michigan Department of Information Technology</td>
</tr>
<tr>
<td>Rick Warren</td>
<td>Co-Chairperson</td>
<td>Allegiance Health</td>
</tr>
<tr>
<td>Marcus Cheatham</td>
<td>Local public health</td>
<td>Ingham Co. Health Department</td>
</tr>
<tr>
<td>Doug Dietzman</td>
<td>Laboratory systems</td>
<td>Spectrum Health</td>
</tr>
<tr>
<td>Doug Fenbert</td>
<td>Hospitals &amp; Health Systems</td>
<td>Trinity Health</td>
</tr>
<tr>
<td>Thomas Lauzon</td>
<td>Health plan/Insurer/Payer</td>
<td>Health Plan of Michigan</td>
</tr>
<tr>
<td>Paul G. Miller</td>
<td>Pharmacy systems</td>
<td>M.Sc., Pharm.D., R.Ph</td>
</tr>
<tr>
<td>Bill Riley</td>
<td>Behavioral/ mental health</td>
<td>Oakland County Community Mental Health</td>
</tr>
<tr>
<td>Dan Stross</td>
<td>Hospitals &amp; Health Systems</td>
<td>Genesys Health System</td>
</tr>
<tr>
<td>Bruce Wiegand</td>
<td>FQHC</td>
<td>Michigan Primary Care Association</td>
</tr>
<tr>
<td>Mark Tuthill</td>
<td>Multispecialty group practice</td>
<td>MD - Henry Ford Health System</td>
</tr>
<tr>
<td>Ernie Yoder</td>
<td>Health research</td>
<td>MD, PhD, St. John Health System</td>
</tr>
</tbody>
</table>

The workgroup was facilitated by Mike Gagnon from s2a Consulting.
6.1.1.6 LEGAL/POLICY WORKGROUP MEMBERS

The Privacy and Security Workgroup was led by 1 chair who was appointed by the State of Michigan. The voting members and chair are listed below along with the role they represent and the organization they are from.

<table>
<thead>
<tr>
<th>Name</th>
<th>Voting Member Role</th>
<th>Position and Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Margaret Marchak</td>
<td>Chair</td>
<td>Hall, Render, Killian, Heath &amp; Lyman, P.C.</td>
</tr>
<tr>
<td>Moira Davenport-Ash</td>
<td>Security/Compliance Representative</td>
<td>CEI Community Mental Health Authority</td>
</tr>
<tr>
<td>Jeff Bontsas</td>
<td>Hospital Setting Representative</td>
<td>St John Health System</td>
</tr>
<tr>
<td>Denise Chrysler</td>
<td>MDCH Representative with Privacy experience</td>
<td>Michigan Department of Community Health</td>
</tr>
<tr>
<td>Darrell Dontje</td>
<td>MDCH Enterprise Security representative</td>
<td>Michigan Department of Information Technology</td>
</tr>
<tr>
<td>Chuck Dougherty</td>
<td>CIO representative</td>
<td>CEI Community Mental Health</td>
</tr>
<tr>
<td>George Goble</td>
<td>CIO representative</td>
<td>Trinity Health</td>
</tr>
<tr>
<td>John Hazewinkel</td>
<td>Attorney with HIE experience and HIE Privacy and Security Compliance Representative</td>
<td>Michigan State University</td>
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<tr>
<td>Glen Lutz</td>
<td>Compliance representative</td>
<td>Ascension Health</td>
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<tr>
<td>Melissa Markey</td>
<td>Attorney Representative</td>
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<tr>
<td>Mike Tarn</td>
<td>Consumer representative</td>
<td>Western Michigan University</td>
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<tr>
<td>Nancy Walker</td>
<td>Compliance representative</td>
<td>Michigan Health Information Management Association</td>
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<tr>
<td>Shelli Weisberg</td>
<td>Consumer representative</td>
<td>ACLU of Michigan</td>
</tr>
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The workgroup was facilitated by Kelly Coyle and Linda McCardel from the Michigan Public Health Institute (MPHI).
### 6.2 The Comparative Analysis Matrix

<table>
<thead>
<tr>
<th>Citation/ Link</th>
<th>More Stringent than HIPAA for Patient Care?</th>
<th>More Stringent than HIPAA for Population Health?</th>
<th>References to Related State/ Federal Law &amp; Legislative Proposals</th>
<th>Statutory or Regulatory Change Needed?</th>
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<tbody>
<tr>
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<td>Y/N</td>
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#### Subject Matter

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<tr>
<td>Comprehensive general privacy act</td>
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<tr>
<td>Comprehensive medical privacy act</td>
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<tr>
<td>Constitutional right to privacy</td>
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<tr>
<td>Restrictions on use of Social Security number</td>
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<td>Freedom of Info. Act</td>
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<table>
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<th>More Stringent than HIPAA for Population Health?</th>
<th>References to Related State/ Federal Law &amp; Legislative Proposals</th>
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<tr>
<td>Provisions adopting HIPAA requirements</td>
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<td>Provisions adopting other federally-based provisions</td>
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<td>HIPAA (42 CFR Part 2)</td>
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<td>Health information exchange specific provisions</td>
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<td>Electronic health/ medical record specific provisions</td>
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<td>HIPAA (45 CFR 164.302 et seq.)</td>
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<tr>
<td>Breach of electronic security reporting - general</td>
<td>Identity Theft Protection Act (MCL 445.72: Notice of Security Breach; Requirements)</td>
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<td>HIPAA (45 CFR 164.302 et seq.)</td>
<td>HITECH</td>
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<tr>
<td>Breach of electronic security reporting - health records</td>
<td>Identity Theft Protection Act (MCL 445.72: Notice of Security Breach; Requirements)</td>
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<tr>
<td>Citation/ Link</td>
<td>More Stringent than HIPAA for Patient Care?</td>
<td>More Stringent than HIPAA for Population Health?</td>
<td>References to Related State/ Federal Law &amp; Legislative Proposals</td>
<td>Statutory or Regulatory Change Needed?</td>
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<tr>
<td>Telehealth/ telemedicine provisions</td>
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<tr>
<td>Electronic signatures</td>
<td><strong>Uniform Electronic Transactions Act</strong> (MCL 450.831: Terms and conditions for using electronic signatures and information of business transactions) <strong>Public Health Code</strong> (MCL 333.17753: Centralized prescription processing, etc.)</td>
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<td>Personal health records</td>
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<td>Uniform Electronic Transactions Act</td>
<td><strong>Uniform Electronics Transactions Act</strong> (MCL 450.832 to 450.846: Electronic signatures and information of business transactions)</td>
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<td>HIPAA (45 CFR 164.312)</td>
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<tr>
<td><strong>Health/Medical Records in General</strong></td>
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<tr>
<td>Records retention requirements</td>
<td><strong>Public Health Code</strong> (MCL 333.16213: Retention of Records; MCL 333.20175: Patient records) <strong>Release of Information for Medical Research and Education</strong> (MCL 331.531: Disclosures to peer review entities) <strong>Michigan Court Rules</strong> (MCR 2.314: Release of medical information by subpoena)</td>
<td></td>
<td></td>
<td>HIPAA (42 CFR 482.24, 431.306)</td>
</tr>
<tr>
<td>Patient access</td>
<td><strong>Release of Information for Medical Research and Education</strong> (MCL 331.531: Disclosures to peer review entities) <strong>Revised Judicature Act of 1961</strong> (MCL 600.2157: Waiver of physician-patient privilege)</td>
<td></td>
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<td>HIPAA (42 CFR 431.306)</td>
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<tr>
<td>Ownership of medical records</td>
<td><strong>Public Health Code</strong> (MCL 333.16213: Retention of Records; MCL 333.20175: Patient records; MCL 333.20175a: Agreement with another health facility to protect, maintain and provide access to records, etc.)</td>
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<tr>
<td>Accounting for disclosures</td>
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<tr>
<td>Specific redisclosure prohibitions</td>
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<td>Redisclosure statement required</td>
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<tr>
<td>Disposition/ destruction of records</td>
<td>Public Health Code (MCL 333.20175: Patient records; MCL 333.20175a: Agreement with another health facility to protect, maintain and provide access to records, etc.)</td>
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<td>Status of Minors and Child Support (MCL 722.4: Emancipation of minor)</td>
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<td>Mental Health Code (MCL 330.1498i: Notice to parent of hospital admission of minor; MCL 330.1716: Surgery consent; MCL 330.1707: Rights of minor; MCL 330.1724: Fingerprints, photographs, etc.)</td>
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<td>Public Health Code (MCL 333.17015: Informed consent for abortion) Marriage License (MCL 551.103: Persons capable of contracting marriage; age requirement; etc.)</td>
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<td>Alcohol addiction</td>
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Drug addiction  | Rule 325.14304: Substance Abuse Treatment Program Patient's Right to Review Records  
| Rule 325.14910: Content and Maintenance of Patient Records for Substance Abuse Treatment Programs  
| 42 CFR Part 2


Minor wards of the state  | Probate Code of 1939 (MCL 710.44: Consent to adoption; separate instrument, etc.)

Adult wards of the state

Reporting of abortions  | Public Health Code (MCL 333.2835: Abortion Reporting; MCL 333.2837: Abortion-related deaths or complications; MCL 333.17015: Informed consent)

Victims (domestic violence, sex assault, etc.)

Futile Care Provisions

Other proxies

**Provider Specific Provisions**

Pharmacy records  | Public Health Code (MCL 333.17752: Prescription or equivalent record; preservation; disclosure; etc.)

Emergency services (ambulance/EMT)

Health profession licensing  | Public Health Code (MCL 333.16608: Health profession specialty field license, etc.; MCL 333.16196: License or registration of individual inducted or entering into service; continuation; notice; MCL 333.16221: Investigation of licensee, etc.)
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<td>Public Health Code (MCL 333.16148: Board; rules establishing standards for education and training; accreditation of training programs; etc.; MCL 333.20155: Facility accreditation and audits)</td>
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<td>Public Health Code (MCL 333.18117: Confidentiality of counselor communications)</td>
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<td>The Revised School Code (MCL 380.1531: Requirements for issuing licenses and certificates and endorsements as qualified counselors etc.)</td>
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<td>Public Health Code (MCL 330.1143a: Confidentiality of peer review information for psychiatric facilities; MCL 333.21515: Confidentiality of hospital peer review records)</td>
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<td>Public Health Code (MCL 333.21743: Confidentiality of clinical records by MDCIS, MDCH and nursing homes; MCL 333.21763: Confidentiality of communications by nursing home residents) Mental Health Code (MCL 330.1433: Assisted outpatient treatment, etc.; MCL 330.1469a: Treatment program as alternative to hospitalization; court order) Adult Foster Care Facility Licensing Act (MCL 400.712: Keeping and maintaining records and reports, etc.) Rule 325.20112: Nursing Homes' Policies for Access to Records Rule 400.14316 and Rule 400.15316: Maintenance of Resident Records by Adult Foster Care Group Homes Rule 325.1851: Records of Homes for the Aged Rule 325.1853: Content of Homes for the Aged Records Rule 325.20404: Life-Threatening Accidents or Injuries in Nursing Home</td>
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<td><strong>Drug &amp; alcohol treatment facilities</strong></td>
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<td><strong>Public Health Code</strong> (MCL 333.16238: Confidentiality of information, etc.; MCL 333.16243: Reports, etc.)</td>
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<td><strong>Corrections Code of 1953</strong> (MCL 791.234: Prisoners subject to jurisdiction of parole board, etc.: MCL 791.267: Testing of prisoners for HIV)</td>
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<td><strong>Mental Health Code</strong> (MCL 330.1723: Obligation of mental health professional to report abuse or neglect; MCL 330.1748a: Use of mental health records as evidence of abuse or neglect) <strong>Public Health Code</strong> (MCL 333.2640: Provision of medical records for child abuse or neglect; MCL 333.16281: Disclosure of Child Abuse Investigation Records) <strong>Foster Care and Adoption Services Act</strong> (MCL 722.954c: Release of child's medical records, etc.) <strong>Child Protection Law</strong> (MCL 722.623: Individual required to report child abuse or neglect, etc.)</td>
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### Table: Comparison of Stringency

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6.3 Alternative Technology Approaches Considered

The MiHIN is being designed with sub-state 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 Shared Services Bus**

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

**Shared Services Bus with Stakeholder Organizations plugged in directly**

1. This is a Shared Services Bus 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

**Shared Services Bus with multiple HIEs**

1. The HIE connects organizations and the Shared Services Bus 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. Keeps standards at the core and pushes non-standards to the edges
5. This is the **recommended** approach because it promotes both standards-based interoperability and timely implementation.
Appendix E: MiHIN Shared Services Operational Plan
State of Michigan
MiHIN Shared Services Operational Plan
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1 Stakeholder Approvals

The MiHIN Shared Services Operational Plan was endorsed by the MiHIN Governance Workgroup by unanimous vote on April 22, 2010. Membership of the MiHIN Governance Workgroup is listed in Appendix 1 of the MiHIN Shared Services Strategic Plan. The MiHIN Shared Services Operational Plan was endorsed by the Michigan Health Information Technology Commission by unanimous vote on April 22, 2010. Membership of the Michigan Health Information Technology Commission can be found in the Governance domain section in the MiHIN Shared Services Strategic Plan.

2 Executive Summary

The Michigan Health Information Network (MiHIN) vision of fostering the development of health information exchange (HIE) that will reduce the overall cost of care while at the same time increasing quality of care and patient safety, will be realized by implementing this Operational Plan based on the strategies developed by stakeholders across Michigan.

This Operational Plan is grounded in the experiences and progress of HIE in Michigan’s healthcare communities, and it will serve as the roadmap for the leadership of the MiHIN Shared Services by outlining the activities, timelines and financial aspects of implementing the MiHIN Strategic Plan for statewide health information exchange over the next four years.

Achieving the goals of this Plan will enable and support the ability of Michigan’s providers to accomplish and demonstrate meaningful use of health information technology by leveraging advancements in the cross-community exchange of patient information enabled by the MiHIN Shared Services.

The deployment the MiHIN Operational Plan will improve the ability of sub-state HIE efforts to access appropriate and timely health information both within and across state borders by serving as the vehicle for interoperability with other states and the national health information network.

The following sections provide a summary of the subsequent sections of this operational plan and are intended to document Michigan’s overall approach toward each of the domain areas. Most substantive discussions are provided in the sections dedicated to that domain area. The figure below shows a high level depiction of the projected timeline and key milestones for this project.
2.1 Governance

The State of Michigan facilitated a process that involved the Michigan’s HIT and HIE stakeholder community and determined the overall approach toward governing statewide Health Information Exchange services. This approach, documented in detail in the Strategic Plan, involved the creation of a collaborative governance structure between the legislatively mandated Health Information Technology Commission (HIT Commission) and a not-for-profit organization, the Michigan Health Information Technology Network (MiHIN) Shared Services. As delineated in the Strategic Plan, the HIT Commission will be leveraged to set broad based policy decisions and the MiHIN Shared Services Governance Board will execute on the technology components of the statewide HIE.

Establishing this Governance structure is the first and most critical task to complete. It is expected that these activities will initiate upon the submission of the Strategic and Operational Plan using members of the current MIHIN Governance Workgroup including the State of Michigan staff and will be completed July 2010.

2.2 Finance
The primary consumers of the statewide shared services are the Sub-state HIEs and the payers of healthcare. Defining the primary customers guided the formation of the operational decisions related to the creation of the budget and the overall sustainability plan.

To ensure broad participation in the statewide shared services, there are no hard dollar costs to the stakeholder community until 2012. However, in order to ensure that the stakeholders were invested in the project, in kind contributions in the form of labor would be expected from those customers who connect to the MiHIN Shared Services. Therefore during the startup phase of the MiHIN Shared Services (2010 and 2011) funding for the planning, capital, operational startup and pilot project implementation costs will be covered through the State HIE Cooperative Agreement and State of Michigan matching funds.

Beginning in 2012 a fee structure consisting of access and usage fees will be collected from the primary customer base of Sub-State HIEs and Healthcare Payers that are connected to the MiHIN Shared Services.

Michigan was allocated $14.9M through the State HIE Cooperative Agreement. The amount combined with the calculated State funded match of $1.6M results in a budget of $16.6M. One million dollars was allocated for planning and $1.9M is dedicated for the Michigan Department of Community Health (MDCH) grant requirements and to fund the work of the Michigan HIT Commission resulting in a total of $13.7M being available for the governance, technical and business operations of the MiHIN Shared Services.

2.3 Technical Infrastructure

The MiHIN Shared Service will be implemented in phases that will provide ability for the stakeholders to consume the technology components in manageable pieces.

The current project schedule sets a goal that the technology implementation will initiate in October 2010. This milestone requires the selection of vendors and the associated products prior to that date. Therefore the stakeholder community has identified the RFP process as a critical path item for the deployment of MiHIN.

The planned deployment of MiHIN Shared Services was structured to provide customer benefit through the implementation of specific use cases that map to the HIE Service areas identified in the State HIE Cooperative Agreement Funding Opportunity Announcement. This approach has an added benefit of allowing the stakeholder community to build out the foundational components in an incrementally over a period of 12 months and will ultimately lead to an extensible set of web services operating through a enterprise service bus that will facilitate comprehensive data exchange among Michigan's sub-state HIEs throughout Michigan, to other states and nationwide.

The approach that MiHIN Shared Services will use involves the deployment of core infrastructure technology beginning in 2010 that will enable the transfer of reportable lab
summarizes to MDCH’s Disease Surveillance System (MDSS) and the transfer of Immunization records to MDCH’s Immunization Record (MCIR) System. In order to accomplish these use cases a Master Patient Index, an initial set of Security Services and a Provider Index will be deployed.

Phase 2 will consist of continuing with the same approach of incrementally adding functionality by deploying more of the core infrastructure including: the completion of the Security Services, standing up an XDS Registry/Record Locator Service and the component required to implement the shared services bus. This will result in the sub-state HIEs being able to retrieve Immunization histories from MCIR and the transfer of Continuity of Care Documents (CCD) to physician offices and emergency departments.
2.4 Business and Technical Operations

The MiHIN Shared Services Governance Board is scheduled to begin operations in July 2010. The primary activity within the first quarter of operation will be to utilize the technical documentation produced during the planning activities to create a Request for Proposal which will result in the selection of a vendor for the technology that will be deployed.

Once the technology implementation kicks off the focus of the MiHIN Shared Services Governance Board will turn to finalizing the financial sustainability strategy and the creation of the business plan which is due to the ONC by February 2011.

2.5 Legal and Policy

The Governance section of this document provides an overview of the steps required to implement the legal entity and to obtain the State Designated Entity status. This section focuses on the implementation of the privacy and security aspects of Michigan’s Strategic Plan.

The stakeholder community has been working with the State of Michigan and other organizations to develop a comprehensive security and privacy policy for the MiHIN Shared Services. In order to implement these policies the MiHIN Shared Services Governance Board will appoint both a Privacy Officer and Security Officer that will ensure compliance with the application federal, state and international laws as well as providing state-wide leadership and guidance for the broad stakeholder community.

As a starting point for ensuring compliance a set of policies were developed, including: consent, access, authentication, authorization, and breach notification policies that will be provided to the MiHIN Shared Services Governance Board for implementation.

The approach toward implementing these policies will be the creation of a Participation or Subscription Agreement for the sub-state HIEs to sign in order to connect to the statewide shared services.
3 General Components

This section of the document provides an overview of the State of Michigan’s general approach toward implementing the Strategic Plan. It contains a high level schedule of the activities required to stand-up the MiHIN Shared Services, executing the procurement process to select the required vendor(s) and performing the technical activities associated with standing up the Core Services and implementing the technology required for the identified use cases.

3.1 Project Schedule

The project schedule that has been created is designed to demonstrate the activities and interdependencies that exist in order for the content of the Strategic Plan to be operationalized. The early phases of this project schedule are critical to ensure that the technology components can be properly implemented in a timely manner thereby allowing the MiHIN Shared Services components to be available for use by the sub-state HIEs and Payers.

This section of the MiHIN Shared Services Operational Plan describes the project schedule, its interdependencies, and risks and mitigation measures.

3.1.1 Overall timeline

The timeline associated with this project plan has been broken down into several major sections, some of which will run in parallel. The first major activity is to standup the Governance structure in July 2010. Once that critical path item is satisfied the process for selecting the vendor and associated technology can begin with a goal of vendor selection finishing September 2010.

The selection of the technology vendor will allow the Governance Board of MiHIN Shared Services to transfer the implementation responsibilities to the technical team to implement the core technology required to satisfy the targeted use cases beginning October 2010. This will allow the Governance Board to focus on the creation of Business Plan for Financial Sustainability which is due in February 2011. The Financial sustainability will need to be implemented in January 2012 when membership and other fees are expected to sustain the MiHIN Shared Services.

3.1.1.1 Governance Timeline

The State of Michigan and the Healthcare Stakeholders involved in the Governance Workgroup activities have made significant progress on determining the framework for the MiHIN Shared Services entity and its associated governance board. In the Strategic Plan the type of entity and overall board make-up is described in detail. As of the submission of this plan the State of Michigan and the members of the Governance workgroup will begin with the activities in implementing the strategy.
The goal is to have the Governance Entity operating and an Executive Director selected by July 2010. This means that the initial members of the Governance board will need to be selected in June 2010.

To complete the coordinated governance structure, as described in the Strategic Plan, the State of Michigan must seek a legislative change for the HIT Commission to add a member of the MiHIN Shared Services Governance Board. Further, Governor Jennifer M. Granholm must designate the MiHIN Shared Services Governance Board as the State Designated Entity. These changes are targeted to begin in May 2010.

3.1.1.2 Vendor Selection

Throughout the workgroup process a group of technical stakeholders have been involved with the vendor community to understand the vendor capabilities that exist in the marketplace today to realistically implement the capabilities of MiHIN within a defined budget. These activities did not include a formal RFP process yet resulted in the creation of a Systems Requirements Document and detailed specifications for the interfaces that would be required for the pilot implementations. These documents were created in such as fashion as to ensure that they could easily be inserted into a RFP template with the associated terms and conditions and evaluation criteria.

As a result it is the plan of the MiHIN Shared Services entity to use this work and quickly release a request for proposal to select a vendor technology. The planning activities that preceded this operational plan included the creation of a Technical Architecture Plan, System Requirements document and targeted technical specifications. Also during the preparation activities a Vendor Technical Collaboration Team was formed that informed a project team on the status of various vendor products. The combination of these activities will allow for the creation of a Request for Proposal on an aggressive schedule. It is expected that the RFP will be released as a next step once the MiHIN Shared Services Entity is formed in July 2010. The goal is to finalize the vendor selection and contract negotiation in September 2010.

3.1.1.3 Technology Deployment

The MiHIN Shared Services technology components will be implemented incrementally with each phase deploying a use case that relates to the Meaningful Use requirements and simultaneously building out the core infrastructure. This implementation method balances user adoption, business planning and infrastructure development in such a way to create sustainability, extensibility and scalability.

The MiHIN Shared Services implementation will occur in two phases of approximately six months each. The goal is for the first phase to begin in October 2010.

3.1.1.4 Business Planning and Sustainability Timeline
The new MiHIN Shared Services 501(c)(3) organization, once it has been created in July 2010, will undertake the development of a business plan that supports their adopted financial sustainability strategy and approach. In this effort the estimated operational and capital budgets developed during the Strategic and Operational Planning phase will be replaced with actual budgets that result from completing a formal RFP process and from the implementation and ongoing support of the planned HIE pilot projects.

The initial and ongoing results of business and financial modeling will enable MiHIN Shared Services to finalize its revenue targets and establish the appropriate fee structures that will be incorporated into the stakeholder trust agreements thereby establishing the formal basis for financial support. Additionally, this modeling activity will allow MiHIN Shared Services to finalize its Business Plan and submit this plan to the ONC by the February 10, 2011 deadline.

### 3.2 Interdependencies

A project of this magnitude has many interdependencies that are on the critical path to success. This section of the plan describes the macro-level dependencies while the detailed project plan that will be created during the project will provide a complete picture of all the dependencies.

#### 3.2.1 Governance Entity Functioning and Funding

Michigan’s structure for the deployment of the MiHIN Shared Services requires the creation of a not-for-profit corporation that will operate as the statewide organization responsible for the implementation of the technology that will facilitate Michigan’s providers with ability to exchange data on a statewide basis. When the MiHIN Shared Services Governance Board is created and functioning the substantial decisions and critical activities can begin in earnest.

Therefore it is imperative that MiHIN Shared Services be operating in July 2010 and the associated federal funding be available.

#### 3.2.2 Vendor Selected and Contracts signed

The second major dependency is the selection of the vendor(s) that will provide the technology for the operation of the MiHIN Shared Services. The selection of this vendor requires that MiHIN Shared Services entity purchase the technology that satisfies its requirements at a competitive price. MiHIN Shared Services will use a RFP process to ensure that selects the correct vendor technology. This project has been structured to minimize the match funding that the State of Michigan will need to provide through the State HIE Cooperative Agreement, as a result it is a goal for the contract to be signed with the vendor in October 2010.

#### 3.2.3 Sub-State HIE Capabilities
The technical architecture of the MiHIN Shared Services leverages the work of Michigan’s existing and operational sub-state HIEs. Though the sub-state HIEs have made tremendous progress within their respective areas of services, the sub-state HIEs within Michigan require funding to become fully capable of participating in the MiHIN Shared Services. Therefore, the MiHIN Shared Services Budget provides funding for multiple sub-state HIEs to make the necessary additions and changes to their technology and organization. It is critical that the MiHIN Shared Services Governance Board holds the sub-state HIEs accountable toward making the changes required within their organizations to enable participation with the MiHIN Shared Services.

3.2.4 Technology Dependencies

The technology that is required to be implemented to support the use cases will be deployed in such a way that will maximize use case functionality without causing rework in later phases. The Master Patient Index (MPI) is scheduled to be deployed first along with portions of the security services. This approach will provide a high value component deployed in a secure manner that will provide the basis for the build out of use case functionality. The provider directory is dependent on the deployment of the MPI.

3.3 Project Risks

Given that statewide HIE Shared Services is a relatively nascent area of healthcare, a certain level of risk can be expected as the project is implemented. The following risks have been identified according the State HIE Cooperative Agreement five domains. Each risk is accompanied by an assessment of the impact of the risk along with a strategy and approach to mitigate that particular risk. As the project is implemented, the proactive nature of the mitigation strategies are expected to eliminate or substantially reduce the risks, however they will also be refined and changed if necessary in response to the evolving nature of these risks and other risks that are identified.

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<th>Likelihood of Occurrence</th>
<th>Risk Impact Assessment</th>
<th>Mitigation</th>
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<tr>
<td>Governance: Stakeholder support</td>
<td>Moderate</td>
<td>As the MiHIN Shared Services begins implementation the support for statewide shared services by sub-state HIEs will be critical to successfully implementing the Operational Plan. The challenges and priorities for implementing their own respective HIEs could result in reduced focus and</td>
<td>Maintain the momentum created from the Governance Workgroup process and immediately shift into establishing the MiHIN Shared Services Governance Board. Ensure strong participation in Governance by sub-state HIEs and ensure they are active participants in implementation decisions and the attainment of milestones.</td>
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<tr>
<td>Risk Event</td>
<td>Likelihood of Occurrence</td>
<td>Risk Impact Assessment</td>
<td>Mitigation</td>
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<tr>
<td>Governance: Timing to get MiHIN Shared Services Established</td>
<td>Moderate</td>
<td>The plan calls for the creation of a State Designated Entity to procure and operate the technology associated with MiHIN Shared Services. Without this entity there is no procuring agent.</td>
<td>Begin the creation process using experienced personnel and stakeholders immediately after the submission of the Strategic and Operational Plan. Enlist stakeholder support throughout the process to ensure timely acceptance of bylaws.</td>
</tr>
<tr>
<td>Governance: Ability to get contract executed with Vendor by 1 October 2010</td>
<td>Moderate</td>
<td>The timeline for implementing MiHIN Shared Services requires that a contract be executed and project planning begins on the date specified. Delaying the start date has multiple impacts on the project including the amount of match funding necessary.</td>
<td>The creation of the System Requirements Document and Pilot Specifications documents in the planning phase will greatly shorten the time required to create an RFP.</td>
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<td>Technical: Architecture Model</td>
<td>Low</td>
<td>The choice of an architectural model has risks as well as benefits. There are some risks in designing the MiHIN Shared Services Bus as a gateway between Sub-state HIEs and modeling the SSB as a NHIN compatible architecture. The primary risks are the immaturity of the shared services bus technology and the potential costs and time to build it.</td>
<td>Build the MiHIN Shared Services incrementally ensuring that each part works and is valuable before adding new capabilities. Vendor selection will be very important to controlling costs and timeline for implementation. These risks can partially be offset by contract terms.</td>
</tr>
<tr>
<td>Technical: Leveraging Existing Technology</td>
<td>Low to Moderate</td>
<td>Leveraging existing technology is both an opportunity and a risk. The goal in leveraging existing technology is to save money. But the key risk in trying to leverage technology is the complexity of integration.</td>
<td>Initially, attempt only to leverage value-added networks that are already in place as opposed to trying to leverage core components of the technology. Attempt to leverage core components in the future to function as redundant services once the core components are working.</td>
</tr>
<tr>
<td>Business Operations: Failure to accomplish implementations</td>
<td>Low</td>
<td>Implementations can fail for (1) technical, (2) organizational and (3) process reasons.</td>
<td>To minimize the risk of failure for these reasons, and the MiHIN Shared Services Governance Board will continue to, (1) thoroughly review the technologies to be</td>
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<tr>
<td>Risk Event</td>
<td>Likelihood of Occurrence</td>
<td>Risk Impact Assessment</td>
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<tr>
<td>Privacy and Security: Consumer Perception</td>
<td>Moderate</td>
<td>The Privacy and Security Work Group identified a risk related to managing the consent process. While the work group recognized that the portability of individually identifiable health information is critical to the success of HIE, the risk of consumer perception and fear was also readily acknowledged.</td>
<td>Refined and easily understandable educational and outreach materials for both providers and consumers; privacy and security officers for the MiHIN Shared Services Governance Board; issuance of consistent and guidance materials for Sub-state HIEs; willingness and flexibility to adjust consent options as technology evolves.</td>
</tr>
<tr>
<td>Privacy and Security: Confusion Among Sub-state HIEs Regarding Compliance with State and Federal Law</td>
<td>Low</td>
<td>The Privacy and Security Work Group also identified a risk related to the management of compliance with multiple federal and state laws and regulations. Newly forming and newly evolving sub-state HIEs will not only have to ensure that their participant activities are legal and in compliance with any existing laws, the sub-state HIEs will also have to ensure that they are in compliance with the policies and procedures of the MiHIN Core Services Network. In order to build the fabric of trust between diverse participants, regardless of what sub-state HIE they participate in, overall direction and guidance will need to come from the MiHIN Privacy and Security Officers.</td>
<td>Involving sub-state HIEs in the future development of HIE policies to ensure that concerns are addressed, appointing a Privacy Officer and a Security Officer to lead efforts, reviewing and updating the Comparative Analysis Matrix, engaging a health law attorney to issue opinions that can be trusted by all sub-state HIEs, requiring all sub-state HIEs will have a contractual agreement with the MiHIN Core Services Network.</td>
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<tr>
<td>Finance:</td>
<td>Low</td>
<td>The possibility that the</td>
<td>MiHIN will develop a Request for Proposal</td>
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### MiHIN Project Risks, Impacts, and Mitigation Strategies

**3.4 Coordinate with ARRA Programs**

Michigan has experienced a high level of planning efforts between the HIT ARRA programs in Michigan and the HIT Coordination Work Group has established milestones and timelines to carry-out the coordination activities. The State HIT Coordinator will continue to convene monthly HIT Coordination work group meetings with the staff of the Michigan Center for
Effective IT Adoption (M-CEITA), the State’s Regional HIT Extension and the Medicaid EHR Incentive Program Staff.

The goal of the HIT Coordination work group is to develop a united message to accelerate health IT adoption, awareness and acceptance amongst health care professionals and the citizens of Michigan. To accomplish this goal several milestones have been set. The development of a one stop website containing all of the necessary information on the HIT activities and projects in the State of Michigan is one of the milestones established. Planning for the one stop website began in January 2010 and the estimated time to move the website into production is June 2010.

A shared health IT adoption database is another milestone of the HIT Coordination work group. MiHIN, M-CEITA and the Medicaid EHR Incentive Program all have or plan to conduct surveys to gain a baseline on the status of HIT/HIE in Michigan. The efforts of survey development have been coordinated to ensure the healthcare professionals are not inundated with duplicative surveys. Future plans are to collect the results of the surveys into a database that is shared with the ARRA programs. The database will be a tool allowing for uniform reporting on Michigan’s health IT environment to the ONC and CMS. Planning for the shared database began in March 2010 and completion is expected by October 2010.

Michigan also plans on leveraging the Medicaid EHR Incentive Program and M-CEITA outreach plans to promote HIT and HIE. Current plans have the projects not only collaborating on outreach but also on educational activities, and as part of these activities, regional information and listening sessions will be held throughout the state to solicit information and input from healthcare professionals. The regional listening sessions will begin in the spring 2010 and continue through the summer of 2010. Providers that use M-CEITA services and/or enroll in the EHR Medicaid Incentive Program will be given assistance in joining an HIE connected to MiHIN Shared Services and will be provided with information to providers on how to realize the benefits of HIE in their practices, sustaining the transformative power of HIT.

Additional coordination between the MiHIN and the Medicaid EHR Incentive Program to leverage existing technologies and share directories and services will also take place and planning efforts are well underway. MDCH plans to leverage the Medicaid data warehouse integration capabilities to extract pertinent administrative and clinical information making it available in a CCD format to Medicaid providers through the MiHIN. The data warehouse’s repository capacity and analytical capabilities will also be used to support quality reporting requirements. The data warehouse and Michigan’s Medicaid Management Information System will utilize the MiHIN’s shared services.

A major milestone of this project is to establish a team of subject matter experts to carry-out the planning and implementation of this integration project. In March of 2010, a project manager was hired to lead the team in the development of a project plan and schedule. The project plan will be complete in June 2010. The integration plan and project schedule will be synchronized with both the MiHIN and the Medicaid HIT Plans.
3.5 Coordinate with Other States

To ensure intrastate coordination and interoperability with other states the MiHIN Shared Services Governance Board will utilize guidance already created by existing HIEs within Michigan, HIEs in other states, nationally recognized organizations, and the ONC. Some of the opportunities to coordinate with other states will initially begin with the following initiatives:

- PHIN Public Health Information Network
- Great Lakes Border Health Initiative- multi-state efforts that ensure that geopolitical and jurisdictional boundaries do not impede infectious disease control and surveillance efforts.
- NGA National Governor’s Association State Alliance for e-Health State-level HIE
- ONC- Office of the National Coordinator, including HISPC work

The MiHIN Shared Services coordinated governance structure will also have to monitor and participate in national conversations regarding Privacy and Security, including developments on NHIN and with the DURSA (Data Use and Reciprocal Support Agreement), as well as developments with projects like NHIN Direct. Through implementation of Privacy and Security policies and procedures and the Privacy and Security Committees, MiHIN Shared Services will work to harmonize intrastate efforts with an eye towards interstate exchange.
4 Domain Specific Components

The following sections define Michigan’s approach toward operationalizing the domain components detailed in the strategic plan. It is organized by domain and addresses the requirements of the ONC Toolkit.

4.1 Governance

The development of the MiHIN governance functions is a key to developing the statewide shared services infrastructure and supporting widespread interoperability. The MiHIN will be governed by a coordinated governance structure that builds on unique strengths that exist in Michigan.

In July 2010 a new 501(c)(3) not for-profit entity will be established and designated by Governor Jennifer M. Granholm as the State Designated Entity (SDE). The governance board of MiHIN Shared Services will assume the following responsibilities: the business and technical operations of MiHIN Shared Services technology; implementing this Operational Plan; authority over the MiHIN Shared Services; and implementing the financing structures.

Effective immediately, the existing HIT Commission, a representative body of Michigan’s HIT and HIE stakeholders, will assume the following responsibilities: monitoring the progress of HIT and HIE statewide; facilitating public discussion of HIT and HIE principles; recommending public policies for HIT and HIE adoption and use; and providing a voice of the public to the MiHIN Board and establish the statewide vision for HIE.

Together, these two entities will share responsibility for specific roles in providing leadership and facilitating consensus to continuously expand Michigan’s HIT and HIE capacity.

4.1.1 Milestones, Interdependencies and Timelines

Work is currently underway to formally and legally establish the MiHIN Governance Board in July 2010. Key decisions that are required for the development of articles of incorporation and bylaws, as noted in the Strategic Plan, have been made by the Governance Workgroup. The appropriate actions are currently being taken to complete and file all legal documents required to establish the new entity.

In the timeline depicted below the critical steps that must be performed prior to July 2010 include: finalizing bylaws, designation as the State Designated Entity by the Governor, the establishment of MiHIN Shared Service as legal entity, the election of a board of directors and the hiring of an Executive Director and Administrative Assistant.

The July 2010 date is a critical path item to the MiHIN and has been identified as a risk in the risk section of this document.
The board will be seated in various methods: State government will appoint its members; the HIT Commission will vote on their representative. Healthcare payer and sub-state HIE organizations will be invited by MDCH to identify themselves. A letter from the Director of MDCH will be sent to potential sub-state HIE and payer organizations within Michigan. The intent of these letters is to identify interested parties that are commitment to serving as a member of the MiHIN Shared Services Governance Board. The MiHIN Shared Services Governance Board seating process will be defined with the input of multiple stakeholders throughout May 2010 with the initial board seated in June 2010.

Successful implementation of Michigan’s Strategic and Operational Plans will require close collaboration between the coordinated governance structure and the MiHIN Shared Services staff. The management structure and staff to operate the MiHIN Shared Services on a day to day basis will be phased in over the four year project term. Positions, including the Executive Director, will be added during 2010 and 2011. Additional staff will be added with the organization fully staffed by 2014. The MiHIN Shared Services Governance Board will evaluate the staffing plans on a quarterly basis to determine the most efficient and effective strategy for staffing.

4.1.2 Achieving Status as a National Health Information Organization

The technical infrastructure, interoperability standards and privacy and security policies in Michigan’s Strategic and Operational Plans were designed to accommodate national standards and enable connection to the National Health Information Network (NHIN). The MiHIN Shared Services will be well positioned for connectivity to federal systems due to the design of the architecture.

It is the role of the Michigan HIT Commission to assure continued alignment of the statewide and national vision for health information exchange. It will be the role of the MiHIN Shared Services Governance Board to assure the statewide infrastructure is implemented in accordance with the Strategic and Operational Plans. The Michigan HIT Coordinator will serve as the liaison with NHIN to ensure regular communication regarding the MiHIN Shared Services’ evolution toward achieving operational status as an NHIO. The Michigan HIT Coordinator will be charged with keeping the coordinated governance structure fully informed of NHIN developments.

4.2 Finance

The MiHIN Shared Services Strategic Plan establishes the guiding principles, the overriding strategy, and the underlying approach to the financial sustainability of the Michigan statewide shared services network. This foundation not only guided the decisions and efforts that were required to develop the Strategic and Operational Plans. This section provides details related to the financial processes and efforts required to implement the Strategic Plan, and it provides the
specifics of the MiHIN Shared Services startup and operational budget as well as the MDCH Planning and HIT Commission operational budget components.

4.2.1 MiHIN Shared Services Operating Budget

The budget and staffing plan required for the implementation of the Strategic Plan and to operate the MiHIN Shared Services network was developed based upon the selected governance and legal structure, the identified ongoing activities, the architectural infrastructure design, and the stakeholder prioritized services. These factors were used as the foundation for gathering of cost information from several sources including other state and community based Health Information Exchanges and from a select group of the leading HIE vendors. The following are the processes utilized to develop the budget and staffing plan.

- An informal RFI process was undertaken to obtain information regarding software, hardware, implementation and hosting services costs; this included direct discussions with interested vendors
- Detailed discussions were held with several leaders and staff members from the State of Michigan, the Michigan Department of Information Technology and the Michigan Department of Community Health to understand their requirements
- The operational budgets and staffing structures of several other state and community Health Information Exchanges were reviewed to provide insight into the MiHIN budget and staffing, and to validate budget and staffing assumptions
- The ongoing governance, legal/policy, technical, business, and financial activities were identified to assist in defining budgetary requirements

The funding and staffing detailed in the following MiHIN Shared Services budget will allow Michigan to:

- Establish the MiHIN shared services infrastructure to support the deployment of a Master Patient Index, a Master Provider Index, an XDS Repository (Record Locator Service), and security services that make up the enterprise Shared Services Bus.
- Deploy the shared services technology at the MiHIN and sub-state HIE level to undertake use cases that correlate to the first Meaningful Use requirements
- Establish, govern and operate the MiHIN organization, and manage the startup and implementation processes
## MiHIN Operational Plan Budget

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<tr>
<td>MIHIN Operational Plan Page 21</td>
<td>20,948,931</td>
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### Cost Summary

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<tr>
<td>MIHIN Operational Plan Page 21</td>
<td>20,948,931</td>
</tr>
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**4.2.2 MiHIN Shared Services Staffing Plan**

The section below details the overall staffing plan associated with implementation the MiHIN Shared Services Entity. Key functional roles and their associated descriptions are described in this section. The Business and Technical Operations section of this document provides more detail on how contractor and vendor staff will be used to augment these resources during the implementation of the MiHIN Shared Services technology.

The Staffing Plan consists of the following positions phased in over a five year period. In 2010 and 2011, during the deployment, implementation, and startup stage, the Executive Director, Administrative Assistant, Project Manager, Business Analyst, and the two Customer Support
Specialists positions will be filled. These positions will provide the direction, leadership, and coordination for the MiHIN Shared Services governance and business operations startup activities, customer support activities, as well as, the technical activities related to the design, acquisition, and deployment of the statewide shared services network infrastructure.

Additionally, these positions will provide the project management and technical leadership for the implementation of the planned HIE pilot projects. During this phase the MiHIN Shared Services staff will be assisted by a contracted Implementation Team that will provide lead positions in the areas of business and system architecture including privacy and security. The following provides a general description of the responsibilities of these first MiHIN Shared Services positions.

- **Executive Director:** Provides strategic and operational direction and oversight for the organization; ensures that the MiHIN outreach program is coordinated with sub-state HIEs and Michigan’s REC; is the executive representative for MiHIN Shared Services and is the primary point of contact for the stakeholders and others seeking to conduct business with MiHIN Shared Services.

- **Administrative Assistant:** Provides clerical and administrative support; assists the Executive Director in collecting, tracking, and reporting of the financial activities, and assists with the maintenance of the MiHIN Shared Services website content.

- **Project Manager:** Coordinates all service development and service implementation projects with vendor, contracted, sub-state HIE, and the State of Michigan project managers and staff; ensures that industry recognized standards and methods are utilized to manage all projects.

- **Business Analyst:** Coordinates activities related to the identification, evaluation, and selection of services and capabilities that will be offered by MiHIN Shared Services; monitors and reports stakeholder utilization of existing services and capabilities; assists in the maintenance of the MiHIN Shared Services website content.

- **Customer Services Specialist:** Coordinates activities related to the operational support of the MiHIN Shared Services stakeholders including access to services and capabilities, and coordinating the resolution of MPI identity match issues with the sub-state HIEs.

In 2012, with the beginning of the first year of full production operations the Technical Analyst and the Lead Technical Architect positions will be filled. These positions will provide additional capacity to support new stakeholders and new services, and will assume more responsibility for the control and direction of the MiHIN Shared Services technical infrastructure. During this period the MiHIN Shared Services staff will continued to be supported by the contracted Implementation Team, however, this support will not require as much time during this stage of operations as was required during the startup and implementation stage. This contracted support will be phased out at the end of State HIE Cooperative Agreement funding.
following provides a general description of the responsibilities of these additional MiHIN Shared Services positions.

- **Technical Analyst**: Coordinates activities related to the operational status of technical and functional services and capabilities, stakeholder access to these services and capabilities, and assists in the resolution of data, software, and hardware issues including providing the second level of support for the resolution of MPI identity match issues.

- **Lead Technical Architect**: Coordinates activities related to the acquisition, installation, maintenance, and operation of the various infrastructure components; serves as the primary contact for all vendor and service provider contracts, and serves as the primary system architect for the MiHIN Shared Services organization.

In 2014, the organization will have implemented its Business Plan and will be fully sustainable without dependence upon grants or State subsidy for its operations. Beginning this year the MiHIN Shared Services operations will be supported entirely by entity employed staff. At this point the remaining open positions will be filled; this includes the Lead Security Architect, and the Lead Privacy Analyst. These positions will replace the contracted Implementation Team staffing that will be phased out at the beginning of this year. The following provides a general description of the responsibilities of these additional MiHIN Shared Services positions.

- **Lead Security Architect**: Coordinates activities related to the establishment of security and access standards, policies, methods, and procedures; monitors, reports, tracks, and resolves security and access violations; this position is a contracted position during the grant period, and it will then become a permanent staff position.

- **Lead Privacy Analyst**: Coordinates activities related to the establishment of privacy and confidentiality standards, policies, methods, and procedures; monitors, reports, tracks, and resolves privacy and confidentiality breaches; this position is a contracted position during the grant period, and it will then become a permanent staff position.

### 4.2.3 MDCH Planning & HIT Commission Budget

The following details the operational components of the Michigan HIT Commission budget that directly support the governance and operations of MiHIN Shared Services, as well as, those components required to support activities related to the monitoring the progress of HIT and HIE adoption statewide, facilitating public discussion of HIT and HIE principles, and recommending public policies for HIT and HIE adoption and use.
### MDCH Planning & HIT Commission Operating Budget

This is a calendar year based budget representing the 4 fiscal years of the ONC Grant.

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<th>Item Description</th>
<th>Factors</th>
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<th>2011</th>
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<td>10,184</td>
<td>63,104</td>
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</tr>
<tr>
<td>Total Implementation &amp; Operating Costs</td>
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<td>471,035</td>
<td>470,832</td>
<td>445,990</td>
<td>364,164</td>
<td>3,337,140</td>
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</table>
4.2.4 HIT Commission Staffing Plan

This Staffing Plan includes the current positions of HIT Coordinator and the Department Manager which have led the development of the MiHIN Shared Services Strategic and Operational Plans, and the position of Outreach Coordinator that will be recruited by October 2010. These positions will provide the direction, leadership, and coordination of HIT Commission activities with the MiHIN Shared Services staff and governance body in the areas of business operations, operational startup, statewide shared services priorities, network infrastructure design, and stakeholder outreach and education activities.

- **HIT Coordinator:** Provides senior management leadership and government oversight of the State of Michigan’s involvement in the creation and operation of the statewide shared services network and the exchange of health information. Provides daily coordination with the MiHIN Shared Services Executive Director in the areas of stakeholder education, collaboration, and consensus building regarding the statewide and national vision for health information exchange and HIT adoption, and public policy development.

- **Department Manager:** Provides departmental leadership in the administration of the HIT Commission’s operations including areas related to outreach and educational program development, definition and development of state and national progress reporting, and coordination with the MiHIN Shared Services leadership in the development and delivery of stakeholder and public informational and educational programming.

- **Outreach Coordinator:** Provides coordination of marketing and outreach activities with MiHIN Shared Services leadership, sub-state HIEs, and the healthcare community in Michigan; promotes the adoption and use of HIT, the exchange of health information through the sub-State HIEs and MiHIN Shared Services; coordinates the development and distribution of marketing, educational, and promotional materials; coordinates the maintenance of the MiHIN Shared Services website content.
4.2.5 Achieving Operational Status

The funding and the staffing represented in the above budgets provides the resources to operationalize the MiHIN Strategy and Approach for Financial Sustainability which calls for the implementation of a series of funding mechanisms that establishes an equitable and proportional allocation of costs across all MiHIN Share Services customers. It directs the organization to utilize only those funding mechanisms that through an ongoing process of analysis and review achieve the following:

1. Recognize that all who benefit from the values realized from the exchange of health information will equitably and proportionally participate in the financing and support of the statewide shared services network, and

2. Optimize the use of the statewide shared services network by establishing a fee structure that encourages the adoption and use of HIT and the exchange of health information within and across sub-state HIEs, thus further assisting eligible providers in achieving "meaningful use", and

3. Enable the extension and expansion of the capabilities, services, and benefits of the exchange of health information within the State of Michigan by ensuring that sustainable revenues are available to meet both current and future federal, state, and stakeholder service demands beyond the four years of the HITECH grant funding (2010 – 2014).

MiHIN Shared Services will institute an evaluation and review process that will continually measure the appropriateness and effectiveness of the various funding mechanisms to ensure the operational sustainability of the statewide shared services network beyond the HITECH grant funding period. The selected mechanisms will enable the equitable and proportional allocation of costs to the various stakeholders, and will ensure that the pricing structures reflect the relative value of each service and generate the required revenues. To ensure the most cost effective acquisition of services and assets the State of Michigan will continue to utilize its purchasing power to enable MiHIN Shared Services, as the State Designated Entity, to leverage its purchases. The following describes the funding approach that will be used in each stage of evolution of MiHIN Shared Services’ production operations.

**Startup & Pilot Stage** - During the startup and pilot phases of operations (2010 and 2011) MiHIN Shared Services financing will utilize funds provided through the HITECH State HIE Cooperative Agreement grant and the State of Michigan matching funds to cover planning, capital startup costs, asset acquisition, operational startup costs, and pilot project implementation costs.

**Production Stage** - Beginning in 2012 with the first full year of production operations MiHIN Shared Services will initiate the collection of access and usage fees from its primary customer
base which includes the sub-state Health Information Exchanges and Public and Private Healthcare Payers that are then connected to MiHIN Shared Services statewide network. These fees will begin establishing the financial sustainability of the network. It is likely that the allocation of the fees to each of the primary customers will be based upon one or more factors that reflect some relevant aspect of its service base such as total population, number of hospitals, number of hospital beds, number of admissions, number of ER visits, number of ambulatory encounters, number of physicians, market share, number of covered lives, or other such statistical indicator of potential impact and benefit. This equation will be finalized by the MiHIN Shared Services Governance Board.

Each sub-state Health Information Exchange will determine the methodology it will use to allocate their MiHIN fees across their customer base. This process will significantly simplify the MiHIN revenue administration activities, and will take advantage of the revenue processes already in place in each sub-state Health Information Exchange.

Additionally, during this initial production period MiHIN Shared Services may institute the use of additional access and usage fees such as Membership, Subscription, Sponsorship, Transaction, and Fee-for-Service fees to accommodate the addition of new customers and new statewide shared services. This evolving fee structure and the growing customer base will provide the sustaining revenue required to operate the MiHIN statewide shared services network beyond the grant period.

**Sustainable Production Stage** - Finally, beginning in 2014 at the end of the HITECH State HIE Cooperative Agreement grant period, MiHIN Shared Services will have established the services and the customer base to provide the sustaining revenues it requires for operations without dependence upon additional grant funding or State of Michigan subsidies. While grant funding will not longer be required for operational support, it is anticipated that additional grant funding will be sough to support the acquisition, deployment, and piloting of new statewide shared services.

**4.2.6 Business Model and Financing**

The new MiHIN Shared Services 501 (c)(3) entity, once it has been created, will undertake the development of a business plan that supports their adopted financial sustainability strategy and approach. In this effort the estimated operational and capital budgets developed during the Strategic and Operational Planning phase will be replaced with actual budgets that result from completing a formal Request for Proposal process and from the implementation and ongoing support of the planned HIE pilot projects.

This financial and business modeling effort will establish the ongoing process that will allow all factors including those listed below to be fully analyzed and periodically reviewed to ensure that the selected funding mechanisms remain aligned with MiHIN Shared Services financing strategy and guiding principles, and that they continue to produce the required sustaining revenue.
The following are examples of business and financial evaluation factors that will be considered:

1. The impact, appropriateness, acceptability, and timing of each of these funding mechanisms as it relates to each stakeholder group
2. The size and number of participants in each stakeholder group
3. The timing of the delivery of each of the identified service priorities
4. The extent to which the value of a given service can be determined and associated with one or more stakeholder groups
5. The extent to which a given service has a directly associated ROI that can be associated with one or more stakeholder groups

The initial and ongoing results of this business and financial modeling will enable MiHIN Shared Services to finalize its revenue targets and establish the appropriate fee structures that will be incorporated into the stakeholder trust agreements thereby establishing the formal basis for financial support. Additionally, this modeling activity will allow MiHIN Shared Services to finalize its Business Plan and submit this plan to the ONC by the February 10, 2011 deadline.

Accounting, financial and reporting structures will be established by MiHIN Shared Services to reflect the financial plan and budget presented for the State Health Information Exchange Cooperative Agreement program. The software and accounting pack is yet to be selected. That will be a primary initial function of the MiHIN Shared Services governance board once the entity has officially been created and is functional. The requirements for the accounting and time keeping applications will include Generally Accepted Accounting principles. There will also be challenges surrounding the grants management process. This will require a centralized process for grants management to assure that no money is left on the table and that an accurate understanding of administrative costs will be crucial to management of them. In addition, MiHIN will comply with OMB regulations Circular A-122 and Circular A-133 detailing the requirement to supply certified audits and reports of the MiHIN accounting activities by engaging a CPA.
4.3 Technical Infrastructure

Michigan’s technical infrastructure will accommodate the implementation of a statewide shared service bus while providing a framework that sets boundaries on the dimensions of technical implementation to ensure interoperability and consistent operation.

This section defines the approach, action steps and decision points associated with the technical aspects of the deployment of the MiHIN Shared Services Bus including NHIN interoperability. It also describes plans to respond to the evolving meaningful use criteria and relevant certification processes.

4.3.1 Implementation Approach and Action Steps

The MiHIN Shared Service will be implemented in phases that will provide ability for the stakeholders to consume the technology components in manageable pieces.

The current project schedule sets a goal that technology implementation will initiate in October 2010. This milestone requires the selection of vendors and the associated products prior to that date. Therefore the stakeholder community has identified the RFP process as a critical path item for the deployment of MiHIN.

The planned deployment of MiHIN was structured to provide immediate consumer benefit through the implementation of specific Use Cases that map to the ONC HIE Service areas. This approach has an added benefit of allowing the stakeholder community to build out the foundational components in an incremental fashion that over a period of 12 months will ultimately lead to an extensible set of web services operating through an Enterprise Services Bus (ESB) that will facilitate comprehensive data exchange throughout the State of Michigan and with additional funding the NHIN.

An aggressive schedule of six weeks is planned for the vendor selection process. This schedule can only be achieved because of the significant work performed by the State of Michigan and contracted consultants and subject-matter experts from September 2009 through April 2010. During that time period a technical architecture document was created, vendors were solicited through an RFI process, a technical workgroup consisting of stakeholders through the state was convened, vendors were further screened through the Vendor Collaboration Team, a System Requirements Document was completed and targeted detailed technical specifications were complete. This work, specifically the System Requirements Document and Technical Specifications are structured to be integrated into a RFP template.

A two week period for contract negotiations has been allocated with a contract planned to be executed in September 2010. This schedule provides some contingency during September and allows for a project planning period prior to the project start in October 2010.
4.3.2 Decision Points

Throughout the project key decisions will be made regarding the deployment of technology. Those decisions will be documented during the project planning activities. This section of the document details larger scope decisions that will need to be made during the implementation of MiHIN.

4.3.2.1 Vendor Selection

One of the key decisions that will be made by the MiHIN Shared Services Governance Board in the early phases of the project will be the selection of the vendor. This decision will be made using a process that will combine immediate business need, strategic direction, capabilities and cost.

4.3.2.2 Leveraging Components

Leveraging components that stakeholders already have that are required by the MiHIN shared services bus is a key decision for the implementation team. For example messaging gateways (or interface engines), eMPIs, security tools and data warehouses are all examples of some of the technologies uncovered during an analysis of the HIT and HIE capacity in Michigan. Determining if any of them should be leveraged or extended to the Shared Services Bus will be a part of the first phase of the technology deployment.

The core components of the MiHIN are crucial to its function, performance, security and success so reusing existing components must be considered carefully. As the MiHIN matures there will be the need to have more than one shared services bus for purposes of reliability and performance.

4.3.3 Alignment with NHIN Core Services and Standards

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. Similarly, 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, as is cited later in this document.

The MiHIN Shared Services Bus will support the NHIN core functions of Security Services, Patient Discovery, Query for Documents and Retrieve Documents. NHIN Standards are mostly in Limited Production but there is at least one case of Production with the MedVirginia
connection to the Social Security Administration using Connect Open Source. To meet these functional requirements MiHIN Shared Services will follow the NHIN 2010 Final Production Specifications as follows:

- ACCESS CONSENT POLICIES PRODUCTION SPECIFICATION - V1.0
- AUTHORIZATION FRAMEWORK PRODUCTION SPECIFICATION V2.0
- QUERY FOR DOCUMENTS PRODUCTION SPECIFICATION V2.0
- RETRIEVE DOCUMENTS PRODUCTION SPECIFICATION V2.0
- HEALTH INFORMATION EVENT MESSAGING PRODUCTION SPECIFICATION V2.0
- MESSAGING PLATFORM PRODUCTION SPECIFICATION V2.0
- PATIENT DISCOVERY PRODUCTION SPECIFICATION V1.0
- WEB SERVICES REGISTRY PRODUCTION SPECIFICATION V2.0

The MiHIN Shared Services NHIN gateway implementation is scheduled to be implemented in Phase three. In order to prepare for this implementation all connectivity to the MiHIN Shared Services Bus will be standards-based.

4.3.4 Compliance to Certification Requirements

The MiHIN Shared Services Governance board recognizes that the ONC is ultimately the certifying authority for statewide HIE initiatives. MiHIN Shared Services will follow and implement any guidance published by the ONC and expects to be able to quickly attain certification when required.

4.3.5 Process for Responding to Evolving Meaningful Use Criteria

As the criteria and requirements for Meaningful Use expand and adapt over time, the MiHIN Shared Services technologies are a solid foundation to meet any emerging requirements. The shared services in security, document registry, patient and provider indexes and the shared services bus will enable any necessary functionality to be added incrementally, without requiring the replacement of current technologies to meet new needs and use cases.

At this time, the planned service capabilities are adequate to meet the needs of providers in Michigan to achieve meaningful use through the sub-state HIEs and the MiHIN Shared Services. The incremental nature of the deployment strategy allows the MiHIN to adjust service deployment to match the changing needs of Meaningful Use and developments in standards and technologies.

Operationally, the needs and requirements for health information exchange and meaningful use will be integrated in the formal environment scan methodology used to assess HIE in Michigan. The deployment strategy calls for a 12 month rolling window with two six month phases. As the first phase nears completion, the next six month implementation phase will be planned. These methodologies allow MiHIN Shared Services to adapt and meet changing needs.
4.4 Business and Technical Operations

This section of the Operational Plan describes the details of how the governance structure and technical operations will be implemented.

4.4.1 Governance Implementation

The MiHIN long-term governance model is a coordinated governance structure that includes utilizing the statewide vision and public structure of the existing Michigan HIT Commission and the creation a new MiHIN Governance Board to allow those that pay for and directly benefit from the MiHIN to govern the business and technical operations.

The Michigan HIT Commission will immediate assume its role in the coordinated governance structure, as it has the organization capacity to incorporate this scope of work.

It is expected that the MiHIN Shared Services Governance Board parameters (operational charter, etc.) will be defined by the end of May 2010 with the proper paperwork being filed and the initial appointment process ending in July 2010. The governing entities board has been defined to consist of a maximum of 13 member, consisting of representatives from up to seven sub-state HIEs, three payer representatives, two State government members (representing MDCH and Medicaid), and one commissioner from the HIT Commission.

The board will be seated in various methods: State government will appoint its members; the HIT Commission will vote on their representative. Payer and sub-state HIE organizations will be invited by MDCH to identify themselves. The MiHIN Shared Services Governance Board seating process will be defined with the input of multiple stakeholders throughout May and June 2010. The need to accommodate additional sub-state HIEs or other classes of board membership has been identified and listed as a future action item for the MiHIN Shared Services Governance Board.

Initial MiHIN Shared Services Board membership will be staggered and while the exact duration of a term is to be determined, officers elected by the board will serve at least a 2 year term.

Legal services will be used in May to perform the functions necessary to form the MiHIN Shared Services Governance Board entity. The entity will be initially incorporated as a Michigan corporation, then apply for 501(c)(3) status. It is expected that the governing entity will be operation in July 2010. At that time, the Michigan Governor Jennifer M. Granholm will designate the MiHIN Shared Services as the Governance Board as the State Designated Entity.

Before the boards first meeting, final corporate bylaws will be developed as well as clearly delineated and designated governance roles, along with non-discrimination and conflict of
interest policies that demonstrate a commitment to open, fair, and nondiscriminatory board activities. The bylaws, roles and policies will be developed by a sub-set of members from the MiHIN governance workgroup process.

The initial MiHIN Shared Services Governance Board meeting is scheduled in July 2010. At this meeting, the final bylaws, roles and policies will be approved. The MiHIN Shared Services Governance Board will conduct regularly scheduled meetings as determined by the bylaws creating the entity. The HIT commission will continue its regularly scheduled monthly meetings. A joint meeting with the Michigan HIT Commission is targeted to take place in September 2010.

4.4.2 Technical Implementation

The kick-off for first phase of the MiHIN Shared Services is October 2010. Leading up to kick-off date, a variety of planning and preliminary technical testing will occur. Currently underway are activities to define specifications including use cases, technical specifications, and implementation guidance. These documents will define the technical characteristics of the pilot projects and will be delivered to the MiHIN Governance Board upon completion.

Selection of pilot organizations will be done by the MiHIN Shared Services Governance Board and will be completed in September 2010. Technical procurement requirements will be met in October 2010. At that time, the formal kick-off of the first phase of the MiHIN Shared Services will begin.

The build-out of core MiHIN capabilities is scheduled to begin in October 2010. To incrementally test the implemented core services, proof-of-concept testing will occur after initial installations. The testing will confirm abilities to transfer reportable laboratory results to the Michigan Disease Surveillance System (MDSS) and immunization records to Michigan Care Improvement Registry (MCIR).

Core MiHIN capabilities will be built in two broad categories: core infrastructure build-out and security services, core infrastructure build-out will consist of a Master Patient Index (MPI), provider directory, XDS registry (Record Locator Service), which completes the shared services bus. The MPI is scheduled to begin implementation in October 2010, completing in March 2011. The provider directory is scheduled to begin implementation in January 2011, completing in March 2011. The XDS registry will begin implementation in April 2011, completing in June 2011. The last core infrastructure build-out, the shared services bus, will begin in April 2011 and complete in July 2011.

Security services will consist of audit and node authentication, consent, and roles. Audit and node authentication capabilities will begin implementation in October 2010, completing in December 2010. Capabilities to enforce consent directives will begin to be implemented in January 2011, completing in March 2011. The ability to enforce policy directives based on roles will begin implementation in April 2011, completing in September 2011.
A graphical summary of the deployment timeline can be found in the MiHIN Deployment Strategy Chart below.

<table>
<thead>
<tr>
<th>Core Infrastructure Buildout</th>
<th>Phase I</th>
<th>Phase II</th>
<th>Phase III</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPI</td>
<td>Oct-10</td>
<td>Apr-11</td>
<td>Oct-11</td>
</tr>
<tr>
<td>Provider Directory</td>
<td>Nov-10</td>
<td>May-11</td>
<td>Nov-11</td>
</tr>
<tr>
<td>XDS Registry (RLS)</td>
<td>Dec-10</td>
<td>Jun-11</td>
<td>Dec-11</td>
</tr>
<tr>
<td>Shared Services Bus</td>
<td>Jan-11</td>
<td>Jul-11</td>
<td>Jan-12</td>
</tr>
<tr>
<td>NHIN Gateway</td>
<td>Feb-11</td>
<td>Aug-11</td>
<td>Feb-12</td>
</tr>
<tr>
<td>Security Services</td>
<td>Mar-11</td>
<td>Sep-11</td>
<td>Mar-12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Use Cases</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase I Use Cases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labs to MDSS</td>
<td>Oct-10</td>
<td>Apr-11</td>
<td>Oct-11</td>
</tr>
<tr>
<td>Immunizations to MCIR</td>
<td>Nov-10</td>
<td>May-11</td>
<td>Nov-11</td>
</tr>
</tbody>
</table>

| Phase II Use Cases            |          |          |          |
| Immunion History from MCIR    | Oct-10   | Apr-11   | Oct-11   |
| CCDs to ED                    | Nov-10   | May-11   | Nov-11   |
| CCDs to Physician Offices     | Dec-10   | Jun-11   | Dec-11   |

| Phase III Use Cases           |          |          |          |
| Syndromic results to MSSS     | Oct-10   | Apr-11   | Oct-11   |
| Medicaid Eligibility          | Nov-10   | May-11   | Nov-11   |
| Lab Results Inquiry           | Dec-10   | Jun-11   | Dec-11   |

Funded Box: Items inside the box are funded by this State HIE Cooperative Agreement. Items outside the box would require additional funding from alternative sources to complete.
The first phase (Pilot Phase I) will begin in October 2010. The projects are reportable lab results delivery to the Michigan Disease Surveillance System (MDSS) and immunization reports to the Michigan Care Improvement Registry (MCIR) and will end deployment phase in March and February 2011, respectively. In accordance with the deployment strategy, all projects will enter the three month pilot operations stage at that time, with the limited production stage to follow in July and June 2011 respectively. The phase I pilot projects are scheduled to enter production status in December and November 2011, respectively.
The second phase will begin in April 2011. Three use cases will be rolled out in this phase. The projects are Immunization History from MCIR, CCDs to Emergency Departments and CCDs to Physician Offices. The first project, immunization history from MCIR, will begin deployment in April 2011, enter pilot operations in October 2011, limited production in January 2012, and production status in June 2012. The second and third pilot projects, CCDs to Emergency Departments and CCDs to Physician Offices, will both start deployment in June 2011, enter pilot operations in October 2011, production in January 2012, and production status in June 2012.

[Diagram showing phase 2 deployment, pilot, and production schedule]
4.4.3 Staffing

Staffing is expected to be minimal; our strategy relies on outsourcing all initial and future implementation and technical development activities. The new governance entity board will be responsible for hiring new staff for the MiHIN organization. It is estimated that five staff members will be needed by October 2010. By 2015, it is expected that eleven staff members will be needed.

4.4.4 MiHIN Shared Services Governance Staffing

The governing entity is expected to have an initial staff of five. Details of positions and hire dates can be found in section VI.B. All governing entity staff positions will be employees. The positions, roles, and dates of hire are summarized in the table below:

<table>
<thead>
<tr>
<th>Staff Member</th>
<th>Year of Hire</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive Director</td>
<td>2010</td>
<td>Administrative</td>
</tr>
<tr>
<td>Administrative Assistant</td>
<td>2010</td>
<td>Administrative</td>
</tr>
</tbody>
</table>

4.4.5 Michigan HIT Commission Staffing

In its role in the coordinated governance structure, the Michigan HIT Commission will utilize staff to fulfill its roles and responsibilities. The positions, roles, and dates of hire are summarized in the table below.

<table>
<thead>
<tr>
<th>Staff Member</th>
<th>Year of Hire</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIT Coordinator</td>
<td>2010</td>
<td>Administrative</td>
</tr>
<tr>
<td>HIT Specialist</td>
<td>2010</td>
<td>Administrative</td>
</tr>
<tr>
<td>Outreach Specialist</td>
<td>2010</td>
<td>Technical</td>
</tr>
</tbody>
</table>

Detailed estimates of costs can be found in the financial domain section.
4.4.6 MiHIN Shared Services Technical Staffing

The staff for implementation will consist largely of contracted vendor services and other consultants as appropriate. As pilot projects move toward production status, the ongoing operations will be handled by governing entity technical staff and vendor staff as appropriate.

For ongoing operations, the governing entity will hire employees. The positions and dates of hire are summarized in the table below:

<table>
<thead>
<tr>
<th>Staff Member</th>
<th>Year of Hire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager</td>
<td>2010</td>
</tr>
<tr>
<td>Business Analyst</td>
<td>2010</td>
</tr>
<tr>
<td>Customer Support Specialist (2)</td>
<td>2010</td>
</tr>
<tr>
<td>Technical Analyst</td>
<td>2012</td>
</tr>
<tr>
<td>Lead Technical Architect</td>
<td>2012</td>
</tr>
<tr>
<td>Lead Security Architect</td>
<td>2014</td>
</tr>
<tr>
<td>Lead Privacy Analyst</td>
<td>2014</td>
</tr>
</tbody>
</table>

During implementation, the deployment will be overseen by the MiHIN Shared Services Technical staff and with a contracted implementation team. The implementation team will be built up as appropriate, but initially it is anticipated that a lead project manager, a system architect and a business architect would be needed.

A variety of technical staff will be used as part of vendor solutions. These services may be contractual or bundled into the price of the solutions. Estimated requirements to implement use cases have been developed. These estimates are subject to change based on the actual vendor solution procured. Detailed estimates of labor-hours and costs can be found in the financial domain section.

4.4.7 Procurement processes and timelines
In July 2010, the governing entity will use the materials prepared in advance to rapidly evaluate and procure the hardware necessary to begin the phase I projects in the deployment plan.

The initial procurement of the phase one technology will be done by October 1, 2011. The deployment plan projects an October 1, 2010 start for phase one projects. Planning and vendor evaluation will occur throughout August and September 2010.

4.4.8 Contracting processes and timelines

Contracts for technology will be established by the MiHIN Shared Services Governance Board. The process for procuring and contracting will be determined by the new governing entity and implemented as an initial task once it is created in July 2010.

4.4.9 Standard operating procedures

Standard operating procedures will be developed during pilot deployments and limited production phases of our deployment strategy. Best practices will be reviewed and preliminary policy and procedure manuals covering the services to be deployed will be drafted. During the course of the phases, changes in implementation specifications will be monitored and their impact on the operational methodologies assessed. A production candidate set of operational policies and procedures will be validated during the deployment strategy limited production phases of service implementations. They will, in turn, be assessed and modified as required based the experiences of the limited production phases.

There are two classes of operations guidelines: one for organization-wide operations that all services are likely to require (backup, disaster recovery, etc) and technology-specific operations guides (patient-identity remediation, etc). Organization-wide policies will be reviewed for necessary changes required by the addition of unique services. Specific guides will be developed when a service is deployed.

To ensure continuous improvement of process and realize the lowest operating cost possible, operational policies will be reviewed on a rolling quarterly basis, each policy being review yearly. To realize efficiency gains, all specific policies will be analyzed yearly to discover any similarities that would enable a shared procedure and potential savings in money, time and/or labor.

Policies and procedures for business functions (such as accounting) will be established by the MiHIN Shared Services Governance Board.
4.5 Legal / Policy

This section of the operational plan provides the details associated with the approach toward creating the legal structure that will be responsible for the operation of MiHIN Shared Services and the steps required to ensure compliance with Federal and State Privacy and Security regulations.

4.5.1 Legal Steps for the Establishment of the Governance Structure

One of the key steps in the execution of this operational plan is the creation of the legal entity that is MiHIN Shared Services. Many of the decisions that are required to create the legal entity such as make-up of the Board of Directors, operational budget and staffing plan were made during the planning phase of this project. The next step is the creation of the legal entity that is MiHIN Shared Services.

The creation of this entity will be performed by a Michigan attorney skilled in the creation of not-for-profit organizations. It will be the responsibility of this attorney to use the results of the planning effort to create the bylaws and articles of incorporation that will be filed with the State of Michigan.

The creation of the legal entity provides the organizational structure that is required to apply to the Internal Revenue Service for not-for-profit status. While Health Information Exchange’s have been approved for not-for-profit status there are no clear guidelines for an organization to obtain the required status. Therefore it is expected that this process will take some time to complete.

4.5.2 Federal and State HIE Privacy and Security Policy Development

The MiHIN Shared Services Governance Board will appoint both a Privacy Officer and a Security Officer who will ensure compliance with all applicable federal and state laws, as well as providing state-wide leadership and guidance for Michigan’s sub-State HIEs. Additionally, due to Michigan’s shared international border with Canada and in consideration of Michigan’s colleges and universities the MIHIN Shared Services will also work to develop policies that address international laws as appropriate. The MiHIN Shared Services will build on the stakeholder policy recommendations to ensure that adequate Privacy and Security policies are in place.

In order to continue to foster state-wide participation and to promote consistency and communication among the sub-state HIEs, the MiHIN Shared Services coordinated governance structure will establish and manage two working committees made up of stakeholders, including representatives from specially protected health information groups and health plans. The work
groups will manage the Privacy and Security of the MiHIN Shared Services as well offering guidance and direction to the sub-state HIEs. The two committees are composed as follows:

- MiHIN Privacy Committee- made up primarily of Privacy Officers from each of the sub-state HIEs, along with other stakeholders and lead by the MiHIN Privacy Officer. The Privacy Committee, lead by the MiHIN Privacy Officer will assist in the development, drafting and implementation of all MiHIN Privacy policies for sub-State HIEs. The Committee will follow guidance from both the State and Federal government and will work with the sub-state HIEs to identify challenges and risks and develop mitigation plans to address them.

- MiHIN Security Committee- made up primarily of Security Officers from each sub-state HIE, along with other stakeholders and lead by the MiHIN Security Officer. The Security Committee, lead by the MiHIN Security Officer will assist in the development, drafting and implementation of all MiHIN Security Policies for sub-state HIEs. The Committee will follow guidance from both the State and Federal government and will work with the sub-state HIEs to identify challenges and risks and develop mitigation plans to address them.

The MiHIN Privacy and Security Committees will update the Strategic and Operational plans on an annual basis to evaluate the overall MiHIN Privacy and Security implementation, update policy and guidance recommendations as needed, review and update forms and agreements, and review and update the overall MiHIN Privacy and Security direction.

Covered Entities are required by the HIPAA Privacy and Security Rules to have Privacy and Security officers in place. In addition, under the new HITECH amendments, Business Associates are also required to have a number of HIPPA Privacy and Security policies in place. These federal requirements create a structure of Privacy and Security Officers that allow both guidance and feedback to flow. Under the leadership of the MiHIN Privacy and Security Officers, and the respective Privacy and Security Committees, appropriate safeguards will be in place to assure and assist state HIE participants in complying with state and federal legal policies and requirements. Privacy and Security Officers will both report regularly to the Executive Director of the MiHIN Shared Services and to the HIT Commission.

The MiHIN governing body will work with sub-state HIEs and with the State to coordinate federal initiatives. This will include health initiatives with the Department of Military and Veterans Affairs, Indian Health Services, as well as Medicaid and Medicare initiatives. The MiHIN Governance Board will provide guidance to assist sub-state HIEs with integration and alignment of relevant federal initiatives. Sub-state HIEs will work with a number of organizations in Michigan that support federal HIE and HIT initiatives, including:

- Grand Rapids Veterans Nursing Home- located in Grand Rapids, Michigan houses two units for Alzheimer’s, as well as one unit for dual diagnoses patients and operates domiciliary and nursing care.
• Dominic J. Jacobetti Veterans Facility- located in Marquette, houses one of Michigan’s first nursing units for Alzheimer’s disease and related disorders and operates domiciliary and nursing care.

• State Veterans Homes Board of Managers- Governance Board made up of Veterans who act in the interest of the veterans’ community in both advocacy and advisory roles related to the admission and member affairs at Michigan’s two veterans’ homes.

• Michigan’s Inter-Tribal Council- the Council’s Indian Health Services Comprehensive Field Health Division works to implement programs that improve the health status of Indian families- including communications of federal, state and local initiatives.

As the MiHIN Shared Services infrastructure and sub-state HIEs begin to develop and increase capacity for health information exchange, the Privacy and Security Committees will address issues on an incremental basis. Initially, the first task will be to create a Participation Agreement or Subscription Agreement for the sub-state HIEs in order to “connect” to the MiHIN Shared Services. The next task will be to review and refine the Privacy and Security Policy Framework developed by the Privacy and Security Work Group which includes:

4.5.2.1 Policy Direction: Informed Opt Out

Informed Opt Out recognizes that the HIPAA Privacy Rule allows for the sharing of Protected Health Information for purposes of treatment, payment and operations between Covered Entities. Based on that recognition, even if an individual “opts out” of data exchange, some identifiable health information will still be transferred electronically. The exceptions are listed below and apply to Direct Transfers, “Break the Glass” and Legally Mandated Reports.

This Policy recommendation includes a draft for a model Informed Opt Out form.

This Policy recommendation includes a draft of model language for insertion in Notice of Privacy Practices.

4.5.2.2 Policy Direction: Access

Access controls govern when and how a patient’s information may be accessed by authorized individuals via the MiHIN. This policy is designed to reduce unauthorized access and ensure information is used for authorized purposes.

4.5.2.3 Policy Direction: Authorization

Authorization is the process of determining whether a particular individual within a sub state HIE has the right to access Protected Health Information via the MiHIN. Authorization is subject to role-based access standards that take into account an individual’s job function and the information needed to successfully carry out a role
within the entities participating in the HIE. These requirements are designed to limit exchange of information to accomplish the intended purpose of the exchange, thereby allowing patients to have confidence in the privacy of their health information.

4.5.2.4 Policy Direction: Authentication

Authentication is the process of verifying that an authorized individual is who she or he claims to be. Sub-state HIEs using the MIHIN Shared Services will implement policies and procedures to verify that an Authorized User seeking access to electronic Protected Health Information is the person or entity he/she/it claims to be.

4.5.2.5 Policy Direction: Audit

Audits are oversight tools used for recording and examining access to information within an electronic health information exchange system. This policy is necessary for verifying compliance with access controls implemented to prevent/limit inappropriate access to information.

4.5.2.6 Policy Direction: Breach

Breach Notification requires sub-state HIEs and all their participating entities to notify individuals when unencrypted personal information was, or is reasonably believed to have been, acquired by an unauthorized person or a person without authority, including when a confirmed breach in the security of the system poses a significant risk of identity theft or other harm. (42 USC §17931)
5 SUMMARY / CONCLUSION

The MiHIN Operating Plan is the culmination of work that stakeholders across Michigan undertook with the initial strategies outlined in the 2006 Conduit to Care and furthered through the MiHIN Strategic Plan over the last six months.

This Operating Plan builds upon the development of sub-state HIEs over the past several years and leverages existing State of Michigan information technology systems by taking an incremental approach to deploying use cases and associated shared services that have been prioritized by stakeholders across the state.

This plan identifies the domain based activities, schedules and financial requirements for implementing the MiHIN Strategic Plan as well as the approach to governing and operating the MiHIN over the next four years.

Achieving cross-community exchange of patient information by deploying statewide shared services will enable and support the ability of Michigan’s providers to accomplish and demonstrate meaningful use while improving the ability of sub-state HIEs to access health information within and across State borders.

The ONC approval of this Plan will support the ability of stakeholders across the State of Michigan to participate in statewide HIE, the National Health Information Network (NHIN) and achieve the MiHIN vision of fostering the development of HIE that will reduce the overall cost of care while at the same time increasing quality of care and patient safety.
6 Appendices

Appendix 1 – Glossary of Terms and Acronyms

**AHIC** – American Health Information Community

**ARRA** – American Recovery and Reinvestment Act

**CAM** – Comparative Analysis Matrix

**CDC, CDCP** – Center for Disease Control and Prevention

**CCD** – Continuity of Care Document

**CHAMPS** – Community Health Automated Medicaid Processing System

**COBIT** - Control Objectives for Information and related Technology, a set of best practices (framework) for information technology management created by the Information Systems Audit and Control Association (ISACA), and the IT Governance Institute (ITGI) in 1996.

**Conduit to Care** – the product of a “180 day” partnership of a diverse set of Michigan’s health care and business stakeholders, aka Michigan’s eHealth Initiative

**Connect Open Source** - The Federal Government's open source implementation of a national health information network gateway (Source MiHIN Architecture Design document V 1.2.4

**DICOM** – Digital Imaging and Communications in Medicine

**DURSA** – (Data Use and Reciprocal Support Agreement) a comprehensive agreement that governs the exchange of health data across a diverse set of public and private entities.

**EHR** - Electronic Health Records

**EMPI** - Enterprise Master Patient Index (In this context, we are talking about an MPI for the state of Michigan.)

**ER** – emergency room

**ESB** - Enterprise Service Bus

**FCC Rural Health Care Pilot** – Project to connect rural health care providers in the state with high speed Internet
FQHC – Federally Qualified Health Centers

HHS - Department of Health and Human Services (Executive Department of US Federal Government)

HIT – Health Information Technology

HITECH - Health Information Technology for Economic and Clinical Health

HIE - Health Information Exchange

HIMSS – Healthcare Information Management Systems Society

HIPAA – Health Information Portability and Accountability Act

HISPC – Health Information Security and Privacy Collaboration

HITSP - Healthcare Information Technology Standards Panel

HL7 - Health Level Seven, an all-volunteer, non-profit organization involved in development of international healthcare; this term is also used to refer to some of the specific standards created by the organization (e.g., HL7 v2.x, v3.0, HL7)

IHE - Integrating the Healthcare Environment

IT – Information Technology

ITIL - Information Technology Infrastructure Library, a set of concepts and practices for managing information technology services, development and operations

JVHL - Joint Venture Hospital Laboratories

MCIR – Michigan Care Improvement Registry

MDIT – Michigan Department of Technology

MDSS – Michigan Disease Surveillance System

M-CEITA – Michigan Center for Effective IT Adoption

MiHIN - Michigan Health Information Network

MiHIN SSB - MiHIN Shared Services Bus
MPHI - Michigan Public Health Institute (Michigan non-profit organization focused on public health)

MPI - Master Patient Index

MSSS – Michigan Syndromic Surveillance System

MU – Meaningful Use

NHIN - Nationwide Health Information Network (An HHS Sponsored development effort to build a national health information exchange capability)

NHIN Direct - new initiative from the ONC trying to simplify the way a physician can meet meaningful use requirements with their electronic health record

NPP – Notice of Privacy Practice

OMB – Office of Management and Budget

ONC - Office of the National Coordinator for Health Information Technology

PCO – Program Control Office

PHI – Protected Health Information

PIX - Patient Identity Exchange (a transaction type)

PIX -PDQ - Patient Identification Exchange - Patient Data Query

REC – Regional Extension Center

RHIO – Regional Health Information Organization

RHITEC – Regional Health Information Technology Extension Center

RLS – Record Locator Service

SAML - Security Access Markup Language

SCP – New York eHealth Collaboratives Statewide Collaboration Process

SDE – State Designated Entity

SHIN-NY –State Health Information Network of New York
**SOA** - Service-Oriented Architecture

**SOM** – State of Michigan
Appendix 2 – Privacy and Security Policies

Access Policy

Access controls govern when and how a patient’s information may be accessed by authorized individuals via the MiHIN. These access policies are designed to reduce unauthorized access and ensure information is used for authorized purposes.

Policy: Access

- Authorized Users will access information via the MiHIN in accordance with all applicable policies, and state and federal laws and regulations.

- Sub-state HIEs will establish policies and procedures to ensure that access meets current security standards.

- Only Authorized Users shall access information via the MiHIN.

- Authorized Users shall be authenticated in accordance with the provisions of the Authentication Policy.

- Sub-state HIEs and their participating entities will have processes and capabilities in place to ensure accountability and enable identity of each user who has accessed patient information.

- All participating entities shall implement and enforce an accountability policy that meets state and federal legal and regulatory requirements.

- Authorized Users shall be prohibited from sharing their user names and/or passwords with others and from using the user names and/or passwords of others. The use of another's credentials to access the system is prohibited.

- Users are responsible for all activities related to their unique credentials.

- All breaches of credentials must be reported in a timely manner.

- Authorized Users who have access to electronic PHI via the MiHIN will be required to receive training on the access and authentication process and mechanisms required for their job function.

- Sub-state HIEs will meet security requirements under state and federal laws and regulations, and policies and procedures as determined by the MiHIN governing body.

- The MiHIN Governance entity will create and maintain a security workgroup that will recommend best practices and policies/procedures to the MiHIN.
• Sub-state HIEs and participating entities must manage their user accounts in accordance with MiHIN standards.

Authentication Policy

Authentication is the process of verifying that an authorized individual is who she or he claims to be. Sub-state HIEs using the MIHIN Shared Services will implement policies and procedures to verify that an Authorized User seeking access to electronic Protected Health Information is the person or entity he/she/it claims to be.

Policy: Authentication

• All participating entities shall implement and enforce a user authentication mechanism that meets state and federal law and regulatory requirements.

• Sub-state HIEs must authenticate, or must require their participating entities to authenticate, each Authorized User’s identity prior to providing any Authorized User with access to Protected Health Information (PHI) via the MIHIN.

• Authorized Users shall be prohibited from sharing their user names and/or passwords with others and from using the user names and/or passwords of others. The use of another’s credentials to access the system is prohibited.

• Authorized Users who have access to electronic PHI via the MiHIN will be required to receive training on the access and authentication process and mechanisms required for their job function.

Informed Opt Out Policy

The MiHIN will develop and implement minimum policies for sub-state HIEs and their participating entities to adopt in order to connect to the MiHIN shared services.

Policy: Informed Opt Out

This policy recognizes that the HIPAA Privacy Rule allows for the sharing of Protected Health Information for purposes of treatment, payment and operations between Covered Entities. Based on that recognition, even if an individual “opts out” of data exchange, some identifiable health information will still be transferred electronically. The exceptions are listed below and apply to Direct Transfers, “Break the Glass” and Legally Mandated Reports (the “Exception” situations).

• With respect to the other transfers of data, an individual will be given two choices:
  o Allow individually identifiable health information to be accessed by authorized users through the MiHIN, but only when that access is legally permissible.
- Not allow access to individually identifiable health information, other than Direct Transfers, Break the Glass, and Legally Mandated Reports (the "Exception" situations).

- Standard language will be added to any NPP to inform the patient that individually identifiable health information will be accessed through the MiHIN unless they opt out (see attached).

- Regardless of the individual’s choice, individually identifiable health information may be stored by the sub-state HIE.

- Individually identifiable health information that is subject to additional, legally imposed special restrictions will only be used and/or disclosed in accordance with applicable laws.

- Individuals can change their minds and terminate their prior opt out decision.

- Consumer education materials will be provided to explain the benefits of access and what the decision to opt out of data exchange means with sufficient information to allow a consumer to make an informed choice. After an individual opts out, the individual may reverse that decision.

- The sub-state HIE and MiHIN levels will keep an electronic record of the decision.

- Contractual agreements will be required at the sub-state HIE and MiHIN level and will include provisions to protect patient privacy.

- To Opt Out, or to terminate a prior opt out decision, the individual will have to complete the Request to Opt Out Form (draft attached).

- EXCEPTIONS
  - **Break the Glass** – This refers to individually identifiable health information being accessed (break the glass) in emergency medical situations by authorized providers.
  
  - **Direct Transfers** – This refers to individually identifiable health information being sent and received via the MiHIN by authorized providers with a treatment relationship to an individual, without the use of the RLS. Direct transfers only occur between authorized providers or between providers and Business Associates.
  
  - **Legally Mandated Reports** – This refers to authorized providers sending individually identifiable health information via the MiHIN to a government agency for the purposes of complying with mandatory public health reporting requirements (if the authorized provider may make the disclosure without express consent of the patient).
Audit Policy

Audits are oversight tools used for recording and examining access to information within an electronic health information exchange system. They are necessary for verifying compliance with access controls implemented to prevent/limit inappropriate access to information.

Policy: Audit

- Sub-state HIEs and participating entities must ensure that the following information be recorded and maintained at the point of access for audit purposes:
  - The identity and time frame of each entity/individual that accesses or transmits information through the MiHIN.
  - The patient identification and the type of data accessed.
- Each sub-state HIE and participating entity must validate the integrity of the audit process. Audits must be conducted on a regular basis at least once a year at a minimum.
- Sub-state HIES and participating entities will implement a system wherein, upon request, patients have a means of seeing who has accessed information about them via the MiHIN and when such information was accessed.
- All sub-state HIEs and participating entities must cooperate with the MiHIN and/or other sub-state HIEs with respect to any audits.
- All sub-state HIEs and participating entities must retain audit information for the time frame required by law.
- MiHIN and all sub-state HIEs will generate audit records for all security relevant events.

Authorization Policy

Authorization is the process of determining whether a particular individual within a sub-state HIE has the right to access Protected Health Information via the MIHIN. Authorization is subject to role-based access standards that take into account an individual’s job function and the information needed to successfully carry out a role within the entities participating in the HIE. These requirements are designed to limit exchange of information to accomplish the intended purpose of the exchange, thereby allowing patients to have confidence in the privacy of their health information.

Policy: Authorization

- Sub-state HIEs shall establish and implement policies, standards and procedures that:
  - Establish role definitions and rules for Authorized Users.
Define the purposes for which Authorized Users in those roles may access Protected Health Information (PHI) via the MIHIN.

Define the types of PHI that Authorized Users within such roles may access (e.g., demographic data only, clinical data).

- The purposes for which an Authorized User may access information via the MIHIN and the types of information an Authorized User may access shall be based, at a minimum, on the Authorized User's:
  - Job function
  - Relationship to the patient

- Sub-state HIEs shall require their participating entities to assign roles to the individuals within their organizations who will be authorized to access information via the MIHIN. Sub-state HIEs and their participating entities may have additional roles, but they must map those roles to one of the eight roles listed below:
  1. Practitioner with access to all information and Break the Glass authority
  2. Practitioner with access to all information but no Break the Glass authority
  3. Non-Practitioner with access to all information
  4. Non-Practitioner with access to only non-clinical information
  5. Sub-state HIE administrator with access to only non-clinical information
  6. Sub-state HIE administrator with access to all information for the purpose of public health reporting
  7. System administration support and technical support access
  8. Sub-state HIE read only audit account

- Users with multiple roles will access data using the role that applies to the job function they are performing at the time.

**Breach Notification Policy**

Breach Notification requires sub-state HIEs and all their participating entities to notify individuals when unencrypted personal information was, or is reasonably believed to have been, acquired by an unauthorized person or a person without authority, including when a confirmed breach in the security of the system poses a significant risk of identity theft or other harm. (42 USC §17931)
Policy: Breach Notification

- The sub-state HIE and all their participating entities will abide by all applicable federal, state and local laws, rules and regulations pertaining to any security breach related to MiHIN.

- If a sub-state HIE or participating entity experiences a reportable security breach related to MiHIN they must immediately notify the MiHIN governance entity.

Note: These laws also apply:
- Michigan Identity Theft Protection Act 452 of 2004
- Michigan Social Security Privacy Act
- Federal "Red Flags" Rule, 16 C.F.R. § 681.2
  http://www.ftc.gov/bcp/edu/microsites/redflagsrule/more-about-red-flags.shtm
State of Michigan
MiHIN Shared Services
Strategic & Operational Plan
Amendment 1
August 1, 2010
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1 Introduction
This amendment to Michigan’s Strategic and Operational Plans that were submitted on April 30, 2010 for the Office of the National Coordinator for HIT (ONC) approval is in response to the Program Information Notice (ONC-HIE-PIN-001) issued on July 6, 2010. Guidance was issued from the ONC via email on July 14, 2010 that asked each state that had previously submitted plans to respond directly to the new criteria introduced in ONC-HIE-PIN-001. The July 14 guidance asked states that meet the new criteria but needed to supply new documentation to do so by August 1, 2010. Michigan falls into this category of needing to supply new documentation.

This amendment is meant to supply new documentation to the ONC to demonstrate Michigan’s compliance with ONC-HIE-PIN-001. The new guidance is separated into two categories; Strategic Plan and Operational Plan. The ONC guidance is listed at the beginning of each section in black text. Michigan’s response is under each new criterion in blue text and is also boxed.

In most cases, Michigan’s response points back to specific page numbers in the Strategic and Operational Plans. In cases where further documentation is needed, the additional documentation is available in the Appendices of this amendment and is noted in the blue and boxed responses.

The responses in this amendment should be considered supplemental information to what is given in the Strategic and Operational Plans that were submitted on April 30, 2010.

2 Strategic Plan

2.1 Environmental Scan
Within the strategic plan, the environmental scan shall include an overview of the current HIE activities within the state including the penetration of electronic lab delivery, e-prescribing networks and other existing HIE solutions.

Michigan has addressed this requirement in pages 7-11 of the MiHIN Shared Services Strategic Plan submitted to the Office of the National Coordinator on April 30, 2010.

The environmental scan should include the following measures or similar measures to determine the health information exchange taking place with these important data trading partners:

- % pharmacies accepting electronic prescribing and refill requests
- % clinical laboratories sending results electronically
- % health plans supporting electronic eligibility and claims transactions
- % health departments receiving immunizations, syndromic surveillance, and notifiable laboratory results
In the Strategic Plan, on page 7, an analysis of Michigan’s early adopters of HIT and HIE that was done to support the MiHIN planning process is briefly described. The entire analysis was fundamental to the decision-making of the MiHIN Workgroups and the project staff throughout the planning process. The qualitative findings of this analysis are discussed in the Environmental Analysis that was submitted in the Strategic Plan, but more detail, including the full report and the breadth of quantitative findings, was not included. Appendix B of this amendment contains the “Michigan HIT and HIE Technical Environment Analysis”, which is the full report containing all detail of Michigan’s current state and gap analysis.

Page 9 of Appendix B “Michigan HIT and HIE Technical Environment Analysis” details the current status of Michigan’s HIE and HIT functionality with this chart:

This chart shows Michigan’s initial metrics. The analysis that derived these metrics will be expanded as part of the State HIE Cooperative Agreement. As the reporting requirements are solidified, future analyses will include more scientific data collection methods and include data from national sources like Surescripts and federal partners like CMS.

An analysis of state government systems was also critical to the planning process, but was not provided in the Strategic and Operational Plans. This analysis is called the “State of Michigan Systems Technical Environment Analysis” and can be found in Appendix J. This analysis looked exclusively at State of Michigan government systems that utilize clinical and/or administrative data and provides a full environmental scan of the State of Michigan systems and
reaches the conclusion that several systems are able to be leveraged and have great potential to assist providers in meeting meaningful use and expanding statewide HIE capacity.

These systems include the State’s vital records systems, public health reporting and surveillance, corrections health systems, Medicaid and several others. This analysis was fundamental in the decision making of the workgroups that were formed and directly influenced Michigan’s focus on public health surveillance and reporting and Medicaid quality data.

2.2 Strategy to meet meaningful use

Strategic plans shall describe how the state will execute the state’s overall strategy for supporting Stage 1 meaningful use including how to fill gaps identified in the environmental scan. Specifically, states and SDEs shall describe how they will invest federal dollars and associated matching funds to enable eligible providers to have at least one option for each of these Stage 1 meaningful use requirements in 2011:

1. E-prescribing

As described in the Environmental Scan on page 10 (E-prescribing readiness) and through the offerings of sub-state HIEs described on pages 7-9 of the strategic plan and the analysis provided in Appendix B, Michigan’s providers currently have options for e-prescribing. To ensure that all of Michigan’s providers have at least one option for e-prescribing, Michigan will pursue two paths – expanding e-prescribing directly through sub-state HIEs and expanding e-prescribing through policies, incentives and other available market levers. To expand e-prescribing technology offered throughout the state, the MiHIN Shared Services will expand the coverage areas and technical capacity of sub-state HIEs in Michigan (described on pages 29-39 of the Strategic Plan). Every sub-state HIE that is operating in Michigan currently or plans to offer e-prescribing in the near future. See Appendix B for more information on sub-state HIE offerings in MI.

To expand e-prescribing through policy, incentives and other market levers, the HIT Coordinator will work with Michigan Medicaid to continue to examine policy levers and the operations of the EHR incentive program that can be utilized to encourage E-prescribing. Further, the Michigan HIT coordinator will work with existing coalitions of payers and other stakeholder to identify mechanisms for encouraging e-prescribing in Michigan to those providers that are not utilizing this service today.

The Michigan Primary Care Consortium is currently working on expanding e-prescribing in Michigan as a stated goal. The Michigan HIT Coordinator is already and will continue to work directly with the Michigan Primary Care Consortium to identify levers to make this goal a reality. See Appendix E for a full description of the Michigan Primary Care Consortium and a list of their stated goals and accomplishments.

The HIT Coordinator will also work closely with the Michigan HIT Commission to develop recommendations for specific action on promoting the availability and use of e-prescribing. The Michigan HIT Commission has representatives from pharmacies, pharmacists, pharmaceutical companies as well as payers, providers and hospitals which are important stakeholders in
promoting e-prescribing. See pages 18-19 for more information on the composition of the Michigan HIT Commission.

2. Receipt of structured lab results

As described in the technical section of the Strategic Plan, pages 26-40, the proposed technical architecture for the MiHIN Shared Services is to connect Michigan’s sub-state Health Information Exchange initiatives together for statewide Health Information Exchange. The architecture is built upon functioning HIE initiatives at local levels. In Michigan, the first and most robust services offering of sub-state HIEs is the delivery of structured lab results (more detail is available in Appendix B “Michigan HIT and HIE Technical Environment Analysis”). At present, the bulk of Michigan’s providers have or will have at least one option for receiving structured lab results (see the Environmental Scan on pages 7 and 8 to see the statewide reach of HIE in Michigan).

The strategy for ensuring that all Michigan providers have an option for at least one method of results delivery is to utilize and expand the reach of sub-state HIEs in Michigan. One of the goals of the MiHIN Shared Services is to provide the technical, business and policy support for that will allow sub-state HIEs to thrive and expand. By creating a suite of shared services for sub-state HIEs not only allows for statewide HIE connectivity, but it allows sub-state HIEs to utilize the shared services to reach greater efficiencies and capabilities within their own areas of services.

Through the MiHIN Shared Services Governance Structure (described on pages 15-21 of the Strategic Plan), further policy methods will be pursued to maximize available options for Michigan’s providers. The HIT Coordinator will take responsibility for working with all relevant stakeholders to explore, recommend and implement policies, incentives or other market levers to ensure that Michigan providers have the capacity to receive structured lab results.

3. Sharing patient care summaries across unaffiliated organizations

The sharing of patient care summaries across unaffiliated organizations was found by Michigan’s stakeholders through the MiHIN Shared Services planning process to be a high priority and is described in detail on pages 42 – 45 in the Technical domain of the Strategic Plan.

States and SDEs should also describe a strategy and plan to address the other required information sharing capabilities specified in the FOA over the course of the project, including:

- Building capacity of public health systems to accept electronic reporting of immunizations, notifiable diseases and syndromic surveillance reporting from providers;
Expanding the capacity of Michigan’s robust immunization reporting, notifiable disease and syndromic surveillance systems was found to be a top priority for Michigan’s stakeholders through the MiHIN Shared Services planning process. More detail can be found on the following pages of the Strategic Plan: 35, 41-45. Also, see Appendix J for a full analysis of capabilities and environmental scan of Michigan’s public health systems.

- Enabling electronic meaningful use and clinical quality reporting to Medicaid and Medicare.

Michigan’s Medicaid program and the MiHIN Shared Services are working closely together to determine the best solutions for enabling electronic meaningful use and clinical quality reporting. As described on pages 12-14 of the Strategic Plan, there is a framework in place to continue working on common goals between these two programs, one of which is clearly defined as electronic quality and meaningful use reporting. Through this collaborative framework, Michigan Medicaid and the MiHIN Shared Services plan to address this capability over the course of the project. The Michigan HIT Coordinator will continue to work with federal partners to ensure that Medicare meaningful use and clinical quality reporting is addressed.

2.3 Coordination with Medicaid

Because of the importance of the Medicaid program in setting state level HIT policy, states and SDEs are required to describe their coordination with Medicaid in their Strategic Plans. The following activities are either required or highly encouraged and the activities adopted shall be reflected in the state HIE plan.

Required Activities:

1. The state’s governance structure shall provide representation of the state Medicaid program.

In the MiHIN Shared Services Strategic Plan, on page 19, it is stated that Medicaid will have a seat on the board of the MiHIN Shared Services Governance Board. Also, the Director of the Michigan Department of Community Health, which houses the Michigan Medicaid program, is by state statute a member of the Michigan HIT Commission.

2. The grantee shall coordinate provider outreach and communications with the state Medicaid program.

As outlined on pages 12-14 of the Strategic Plan, Michigan Medicaid and the MiHIN Shared Services are working together to coordinate efforts. Since submitting the Strategic and Operational Plans in April, the two programs have been also working with Michigan’s Regional Extension Center, M-CEITA, to do outreach and communications.
One example of this collaboration is the jointly hosted website www.michiganhit.org, which provides information, links and contact information for each of the ARRA funded HIT initiatives in Michigan.

Also, Medicaid, MiHIN and M-CEITA worked together to hold provider outreach sessions – a postcard that details this first round of outreach sessions is in Appendix C “Michigan Provider Outreach Sessions Postcard”. These sessions took place in May and June, and all of the information from each of the initiatives was presented. Archived video of the sessions are available at www.michiganhit.org.

Medicaid, MiHIN and M-CEITA plan to continue working together on provider outreach and communications. To ensure that these initiatives continue to collaboration on this and other actions, the HIT Coordinator has developed a coordination framework that is described on pages 12-14 of the Strategic Plan and further detailed on pages 12-13 of the Operational Plan.

3. The grantee and the state Medicaid program shall identify common business or health care outcome priorities.

Page 13 of the MiHIN Shared Services Strategic Plan details the efforts of the Michigan Medicaid agency and the State HIE Cooperative Agreement and the joint goals that have been developed collaboratively.

4. The grantee, in collaboration with the Medicaid program, shall leverage, participate in and support all Beacon Communities, Regional Extension Centers and ONC funded workforce projects in its jurisdiction.

Page 14 of the MiHIN Shared Services Strategic Plan and pages 12-13 of the Operational Plan outline the coordination strategy between all ARRA funded activities within Michigan. The Michigan HIT Coordinator is responsible for the coordination and identification of activity, resources or other leverage point. The Strategic plan focuses on collaboration between the Medicaid agency, the Regional Extension Center in Michigan and the State HIE Cooperative Agreement. There are currently no Beacon or workforce projects within Michigan's jurisdiction. If/when new projects are awarded in Michigan; they will be added to the collaboration framework.

5. The grantee shall align efforts with the state Medicaid agency to meet Medicaid requirements for meaningful use.

The MiHIN Shared Services is committed to aligning with Michigan Medicaid to meet the requirements of meaningful use as stated on page 13 of the MiHIN Shared Services Strategic Plan. Also, the letter from the Michigan Medicaid Director, in Appendix A, clearly states the commitment to collaborate with the State HIE Cooperative Agreement and other HIT and HIE initiatives in the state.
Encouraged Activities:

6. The state’s HIE program is encouraged to obtain a letter of support from the Medicaid Director. If a letter of support is not provided, ONC will inquire as to why one was not provided and the lack of a letter may impact the approval of a state plan, depending on circumstances.

Though the Medicaid Director approved the submission of the MiHIN Shared Services Strategic and Operational Plan to the Office of the National Coordination through a vote on the MiHIN Governance Workgroup and through the Michigan HIT Commission as stated on page 1 of both the Strategic and Operational Plan, a letter of support is attached in Appendix A for completeness.

7. Conduct joint needs assessments.

The MiHIN Shared Services is committed to conducting joint needs assessments with the Michigan Medicaid program, specifically the Medicaid EHR Incentive program and Michigan’s Medicaid Management Information System. Through the planning phase of the State HIE Cooperative Agreement, Medicaid was a key partner in assisting in the environmental scan of private partners and of State of Michigan systems (Appendix B and Appendix J) and in participating in all of the planning workgroups. This made certain that the Michigan Medicaid needs were well represented in the Strategic and Operational Plans.

8. Conduct joint environmental scans.

For Michigan Medicaid’s State HIT Plan, the MiHIN Strategic Plan environmental Scan as well as the information contained in Appendix B and Appendix J were used to assess the current state in Michigan. Further, MiHIN and the Regional Extension Center worked with Medicaid to administer the survey found in Appendix D, “Medicaid EHR Provider Survey”. Over 10,000 surveys were sent out to Michigan’s Medicaid providers on May 7, 2010. Full results and analysis are anticipated in late August 2010.

9. Collaborate with the Medicaid program and the ONC-supported Regional Extension Centers to provide technical assistance to providers outside of the federal grant for Regional Extension Centers’ scopes of work.

Page 14 and 21 of the MiHIN Shared Services Strategic Plan details the foundation of coordination, support and collaboration between the Michigan Medicaid, Michigan’s Regional Extension Center (M-CEITA) and the MiHIN. It is the role of the HIT Coordinator to continually assess and improve the coordination between these programs. Further, the Medicaid State HIT Plan when it is finalized will further detail the coordination between Medicaid and the Regional Extension Centers and the State HIE Cooperative Agreement.
10. Leverage public help desk/call center contracts and services between the State HIE Program, Medicaid and the REC.

The State HIE program, Medicaid and the REC are committed to collaborating together to leverage help desks, call centers, informational resources and other services between all programs to ensure efficiency and coordination for Michigan’s providers and patients. The framework for collaboration (as outlined on pages 12-14 of the Strategic Plan) will be utilized to identify and determine the feasibility of potential leverage points.

11. Conduct joint assessment and alignment of privacy policies at the statewide level and in the Medicaid program.

The MiHIN Shared Services and the Michigan Medicaid program are committed to leveraging existing assets and are all committed to following statewide policies and standards as they emerge. As it is outlined on pages 50-55 of the Strategic Plan, the necessary statewide policy framework will be finalized throughout the course of this cooperative agreement and with Medicaid at the governance board and as a programmatic partner all policies will be aligned.

12. Leverage existing Medicaid IT infrastructure when developing the health information exchange technical architecture.

Pages 13, 14, 34, and 35 of the MiHIN Shared Services Strategic Plan address exactly how Michigan’s Medicaid Management Information System (called the Community Health Automated Medicaid Payment System or CHAMPS) will be utilized and leveraged by the state HIE technical architecture to ensure that it is interoperable statewide.

13. Determine whether to integrate systems to accomplish objectives such as making Medicaid claims and encounters available to the health information exchange and information from non-Medicaid providers available to the Medicaid program.

Michigan Medicaid and the MiHIN Shared Services will utilize the framework for collaboration described on pages 12-14 of the Strategic Plan to further explore this issue and make the appropriate determination.

14. Determine which specific shared services and technical services will be offered or used by Medicaid.

Michigan Medicaid and the MiHIN Shared Services will utilize the framework for collaboration described on pages 12-14 of the Strategic Plan to further explore this issue and make the appropriate determination.

15. Determine which operational responsibilities the Medicaid program will have, if any.
Michigan Medicaid and the MiHIN Shared Services will utilize the framework for collaboration described on pages 12-14 of the Strategic Plan to further explore this issue and make the appropriate determination.

16. Use Medicaid HIT incentives to encourage provider participation in the health information exchange.

It is the intent of the MiHIN Shared Services and Michigan Medicaid to ensure that Michigan’s providers who take advantage of the EHR incentives also take full advantage of the sub-state HIEs that are available throughout the state. Michigan Medicaid is working with the HIT Coordinator, the HIT Commission and the MiHIN Shared Services Governance board to examine which policies, financial incentives or other levers can be utilized to create this cross-participation a reality.

17. Collaborate during the creation of payment incentives, including Pay for Performance under Medicaid, to encourage participation by additional provider types (e.g. pharmacies, providers ineligible for incentives).

Michigan Medicaid and the MiHIN Shared Services will utilize the framework for collaboration described on pages 12-14 of the Strategic Plan to further explore this issue and make the appropriate determination.

2.4 HIE Sustainability Plans
ONC recognizes the importance and challenges of developing a sustainable health information exchange capability. It is essential, therefore, that for the initial submittal of the Strategic Plan, that states and SDEs shall describe initial thoughts for sustaining HIE activities during and after the cooperative agreement period. It is important to consider how to achieve sustainability based on the model being pursued and to incorporate any work that has been done to test the market acceptance of revenue models. The primary focus of sustainability should be on sustaining information sharing efforts, and not necessarily the persistence of government-sponsored health information exchange entities. ONC anticipates that annual updates to the state plans will provide further developed approaches and activities for long-term HIE sustainability.

Pages 22 – 26 of the Strategic Plan and pages 16-21 of the Operational Plan detail the financial sustainability strategy for the MiHIN Shared Services. By examining the lessons learned from HIE initiatives around the nation throughout the MiHIN planning process, the MiHIN Finance and Governance workgroups found several success factors of financial sustainability that are planned to be part of the MiHIN Shared Services. First, the MiHIN Shared Services will provide a limited set of functions that have been identified by the primary customers as services that will demonstrate direct value. Second, the MiHIN Shared Services technology is designed to meet all requirements with the minimum amount of technology. Third, the direct customers of the MiHIN Shared Services will be the majority of the governing entity that makes business and technology decisions.
The result of these three factors is valuable services at low costs to the MiHIN Shared Services customers. Keeping costs low, implementing the minimum necessary and involving the primary customers in governance are key lessons learned that will improve the long-term sustainability of the MiHIN Shared Services.

As discussed in the page numbers referenced above, Michigan’s governance for the MiHIN Shared Services is primarily made up of direct customers – Sub-state HIEs and payers. Both of these stakeholder groups are the direct users of the MiHIN Shared Services. The long-term sustainability strategy is to have the direct customers thoroughly represented in governance of the technical and business operations decisions so that as new services and new costs are added they will be palatable because those paying are those that made the decisions. To add further “checks and balances” to ensure that the entire healthcare community (including consumers) are well represented, the coordinated governance model is balanced with the Michigan HIT Commission, which is described on pages 18 and 19.

Facilitating Services - If the state HIE effort is facilitating the statewide coverage of HIE services using a variety of exchange methods, the state plan shall describe preliminary plans for how sustainability of the HIE market in the state may be enhanced by state or SDE actions including any state policy or regulation. Specific plans for sustainability of any directories or authentication services offered at the state level by the grantee must be addressed during the course of the four-year program.

Pages 16-21 of the Operational Plan detail how Michigan will support the MiHIN Shared Services. In the first two years of implementation, the Cooperative Agreement funding will be utilized. As operations begin, the MiHIN Shared Services will be supported by customers – sub-state HIEs and payers. These customers are the majority on the MiHIN Shared Services Governance Board, which is the organization that is tasked with the full business plan (which includes the plan for sustainability) that has previously been established by the ONC and being due in February of 2011.

Directly Offering Services - If the state HIE effort is directly providing the services, the state plans shall provide preliminary but realistic ideas on who will pay for the services and under what mechanisms (e.g., per transaction fees, subscription models, payers receiving a percentage allocation based on their covered base) The state plan should also consider how program sustainability can be supported by state policy or regulation including payment reforms to incentivize demand for information sharing or contracting requirements to ensure participation of key partners such as labs and pharmacies.

The MiHIN Shared Services plans to provide direct services to sub-state HIE initiatives within the state and to Michigan’s payers. These services are outlined on pages 28-31 of the Strategic Plan. The MiHIN Shared Services is not planning to provide HIE services directly to providers, but instead providing efficiencies and leveraging purchasing power to provide sub-state HIEs with the necessary technologies to offer services to every provider in the state and connect to one another for statewide connectivity.

Pages 16-21 of the Operational Plan detail how Michigan will support the MiHIN Shared Services. In the first two years of implementation, the Cooperative Agreement funding will be
utilized. As operations begin, the MiHIN Shared Services will be supported by customers – sub-state HIEs and payers. These customers are the majority on the MiHIN Shared Services Governance Board, which is the organization that is tasked with the full business plan (which includes the plan for sustainability) that has previously been established by the ONC as being due in February of 2011.

3 Operational Plan

3.1 Executing Strategy for Supporting Meaningful Use

For each of these areas, the Operational Plans shall:

- Outline a clear and viable strategy to ensure that all eligible providers in the state have at least one viable option in 2011;

Pages 32-26 of the Operational Plan describe the strategies for ensuring that all providers in the state have at least one viable option in 2011. Further, the information added in this Amendment in section 2.2 describes the more specific clear strategy for activities that have been introduced in ONC-HIE – PIN – 001.

- Include a project timeline that clearly illustrates when tasks and milestones will be completed;

Pages 6-8 and 32-28 provide the project timeline that clearly illustrates tasks, milestones and interdependencies. The full project plan is available in Appendix F of this Amendment. It is important to note that the timeline in Appendix F is an initial draft, subject to change after a vendor is procured. After a vendor is put in place, the first deliverable of the vendor’s contract will be a highly detailed timeline that lists very specific tasks.

- Provide an estimate of all the funding required, including all federal funding and state funding, used to enable stage one meaningful use requirements;

Pages 17-25 of the Operational Plan provides estimates of all funding that is required for the MiHIN Shared Services – including state funding, private funding and federal funding. The only potential source of funding that was not included in the Operational Plan that was submitted on April 30, 2010 is funding from the Medicaid EHR program. In the Planning – Advanced Planning Document that Michigan submitted for approval from the Centers for Medicare and Medicaid, planning funding for the State HIE Cooperative Agreement was denied by the CMS region five office. At the time of this Amendment, the HIT Coordinator is currently working closely with Michigan Medicaid on the Implementation – Advanced Planning Document to ensure that funding from the EHR Incentive program for the State HIE Cooperative Agreement program is included effectively and appropriately.
• Indicate the role both in funding and coordination of the state Medicaid agency in achieving the state strategy;

The role for coordination with Michigan Medicaid is identified on pages 12 and 13 of the Operational Plan.

The role for funding with Michigan Medicaid is identified in this amendment in section 3.1 and will be further detailed when Michigan’s Implementation – Advanced Planning Document and the Medicaid State HIT Plan is finalized for approval.

• Identify potential barriers and risks including approaches to mitigate them; and,

Pages 9-12 of the Operational Plan detail potential barriers/risks to this project as well as the possible approaches for mitigation.

• Identify desired technical support and coordination from ONC to support the state strategy.

The level of technical support and coordination desired from ONC is addressed in this section of the Amendment. Michigan is requesting that ONC provide technical support and coordination throughout the Cooperative Agreement project period by sharing best practices from other states, holding regular information sessions, communicating frequently with the HIT Coordinator and providing clear expectations. Many of these support and coordination needs are well underway by the ONC and the technical assistance team. Michigan has benefitted from the informational sessions held via web-conference and the in person conference held in May of 2010.

3.2 Project Management Plans
State Operational Plans shall include a robust project management plan with specific timelines, milestones, resources and interdependencies for all the activities in the state’s HIE project. States and SDEs shall explain their project management approach including the project plan tasks that are managed by vendors in order for ONC to judge the comprehensiveness and the feasibility of the plans. State plans should also describe the change management and issue escalation processes that will be used to keep projects on schedule and within budget.

Appendix F of this Amendment contains a robust project management plan with specific milestones, resources and interdependencies. The project management plan in Appendix F is based on the information supplied in the Strategic and Operational Plans that were submitted to the ONC on April 30, 2010.
The project plan has two parts – first, the project plan for the planning phase and the project plan for the implementation phase. The planning phase project plan shows a 100% complete status. The implementation project plan shows an overdue status. The critical interdependency of the implementation project plan is the approval of the Strategic and Operational plans. The project plan was based on the expectation that Michigan would have approval of the Strategic and Operational Plans within eight weeks of submission which is by July 1, 2010. Once the plans are approved there will be new dates in the implementation project plan, but the sequence and duration of the tasks will remain the same.

It is important to note that the timeline in Appendix F is an initial draft with high level tasks. After a vendor is put in place, the first deliverable of the vendor’s contract will be a highly detailed timeline that lists very specific tasks.

The project management approach is outlined in the proposal for the State HIE Cooperative Agreement program that was submitted in October 2009. A summary is provided below:

“The MiHIN Program Office, created in May 2009, is a joint effort of MDIT and MDCH. The MiHIN Program Office has two focus areas—business needs and technical solutions—that work together to inform and present decision points to a Steering Committee made up of state government officials. The MiHIN Program Office will coordinate and align state government involvement in all ARRA HIT initiatives, including the Medicaid EHR Incentives, the Regional Extension Center, and HIT Workforce initiatives. The state HIT Coordinator leads the MiHIN Program Office.

In July 2009, Michigan selected a partnership between Dewpoint Inc. and Strategic Alliance Advisors (s2a) to manage and support implementation of the MiHIN. This team of business, technical, clinical informatics, and project management consultants will staff the MiHIN Project Control Office. The MiHIN Project Control Office will provide oversight management for ongoing project administration, maintaining scope and change control, release planning, release management, risk management, issue management, defect assessment, performance metrics for the Implementation contractor, and periodic participation in project strategy and direction as requested.”

The Michigan Department of Community Health will utilize the MiHIN Project Control Office contract for the purposes described above for the interoperability of the public health systems and Medicaid systems projects. The MiHIN Shared Services Governance Board may leverage the MiHIN Project Control Office contract from the Michigan Department of Community Health in whole or in part for the work described above.

Two key components of the Project Control Office to keep the project on schedule and within budget are the issue resolution and change management processes outlined below. The issue resolution process is critical throughout all aspects of the project. An issue is an identified event that if not addressed may affect schedule, scope, quality, or budget.

An issue log will be maintained and updated with the following minimum elements:
- Description of issue
- Issue identification date
- Responsibility for resolving issue
- Priority for issue resolution (to be mutually agreed upon by the State and the Contractor)
- Resources assigned responsibility for resolution
- Resolution date
- Resolution description

Issues shall be escalated for resolution from level 1 through level 3, as defined below:
- Level 1 – Project Managers
- Level 2 – Executive Stakeholders
- Level 3 – Executive Steering Committee

An issue is an event that requires an action plan to fix a problem that has occurred, or an uncertainty, stated as a question, which needs to be answered so necessary actions can be taken. Issues, or problems, are expected to occur during the course of a project. Any issue has the potential to affect the progress of the project if it goes unresolved, and it may jeopardize the achievement of project deliverables. Issue Management identifies project issues, ensures an owner is assigned, and sets a due date for resolution.

Issue Management provides a mechanism by which team members can surface, escalate, and resolve issues that jeopardize the attainment of a project milestone or causes significant project risk. A successful Issues Management process ensures that issues are documented and managed across the project consistently, and that timely and effective resolution and communication occur. The early detection and resolution of issues is a key project management role, and provides for open communication channels and aggressive approach by the team. If it is determined that in order for the issue to be resolved a change must be made to either scope, schedule or budget, the Change Management Process will be invoked.

The Change Management process is defined as the process to communicate, assess, monitor, and control all changes to schedule and budget. The change management procedures will handle such things as “out-of-scope” requests or changing business requirements while the project is underway.

Throughout the life of a project, new requirements may be discovered, deliverables may change, and sometimes reasons to make adjustments to the scope of work are identified. Although change is inevitable, a structured Change Management process, when implemented properly and executed consistently, can aide in setting, managing, and more importantly, meeting, stakeholder expectation. The rigorous implementation of a Change Management process is an essential component in controlling the scope of the project. Managing changes to the baseline project schedule is accomplished by incorporating only vital changes, which are documented and approved through the change control process. This is an iterative process which is triggered through the submission of change requests.

The purpose of a Change Request is to document, track, and control any changes to the project or adjustments to the agreed-upon scope of work for the project. A change may or may not impact the cost or schedule of the project. The Change Request provides a documented trail of changes, and provides information for the assessment of time, resource availability, and cost impact of the change (if any). Change Requests may also be used to document the removal of functionality or a reduction in cost.

The project team members will submit a Change Request under the following circumstances:
3.3 Risk Assessment
Managing risk is an important element of successfully building HIE capacity to support meaningful use. Within their Operational Plans, States and SDEs shall identify known and potential risks and describe their risk mitigation strategies. Risks should be prioritized using risk severity and probability. Examples of risks that may be included are: changes in the HIE marketplace, evolving EHR and HIE standards, lack of participation of large stakeholders including Medicaid, breach of personal health information.

The MiHIN Shared Services Operational Plan contains a complete risk assessment that prioritizes the probability, details the impact of the risk and provides mitigation strategies on pages 9 through 12.

3.4 HIE Architecture and Standards
Within the operational plans, States and SDEs shall describe the technical approach taken to facilitate data exchange services within the state based on the model being pursued.

Pages 29-36 of the Operational Plan and Pages 26-38 of the Strategic Plan detail the approach Michigan is taking to facilitate data exchange services statewide.

- Facilitating Services - If the state HIE effort is facilitating the statewide coverage of HIE services using a variety of exchange methods, the state plans shall describe the approach of obtaining statewide coverage of HIE services to meet meaningful use requirements and also the processes or mechanisms by which the state or SDE will ensure that the HIE services comply with national standards.

Pages 29-36 of the Operational Plan and Pages 26-38 of the Strategic Plan detail the approach Michigan is taking to facilitate data exchange services statewide. Specifically, pages 32-24 of the Strategic Plan and pages 30-31 of the Operational Plan detail how the MiHIN Shared Services will comply with national standards. Page 31 of the Operational plan specifically addresses the approach for meeting meaningful use requirements as they evolve.

- Directly Offering Services - If the state HIE effort is directly providing or provisioning services (including shared directories or provider authentication services) the state plans shall provide either the detailed specifications or describe the process by which the detailed specifications will be developed. For those plans that don't have a detailed architecture, the updated Notice
The MiHIN Shared Services is planning to provide shared directories and so the detailed specifications and the process for further defining specifications can be found on pages 26 -38 of the Strategic Plan. As part of the MiHIN Shared Services planning process, detailed specifications were drafted and are available in Appendix H "MiHIN Shared Services Interoperability Specifications" and Appendix I "MiHIN Security Architecture and Requirements."

The approach for developing these detailed standards and specifications included subject matter experts and a workgroup made up of technical experts from a diverse array of Michigan’s healthcare systems (described on page 65 of the Strategic Plan). Also, a “Vendor Technical Collaboration Team” was created so that HIT and HIE vendors could provide specific input to standards and specifications that would create a highly interoperable technical environment. To mitigate any conflict of interest in potential procurement processes, the State of Michigan did not sponsor the Vendor Technical Collaboration Team. More information about the Vendor Technical Collaboration Team can be found in Appendix K.

The use of standards to support HIE enabling technology is a critical aspect of this program and needs to be part of a longer-term framework to support interoperability. Due to the evolving nature of health information technology, standards, requirements related to meaningful use, and standards adoption, there should be an explicit mechanism specified in state plans that ensures adoption and use of standards adopted or approved by the Department of Health and Human Services (HHS) as well as the appropriate engagement with ONC in the ongoing development and use of the NHIN specifications and national standards to support meaningful use. The plans should also explain how the states will encourage any vendors or service providers to follow national standards, address system modularity, data portability, re-use of interfaces, and vendor transition provisions.

The MiHIN Shared Service Operational Plan addresses the specified issues on pages 29-31 and 38-39. Michigan is committed to engage ONC in the ongoing development and use of NHIN specifications and national standards to support meaningful use. Further, the guiding principles listed on page 16 for Governance and on page 27 for Technology specifically address strong commitment to utilize national standards in Michigan. Appendix H “MiHIN Shared Services Interoperability Specifications” illustrates Michigan’s proposed reliance on national standards. The procurement process will require MiHIN Shared Services vendors to follow national standards and interoperability principles.

Michigan, through the Michigan HIT Coordinator, will continue to examine potential policy levers and work directly with technology stakeholders and trade organizations to find effective ways to encourage all vendors or services providers to follow national standards and interoperability principles. The Michigan HIT Commission has technology vendor representation and as part of the MiHIN Coordinated Governance Structure will be a key resource to developing such policies.
3.5 Privacy and Security

Within the Operational Plans, States and SDEs shall develop and fully describe their privacy and security framework including the specific policies, accountability strategies, architectures and technology choices to protect information. The state privacy and security framework shall be consistent with applicable federal law and policies. To assist the states, ONC will provide guidance on security and privacy policies and programs in the near future. The state plan shall contain a description of the analysis of relevant federal and state laws as related to HIE and the plans for addressing any issues that have been identified. If an analysis hasn’t been done, the state or the SDE shall provide a description of the process and the timeline for completion. Furthermore, states should describe the methods used to ensure privacy and security programs are accomplished in a transparent fashion. If a complete framework is not available, the state or the SDE shall describe the process they will use to fully develop such a framework.

On pages 47-55 of the Strategic Plan and pages 40-44 of the Operational Plan Michigan lays out a privacy and security framework that will evolve overtime. A full analysis of state and federal laws that pertain to health information exchange can be found in section 6.2 Appendix: Comparative Analysis Matrix in the Appendix of the Strategic Plan. The findings from this analysis are address on pages 51-55 of the Strategic Plan. Appendix 2 of the Operational Plan offers detailed privacy and security policies that address access, authentication, individual choice, audit, authorization and breach. This framework will continue to develop as described on pages 40 – 41 of the Operational Plan.

The technology sections of the Strategic and Operational Plans illustrate Michigan’s technology choices and considerations regarding privacy and security. See pages 29-31 of the Operational Plan and pages 26-39 of the Strategic Plan for more details. Appendix I of this amendment “Michigan Information Security Architecture and Requirements” also provides detailed security specifications, technology choice considerations and requirements.
August 1, 2010

David Blumenthal MD, MPP
National Coordinator for Health Information Technology
Department of Health and Human Services
200 Independence Avenue, S.W.
Washington, DC 20201

Dear Dr. Blumenthal:

I am writing this letter to express my strong support for and coordination with the Michigan Health Information Network (MiHIN), which is the name of Michigan’s project under the State Health Information Exchange Cooperative Agreement.

In Michigan, the Medicaid Agency is part of the Michigan Department of Community Health, which is the prime applicant on the State HIE Cooperative Agreement. As such, Michigan’s Medicaid Agency has been supportive with direct involvement in the MiHIN from its beginning in 2005.

Medicaid has been at the table when health information technology is planned and implemented statewide in Michigan and locally, as well. Michigan Medicaid has taken a policy stance that supporting Health Information Technology and HIE is right for our beneficiaries, our providers and our entire state.

To put this policy into action, Michigan Medicaid has historically offered incentives for Medicaid health plans to participate in local Health Information Exchanges and has been actively encouraging e-prescribing in Michigan. Michigan Medicaid is working closely with the MiHIN to respond to all HIT opportunities under the American Recovery and Reinvestment Act of 2009 in a coordinated manner. As Michigan’s Medicaid Director, I have assigned top staff to explore options for leveraging resources, funding and other policy levers to promote HIT and HIE throughout Michigan. Further, I am prepared to ensure representation from Medicaid on the MiHIN governance board.

I am pleased with the progress and stated direction of the MiHIN and Michigan Medicaid is committed to working with all partners to guarantee success.

Sincerely,

Stephen Fitton
Director
Medical Services Administration
5 Appendix B: State of Michigan HIT Adoption Analysis

Adobe Acrobat Document

File inserted on next page
MICHIGAN HIE & HIT
TECHNICAL ENVIRONMENT
ANALYSIS

April 5, 2010
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Executive Summary

Health Information Exchange (HIE) is occurring on an ever-expanding 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.

The Michigan Health Information Network (MiHIN) aims to optimize the performance of the healthcare delivery system in Michigan by enhancing information exchange capabilities between trading partners. Enhanced integration of business processes and IT systems across the marketplace of trading partners is expected to optimize the efficiency, quality and safety of healthcare delivery.

Given limited resources, stakeholders place a high priority on maximizing the value generated from early-stage investments. Maximizing early returns of MiHIN requires that the analysis used to drive prioritization and scoping decisions is able to identify strategies with the greatest likelihood of benefit, thus further validating the value proposition for regional interoperability, and bootstrapping follow-on investments intended to scale-up and scale-out the infrastructure.

The purpose of this document is to inform the planning and implementation of MiHIN. It presents a set of surveys, methods, and results divided into several tiers of focus: Business, Information, Application, Integration, Technical and Security. The high level tiers of Business, Information and Application outline the broad categories of services provided and potential data. As we move through the tiers towards Integration, Technical and Security, we add detail and include technical capabilities that enable the exchange of information electronically. By analyzing using tiers, we can assess the complexity of exchanging health information at that tier.

Extensive data was gathered in this effort and the confidentiality and protection of sensitive operational information has been a crucial aspect in our use of identified data. The data presented in this analysis has been de-identified or aggregated to preserve that confidentiality. Abstracting the data provides an analysis free of any assumptions or misconceptions that may be attached to a given organization and allows the analysis to be informed simply by the facts of analysis. When the facts may be interpreted in differing ways, the analysts relied on their experience in the domain and the information gathered during the interview process to make their judgments.
Survey Methodology and Scope

The information presented in this document was gathered through two surveys: one short survey of Early Adopters of Health Information Technology or Health Information Exchange in the State of Michigan asking for basic services rendered, types of data exchanged, and barriers to exchange; and a subsequent, extensive Technical Assessment survey which provided detailed information on applications, data types, integration and security capabilities. Concurrent with the surveys, in-depth interviews to fully understand Michigan’s capacity for HIE and HIT.

Early Adopter Survey

The Early Adopter survey was the initial, short survey sent to over 80 organizations thought to be technically advanced was conducted in late August/early September 2009. There were two goals:

1. To validate that the information currently compiled on the organizations thought to be technically advanced was accurate and to select the most advanced for subsequent surveys and interviews.
2. To create, through analysis of survey data, broad statements about the demographics, business and technical capabilities, current HIE activities and levels of commitment to further enabling HIE through the MiHIN project.

The complete survey can be found in the Appendix. The questions asked for information regarding:

1. Demographics: Name, location(s), organizational type and brief description, affiliations (if any)
2. Number of patients, insured lives, providers, beds as appropriate to the organization
3. Importance of HIE to organization
4. Types of HIE activities currently performed (e.g. Claims, Lab orders/results, eRx, etc) and significant exchange partners
5. Barriers to HIE encountered
6. Current participation in a RHIO/HIE
7. Top problems by category (Administrative, Financial, Clinical, Quality and Population Management)
8. State of current HIPAA mandated Risk Analysis
9. Current use of Health Information Technology (EHRs, eRx, interface engines, etc)
10. Existing interfaces (billing, clinical) and patient indexes
11. Impact of ARRA legislation on HIT/HIE plans

A total of 32 organizations responded to the Early Adopter survey. Responses came from a variety of organization types including:

- Health Systems
- Critical Access Hospitals
- Community Hospitals
- Post Acute Care Facilities
- Employer Based Clinics
- Physician's Offices
• Multi-Specialty Groups
• Community Health Centers
• Behavioral Health Centers
• Ancillary Service Providers
• Community HIEs
• RHIOs
• Payer/Health Plans
• Indian Health Services
• Telehealth Networks
• Public Health Departments
• Health Coalitions
• Home Care Organizations, VNAs, Nursing Homes.
• Purchaser initiatives
• Health Information Exchanges

The organizations covered all of Michigan’s regions:

<table>
<thead>
<tr>
<th>Region/MTA</th>
<th>Number of Responders with HQ address in this Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Peninsula</td>
<td>1</td>
</tr>
<tr>
<td>Northern Lower</td>
<td>1</td>
</tr>
<tr>
<td>Central/MiHIA</td>
<td>8</td>
</tr>
<tr>
<td>Greater Flint</td>
<td>3</td>
</tr>
<tr>
<td>SEMHIE</td>
<td>5</td>
</tr>
<tr>
<td>SouthCentral</td>
<td>7</td>
</tr>
<tr>
<td>CA RHIO</td>
<td>3</td>
</tr>
<tr>
<td>Southwest</td>
<td>2</td>
</tr>
<tr>
<td>West</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>32</strong></td>
</tr>
</tbody>
</table>

One of the items of interest was the level of commitment to implementing HIE in the surveyed organizations. This was measured by the level that a responder’s HIE Champion was drawn from, with higher level management signifying a stronger commitment to HIE. The results show a high level of commitment indicated by a plurality of C-level HIE champions:

HIE Champion:

<table>
<thead>
<tr>
<th>Champion</th>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C Level</td>
<td>13</td>
<td>CIO, Sr VP, etc</td>
</tr>
<tr>
<td>D Level</td>
<td>10</td>
<td>Director</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

1 Several health systems were present in multiple MTA regions.
To further rank the importance of HIE, we asked current prioritization and participation in HIE and related activities:

- 63% rank HIE in their top 5 priorities
- 10% rank HIE as their #1 priority
- 57% currently participate in an HIE
- 90% of responders will participate in Medicare/aid incentive programs
- 90% will commit in-kind resources to the MiHIN project
- 96% are willing to provide a Letter of Commitment
- Top Reported current HIE Activity: Lab Results
- Top Barrier to HIE: Money to implement, followed by Sustainability

Public polls have repeatedly shown that privacy and security are the number one public concern regarding health information exchange. We used the existence of an up to date HIPAA mandated Risk Assessment to indicate that the organization also followed security best practices. A Risk Assessment provides the basis for an organization to build and operate the appropriate security infrastructure to protect health data. It is a security industry best practice to update your organizations risk assessment yearly. Our survey results show that security practices need effort to achieve best practices compliance.

<table>
<thead>
<tr>
<th>Last HIPAA Risk Assessment</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>16</td>
</tr>
<tr>
<td>2008</td>
<td>5</td>
</tr>
<tr>
<td>2007</td>
<td>2</td>
</tr>
<tr>
<td>before 2007</td>
<td>4</td>
</tr>
</tbody>
</table>

We also wanted to gain an understanding of what surveyed organizations think are the problems HIE will solve. Responses outside of the possibilities we considered would inform us of unique needs in Michigan or a misunderstanding of what HIE can do. Also of interest was the frequency of problems: were organizations sharing common problems, or was there a diversity of problem sets?

- Top Problems thought solvable by HIE in each area
  - Administrative: Eligibility Checking (strong response)
  - Financial: Duplicate Testing (strong response)
  - Clinical: Lack of previous clinical documentation (strong response)
  - Quality: Readmissions, DSS
  - Population Management: Chronic Disease Management, Rx compliance

The responses show a significant (generally 70% or more) reporting of the same problem in multiple categories, especially Financial/Administrative and Clinical/Financial with eligibility and duplicate testing as the most reported respectively. Other areas had same phenomena.

We also wanted a high level overview of technical capabilities to see which areas would require the most development to build capacity. In general, the responses show a good capability for billing and administrative functions, a fair capability for clinical data work, and substantial number reporting EMR use, but a significant (43%) number reported uncertified EMR use. One would expect healthcare IT early adopters to have a significant number of EMR users and their EMRs to be certified. EMR certification is the best indicator that the EMR is capable of engaging in standards based health information exchange.
Technical Overview:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Percentage</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMR Use?</td>
<td>71% yes</td>
<td>Of all respondents</td>
</tr>
<tr>
<td>CCHIT Certified EMR Use?</td>
<td>57% yes</td>
<td>Of all respondents- 43% use no EMR or an</td>
</tr>
<tr>
<td></td>
<td></td>
<td>uncertified EMR</td>
</tr>
<tr>
<td>Top EMR systems by reported use</td>
<td></td>
<td>Cerner, Epic, Allscripts, NextGen, GE - In</td>
</tr>
<tr>
<td></td>
<td></td>
<td>order of prevalence</td>
</tr>
<tr>
<td>eRx?</td>
<td>64% yes</td>
<td></td>
</tr>
<tr>
<td>Remote Access to Clinical Data?</td>
<td>89% yes</td>
<td></td>
</tr>
<tr>
<td>Interface Engine</td>
<td>79% yes</td>
<td></td>
</tr>
<tr>
<td>Interfaces</td>
<td>% yes</td>
<td></td>
</tr>
<tr>
<td>Billing/Claims</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>Patient Demographics</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Results</td>
<td>67</td>
<td></td>
</tr>
<tr>
<td>HL7</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>Orders</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>Clinical Documentation</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>MPI?</td>
<td>67% yes</td>
<td></td>
</tr>
</tbody>
</table>
We also wanted to get an understanding of the self reported activity in HIE activities of interest to the Federal government. These were:

![Bar chart showing the percentage of organizations engaged in various HIE activities.]

The responses show that a fair number of responding organizations are engaged in activities of interest, but that significant percentages (greater than 30%) are not engaged in HIE in areas other than claims and eligibility. That shows that even those reported as being the most advanced have a significant number of transactions to migrate to electronic methods.

The Early Adopter survey did not gather detailed information regarding usage of National HIE and Vocabulary Standards.

**Technical Assessment Survey**

The results of the Early Adopter survey allowed a list of Early Adopters to be created for the subsequent longer and more extensive Technical Assessment survey. (See Appendix for the complete list of questions.) Additional recipients were identified through interview activities at MDCH to gain a detailed understanding of the current HIT/HIE environment in Michigan. Included were a diversity of organization types (provider, payer, RHIO, Public Agency) and geographic locations while including organizations servicing as much of the health population as possible. Some organizations that were not
in the original Early Adopter survey were added as their potential status as an Early Adopter become known. The following organizations were sent a survey. The list is grouped by organization type.

**Technical Assessment Recipient List**

<table>
<thead>
<tr>
<th>Lifeways</th>
<th>Behavioral Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pathways to Health Initiative (Battle Creek Registry)</td>
<td>Community Chronic Disease Registry</td>
</tr>
<tr>
<td>Jackson County Medical Record (JCMR)</td>
<td>Community HIE</td>
</tr>
<tr>
<td>A3HIE</td>
<td>Community HIE</td>
</tr>
<tr>
<td>Michiana</td>
<td>Community HIE</td>
</tr>
<tr>
<td>MSMS Connect</td>
<td>Community HIE</td>
</tr>
<tr>
<td>My1HIE</td>
<td>Community HIE</td>
</tr>
<tr>
<td>Spectrum Health/Medicity HIE (Michigan Health Connect)</td>
<td>Community HIE</td>
</tr>
<tr>
<td>Harbor Beach Community Hospital</td>
<td>Critical Access/Long Term care</td>
</tr>
<tr>
<td>Herrick Medical Center</td>
<td>Critical Access</td>
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<tr>
<td>Dow Chemical</td>
<td>Employer Health System</td>
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<tr>
<td>Southeast Michigan ePrescribing Initiative (SEMI)</td>
<td>ePrescribing</td>
</tr>
<tr>
<td>Kent County Health Department</td>
<td>Health Department</td>
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<tr>
<td>Bronson</td>
<td>Health System</td>
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<tr>
<td>Henry Ford Health System</td>
<td>Health System</td>
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<tr>
<td>Trinity Health System</td>
<td>Health System</td>
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<tr>
<td>Metro Health</td>
<td>Health System</td>
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<td>Borgess</td>
<td>Health System</td>
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<tr>
<td>Detroit Medical Center (DMC)</td>
<td>Health System</td>
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<tr>
<td>University of Michigan Health System</td>
<td>Health System</td>
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<tr>
<td>Munson</td>
<td>Health System</td>
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<tr>
<td>Oakwood</td>
<td>Health System</td>
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<tr>
<td>Marquette GH</td>
<td>Health System</td>
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<tr>
<td>St. Mary's</td>
<td>Health System</td>
</tr>
<tr>
<td>Indian Health Services(IHS) Lac Vieux Desert Clinic</td>
<td>Indian Health Service</td>
</tr>
<tr>
<td>Blue Cross Blue Shield</td>
<td>Payer</td>
</tr>
<tr>
<td>Upper Peninsula Health Care Network</td>
<td>Regional HIE</td>
</tr>
</tbody>
</table>

A large number of health systems were selected to receive the Technical Assessment survey for a number of reasons:

1. In the healthcare industry, health systems provide a diversity of services to a wide segment of the population, both inpatient and ambulatory. This is also true in Michigan.
2. The initial Early Adopter survey had many responses from health systems indicating that they were the most numerous type of organization with advanced HIE capability.
3. Health Systems cover a wider geographic area. Other organization types tend to be highly localized.
4. The other organization types tended to have few members which were thought to have HIE capabilities. This thinking was informed from the results of the initial Early Adopter Survey and information from MDCH.

Of the 27 Technical Assessments sent, 18 responses of some nature were received. Of the 18 responses, 11 of them were of sufficient detail (“substantive”) to be used for analysis. The majority of detailed results were from health systems. This is compatible with our earlier observation that the majority of health information exchange capability is in health systems.

Interviews were also conducted, some as follow-ups to the Technical Assessment response, some as the only information gathering tool. The format of the interviews tended to be mutual presentations: the MiHIN PCO presenting their conceptual architecture and responding to questions and the interviewee presenting on their perceived HIE needs, capabilities and “fit” in a backbone plan. Interviews occurred with

- BCBSM
- JCMR/Allegiance Health
- MPCA
- DMC
- UMHS
- my1HIE
- Trinity Health
- Michigan Health Connect
- MSMS

During the interviews, issues for follow-up were identified. In general, interviewed organizations did not respond to requests for follow-up information, including requests acknowledged with intent to respond.

No substantive response or subsequent interview occurred for the following organizations:

- Pathways to Health Initiative (Battle Creek Registry)
- A3HIE
- Michiana
- Harbor Beach Community Hospital
- Southeast Michigan ePrescribing Initiative (SEMI)
- Kent County Health Department
- Bronson
- Henry Ford Health System
- St. Mary's
- Indian Health Services(IHS) Lac Vieux Desert Clinic

When the organizations were queried on lack of response, the dominant reason given was lack of time and other resources to respond in a meaningful fashion.
Based on the previous responses from surveyed organizations, the demographics regarding the number of physicians, patients, beds, along with the geographic distribution of responders, is about the same as the Early Adopter Survey. The significant representative response indicates that the information from the responses is an adequate basis for analyzing the capabilities for health information exchange in Michigan.

Survey Results Analysis by Organization Type

On the supply side, the analysis will focus on two primary categories of early adopter provider networks within the nine trading markets (MTAs): Health Systems and Regional Health Information Organizations (RHIOs). Behavioral Health/Managed Care and Public Health networks will not be a focus because survey responses were limited.

Health Systems and RHIOs are similar in that both are actively involved in healthcare delivery, usually involving multiple trading partners and multiple facilities of various types distributed across a geographical region. These principle types of early adopters differ insofar as Health Systems are networks of facilities that are owned and operated by single entities, while RHIOs represent networks of organizations that are separately owned and operated. Because the RHIO members serve a common patient population, they have a common incentive as trading partners to collaboratively pursue better business and IT integration. A detailed description of each, along with survey analysis results is presented below.

Health Systems

A Health System is an organization that operates multiple, geographically-distributed healthcare facilities and typically provides a combination of primary, secondary and tertiary healthcare services. Within the State of Michigan, most Health Systems tend to operate within a single Medical Trading Area (MTA), with a few exceptions. A single MTA will typically include more than one Health System.

Health Systems may directly employ providers for delivery of professional services; more typically, a Health System will form business relationships with multiple, independent provider organizations; these community-based providers will either refer patients for services to the health systems, or, if granted staff privileges, will directly render patient care services at the Health System's facilities. Independent providers will typically maintain referral relationships with multiple health systems.

Survey results analysis shows this organization type is the dominant sector. This dominance applies to volume and diversity of services rendered, staffing levels and capabilities and
financial resources. They also provided 9 of 11 substantive responses to the Technical Assessment survey. Any plans for HIE must include health systems.

The majority of reported technical staff is to be found in health systems with several thousand IT professionals reported in the areas of programming, interfacing, systems and security administration and technical project management. This reported staff comprised 78% of all IT staff reported by responders. All health systems reported capabilities in HIE related technologies such as Web Services, HL7 and data interfacing.

Health Systems have the greatest capacity for HIE, expressed in terms of both applications, staff skills and ability to interface disparate health data sources.

**Regional Health Information Organizations**

Region based health information organizations (RHIOs) performing HIE on behalf of the public at large are generally at the planning stages in the State of Michigan. This would accord with the eHI stage of 3. Two regions that were surveyed, the Capital Area RHIO (CARHIO) and the Upper Peninsula HIE, have both begun the implementation stages of HIE.

In the CARHIO, a vendor solution to HIE has been selected, a product by Axolotyl. Currently, CARHIO is installing Edge servers to gather health information from participating healthcare organizations to test interoperability while finalizing detailed adoption, sustainability and governance plans. The majority of healthcare organizations in the region are participating and providing funding for the implementation.

In the Upper Peninsula, a self developed approach to building HIE capability has been pursued. Substantial work has been done to create a robust security framework that will provide the basis for the exchange of health information in the Upper Peninsula of Michigan.

Both regional solutions point to the diversity of priorities and possibilities of solutions to enable HIE. Both regions are achieving HIE not only in the methods desired by the consumers of health information in the region, but in accordance with the non-clinical stakeholders such as patients, employers and local government. In large part, the experiences of the Regions are informing the shared capabilities planned for the MiHIN, namely state-wide master patient index (MPI), Record Locator Service (RLS), Security Services (auditing, federated authentication and authorization), Public Health Reporting service, and a Messaging Gateway. State-wide services enable economies of scale and avoid replication of functionality where requirements and utilization may not require replication.

**Organic Growth**

Organic growth of HIE has been documented in predominantly two geographic areas, the greater Ann Arbor and greater Grand Rapids areas. Organization such as my1HIE provide the
services in demand by independent providers and independent provider organizations, which are in large eRx and registry services to enable better patient care while receiving incentive money for doing so. Medicare eRx incentives, along with large payer incentives Patient Centered Medical Home initiatives, are having their desired effect: the use of HIE to improve patient care and reduce costs. MSMS Connect, an initiative by the Michigan State Medical Society, has achieved some use for many of the same purposes from its inception at the start of 2009 and has the potential to be used by all 16,000 members of the Michigan State Medical Society.

The organic growth of HIE, both as a Region sponsored effort and as commercial or provider group effort show the need for HIE as a fundamental business requirement in the State. The capabilities shown in the State may be predominantly in older standards and require efforts to share in a standards based fashion, but the availability of a variety of document types in some variety of these older standards, coupled with strong integration tier capabilities, provides a basis for exchanging data in the state of the art manner shown by the HITSP specifications, IHE standards in congruence with the ONC vision for HIE in the United States. The foundation is there; the next step is to build the standards based bridges to meet the organically growing need for HIE.

Survey results analysis shows this organization type is focused on providing services to physicians. Areas of demand are for ePrescribing and registry services to meet provider needs for incentive money. Adding capability to meet expected demand caused by Meaningful Use incentives, generally lab results and clinical document exchange. Clinical document exchange was generally focused on referrals and inpatient admissions. There are early community HIE efforts to exchange data between health systems and physicians as shown by a project between my1HIE and the Detroit Medical Center.

This sector reported fewer than 100 IT professionals engaged, the majority being programmers and interface administrators. All reported capabilities in HIE related technologies such as Web Services, HL7 and data interfacing.

Several organizations in this area did not respond to the surveys. Some were reported by third parties to be experiencing difficulties in financial or organizational sustainability. We can infer that it is difficult to sustain community HIE distinct from being part of a clinical organization.

**Behavioral Health/Managed Care**

Behavioral Health/Managed Care provided extensive responses to the Early Adopter survey but only partial responses to the Technical Assessment survey. Reported staffing levels were low, with less than 50 IT staff reported for the sector. The staff were generally reported as lacking in skills for HIE related technologies. Several responding organizations report the use, or intended
use, of other resources to build HIE capacity. Those external resources were generally a health system or provider network associated with a health system. The inference is that smaller, locality focused organizations will rely upon larger organizations, generally health systems, to provide HIE capabilities.

**Public Health**

Public Health included Critical Access, Registries, Health Departments and Health Services. In general, responses were non-substantive responses from this sector. Those organizations which responded to queries regarding their lack of substantive response reported that their critical constraining factors are time and money. This also leads to their depreciation of participation in health information exchange due to lack of resources. One notable exception are the Federally Qualified Health Centers (FQHCs) in Michigan, which are currently engaged in implementing EHRs on all Michigan FQHCs and beginning to plan for health information exchange. The health information exchange is initially planned to be the exchange of clinical documents, generally clinical histories and problem lists, between FQHCs. Future plans include data exchange with local referral partners and inpatient centers.

**Survey Results Analysis by Capability**

In general, organizations need the ability to both format and transport health information in a nationally recognized standard. These nationally recognized standards (“National HIE Standards”) have generally been documented by HITSP and subsequently listed as required for certification of Electronic Health Record (EHR) software. Certification criteria were originally developed by Certification Commission for Healthcare Information Technology (CCHIT). Currently, the federal government through the Office of the National Coordinator (ONC) in the Department of Health and Human Services has established criteria for the capabilities required to meet Meaningful Use incentive program requirements.

In the core National HIE Standards (e.g. CCD, HL 7 v.3, IHE) 15% of respondents are currently compliant with those standards, 52% plan to comply within the next 3 years, and 33% have no plans to implement these standards.

Of particular interest is the ability to create and consume CCD documents. CCD documents are meant to be the cornerstone of the document centric vision of future HIE. A CCD will be the data payload containing the lab result or other clinical information. Currently, 18% of respondents could create and consume CCD documents, 55% plan to implement within the next year and 27% have no plan to implement CCD.
Older standards, such as HL7 v 2.x were supported by 100% of the respondents. All organizations that engage in fee for service activities are capable of using the electronic billing standards of ANSI X12.

Of potentially critical importance is the certification status of an organization’s EHR system. As more functionality to engage in health information exchange is added to Electronic Health Records, the ability of any given provider using an EHR to engage in health information exchange increases. Of reporting organizations, 64% responded that their EHR was currently CCHIT certified.

The ability to exchange the data in a national standard and avoid the use of interfaces is lagging meaning that the data will have to be sent through a messaging gateway for those unable to use the core National HIE Standards. This process could be done at a RHIO or community HIE level. The cost/benefit of including the ability to interoperate these messages at the backbone level should be explored.

Aside from a need to be able to format and transport health information, the information contained in the message must be in a format that can convey meaning across organizations. This is accomplished by normalizing the data using nationally recognized standards (“National Terminology Standards”). Currently, the core National Terminology Standards focus on LOINC, SNOMED and RxNORM. These standards provide a common vocabulary that enables the information to convey meaning from any entity using the standard to any other entity using the standard.

In ability to normalize data using National Standards (LOINC, SNOMED, RxNORM) 87% report the ability to normalize data, 5% plan to implement the ability to normalize data within three years, and 8% have no plan to normalize data. Of particular interest are LOINC codes, which can convey meaning between interoperating organizations. A majority (91%) of organizations were capable of, or planned capability for, using LOINC codes.

Normalization is largely possible, enabling the ability to exchange lab results and clinical documents with the meaning still intact and usable by electronic systems.

**Staffing Analysis**

The majority (76%) of workforce capacity is in health systems. Payers provide the second largest (21%) of the available HIT workforce. Other surveyed sectors (Ambulatory Care and Public Health/HIE/Other) comprise 2% and 1% respectively of reported HIT workforce capacity. The conclusion that can be drawn is that the staff capacity to build health information exchange is largely in health systems.
Overview of HIE Standards and Specifications

The current technical environment for HIE has been specified in large part by HITSP. In turn, HITSP has adopted the standards promulgated by IHE to build the basis for the interoperability of health information. Many of the IHE standards are lacking widespread implementation in the real world.

The Federal Government has guided the activities of HITSP through the department of Health and Human Services (HHS) in general, which formally adopts the work products of HITSP, and through the Office of the National Coordinator (ONC), a part of HHS tasked with enabling HIE in the United States and which oversees and guides the activities of HITSP. The HHS has also promulgated its clinical goals for healthcare and expects HIE to enable those goals. These clinical goals are promulgated in the Meaningful Use criteria, which received formal Federal approval in Dec, 2009. Meaningful use will be met by provider use of Electronic Health Record systems (EHR) which will use HIE to share and access information wherever it may be located. The access will occur according to federally adopted specifications, generally the HITSP specifications. To be fully engaged with the current Federal vision for healthcare IT, HIE must enable the document centric health information exchange through the Federally adopted HITSP standards.

The ability to exchange the data electronically is limited by lack of standardization of the data. The current standards in use, generally HL7 v.2.x, ICD9 and CPT, are lagging behind the specifications set by HITSP. The HITSP standards generally define the approach the Federal Government is taking to enable health information exchange in the United States. Failure to utilize the federal standards creates barriers to interoperability at a national level and makes local interoperability a matter of convenience the parameters of which may not extend to the next required exchange of data. The goal of standards based HIE is to create better clinical outcomes and containing cost growth through standardized, replicable exchange of data. The next step is to build the standards based bridges to meet the organically growing need for HIE.

Business Architecture

The Business Architecture tier comprises services and their business requirements. These characteristics explain the activities independent of the technical solutions that enable the activities. Since the focus of this document was to be a technical analysis, the business architecture is at a high level, pointing out the common services and requirements of the organizations responding to the surveys. The value in this tier is that requirements are documented and analyzed free of assumptions implicit in the current technical solutions. Context for the Business Architecture tier can be found in the Business Architecture Appendix.
Information Architecture
The Information Architecture tier comprises the set of data types or classes gathered by the services existing at an organization. The information available informs us on the types of documents available for exchange in a document-centric health information exchange model, such as the one proposed by the ONC. Of interest are responses that show the availability of document types, again exception for notable psychiatric data. The documents shown to be available by the survey results will inform decisions on which health information data will be most quickly shared. If a document type doesn’t exist, then the ability to create an electronic document will have to be created. If the underlying application also does not exist, then the application may have to be procured and implemented first.
Health systems generally provide a relatively large number and variety of patient care services. As a result, these organizations tend to maintain fairly comprehensive patient health information. This includes:

- inpatient acute-care records for patients hospitalized at their facilities
- records for specialized diagnostic or treatment services rendered to inpatients, outpatients as well as ambulatory or same day surgery patients
- long-term care records for patients admitted to nursing facilities
- emergency department facilities and may operate affiliated community-based urgent care facilities
- information relating to inpatient care, emergency care or specialized diagnostic services

An inpatient hospitalization may generate very large amounts of information, at a detailed level of granularity. To support post-discharge continuity of care, such information does need to be synthesized and summarized. The discharge summary is a key piece of information required to support post-hospitalization care. Of the information contained within the discharge summary, the discharge medications represent the most important information. For discharged patients who seek emergency care subsequently, the discharge medications represent a high priority.

Other aspects of the inpatient course, such as reports of diagnostic tests or therapeutic or surgical procedures are also important.

**Application Architecture**

The Application Architecture tier comprises the set of Computer Applications that an organization has to perform services in a functional area. Functional areas may be clinical, such as a Cardiology application or PACS application. They may serve administrative purposes, such as a Registration or Billing Application. Some applications, such as a Master Patient Index (MPI), may be used by both clinical and administrative applications. In the case of a Master Patient Index, it enables the correlation of identity across clinical and administrative systems to enable a consistent patient view to avoid clinical and business errors. These applications tell us what information may be in an electronic format and potentially available for health information exchange. If no application exists, then even if a service is performed, the data will not be available to electronic systems. The application tier tells us what types of data may be available.
APPENDIX B: State of Michigan HIT Adoption Analysis

Systems Inventory Graph
Data gathered from the Technical Assessment survey shows that most organizations have applications for a majority of clinical uses with the exception of psychiatric systems and data. Most organizations have an MPI, meaning the basic functionality to match up patient identity largely exists across the State. The issue will entail the ability of these MPI systems to interoperate. The ability to interoperate is usually a matter of effort and money. The absolute constraining factor for any electronic health information exchange is the lack of an application to capture the data. In general, there is capacity to capture the data with the noted exception of Psychiatric data.

**Health System Application Topology**

The degree to which a Health system employs a common set of applications across the enterprise will directly affect the level of effort required to implement this common subset of HIE use cases.

The greatest variability in the amount of effort required to participate in HIE is determined by the degree to which the Health System uses centralized IT systems across the multi-facility enterprise. The presence of multiple vendor systems for key functions, or the presence of multiple deployed instances of a single vendor system across facilities, increase the number of interfaces involved in data exchange, and directly affects the cost of initial and ongoing participation in HIE.

Multi-facility health systems may have varying degrees of centralization of HIT services. Organizations that have grown organically typically deploy the same set of applications and infrastructure services across facilities, while health systems that result from merger or acquisition may be at varying stages of integration, with multiple vendor platforms or multiple instances/builds of the same platform present across facilities.

Irrespective of funding source, understanding the deployment topology of key application classes within a Health System is critical to understanding the level of investment required to make clinical information available to other stakeholders.

**Key Systems**

**Hospital Registration (ADT) System**

The hospital registration system is used to track patient flow in the acute care setting. It is generally used for inpatient admissions, but may also be used to register emergency department patients or outpatients.

The hospital registration system is important to the HIE insofar as it gathers patient demographic information and tracks patient care activities involving acute care visits.
This system may also be used to record information such as patient consent for health information exchange.

**Ambulatory Scheduling/Registration**

The ambulatory or outpatient system is used to perform appointment scheduling of outpatient visits, registration of patients, collection and management of demographics and insurance details.

This functionality may be provided in a variety of configurations:

- Stand-alone application: outpatient registration is performed by a specialized, dedicated application.
- Component of the Hospital Registration System: the Health System may use a common platform for registration across inpatient and outpatient settings.
- Practice Management System: the Health System uses a dedicated practice management system in the ambulatory setting to perform patient registration and billing functions.
- Ambulatory Electronic Health Record: the Health System has an ambulatory EHR that is capable of performing scheduling/registration functions.

Regardless of the exact configuration, the ambulatory registration system is important to the HIE insofar as it gathers patient demographic information and tracks patient care activities involving ambulatory visits.

This system may also be used to record information such as patient consent for health information exchange.

**Electronic Health Records (EHRs)**

EHRs are clinical systems used to both store longitudinal care data for a patient and provide workflow and clinical decision support capabilities during episodes of care. EHRs are meant to replace previous clinical workflows, mainly paper based, and provider reliance upon memory and judgment. EHR software is a focus of certification efforts by the federal government through the work of the Certification Commission for Healthcare Information Technology (CCHIT). A certified EHR is meant to represent the state of the art in healthcare IT and certifies the capability to participate in some capacity in standards based HIE. The data may be stored internally in a proprietary format, but certified EHRs are rapidly gaining the ability to interface at the application level in standards based HIE.

**Operational Data Store/Clinical Data Repository**

Health systems that have an operational data store/clinical data repository may have a stronger internal capability to leverage such technology to participate in HIE. An ODS/CDR is typically populated with patient care and related information from many feeder systems. Clinical interfaces are often implemented in real-time using a variant of HL7 v.2.x.
The ODS/CDR present at the health system may not be designed to meet HIE standards. However, the health system may opt to pursue a strategy of developing this capacity internally or through the ODS/CDR vendor. For example, the open-source Mirth Results CDR and the commercial Oracle HTB CDR may support the standards-based interoperability transactions used for HIE.

Health Systems that lack an operational data store/clinical data repository may have a patient care system that serves this same purpose by receiving data feeds from multiple ancillary systems. It is commonplace for health systems to have separate inpatient versus outpatient clinical systems.

**Role of Operational Tier Systems in HIE**
A key set of questions relate to the role of the Health Systems' operational tier applications in health information exchange with external trading partners.

**Patient Care Systems**
Because participation in an HIE is a relatively new requirement, the patient care systems at provider organizations may have varying degrees of support for data exchange. Furthermore, systems are likely to be specifically sized to handle the expected workload from within the organization.

Systems may not be licensed or deployed to handle an extended set of users. The system architecture may not scale to support the larger number of users and transactions expected within an HIE. The system may not be deployed in a configuration that supports the increased workload.

Direct participation in HIE may represent a security risk to the systems involved, and organizational policies may restrict the accessibility of such systems to external partners.

For these reasons, operational tier systems are generally not well-suited for direct participation in HIE transactions.

**HIE Use Case Support**
The patient care application may implement several of the use cases involving interoperability with trading partners. The trade-off involves supporting closer integration of application workflow; the problem is that many of these use cases have not been standardized universally. A vendor may be required to create custom extensions to satisfy the specifications of a given jurisdiction.

The trading partner may provide a specialized application in order to support a given use case. The supplied application may support varying levels of context integration at the provider
organization. It may be possible to integrate the application into the security framework. It may be possible to provide context integration.

With increasing adoption of web-based application, an increased range of application integration options are now available. Discrete applications that support a shared security context can support varying levels of visual integration at the presentation tier. Portal applications are specifically designed to support visual and workflow integration of multiple back-end applications or web services.

The increased use of back-end web services greatly increases the number of options available in terms of integration strategies.

A third-party may provide an application that enables users at the provider organization to meet the use case requirements. For example, an HIE or provider portal vendor may provide the required functionality.

A strategy of relying on end-user applications to deliver the required presentation tier capabilities greatly inhibits agility. In order to respond more rapidly to emerging requirements – for example, to an emerging health threat such as a new outbreak – requires that organizations statewide have the ability to deploy and operationalize new capabilities rapidly.

A new reporting form may be deployed in a matter of hours or days when users of a specific public health system rely on a single user interface. If the public health department strictly provided a back-end service and relied on vendors or developers of end-user applications at provider organizations, the state-wide ability to adapt to new requirements is severely compromised.

There is currently no feasible way to ensure rapid reporting electronically in response to an emerging threat if the health department is required to coordinate with potentially thousands of independent vendors to integrate new data entry requirements into their operational-tier systems.

The only viable solution for responding to such a scenario involves using a centralized public health reporting application or portal website; the alternative involves relying on fax-, paper- or phone-based communication channels.

**Remote Access to Patient Care Systems**

Patient care systems are routinely made available to affiliated community providers. There are several forms of remote access.

- Users may be granted remote network access to an internal system, typically an EHR, using the same user account established for purposes of inpatient care for patients admitted.
• Users may be granted remote network access to an internal system, but the system may be partitioned to restrict access.
• Users may be granted access to a dedicated instance/build of the internal system established specifically for external affiliated providers. There may be a single instance per affiliated provider practice or health center, or there may be a single instance for all affiliated practices.

The modality of remote access may also vary. The system may be accessed via a Citrix desktop; a dedicated fat-client installed at the affiliated provider site; a web user interface. The remote users may rely on a VPN or use encrypted web connections.

For additional context see Application Architecture Appendix.

Integration Architecture
The Integration Architecture tier addresses the ability to take the documents available from the applications present and make the available to other applications in a mutually useful format. Interfaces are generally uni-directional (clinical application to billing system to enable billing) but may be created as bi-directional (EHR system providing lab orders to lab system which then provides results back). These abilities are usually created at the lowest cost possible, which means they are usually not based on Nationally Based Standards, but facilitate by Integration Engine software. An integration engine is a specialized application that is capable of getting information in a required method from one application to another. The required method may be a standards based format such as HL7 or involve queries to an application database. There may be combinations of standards based formats form the source system which then need to be inserted via database update. Such transactions involve transforming the data format, which is a function of the integration engine. The number of such combination of standards based and “high touch” integration approaches is large. What the integration tier tells us is that the capability to transform certain types of data exists. Where the capability exits, it can be used to create standards based data to be used in health information exchange. The capacity to transform shows us which types of data can be shared most quickly without the need to implement the ability to transform the data that may exist at the information or application tiers. The distinction between internal (systems owned and administered by one organization) and external (systems owned and administered by different organizations) is irrelevant for analysis: any internal interface can be modified for external use. Two implementations of the exact same software inside one organization can result in the need for an interface due to implementation differences driven by location specific requirements. The capability to interface is the important aspect, not which particular vendor systems are interfaced.
### Interfaces Graph

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<th>Offsite Lab</th>
<th>Reference Lab</th>
<th>PCL</th>
<th>LIS Interfaces</th>
<th>PHN/MS</th>
<th>Registration (ADT)</th>
<th>Billing</th>
<th>Orders</th>
<th>Results</th>
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Health systems are likely to maintain a number of external interfaces between the organization and trading partners.

Organizations typically have long-standing interfaces with health plans or clearinghouses for purposes of claims submission. Related transactions supported by these interfaces include eligibility verification.

The applications generally used for billing purposes tend to be legacy systems with limited capabilities to support modern integration strategies. Interfaces are likely to involve batch-oriented file transfers or proprietary mechanisms with limited extensibility.

Michigan has a claims clearinghouse operated by BCBS of Michigan that covers nearly 100% of providers.

**ODS/CDR**
In the simplest case, the organization may have a single ODS/CDR repository currently in place that is being populated by various patient care systems.

The organization may decide to make the information present in this system available for HIE, and is capable of complying with HIE standards for interoperability.

**Edge Servers**
HIE vendors will typically deploy edge servers at organizations in order to serve as operational data stores/clinical data repositories. This strategy has mixed benefits. An organization that invests is a true ODS/CDR may be able to leverage this investment for a variety of internal needs as well as HIE.

Investing in an HIE-specific edge server may constrain the organization in terms of other uses of the system.

The organization may decide to deploy an edge server repository supplied by a third-party, such as an HIE vendor, and populate that repository with data feeds from various patient care systems, such as the various ancillary systems (lab, rad, path, cardiology).

This may involve a single HL7 feed from each instance of the patient care system, where each feeder system serves the entire health system.

**Intermediaries**
In order to enable the high priority transactions required with trading partners, a health system may either directly interoperate with these entities or rely on an intermediary.

The optimal approach to interoperability may depend on whether the interaction is with a local or regional partner versus with a state-level or national-level entity.
What is the benefit to routing all interactions with the state through an intermediary?

Meeting interoperability specifications can be satisfied internally by the health system, or can be a value-added service provided by the HIE.

**Interface Considerations**

Although systems interfaces used within larger provider enterprises generally conform to the HL7 specification, there is generally some degree of non-standard implementation (i.e. use of Z-segments), that require additional work to prepare for use with an HIE.

The HIE vendor may undertake the work of developing HL7 interfaces that conform to their system specifications. Generally, integration of health systems into an HIE requires reuse of existing interfaces rather than de novo development. The level of effort required may be minimal to moderate.

The health system will generally benefit from minimizing the number of interfaces required with external community-based providers.

From the health system’s perspective, the options include:
- Extending internal applications to community providers
- Deploying web portal solutions designed for community-based providers
- Relying on an external web portal to interconnect community providers
- Relying on an HIE to broker system-to-system transactions

From the office-based provider’s perspective, the options include:
- Deploying an onsite system with multiple interfaces
- Deploying an onsite system with single interface to HIE
- Using a hosted system with multiple interfaces
- Using a hosted system with single interface to HIE
- Using a provider portal available from a local HIE
- Using a third-party provider portal with integration with one or more affiliated health systems
- Using a provider portal of one or more affiliated health systems
- Using the in-house applications of one or more affiliated health systems

HIE vendors may implement their own HL7 standards, with varying degrees of conformance to the HL7 specifications.

**Interactions between Community Providers**

Beyond business interactions with regional health systems, community providers also require the ability to interact with directly with other community-based providers for a variety of business transactions: placing orders for professional diagnostic or therapeutic services, requesting consultations or initiating referrals.
Interoperability between Health Systems and Independent Community Providers
For health systems, developing point-to-point connections with each independent organization is generally not feasible.

Extending the use of internal clinical applications achieves the health system’s goal of integration, but conflicts with the independent practitioner’s goal of maintaining relationships with multiple health systems.

The HIE provides the opportunity to serve as an honest broker between multiple health systems and independent community provider organizations.

Rationalizing Interfaces
The number of connections to the HIE are another important consideration. A regional HIE will generally cover an area that includes several health systems or independent hospitals. The number of such participants is typically less than ten, although occasionally may exceed that number.

The number of independent practice offices within a given region may number in the hundreds or thousands.

It may be unfeasible to maintain discrete interfaces to each such office. Remotely hosted systems offer advantages by supporting larger numbers of sites.

The deployment of a clinical system onsite at a provider office enables off-line use in the event of loss of internet connectivity. However, this approach may not be required if the connectivity options available to the provider offer an adequate level of performance in terms of quality of service.

Ultimately, whether a provider deploys an on-site or remote patient care system is a business decision that can be left to the provider.

Capabilities for HIE with State of Michigan Systems
The capabilities for HIE with State of Michigan systems are documented in the State of Michigan Systems Technical Analysis. The systems of immediate relevance are MCIR, Disease Surveillance (MDSS, MSSS), Vital Records (Birth and Death), Bureau of Labs and CHAMPS (Medicaid claims system). All perform vital public health duties and a majority of healthcare providers in the State interact with these systems.

The State of Michigan is responsible for administrating the Federal Medicaid Incentive programs outlined in ARRA. Initial planning efforts are underway to obtain the Federal funding to enable the subsequent administration of these programs. It is too early to define what the end solution will be, but it is likely it will involve the use of the CHAMPS system to facilitate
meaningful use and administration of the program. The MiHIN would be an ideal candidate to provide needed services, such as MPI or health reporting services, since the scope of the Medicaid incentive is state-wide.

**Technical Architecture**

The Technical Architecture tier comprises the set of specific implemented technologies through software and hardware. Information on this tier is valuable for estimating efforts at systems integration and capabilities of any given technical solution. The information presented at this level is a poor candidate for analysis supporting state-wide choices for health information exchange due to the extremely large number of software and hardware solutions existing in the current operation of health care in the State. Decisions based on broad, standards based capabilities allow us to estimate in general the costs of any given choice for health information exchange and avoid the “in the weeds” problem of seeking to maximize a complex decision based on the smallest unit of detail. When time is of the essence and there is no previous basis for expectation of results, the best choice will be made based on broad capabilities that will prove or disprove the ability of these capabilities to predict success. Seeking the best match between a technical solution set, which likely entails 300-400 discrete applications at any given organization, will increase analysis time drastically and is not likely to result in any different result than a decision based on the overall capability of the technical solutions set as a whole. Those overall capabilities are expressed in the previous tiers of integration, information and application.

**Interoperability Standards**

The Technical Assessment survey captured information on the ability of organizations to store or transform information in/to Nationally Recognized Standards. These standards serve as the building blocks for health information exchange as envisioned by the ONC. The existence of capability to store and/or exchange data in such standards informs decisions as to which data will be the quickest and lowest cost to access via health information exchange.

**Standards Graph**
### Standards

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<thead>
<tr>
<th>Organization 1</th>
<th>Organization 2</th>
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<td>HL7 v2.x</td>
<td>HL7 v3.0</td>
<td>CDA</td>
<td>IHE (Technical Framework)</td>
<td>SNOMED</td>
<td>RxNorm-Drug</td>
<td>RxNorm-Code</td>
<td>UMLS</td>
<td>RxNorm-Concept</td>
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</table>

### Terminology

- Green: currently implemented
- Yellow: current plans to implement
- Red: no plans to implement

### Technical Framework(s)

- HL7 v2.x
- HL7 v3.0
- CDA
- IHE (Technical Framework)
- SNOMED
- RxNorm-Drug
- RxNorm-Code
- UMLS

### Other Standards

- NCPDP
- ANSI X12
- CPT
- ICD-9
- ICD-10
- LOINC (Labs)
- SNOMED
- RxNorm
- Continuity of Care Document (CCD)
- National Drug Code (NDC)
HIE standards and specifications support

The Technical Assessment survey shows low current support for the IHE standards, with a fair number of organizations having no plans to explicitly implement the standards independently of capabilities inherent in application updates. By extension, HITSP specifications are not widely supported, as the HITSP specifications have fundamental components based on IHE standards.

The lack of capacity on standards congruent with ONC plans for HIE is shown by the lack of capacity for CCD, HL7 v3.0. The mixed use of CCHIT certified EHRs shows that some organizations will gain the capability to participate in standards based HIE as the CCHIT certification requirements expand. Unfortunately, the organizations using certified EHRs are in general the same organization with capabilities for standards based HIE in other fashions (CCD, HL7 v3.0).

There is universal compliance with the dated, currently operational standards existing in HL7 v2.x, ICD and CPT. These standards will require the use of integration tier methodologies to engage in HIE.

State-wide Master Patient Index (MPI) analysis

A common request from stakeholders across the State is the desire to have a central, authoritative repository for identity matching to enable economies of scale and avoid replication of functionality where requirements and utilization may not require replication.

Standards based participation in a State-wide MPI would be based on use of HITSP specifications TP22, TP23 and their underlying IHE standards PIX, PDQ. The lack of documented capacity for the IHE standards shows that work will need to be done to interoperate on in a standards based method. While certified EHRs will be able to participate in the standards based MPI transactions, there will be substantial amounts of data that will not exist in an EHR. A method to allow patient identity matching on an enterprise level will have to be developed, it may leverage the capabilities of certified EHRs to inform an enterprise MPI, or it may be a new capability available to the enterprise as a whole. The use of a State-level MPI will decrease the burden (financially, operationally, transactional load) of any enterprise MPI.

An alternative to these latest standards would be to implement an MPI which uses the more traditional and still ubiquitous HL7 v2.x type interfaces for patient demographics. These interfaces typically use HL7 messages types A01 Admit a Patient, A04 Register a Patient, A08 Update Patient Information, A31 Update Person Information, and A34 Merge Patient Information.
Security Architecture

The Security Architecture tier comprises the set technologies and practices that enable the confidentiality, privacy and integrity of protected health information. Capabilities in this tier are enabled by hardware and software solutions operating in a best practice fashion.

Security, Identity and Access Management and Network Analysis

Utilizing the Technical Assessment we requested information from numerous Michigan healthcare early adopters and stakeholder organizations. We asked each of them questions about Internet access, network security, remote access, encryption standards, user management, and security policies. Due to the length of the survey we did cut back on some of these questions and focused on the connectivity solutions that would ensure secure connectivity to a Community HIE.

We sent out over 20 technical assessments and got back 18 responses. Only 13 responders answered all the security questions. Some did not answer due to the length of the survey and some because they consider this information confidential. What follows is a review of those responses and our recommendation for a Best Practice in each category.

Internet Access

Internet Access Best Practice: At least 60 Mbps bandwidth with redundancy and load balancing

All sites provided Internet access for staff as well as using the Internet for access to stakeholder systems. Almost 70% of respondents said they provided 60 Mbps or higher bandwidth, while 30% responded that they only provide 20 Mbps or lower. In addition 85% of respondents have a second circuit for Internet redundancy. All the respondents with the higher bandwidth had redundancy. Only 46% of the respondents used Internet load balancing with automatic failover. The conclusion is that some additional capacity will have to be procured to enable best practice standards for HIE.

Network Security

Firewalls

Firewall Best Practice: Hardware appliance based firewall with redundancy and failover. Hardware firewalls can be more easily hardened since they have an embedded operating system vs. software firewalls which must run on a general purpose server. The vendor is less important since most have good products.

All sites used some form of firewall. More than half the sites (54%) used Checkpoint either as an appliance or as software or both. The other sites used Cisco (31%) and one site each used Firepass and SonicWall. Most of the firewalls were hardware appliances (69%) but 31% used software. Most sites (69%) had firewall redundancy with failover. The conclusion is that the
basis for security is sound (all sites having a firewall). To ensure security, additional capacity for redundancy to enable failover needs to occur.

**VPN capability**

**VPN Best Practice: Hardware-based VPN using IPSEC, certificates or 802.1x.**

All sites had some form of VPN for encrypting connections to external sites over the Internet or private circuits. Of those responding 62% had hardware VPNs or both hardware and software VPNs. The remaining 38% used software VPNs. Many of the respondents reported using capabilities within their firewalls for VPN access.

All of the respondents used their VPNs for secure connections to external organizations over the Internet. A few sites (25%) used VPN for internal connections as well. All sites used some form of acceptable encryption such as IPSEC (44%), Certificates (22%), 802.1x (22%) or MD5 (11%). Since meaningful use requires IPSEC, TLS or IP V.6, the adoption of IPSEC needs to be greatly expanded or organizations need to implement TLS or IP V.6. This is a potential issue and the intentions of prospective HIE participants regarding VPN practices needs to be clarified.

**Internal Network Encryption**

**Best Practice: Encrypt both internal (LAN) and external (WAN) traffic that contains PHI.**

This is a relatively new requirement that is a change to HIPAA that was part of the ARRA regulation. It is our sense that most healthcare organizations do not encrypt LAN or WAN circuits. The Technical Assessment responses from Michigan stakeholders bore this out since 85% of the respondents were not encrypting “internal” network traffic and only 15% were. It is likely the ability to encrypt internal traffic exists since it is usually included at the Operating System level. The constraint would be the additional load to both computer systems and networks to implement LAN traffic encryption. The recently released Meaningful Use criteria do not address this best practice. A cost/benefit analysis should be conducted to assess the need to implement LAN traffic encryption.

**Remote Access**

**Remote Access Best Practices: Use of VPN or SSL VPN with two-factor authentication for access to PHI**

For remote access all respondents are using one or more technologies to secure access such as SSL Access to Web Server (38%), Client Based VPN (69%) or SSL VPN (69%). These numbers add up to more than 100% because many of the respondents are using more than one technology.

In addition almost half the respondents (46%) are using some form of two-factor authentication for remote access to their networks. For those sites that are using two-factor authentication the technologies in use are tokens (23%), digital certificates (15%), proximity badges (8%), and expiring one time passcodes (8%). Two factor authentication is proposed for ePrescribing of Narcotics, is a requirement for Federal communications (OMB06-16), is a Federal Standard (NIST SP800-53) and is being implemented in both private sector and public sector projects. While not addressed in the current Meaningful Use criteria, further analysis should be done on the cost and benefits of adopting this level of authentication on the MiHIN.
SSL

SSL Best Practice: Using SSL for access to secure web sites, for data transfer and for SSL VPN access
Respondents use SSL for access to secure web sites (62%), SSL VPNs (85%) and for Data Transfer (46%). This strong use of SSL for VPN and data transfer bodes well for making sure there will be secure connections to any HIE portal. Since SSL had been deprecated in favor of TLS, the ability to convert current SSL transports to TLS should be assessed. It is likely that most implementation could convert to TLS with a configuration change. This best practice may best be implemented through both a requirement to access the MiHIN and an educational outreach to highlight the ease of compliance.

Secure messaging (email)

Secure Email Best Practice: Use a product that automatically scans and secures emails that contain Protected Health Information
Most respondents have a secure email system (70%). A few sites do not allow PHI to be emailed outside their organization by policy (22%) and one site has no policy or a secure email solution. There are no clear standards on the implementation of this service and the lack of standards delays widespread implementation. This best practice has been removed from current Meaningful Use requirements. This item can be deferred for initial efforts, with additional research being done with potential users of the MiHIN on effective solutions.

LDAP compatibility and Authentication

LDAP Best Practice: Use of an LDAP compatible user directory
Nearly all respondents are using an LDAP compatible user directory (85%). The majority of these are Windows Active Directory (70%) but there are also some Citrix Thin Clients (15%) and Novell (15%). LDAP provides the foundation for the IHE XUA constructs and can be a repository for HL7 Permissions catalog and other interoperability standards that will enable cross organization identity and authorization assertions. Additional research should be capabilities can be added to LDAP alternatives to allow them to participate the the previously mentioned (XUE, HL7, etc) standards.

System and Network Monitoring and Logging

System Monitoring Best Practice: Active network monitoring and regular routine audits of all systems with PHI. Retain audit logs for 7 years.
This was a complicated question to ask and for respondents to answer. Many of them have numerous systems with differing policies and procedures for system monitoring and auditing. Our qualitative review of the responses reflects our sense of healthcare organizations in general which is that they are only partially complying with the best practice above and may not be HIPAA compliant. The two specific HIPAA Standards that apply are:

Administrative Safeguard
(D) Information system activity review
(Required). Implement procedures to regularly review records of information system activity, such as audit logs, access reports, and security incident tracking reports.

**Technical Safeguard**

(b) *Standard: Audit controls.*
Implement hardware, software, and/or procedural mechanisms that record and examine activity in information systems that contain or use electronic protected health information. Of course our concern is not with the individual institutions internal policies but we should consider the security standards that we recommend for HIEs and certainly for any repositories that might connect to the MiHIN.

**Conclusion**

The broadest basis for health information exchange as measured by standards compliance and staffing capability exists in health systems. For today, look in large part to leverage their capabilities to move data from end users in one organization or region to another organization or region. It is critical to ensure their participation. Failure to include health systems means wasting resources and risking the inability to interoperate between ambulatory and those ancillary (labs, radiology, etc) services delivered by health systems.

Community HIEs generally serve ambulatory providers directly. The intention of independent providers to utilize health systems or community HIEs to provide HIE capabilities remains unknown. Currently, independent providers are reported to be using both health systems and community HIEs for their health exchange needs. Further research on their intentions is likely to be done by the M-CEITA organization as they plan to support EHR adoption in Michigan. Once the intentions of the substantial independent physician population become more clear, decisions on whether the future for health information exchange capability lie with health systems or community HIEs will be indicated.
Appendixes

Business Architecture Appendix

A detailed network analysis of health systems represents an important planning activity. Generating optimal returns from investment in interoperable health IT requires the ability to coordinate the development and integration of targeted services that match the needs of communities and satisfy the demands of consumers at the local levels.

The Health Systems analysis focuses primarily on the structure and dynamics of the supply-side of the healthcare delivery market within a given geographical region. The structures of interest are the facilities operated by the large Health Systems within each region. The dynamics include the exchanges between Health Systems and their trading partners.

Understanding the range of services offered at any given healthcare delivery location is necessary to optimizing the selection and distribution of capabilities of the health information exchange infrastructure. This also ensures optimized matching of service offerings to local demand, thus giving rise to market-driven efficiencies in the overall system.

The facilities present at a given location constrain the range of services that may be offered. For example, inpatient care or emergency care services may only be rendered within an inpatient hospital or emergency department, respectively.

The service capacity at each location is also a key consideration in planning. Service capacity may refer broadly to the number of providers that participate in service delivery at a given location. At a finer-grained level, the service capacity may describe the number of providers of with qualifications to render a specific type of service.

For example, service capacity may refer to number of primary care providers, as measured by FTE-equivalents, working at a rural clinic. It may likewise refer to the number of FTE-equivalent interventional cardiologists on duty for any given shift at a tertiary referral center.

Service capacity may also refer to other resource types such as diagnostic or therapeutic instrumentation, and the number and throughput of each. Examples include the number of available emergency department beds, or the number and/or throughput of MRI scanners or laboratory analyzers at a community hospital.

At the given location, the organization may deliver a range of business services. Healthcare delivery consists of a wide range of services which can be classified, with varying degrees of granularity, into a services ontology (i.e., catalog).
The services catalog is a concrete artifact used to maintain information about the services provided by each organization participating in the healthcare interoperability network. Because most healthcare services are delivered at specific physical locations and involve direct interaction with the consumer, the information in the services catalog needs to be spatially-aware; this might involve geo-coding the information in the business directory and/or services catalog.

Information maintained in the services catalog may reflect varying degrees of granularity. An extension mechanism should enable sub-classifying services; a composition mechanism should permit assembly of component services; orchestration or choreography mechanisms should enable sequencing of service interactions.

- Primary Care
- Specialty Care
- Emergency Care
- Intensive Care
- Diagnostic Testing Services – Laboratory, Radiology, Pathology, Cardiology, Endoscopy
- Therapeutic Services
- Minor Surgical Services
- Major Surgical Services
- Rehabilitation Care
- Skilled Nursing Care

Health systems routinely engage in a large number of transactions with external trading partners. Key partners include affiliated community-based providers, other health systems, ancillary service providers, payers and public health agencies. Health Systems have an interest in information exchange with the network of community-based providers that constitute the organization’s referral network.

The healthcare IT infrastructure requires a degree of spatial awareness. Healthcare delivery occurs largely within local communities, and optimal access and utilization of services is sensitive to distance decay effects. Understanding the capabilities of large health systems within specific geographic regions is important from a planning perspective.

Central-place theory, the underpinning of health services planning, emphasizes segmentation of services into multiple tiers (primary, secondary, tertiary) based on degree of specialization, required infrastructure and market size. The sensitivity to distance relates to the type of service being provided:

- **Primary care services** are relatively less differentiated, require the least amount of support infrastructure, are used by the largest proportion of the population and are highly-sensitive to distance. Optimal distribution minimizes the distance between consumer and provider by locating facilities within communities.
• **Specialized services** are the most highly differentiated, are targeted to narrow population segments, require the most support infrastructure and are relatively insensitive to distance. Optimal distribution maximizes the population referral base through centralization in the largest population centers.

Service Directories for State-Level HIEs

A key requirement for state-level interoperability exchanges is development of a state-wide business directory and catalog of service offerings in order to enable business-to-business integration as well as optimize overall market integration.

Developing a state-wide directory requires cataloging the service capabilities and requirements of each business entity participating in the exchange into a standardized services ontology or equivalent. For health systems, it is necessary to segment service capabilities according to location.

- **State-level**
  - Public Health
  - Health Plans
  - Quality Improvement

- **Business Partners** (include MU/ONC priorities) (partners by use case grid)
  - Outsourced services
  - Independent Diagnostic Services
  - First Responder
  - Other Health Systems
  - Community Practices

**Care Team Requirements**

The basic requirements are to enable community providers to submit requests to the service providers at the regional health systems/referral centers, and receive a response message containing the appropriate response for the service requested.

The information exchanged between a community provider and the health system must also be available more generally to other providers involved in the care of the patient, either those currently involved or those who may get involved at a future date.

Point-to-point solutions between the referring provider office and the health system rendering the services requested do not meet this requirement. Although the request may originate with a single provider, it may need to be routed to one of several service providers present in the region, and the resulting response should be available to any providers to whom the patient consents to granting access.
Providing the capacity to send results to external providers represents one level of interoperability. In addition, it is important to allow external providers to query for this information.
Sample Early Adopter Survey

Health Information Technology Early Adopter Survey

1. Introduction

Thank you for taking the time to participate in this questionnaire in regards to the current state of health information technology and exchange at your organization. For the purpose of this survey, we have defined Health Information Exchange (HIE) as the electronic sharing of information to improve the quality and efficiency of healthcare delivery.

The information you provide will be used by the Michigan Health Information Network (MiHIN) project team to develop the Statewide plan for HIE.

The questionnaire should take approximately 10 minutes to complete, depending on your answers. If you have any questions about the Statewide plan for HIE or this survey please contact Beth Nagel. Thank you.

Beth A. Nagel
Michigan Department of Community Health
Health Information Technology Manager
517.241.2064 (phone)
517.373.4288 (fax)
nagelb@michigan.gov
Health Information Technology Early Adopter Survey

2. Demographic Information

* 1. Please answer the following demographic information.
   - Name of Organization: 
   - Address: 
   - Address 2: 
   - City/Town: 
   - County: 
   - State: 
   - ZIP/Postal Code: 
   - Contact Name: 
   - Title: 
   - Phone number: 
   - Email: 

* 2. Please give a brief description of your organization.

[Text box]

* 3. List your organization location(s).

[Text box]

4. What, if any, parent company or larger health system is your organization associated with?

[Text box]
**Health Information Technology Early Adopter Survey**

*5. What is the type of your organization? (check all that apply)*

- [ ] Health System
- [ ] Critical Access Hospital
- [ ] Community Hospital
- [ ] Post Acute Care
- [ ] Employer Based Clinic
- [ ] Physician’s Office
- [ ] Multi-Specialty Group
- [ ] Community Health Center
- [ ] Behavioral Health
- [ ] Ancillary Service Provider
- [ ] Community HIE
- [ ] RHIO
- [ ] Payer/Health Plan
- [ ] Indian Health Service
- [ ] Telehealth Network
- [ ] Public Health Department
- [ ] Quality/Peer review organization
- [ ] Other (enter below)

**Other (please specify)**

*6. What is the size of your patient (providers) or member (insurers) population?*

**__________**

*7. If you are a provider organization, how many practitioners (physicians/nurse practitioners/physician assistants) are in your organization?*

**__________**

*8. If you are a hospital or a post acute care facility, how many beds?*

**__________**
Health Information Technology Early Adopter Survey

3. Business

1. Where does HIE rank on your organization’s list of strategic priorities (pick one)?
   - #1 priority
   - In top 5 priorities
   - Strategic priority not in top 5

2. Which Health Information Exchange (HIE) activities are you currently performing? If you are engaged in a type of HIE, please provide a list of partner(s) and the volume of transactions per time period (e.g. claims: insurance company 1, insurance company 2, 500 claims per week) in the text box below.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic Eligibility and claims transactions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronic prescribing and refill requests</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronic clinical laboratory ordering and results</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronic public health reporting (notifiable results)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality reporting capabilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prescription fill status and/or medication history</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical summary exchange for care coordination and patient engagement</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Partner(s), Volume(s) and Frequency (type: partner(s), quantity per time period)
### Health Information Technology Early Adopter Survey

3. Other than those activities listed in question 2, are you currently sharing any health information electronically with external organizations? (example for number of transactions: 5000 claims/week, 300 lab results/day)

<table>
<thead>
<tr>
<th>1) Type of information:</th>
<th>Exchange partner(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of transactions and frequency:</td>
<td></td>
</tr>
<tr>
<td>2) Type of information:</td>
<td>Exchange partner(s):</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of transactions and frequency:</td>
<td></td>
</tr>
<tr>
<td>3) Type of information:</td>
<td>Exchange partner(s):</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of transactions and frequency:</td>
<td></td>
</tr>
<tr>
<td>4) Type of information:</td>
<td>Exchange partner(s):</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of transactions and frequency:</td>
<td></td>
</tr>
</tbody>
</table>

4. Describe any barriers to HIE you have encountered and what you may have done to overcome them:

5. Is your organization currently part of a Health Information Exchange (HIE)?
   - [ ] Yes
   - [ ] No

   If yes, please provide the name & location:

   [ ]

   [ ]

   [ ]
## Health Information Technology Early Adopter Survey

6. What are your top priority problems in each category below that electronic sharing of information can solve and how are you measuring the impact of HIE in solving your problem?

**Category**  
A=Administrative  
B=Financial  
C=Clinical  
D=Quality  
E=Population management  

**Problem Example:**  
- A=Administrative: Eligibility verification  
- B=Financial: Duplicate testing  
- C=Clinical: Poor management of diabetics  
- D=Quality: Hospital re-admissions  
- E=Population management: Immunization reporting

**Quantify example:** Current readmission rate for congestive heart failure (CHF) patients is 30%  
**Impact example:** Measure a reduction in the readmission rate for CHF

(Fill out the appropriate text boxes)

<table>
<thead>
<tr>
<th>Category</th>
<th>Problem Description</th>
<th>Quantify Problem</th>
<th>How do you measure the Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Admin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Finan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Clin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Quali</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Pop. Mgmt</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Page 6
### Health Information Technology Early Adopter Survey

**7. When did your organization last update its Security Risk Analysis as mandated by HIPAA [45 CFR s.164.308(a)(1)(A)]?**

<table>
<thead>
<tr>
<th>Date</th>
<th>MM / DD / YYYY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Health Information Technology Early Adopter Survey

## 4. Technical

* 1. Does your organization currently use an electronic health record (EHR)?
   - Yes
   - No

* 2. Is your EHR CCHIT Certified?
   - Yes
   - No

* 3. Please indicate what product name your organization uses.
   - EHR Vendor
   - EHR Product
   - EHR Version

* 4. Does your organization use e-prescribing?
   - Yes
   - No

   If yes, what system do you use?

* 5. Does your organization provide secure remote access to clinical data?
   - Yes
   - No

   If yes, please describe.

* 6. Does your organization use an interface engine to communicate either internally or externally with other systems?
   - Yes
   - No

   If yes, which one?
### Health Information Technology Early Adopter Survey

For questions 7 - 12 please identify if your organization has implemented the type of interface. If you plan to implement in the future please indicate when you are planning to implement this type of interface.

**7. Please identify if your organization has implemented the type of interface:**

<table>
<thead>
<tr>
<th>Clinical Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Yes</td>
</tr>
<tr>
<td>☐ No</td>
</tr>
<tr>
<td>☐ Planned</td>
</tr>
</tbody>
</table>

If planned, when?

**8. Please identify if your organization has implemented the type of interface:**

<table>
<thead>
<tr>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Yes</td>
</tr>
<tr>
<td>☐ No</td>
</tr>
<tr>
<td>☐ Planned</td>
</tr>
</tbody>
</table>

If planned when

**9. Please identify if your organization has implemented the type of interface:**

<table>
<thead>
<tr>
<th>Orders</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Yes</td>
</tr>
<tr>
<td>☐ No</td>
</tr>
<tr>
<td>☐ Planned</td>
</tr>
</tbody>
</table>

If planned when
Health Information Technology Early Adopter Survey

10. Please identify if your organization has implemented the type of interface:

Billing/Claims
- Yes
- No
- Planned
If planned when

11. Please identify if your organization has implemented the type of interface:

HL7 ADT
- Yes
- No
- Planned
If planned when

12. Please identify if your organization has implemented the type of interface:

Patient Demographics
- Yes
- No
- Planned
If planned when

* 13. Does your organization have a Master Patient Index (MPI)?
- Yes
- No
If yes, which one?
## Health Information Technology Early Adopter Survey

### 5. Organizational

**1. Who would serve as your organization's champion for HIE?**

<table>
<thead>
<tr>
<th>Name:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Title:</td>
<td></td>
</tr>
<tr>
<td>Phone Number:</td>
<td></td>
</tr>
<tr>
<td>Email:</td>
<td></td>
</tr>
</tbody>
</table>

**2. The American Recovery and Reinvestment Act (ARRA) of 2009 provided funding for Medicare and Medicaid Electronic Health Record (EHR) Incentive Programs. (More information about these programs can be found at [www.cms.hhs.gov/recovery](http://www.cms.hhs.gov/recovery))

Do you or your organization plan to take advantage of the Medicare & Medicaid EHR Incentive program?

- [ ] Yes
- [ ] No

If you are focused on Medicaid EHR Incentives, please estimate your Medicaid volume as a percentage of your entire caseload.

<table>
<thead>
<tr>
<th>Percentage:</th>
<th></th>
</tr>
</thead>
</table>
### Health Information Technology Early Adopter Survey

**3.** The American Recovery and Reinvestment act of 2009 provides a program for state Health Information Exchange adoption. The grant announcement for this program was released on August 20, 2009 and can be found at [http://healthit.hhs.gov/HITECHgrants](http://healthit.hhs.gov/HITECHgrants).

This grant opportunity calls for increasing levels of matching or in-kind funding from stakeholders over four years. **Would you or your organization be willing to commit in-kind resources to the planning and implementation of the statewide health information exchange?** (For example, project management, interface programming, implementation support, training, etc.)

- [ ] Yes
- [ ] No

If yes, please describe:

![Text box for description]

**4.** As part of Michigan's grant response to the state HIE opportunity as outlined in the American Recovery and Reinvestment Act, we will be forming workgroups to guide the planning and implementation. **Would you or someone from your organization be interested in serving on these workgroups?** If yes, what is the primary topic of interest?

- [ ] Governance
- [ ] Finance
- [ ] Clinical
- [ ] Technical
- [ ] Legal

Please provide the name & title and contact information (email & telephone number) of the interested workgroup participant(s):

![Text box for contact information]
Health Information Technology Early Adopter Survey

* 5. As part of Michigan's grant response to the state HIE opportunity as outlined in the American Recovery and Reinvestment Act, we will need Letters of Commitment to submit with our application by October 1, 2009.

These letters of Commitment as specified in the grant opportunity guidance should include "specifically state how your organization will support this project – through assistance with meeting matching requirements, board/commission participation, advocacy".

Would you/your organization be willing to submit a Letter of Commitment on behalf of the state's grant response?

☐ Yes
☐ No

If yes, who should be contacted to coordinate the drafting and finalizing of this Letter of Commitment?
Sample Technical Assessment Survey

MiHIN Technology Assessment

To assess the technical readiness and capabilities of stakeholders to participate in a regional Health Information Exchange (HIE).

1. Clinical Systems
   1.1. Inpatient
      1.1.1. What Electronic Health Record (EHR) vendor do you use? What is the name of the EHR application?
      1.1.2. Is the EHR CCHIT certified?
      1.1.3. Are you planning on changing vendors in the near future? If so which vendor and when do you plan to change?
      1.1.4. Describe if the following are integrated into the (current or planned) EHR
       1) Inpatient lab results from in-house lab
       2) Inpatient lab results from reference labs
       3) Physician office lab results
       4) Dictated notes
       5) Dictated radiology interpretations
       6) Nurse documentation
       7) Discharge summaries
       8) Orders
       9) Problem Lists
       10) EMAR (Electronic Medication Administration Record)
       11) Allergies
       12) Emergency Department System
       13) Picture Archiving and Communications (PACS) images
       14) Intensive Care Unit (ICU) records (monitor data)
       15) Psychiatric data
       16) Home health care encounters
       17) Dialysis information
       18) Oncology information
       19) Cardiology information system
          a) Cath Lab data
          b) EKG strips and interpretation
       20) Physician office records
          a) Office visit information (schedule data?)
          b) Medication record
       21) Insurance information
       22) Demographics (including guarantor, emergency contact info, etc.)
       23) Advance medical directives
       24) Scanned documents from patient or other providers.

   1.1.5. Does your electronic system have the following capability (describe):
      a. Remote access via the Internet
b. E-prescribing

c. Drug interaction alerts

d. Patient scheduling by physician offices

e. Check insurance eligibility electronically

1.2. Outpatient or Ambulatory
  1.2.1. What ambulatory EHR do you use?
  1.2.2. Is this a different product than your Inpatient EHR? If so please describe.

1.3. Departmental Clinical Systems
  Systems should be identified as integrated, interfaced or stand alone.

  1.3.1. Lab
    1.3.1.1. Do you use a Laboratory Information System (LIS)? Which vendor/product?
    1.3.1.2. Do you have an external lab interface for outbound orders and inbound results?
    1.3.1.3. Do you have any order interfaces or results interfaces with your lab clients?

  1.3.2. Reporting Systems

  Please indicate the reporting systems (systems that generate mostly textual interpretations) that you have (Y – Yes, N – No, P – Planned):

<table>
<thead>
<tr>
<th>Type</th>
<th>Y/N</th>
<th>Vendor</th>
<th>If P then when</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiology</td>
<td></td>
<td></td>
<td>□ 1-12 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>□ 13-24 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>□ &gt;24 months</td>
</tr>
<tr>
<td>Pathology</td>
<td></td>
<td></td>
<td>□ 1-12 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>□ 13-24 months</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>□ &gt;24 months</td>
</tr>
<tr>
<td>Cardiology</td>
<td></td>
<td></td>
<td>□ 1-12 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>□ 13-24 months</td>
</tr>
</tbody>
</table>
1.3.3. Imaging Systems

Please indicate the imaging/PACS systems that you have (Y – Yes, N – No, P – Planned):

<table>
<thead>
<tr>
<th>Type</th>
<th>Y/N/P</th>
<th>Vendor</th>
<th>If P then when</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiology Imaging</td>
<td></td>
<td></td>
<td>☐ 1-12 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>☐ 13-24 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>☐ &gt;24 months</td>
</tr>
<tr>
<td>Pathology Imaging</td>
<td></td>
<td></td>
<td>☐ 1-12 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>☐ 13-24 months</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>☐ &gt;24 months</td>
</tr>
<tr>
<td>Cardiology Imaging</td>
<td></td>
<td></td>
<td>☐ 1-12 months</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>☐ 13-24 months</td>
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<td>☐ &gt;24 months</td>
</tr>
<tr>
<td>Mammography</td>
<td></td>
<td></td>
<td>☐ 1-12 months</td>
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<td>☐ 13-24 months</td>
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<td></td>
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<td></td>
<td>☐ &gt;24 months</td>
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<tr>
<td>Endoscopy</td>
<td></td>
<td></td>
<td>☐ 1-12 months</td>
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<td></td>
<td>☐ 13-24 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>☐ &gt;24 months</td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td>☐ 1-12 months</td>
</tr>
</tbody>
</table>
1.3.4. Clinical Documentation
Please describe your clinical documentation system.

1.3.4.1.1. Do you transcribe dictated notes?
1.3.4.1.2. Do any clinicians use speech recognition?
1.3.4.1.3. How are the reports accessed or interfaced to other systems?
1.3.4.1.4. Do you have an outside agency do your transcription (or part of your transcription)? Are those records interfaced to the EHR?
1.3.4.1.5. Do you have an outside agency interpret your radiology images? Are they interfaced to your system?

1.4. Specialty Systems
Please indicate the specialty systems that you have:

<table>
<thead>
<tr>
<th>Type</th>
<th>Y/N/P</th>
<th>Vendor</th>
<th>Part of EHR?</th>
<th>If P then when</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oncology</td>
<td></td>
<td></td>
<td></td>
<td>1-12 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13-24 months</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&gt;24 months</td>
</tr>
<tr>
<td>Operating Room</td>
<td></td>
<td></td>
<td></td>
<td>1-12 months</td>
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<td></td>
<td></td>
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<td>13-24 months</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&gt;24 months</td>
</tr>
<tr>
<td>Cardiology/EKGs</td>
<td></td>
<td></td>
<td></td>
<td>1-12 months</td>
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<tr>
<td></td>
<td></td>
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<td></td>
<td>13-24 months</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&gt;24 months</td>
</tr>
<tr>
<td>Pharmacy - IP</td>
<td></td>
<td></td>
<td></td>
<td>1-12 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13-24 months</td>
</tr>
</tbody>
</table>
1.5. Administrative Systems

1.5.1. Patient Flow
   1.5.1.1. What system do you use to manage patient registration and tracking?

1.5.2. Master Patient Index
   1.5.2.1. Do you have a Master Patient Index (MPI)? If yes which one?
   1.5.2.2. Is the MPI for a single system, multiple systems or cross organizational?
   1.5.2.3. How do you reconcile duplicate patients in your Master Patient Index?

1.5.3. Billing
   1.5.3.1. What is your billing system vendor?
   1.5.3.2. Do you use a clearing house and if so what is it?
   1.5.3.3. Do you have both hospital and professional billing systems?

1.5.4. Email or Messaging
   1.5.4.1. What system do you use for email?

1.5.5. Advance Medical Directives
   1.5.5.1. How do you collect and track advance directives?
   1.5.5.2. Is an electronic system used for this? Which system and vendor?

1.5.6. Insurance Information
   1.5.6.1. What system is used to collect a patient’s insurance information?
   1.5.6.2. Do you have electronic eligibility tracking?
   1.5.6.3. Do you have the ability to create electronic referrals?

1.5.7. Other scanned in forms (from other health care providers)
   1.5.7.1. What system do you use for scanning paper forms into your EHR?
   1.5.7.2. What forms do you scan?

1.6. Patient Access Systems

1.6.1. Patient Portal
   1.6.1.1. Do you have a patient-accessible portal? What information does the patient have access to?
1.6.2. Secure Physician Communications
1.6.2.1. Do you have secure email capacity to your patients (care provider to patient communication)?

1.7. Provider Access Systems
1.7.1. Physician Portal
1.7.1.1. Do you have a physician portal? What information do the physicians have access to?
1.7.2. Remote Access to Clinical Systems and/or EHR
1.7.2.1. How do you remotely access your EHR?

2. Integration/Interfacing Capabilities

2.1. System Interfaces

Please identify the types of interfaces that you have implemented:

<table>
<thead>
<tr>
<th>Standard</th>
<th>Y/N/P</th>
<th>If P then when</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Demographics</td>
<td>☐</td>
<td>1-12 months</td>
</tr>
<tr>
<td></td>
<td>☐</td>
<td>13-24 months</td>
</tr>
<tr>
<td></td>
<td>☐</td>
<td>&gt;24 months</td>
</tr>
<tr>
<td>Health Level 7 (HL7) Admission Discharge &amp; Transfer (ADT)</td>
<td>☐</td>
<td>1-12 months</td>
</tr>
<tr>
<td></td>
<td>☐</td>
<td>13-24 months</td>
</tr>
<tr>
<td></td>
<td>☐</td>
<td>&gt;24 months</td>
</tr>
<tr>
<td>Billing</td>
<td>☐</td>
<td>1-12 months</td>
</tr>
<tr>
<td></td>
<td>☐</td>
<td>13-24 months</td>
</tr>
<tr>
<td></td>
<td>☐</td>
<td>&gt;24 months</td>
</tr>
<tr>
<td>Orders</td>
<td>☐</td>
<td>1-12 months</td>
</tr>
<tr>
<td></td>
<td>☐</td>
<td>13-24 months</td>
</tr>
<tr>
<td></td>
<td>☐</td>
<td>&gt;24 months</td>
</tr>
</tbody>
</table>
2.2. Integration/Interface Engine

2.2.1. If you have an interface engine please identify the vendor.

2.2.2. Please describe the hardware platform and configuration.

2.2.3. Please describe the number of systems you have interfaced through the interface engine.

2.3. Interface Standards

Please indicate the interface standards that you use (Y) or have planned (P):

<table>
<thead>
<tr>
<th>Standard</th>
<th>Y/N/P</th>
<th>If P then when</th>
</tr>
</thead>
<tbody>
<tr>
<td>HL7 V2.x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1-12 months</td>
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<td></td>
<td>13-24 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;24 months</td>
</tr>
<tr>
<td>HL7 v 3.0 Clinical Document Architecture</td>
<td></td>
<td>1-12 months</td>
</tr>
<tr>
<td></td>
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<td>1-12 months</td>
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<td>(CDA)</td>
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<tr>
<td>HL7 Experience Level</td>
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<tr>
<td>Continuity of Care</td>
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<tr>
<td>Document (CCD)</td>
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<tr>
<td>DICOM (Digital Imaging</td>
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<tr>
<td>and Communications in</td>
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<tr>
<td>Medicine</td>
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<tr>
<td>Integrating the</td>
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<tr>
<td>Healthcare Enterprise</td>
<td></td>
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<tr>
<td>(IHE) Framework</td>
<td></td>
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<tr>
<td>National Council on</td>
<td></td>
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</tr>
<tr>
<td>Prescription Drug</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Programs (NCPDP)</td>
<td></td>
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</tr>
<tr>
<td>Script v10</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.4. Process Integration

2.4.1. Simple Object Access Protocol (SOAP)/Web Services

2.4.1.1. Please describe any systems or applications you have that use web services or the SOAP protocol.
2.4.1.2. Do you have in-house web services programming expertise? If so please describe.

2.4.2. PHIN
  2.4.2.1. Do you currently use the Public Health Information Network messaging system (PHIN-MS) for any public health reporting?
  2.4.2.2. Please describe the types of data you are exchanging using the PHIN-MS system

3. Semantic Interoperability

Semantic Interoperability is the ability of two or more computer systems to exchange information and have the meaning of that information accurately and automatically interpreted by the receiving system.

3.1. Does your computer system use Social Security Number as one form of unique identifier?
3.2. Does your computer system assign:
   3.2.1. Unique Patient Identifiers?
   3.2.2. Unique Guarantor Identifiers?
   3.2.3. Unique Subscriber Identifiers?
3.3. Does your computer system have the ability to accept or allow you to input additional identifiers:
   3.3.1. For the Patient?
   3.3.2. For the Guarantor?
   3.3.3. For the Subscriber?

3.4. Standard Nomenclature Utilization

Please indicate the standard nomenclatures that you use (Y), don’t use (N) or have planned (P):

<table>
<thead>
<tr>
<th>Standard</th>
<th>Y/N/P</th>
<th>If P then when</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Procedural Terminology (CPT)</td>
<td>☐</td>
<td>1-12 months</td>
</tr>
<tr>
<td>Medical Code System</td>
<td>1-12 months</td>
<td>13-24 months</td>
</tr>
<tr>
<td>---------------------------------------------------------</td>
<td>-------------</td>
<td>--------------</td>
</tr>
<tr>
<td>International Classification of Disease 9 (ICD9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICD10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logical Observation Identifiers Names and Codes (LOINC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systematized Nomenclature of Medicine (SNOMED)</td>
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</tr>
<tr>
<td>Unified Medical Language System (UMLS) RxNorm</td>
<td></td>
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</tr>
<tr>
<td>National Drug Code (NCD)</td>
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<td></td>
</tr>
<tr>
<td>First Data Bank (FDB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multum</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.5. Data Normalization Experience

3.5.1. Do you have any experience normalizing (transforming) data to a standard nomenclature? If so please describe.

4. Internal and External Network Capabilities

4.1. Network Capacity

4.1.1. Bandwidth

4.1.1.1. What is your current Internet bandwidth?

4.1.2. Redundancy

4.1.2.1. How is the network redundancy implemented?

4.1.3. What vendor is used for Internet connectivity? (i.e., Charter, Qwest, Comcast)

4.1.4. Do you use any load sharing/balancing, or Border Gateway Protocol (BGP)?

4.2. Network Security

4.2.1. Firewall

4.2.1.1. What firewall do you use?

4.2.1.2. Is it an appliance or software?

4.2.1.3. Do you have redundancy, and is it failover or load sharing?

4.2.2. VPN Capabilities

4.2.2.1. Software or Hardware VPN’s?

4.2.2.2. What types of hardware based VPN’s do you currently use?

4.2.2.3. Do you provide this for Vendors and End Users?

4.2.2.4. Do you use VPN for remote site connectivity?

4.2.2.5. Do you use VPN/Encryption solely for traversing the Internet or do you encrypt other types of connections?

4.2.2.6. What is your internal security process and policy to provide VPN connectivity?

4.2.3. Secure Sockets Layer (SSL) Capabilities

4.2.3.1. Do you use SSL for secure confidential communication or other methods?

4.2.4. Internal Network Encryption

4.2.4.1. What product is used?

4.2.4.2. What kinds of internal traffic do you encrypt?

4.2.4.3. Do you encrypt connections to remote sites?
4.2.5. Secure Email or Messaging
   4.2.5.1. What email system is used?
   4.2.5.1.1. How is email encryption done? Software or appliance used or manual encryption?
   4.2.5.1.2. Is email encryption software installed on client PC’s?
   4.2.5.1.3. Product used for SPAM control and content filtering?
4.2.6. External Portal or Citrix Gateway?
   4.2.6.1. How is this configured? Do you use an appliance or server?
   4.2.6.2. How do you secure your portals from your internal network?
4.2.7. Network Access Control (NAC)
   4.2.7.1. Is this setup on your network? If so, what product/vendor do you use?
   4.2.7.2. Were additional appliances needed to implement?
   4.2.7.3. Is network performance affected?
   4.2.7.4. How does this affect remote users and VPN connections?
4.2.8. DMZ Configuration
   4.2.8.1. How are your Internet servers segregated from your internal network?
   4.2.8.2. Do you use NAT between your DMZ and internal networks?
4.2.9. Logging/Monitoring
   4.2.9.1. What products do you use?
   4.2.9.2. Do you have any sort of Intrusion Detection System (IDS)/Intrusion Prevention System (IPS) or intelligent monitoring?
   4.2.9.3. What other methods do you use to retain an audit trail?
   4.2.9.4. What methods do you use for notifications?

5. Data Center Facilities

5.1. Primary Data Center
   5.1.1. Does your facility have excess capacity in your data center to potentially host an HIE in the following areas?
   - Space  y/n  How much: ________ sq feet.
   - UPS   y/n  How much: ________ KVA
   - Generator  y/n  How much: ________ KVA
   - HVAC  y/n  How much: ________ tons

   5.1.2. If you potentially have excess capacity, can you describe the following:
   a. Location (Street Address, City):
   b. Fire suppression system:
   c. Heating Ventilating and Air Conditioning (including duplicate HVAC):
   d. Duplicate Uninterruptible Power Supplies (UPS’s): (y/n)
   e. Duplicate generator: (y/n)
   f. Separate data entrances into data center (describe):
g. Backup data center facilities (in case of a disaster, this facility could be used) (describe):

h. Storage Area Networks (SAN) capacity (describe):

i. Redundant facility located offsite (describe it's capacity):

j. Is the data center staffed (y/n)?

k. Is the staff available 7x24?

l. Describe the physical security (cameras, proximity badges, motion detectors, etc.):

m. Can personnel other than hospital staff enter the data center?

n. Describe the connectivity vendors that service the area of the data center (i.e. Verizon, Charter Cable, ATT, etc.)

o. Are there any data bandwidth capacity issues (fiber into building, limited capacity of the connectivity vendor, etc.)?

5.1.3. Do you have any experience hosting for an organization outside your own organization’s needs? (describe)

5.2. Secondary or Disaster Recovery Site

5.2.1. Do you have a secondary or DR site? If so please describe.

5.2.2. If you do not have a DR data site how do you provide DR capabilities for your systems?

5.3. Physical Security

5.3.1. Please describe the physical security of your data centers.

5.3.2. Please describe which of your sites are staffed and which are not staffed.

5.3.3. For staffed sites please describe the staff and shift coverage.

6. Security & Authentication

6.1. Is your system ATNA (Audit Trail and Node Authentication) Complaint?

6.2. Primary Network Authentication

6.2.1. Single or Multi-Factor Authentication Capabilities

6.2.1.1. What type of Network Operating System (NOS) is used - Windows, Novell, Unix?

6.2.1.2. Is your network login Lightweight Directory Access Protocol (LDAP) complaint
6.2.1.3. Do you do use any form of two-factor authentication?
   6.2.1.3.1. If so are there tokens, smart cards, or other authentication physical devices?
   6.2.1.3.2. Are there employee ID cards (magnetic strips) that are used for physical access or computer (swipe) logins.
   6.2.1.3.3. Are proximity devices used?
   6.2.1.3.4. Are biometrics used like fingerprints, retinal, biometric identification?

6.3. Remote Access Authentication

   6.3.1. Do you pass credentials from primary network login to applications?
   6.3.1.1. What types of applications are used remotely vs. locally?

6.4. Security Auditing and Incident Review

   6.4.1. Incident response (reactions, procedures, triggers)
   6.4.2. What are the log retention policies?
   6.4.3. What are the log review intervals?
   6.4.4. What actually gets logged? What is the logging level?

6.5. Patient Context Swapping (CCOW)
   6.5.1. Are you doing any Single Sign On with patient context swapping?
   6.5.2. If so which vendor solution are you using?
   6.5.3. Please describe the application of this technology.

7. Current Experience with Data Exchange

   In each case of existing exchange please describe the types of data being exchanged, the messaging standards used and the direction(s) of the data flow.

   7.1. Regional Physician Practices
7.1.1. Are you exchanging data with any local physician offices? If so please describe whether they have EHR’s or not and whether they are employed or non-employed physicians.

7.2. The following chart represents the initial list of priorities for Meaningful Use for Health Information Exchange. Please indicate the exchanges that you currently have (Y), don’t have (N) or have planned (P):

<table>
<thead>
<tr>
<th>Exchange</th>
<th>Y/N/P</th>
<th>If P then when</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Data/ADT</td>
<td></td>
<td>☐ 1-12 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ 13-24 months</td>
</tr>
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<td></td>
<td></td>
<td>☐ &gt;24 months</td>
</tr>
<tr>
<td>Lab Orders &amp; Results</td>
<td></td>
<td>☐ 1-12 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ 13-24 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ &gt;24 months</td>
</tr>
<tr>
<td>Eligibility Checking</td>
<td></td>
<td>☐ 1-12 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ 13-24 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ &gt;24 months</td>
</tr>
<tr>
<td>Public Health Reporting</td>
<td></td>
<td>☐ 1-12 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ 13-24 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ &gt;24 months</td>
</tr>
<tr>
<td>Quality Reporting</td>
<td></td>
<td>☐ 1-12 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ 13-24 months</td>
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<td></td>
<td></td>
<td>☐ &gt;24 months</td>
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<tr>
<td>ePrescribing or Medication Management</td>
<td></td>
<td>☐ 1-12 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ 13-24 months</td>
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<tr>
<td></td>
<td></td>
<td>☐ &gt;24 months</td>
</tr>
<tr>
<td>Coordination of Care</td>
<td></td>
<td>☐ 1-12 months</td>
</tr>
</tbody>
</table>
7.3. Lab Orders & Results

7.3.1. Please describe how you are sharing lab orders and results and with whom.

7.3.2. Results Delivery
How are you distributing and receiving clinical results?

7.3.2.1. Fax
  7.3.2.1.1. Automated Fax system
  7.3.2.1.2. Manual Faxes

7.3.2.2. Phone
  7.3.2.2.1. Automated phone notification
  7.3.2.2.2. Manual calling

7.3.2.3. Paging
  7.3.2.3.1. Automated Text paging of Results
  7.3.2.3.2. Manual Text Paging of Results

7.3.2.4. Electronic
  7.3.2.4.1. Web Portal
  7.3.2.4.2. Virtual Private Network (VPN)
  7.3.2.4.3. Automatic Electronic Interface

7.4. Billing and Payer Exchange

7.4.1. Billing Standards
  7.4.1.1. Please describe the billing interfaces you have with payers.

7.4.2. Eligibility Checking
  7.4.2.1. Please describe any electronic eligibility checking you are doing and with whom.

7.4.3. Electronic Referrals
  7.4.3.1. Please describe any electronic referrals or electronic referral checking you are doing and with whom.

7.5. Public Health Reporting
7.5.1. Please describe if you are doing any of the following data exchange with public health agencies
   7.5.1.1. Reportable Disease Tests
   7.5.1.2. Births
   7.5.1.3. Deaths

7.6. Quality Reporting
   7.6.1. Please describe any electronic quality reporting you are doing and with whom
   7.6.2. Are you currently reporting quality measures to CMS electronically? Please describe.

7.7. ePrescribing or Medication Management
   7.7.1. Please describe any ePrescribing or Medication Management you are doing and with whom.

7.8. Coordination of Care
   7.8.1. Please describe any Coordination of Care (discharge summaries, nursing home notes, etc) you are doing and with whom.

7.9. What other organizations do you share electronic information with (community mental health, payers, nursing homes, other hospitals, etc.)?
Appendix C “Michigan Provider Outreach Sessions Postcard”

Adobe Acrobat Document

File inserted on next page
The American Recovery and Reinvestment Act of 2009 (ARRA) provides significant financial incentives, up to $63,750 per eligible Medicaid professional, to encourage the adoption and “meaningful use” of EHRs in ways that improve quality, increase efficiency, and promote safety. In order to provide physicians and hospitals with a better understanding of the federal incentive programs for health information technology (HIT) adoption, Michigan Medicaid has scheduled five information forums across the state. These forums will explain the intent of the federal statute and seek input from doctors and hospitals as to how this program can be implemented to best meet the needs of providers and the state. Additional details are on the reverse side.

www.MichiganHealthIT.org
<table>
<thead>
<tr>
<th>DATE</th>
<th>CITY</th>
<th>TIME</th>
<th>LOCATION</th>
<th>HOST ORGANIZATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 28</td>
<td>Detroit</td>
<td>Hospitals: 2:00 pm</td>
<td>Medical Society of SE Michigan</td>
<td>Wayne County Medical Society</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Physicians: 5:00 pm</td>
<td>3031 W. Grand Blvd. Suite 645</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Detroit, MI 48202</td>
<td></td>
</tr>
<tr>
<td>May 5</td>
<td>Mt. Pleasant</td>
<td>Physicians: 7:00 am</td>
<td>CMU Health Professions Bldg.</td>
<td>Michigan Health Information Alliance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hospitals: 10:00 am</td>
<td>2255 Global Telepresence Room</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mt. Pleasant, MI 48858</td>
<td></td>
</tr>
<tr>
<td>May 7</td>
<td>Marquette</td>
<td>Physicians: 8:00 am</td>
<td>UPHCN Superior Room</td>
<td>UP Health Information Network</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hospitals: 10:00 am</td>
<td>228 W. Washington St.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Marquette, MI 49855</td>
<td></td>
</tr>
<tr>
<td>May 18</td>
<td>Lansing</td>
<td>Physicians: 7:00 am</td>
<td>University Club Fireplace Room</td>
<td>Capital Area Regional Health Information Organization</td>
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<tr>
<td></td>
<td></td>
<td>Hospitals: 10:00 am</td>
<td>3435 Forest Road</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lansing, MI 48910</td>
<td></td>
</tr>
<tr>
<td>May 20</td>
<td>Grand Rapids</td>
<td>Physicians: 7:00 am</td>
<td>Spectrum Healthier Communities</td>
<td>Alliance for Health</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hospitals: 10:00 am</td>
<td>665 Seward Avenue, NW</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Grand Rapids, MI 49504</td>
<td></td>
</tr>
</tbody>
</table>

If you are unable to attend in person, the May 18 event will be broadcast live over the web and archived for later online viewing. The May 7 event will be videoconferenced through the UP Telehealth Network. For more information, visit [http://www.MichiganHealthIT.org](http://www.MichiganHealthIT.org).

These sessions are free, but space is limited. Please register at [http://www.MichiganHealthIT.org](http://www.MichiganHealthIT.org) or call 877-338-7106.
7 Appendix D “Medicaid EHR Provider Survey”
May 2010

Dear Medicaid Provider:

Electronic Health Records (EHRs) are becoming increasingly important tools in the delivery of health care and in health reform efforts. The American Recovery and Reinvestment Act of 2009 (ARRA) provides significant financial incentives, up to $63,750 per eligible professional, to encourage the adoption and "meaningful use" of EHRs in ways that improve quality, increase efficiency, and promote safety.

The Michigan Medicaid program will launch an EHR incentive program in 2011 and needs your help to make it successful. We are asking providers to take five minutes to complete the enclosed survey, or you may complete the survey on line at www.MichiganHealthIT.org. Your responses will provide the state with the baseline information necessary to understand Michigan’s current health information technology (HIT) capacity and plan for future HIT activities. Additional information on the survey may be found on the next page.

As details of the EHR incentive program are finalized, we will provide additional information to the Medicaid provider community. The first round of informational and listening sessions around the state was just announced and future educational sessions will take place in the fall. You are encouraged to visit www.MichiganHealthIT.org and sign up to be on the email list to receive periodic updates.

For more information about ARRA’s HIT programs, please visit www.MichiganHealthIT.org.

Thank you for completing the survey.

Sincerely,

Stephen Fitton
Director
Medical Services Administration

Attachment
Additional Information about the Survey
The survey is designed to collect baseline information about your EHR current use and future plans. The Michigan Department of Community Health (MDCH) will use the information collected to plan for the EHR incentive program and help develop a long-term state Medicaid Health IT Plan. The survey should only take a few minutes to complete.

How should I answer the questions?
• The survey should be answered from the point of view of your whole practice.
• The survey is anonymous; responses will be aggregated.
• How accurate does the information need to be? You are asked to complete each question as best as you can. Some questions ask about patient volume information that you may not have readily available; please provide your best estimate for these questions.
• A few questions reference patient encounters. The federal Centers for Medicare & Medicaid Services (CMS) is still in the process of defining "patient encounter," but for the purposes of this survey, a patient encounter is defined as a single episode of billable treatment or care per patient per day.

How do I complete the survey?
• You are encouraged to fill out and submit the survey online at www.MichiganHealthIT.org. For assistance with the survey, email info@MichiganHealthIT.org or call 877-338-7106.
• Alternatively, you can complete the enclosed paper copy and return it in the enclosed return envelope. Please only complete one version of the survey.

Who should complete the survey?
• The survey should be completed by the provider to whom it is addressed or any staff member who is familiar with the EHR use/plans for the practice. Only one survey should be completed for the practice.
• Do I need to complete the survey to be eligible for the EHR incentive? The survey is voluntary and you do not have to complete the survey to be eligible for the EHR incentive. However, your input is vital and will help shape the EHR incentive program and long-term plans for HIT in Michigan.

Please complete and return the survey by June 4, 2010.
This information is being collected by the Michigan Department of Community Health (MDCH) to identify current interest in and use of electronic health records (EHRs) by health professionals in Michigan. The information will assist the MDCH in implementing the federal Medicaid EHR incentive program in Michigan. It will also help the MDCH develop a long-term state Medicaid health information technology (HIT) plan.

To best meet our planning needs, only one survey should be completed for each practice. If you are part of a group practice with multiple locations, complete one survey for each practice location. The information you provide is anonymous; no individually identifiable information is collected in this survey. Your participation is encouraged and appreciated. Please complete the survey and return it in the envelope provided.

If you prefer, you may complete the survey online by going to www.michiganhealthit.org.

Example Survey

Please access the online survey at www.MichiganHealthIT.org

1. Do any providers in your practice plan to apply for the Medicaid incentive for EHR adoption? (Individual providers can apply for either the Medicaid incentive or the Medicare incentive, not both.)
   a) Yes ........................................ [A]........................................ [B]
   b) No ........................................ [A]........................................ [B]
   c) Unsure ........................................ [A]........................................ [B]

2. For each provider type listed provide a number for both columns.

1) Physician (other than a pediatrician) ........................................ [A]........................................ [B]
   2) Pediatrician ........................................ [A]........................................ [B]
   3) Dentist ........................................ [A]........................................ [B]
   4) Certified nurse-midwife ........................................ [A]........................................ [B]
   5) Nurse practitioner ........................................ [A]........................................ [B]
   6) Physician assistant ........................................ [A]........................................ [B]

Please note: For each answer, the number in column B should not be greater than the number in column A.

3. Which best describes your practice? (Mark one)
   a) Primary care practice ........................................ [A]
   b) Single specialty practice (not primary care) ........ [A]
   c) Multi-specialty practice ........................................ [A]
   d) Community health center (FQHC, FQHC look-alike, RHC) ........................................ [A]
   e) Community mental health center ............................. [A]
   f) Home health agency or hospice agency ................. [A]
   g) Nursing home or long-term care facility ................. [A]
   h) Other ................................................................ [A]

4. What percentage of the care that your practice provides is based in a hospital or hospital-owned facility?
   a) Less than 90% ........................................ [A]
   b) 90% or more ........................................ [A]

5. About how many patient encounters does your practice handle on an annual basis? (Please provide your best estimate.) ........................................ [A]

6. What percentage of your practice’s annual patient encounters is covered by Medicaid?
   a) Less than 10% ........................................ [A]
   b) 10–19% ........................................ [A]
   c) 20–29% ........................................ [A]
   d) 30–39% ........................................ [A]
   e) 40–49% ........................................ [A]
   f) 50% or more ........................................ [A]
APPENDIX D: Medicaid EHR Provider Survey

The following questions are about interest in and current use of electronic health systems in your practice.

7. Does your practice currently use an electronic practice management system?
   a) Yes .............................................. [X]
   b) No ................................................ [X]
   c) Unsure .......................................... [X]

8. Does your practice currently use an electronic health record (EHR) system?
   a) Yes .............................................. [X]
   b) No ................................................ [X]
   c) Unsure .......................................... [X]

9. If your practice uses an EHR system, is your EHR product certified by the Certification Commission for Health Information Technology (CCHIT)?
   a) Yes ............................................... [X]
   b) No ................................................ [X]
   c) Unsure .......................................... [X]

10. What is the extent of EHR planning and implementation in your practice? (Mark one.)
    a) Fully implemented / used by all providers ................................ [X]
    b) Used by some of the providers ............................................. [X]
    c) Implementation is planned in the next 12 months ....................... [X]
    d) Implementation is planned in the next 13–24 months ................. [X]
    e) We have decided not to implement an EHR ................................ [X]
    f) No decision has been made about implementing an EHR ........... [X]

The following question is for practices that currently have an EHR system in place.

11. Please tell us whether the following EHR functions are available in your EHR system and indicate whether the function is being used.

<table>
<thead>
<tr>
<th>Function</th>
<th>Is the function available?</th>
<th>Is the function used?</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Conduct drug-drug, drug-allergy, and drug-formulary checks ..........</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>b) Generate lists of patients by specific conditions ....................</td>
<td>B</td>
<td>D</td>
</tr>
<tr>
<td>c) Generate patient reminders for guideline-based interventions and/or screening tests ................................</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>d) Submit data electronically to public health agencies (including Michigan Care Improvement Registry [MCIR])</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>e) Generate and transmit permissible prescriptions electronically (e-prescribing) ..................................................</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>f) Computerized provider order entry (CPOE) for medications, labs, radiology/imaging, or referrals .....................</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>g) Generate a clinical summary of office visits for patients ..........</td>
<td>G</td>
<td>D</td>
</tr>
<tr>
<td>h) Maintain up-to-date problem list of active diagnoses ................</td>
<td>H</td>
<td>D</td>
</tr>
<tr>
<td>i) Maintain active medication allergy list ................................</td>
<td>I</td>
<td>D</td>
</tr>
<tr>
<td>j) Maintain active medication list .......................................</td>
<td>J</td>
<td>D</td>
</tr>
<tr>
<td>k) Check insurance eligibility ............................................</td>
<td>K</td>
<td>D</td>
</tr>
<tr>
<td>l) Submit claims ....................................................................</td>
<td>L</td>
<td>D</td>
</tr>
</tbody>
</table>

The following question is for practices that do not currently have an EHR system in place.

12. To what degree are the following issues a concern for implementation of an EHR system in your practice?

<table>
<thead>
<tr>
<th>Issue</th>
<th>Major Concern</th>
<th>Medium Concern</th>
<th>Minor Concern</th>
<th>Not a Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Unsure which EHR system to purchase ....................................</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>b) Worry that EHR choice will become obsolete ...........................</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>c) Initial costs of implementation ........................................</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>d) Recurring costs of EHR system .........................................</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>e) Disruption to practice workflow ........................................</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>f) Patient privacy ..................................................................</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>g) Familiarity with computer technology ...................................</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>h) Internet access availability and reliability ........................</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>i) No clear business value ..................................................</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
</tbody>
</table>

Example Survey

Please access the online survey at www.MichiganHealthIT.org

Thank You!
8 Appendix E “Description of the Michigan Primary Care Consortium”

The Michigan Primary Care Consortium (MPCC) is a collaborative private/public partnership of organizations committed to improving the delivery of primary healthcare in Michigan and to rebuilding the primary healthcare workforce. The Consortium was organized in 2006 in response to an invitation from the Chronic Disease Division of the Michigan Department of Community Health to primary care stakeholders to collaborate in resolving the system level barriers that were impeding the consistent delivery of effective chronic illness and preventive care in primary care settings.

Since 2007, the Consortium has promoted the transformation of primary care practices to patient-centered medical homes. The Improving Performance in Practice (IPIP) project has provided insight into the difficulties and successes experienced by primary care practices while implementing the model. In 2010, MPCC workgroups are completing initiatives in three major arenas: practice transformation, engagement of consumers of healthcare, and rebuilding the primary care workforce.

A basic assumption of the Consortium is that transformative changes in complex systems are best accomplished through the collaborative efforts of all key stakeholders. MPCC members have a vested interest in primary healthcare and/or health system change and affirm the Mission, Vision, and Guiding Principles of the MPCC. MPCC’s members represent diverse organizations:

- Physician organizations and physician hospital organizations
- Businesses and other purchasers of healthcare
- Insurance companies and healthplans
- Professional associations
- Academic programs
- Michigan Department of Community Health
- Quality improvement organizations
- Others

MPCC members are involved in various activities to achieve the overall objective:

Comprehensive, coordinated, whole-person care that is adequately reimbursed will be available in every primary care setting in Michigan

To accomplish this overall objective, the following activities are taking place.

MPCC Workgroups: The MPCC white paper series: “Primary Care is in Crisis” provided a framework and recommended actions for three primary areas of focus. Work groups are implementing action plans for nine objectives in 2010. The nine objectives include:
**Michigan IPIP Program:** Improving Performance In Practice or IPIP is a primary care practice transformation program that combines learning sessions with coaching to implement components of PCMH and chronic illness care.

**Michigan Definition of PCMH:** Michigan health plans, insurance companies and primary care professional associations came to consensus on a MI Definition of PCMH based on the Joint Principles of the Patient-Centered Medical Home with four Michigan footnotes.

**Health Plan Incentive Programs:** Michigan payers agreed that beginning in 2010, they would include three specific PCMH components in their incentive programs: extended access, e-prescribe, and registry use. Additional measures are under consideration for 2011.

More information is available at [www.mipcc.org](http://www.mipcc.org)
9 Appendix F “MiHIN Shared Services Project Plan”
<table>
<thead>
<tr>
<th>ID</th>
<th>% Complete</th>
<th>Task Name</th>
<th>Start</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>MiHIN Technical Design &amp; JEC</td>
<td>Mon 8/10/09</td>
<td>Thu 7/1/10</td>
</tr>
<tr>
<td>2</td>
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<td>Phase 1 - Initiation</td>
<td>Mon 8/10/09</td>
<td>Tue 11/17/09</td>
</tr>
<tr>
<td>44</td>
<td>100%</td>
<td>Phase 1 - Milestone 1 - HIE Project Planning</td>
<td>Mon 8/10/09</td>
<td>Wed 9/16/09</td>
</tr>
<tr>
<td>61</td>
<td>100%</td>
<td>Phase 1 - Execution</td>
<td>Mon 8/17/09</td>
<td>Wed 6/30/10</td>
</tr>
<tr>
<td>62</td>
<td>100%</td>
<td>Milestone 2 - HIE Early Adopter Technical Environment Analysis</td>
<td>Mon 8/17/09</td>
<td>Mon 1/4/10</td>
</tr>
<tr>
<td>81</td>
<td>100%</td>
<td>Letter of Intent</td>
<td>Thu 8/27/09</td>
<td>Fri 9/11/09</td>
</tr>
<tr>
<td>86</td>
<td>100%</td>
<td>Grant Application</td>
<td>Tue 8/25/09</td>
<td>Fri 10/16/09</td>
</tr>
<tr>
<td>98</td>
<td>100%</td>
<td>Milestone 3 - SOM Systems Technical Environment Analysis</td>
<td>Tue 8/18/09</td>
<td>Fri 11/13/09</td>
</tr>
<tr>
<td>114</td>
<td>100%</td>
<td>Milestone 4 - Technical Plan for Statewide HIE Infrastructure</td>
<td>Mon 8/17/09</td>
<td>Mon 1/18/10</td>
</tr>
<tr>
<td>142</td>
<td>100%</td>
<td>Milestone 5 - Operational Plan Budget Creation</td>
<td>Fri 3/12/10</td>
<td>Mon 4/19/10</td>
</tr>
<tr>
<td>143</td>
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<td>Develop vendor pricing template</td>
<td>Fri 3/12/10</td>
<td>Mon 3/15/10</td>
</tr>
<tr>
<td>144</td>
<td>100%</td>
<td>Collect vendor pricing</td>
<td>Mon 3/15/10</td>
<td>Wed 3/24/10</td>
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<tr>
<td>145</td>
<td>100%</td>
<td>Incorporate into Operational Plan budget</td>
<td>Wed 3/24/10</td>
<td>Wed 3/31/10</td>
</tr>
<tr>
<td>146</td>
<td>100%</td>
<td>Develop final Operational Plan budget for equipment</td>
<td>Fri 3/26/10</td>
<td>Wed 3/31/10</td>
</tr>
<tr>
<td>147</td>
<td>100%</td>
<td>System requirements document draft</td>
<td>Wed 3/24/10</td>
<td>Mon 4/12/10</td>
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<tr>
<td>148</td>
<td>100%</td>
<td>Review requirements document with Technical workgroup</td>
<td>Fri 4/2/10</td>
<td>Mon 4/19/10</td>
</tr>
<tr>
<td>149</td>
<td>100%</td>
<td>System requirements document reviewed</td>
<td>Fri 4/2/10</td>
<td>Mon 4/19/10</td>
</tr>
<tr>
<td>150</td>
<td>100%</td>
<td>System requirements document sign off</td>
<td>Fri 4/9/10</td>
<td>Mon 4/19/10</td>
</tr>
<tr>
<td>151</td>
<td>100%</td>
<td>Milestone 6 - Pilot Site Specification Creation</td>
<td>Mon 3/8/10</td>
<td>Fri 4/23/10</td>
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<tr>
<td>152</td>
<td>100%</td>
<td>Finalize pilot use cases</td>
<td>Fri 3/12/10</td>
<td>Fri 3/26/10</td>
</tr>
<tr>
<td>153</td>
<td>100%</td>
<td>Develop detailed HIE requirements with VTCT</td>
<td>Mon 3/8/10</td>
<td>Fri 4/2/10</td>
</tr>
<tr>
<td>154</td>
<td>100%</td>
<td>Develop HIE interoperability specification</td>
<td>Fri 4/2/10</td>
<td>Fri 4/9/10</td>
</tr>
<tr>
<td>155</td>
<td>100%</td>
<td>Develop MiHIN security specification</td>
<td>Thu 3/11/10</td>
<td>Fri 4/9/10</td>
</tr>
<tr>
<td>156</td>
<td>100%</td>
<td>Review specifications with Technical workgroup</td>
<td>Fri 4/9/10</td>
<td>Mon 4/12/10</td>
</tr>
<tr>
<td>157</td>
<td>100%</td>
<td>Finalize specifications</td>
<td>Mon 4/12/10</td>
<td>Fri 4/23/10</td>
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<tr>
<td>158</td>
<td>100%</td>
<td>Business Operations Workgroup</td>
<td>Tue 12/1/09</td>
<td>Tue 4/20/10</td>
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<tr>
<td>159</td>
<td>100%</td>
<td>Business/Technical Requirements Input and Review</td>
<td>Tue 2/9/10</td>
<td>Tue 3/23/10</td>
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<tr>
<td>163</td>
<td>100%</td>
<td>Strategic Plan</td>
<td>Tue 12/1/09</td>
<td>Fri 4/9/10</td>
</tr>
<tr>
<td>181</td>
<td>100%</td>
<td>Operational Plan</td>
<td>Tue 12/1/09</td>
<td>Tue 4/20/10</td>
</tr>
<tr>
<td>193</td>
<td>100%</td>
<td>Technical Workgroup</td>
<td>Mon 11/2/09</td>
<td>Fri 5/28/10</td>
</tr>
<tr>
<td>194</td>
<td>100%</td>
<td>Strategic and Operational Plan</td>
<td>Mon 1/4/10</td>
<td>Mon 4/19/10</td>
</tr>
<tr>
<td>201</td>
<td>100%</td>
<td>Standards</td>
<td>Thu 12/17/09</td>
<td>Thu 4/1/10</td>
</tr>
<tr>
<td>207</td>
<td>100%</td>
<td>Security (Technical)</td>
<td>Thu 12/17/09</td>
<td>Fri 5/28/10</td>
</tr>
<tr>
<td>215</td>
<td>100%</td>
<td>Workgroup Coordination</td>
<td>Tue 1/19/10</td>
<td>Fri 5/28/10</td>
</tr>
<tr>
<td>222</td>
<td>100%</td>
<td>Technical Workgroup Efforts</td>
<td>Thu 12/17/09</td>
<td>Wed 4/21/10</td>
</tr>
<tr>
<td>230</td>
<td>100%</td>
<td>Governance (Technical)</td>
<td>Mon 11/2/09</td>
<td>Tue 11/10/09</td>
</tr>
<tr>
<td>232</td>
<td>100%</td>
<td>Governance Workgroup</td>
<td>Tue 11/10/09</td>
<td>Wed 6/30/10</td>
</tr>
<tr>
<td>233</td>
<td>100%</td>
<td>Governance Model</td>
<td>Tue 11/10/09</td>
<td>Wed 6/30/10</td>
</tr>
<tr>
<td>234</td>
<td>100%</td>
<td>Establish initial governance model</td>
<td>Tue 11/10/09</td>
<td>Tue 12/15/09</td>
</tr>
<tr>
<td>235</td>
<td>100%</td>
<td>Provide high level understanding of what is to be governed based on services, valu</td>
<td>Fri 1/1/10</td>
<td>Fri 1/15/10</td>
</tr>
<tr>
<td>236</td>
<td>100%</td>
<td>Review stakeholder feedback from interviews</td>
<td>Fri 1/22/10</td>
<td>Thu 2/4/10</td>
</tr>
<tr>
<td>237</td>
<td>100%</td>
<td>Develop success criteria</td>
<td>Fri 1/11/10</td>
<td>Thu 1/21/10</td>
</tr>
<tr>
<td>238</td>
<td>100%</td>
<td>Review governance models</td>
<td>Fri 1/15/10</td>
<td>Sun 1/31/10</td>
</tr>
<tr>
<td>239</td>
<td>100%</td>
<td>Review approaches taken by other states based on 'scope of governance' and eval</td>
<td>Fri 1/15/10</td>
<td>Sun 1/31/10</td>
</tr>
<tr>
<td>240</td>
<td>100%</td>
<td>Determine options based on what is to be governed (priorities, use cases, value pr</td>
<td>Mon 2/1/10</td>
<td>Mon 2/15/10</td>
</tr>
<tr>
<td>ID</td>
<td>% Complete</td>
<td>Task Name</td>
<td>Start</td>
<td>Finish</td>
</tr>
<tr>
<td>-----</td>
<td>------------</td>
<td>---------------------------------------------------------------------------</td>
<td>----------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>241</td>
<td>100%</td>
<td>Review and refine long term governance model</td>
<td>Mon 3/1/10</td>
<td>Mon 3/15/10</td>
</tr>
<tr>
<td>242</td>
<td>100%</td>
<td>Approve long term governance model</td>
<td>Mon 3/15/10</td>
<td>Wed 3/31/10</td>
</tr>
<tr>
<td>243</td>
<td>100%</td>
<td>Perform implementation for statewide HIE governance (May)</td>
<td>Mon 5/3/10</td>
<td>Fri 5/28/10</td>
</tr>
<tr>
<td>244</td>
<td>100%</td>
<td>Provide executive mentoring, governance facilitation and transition to formal entity</td>
<td>Tue 6/1/10</td>
<td>Wed 6/30/10</td>
</tr>
<tr>
<td>245</td>
<td>100%</td>
<td>Reporting Requirements</td>
<td>Tue 12/1/09</td>
<td>Tue 12/15/09</td>
</tr>
<tr>
<td>247</td>
<td>100%</td>
<td>Strategic Plan</td>
<td>Fri 11/13/09</td>
<td>Wed 4/7/10</td>
</tr>
<tr>
<td>257</td>
<td>100%</td>
<td>Operational Plan</td>
<td>Mon 2/1/10</td>
<td>Wed 4/14/10</td>
</tr>
<tr>
<td>261</td>
<td>100%</td>
<td>Infrastructure Solution</td>
<td>Wed 1/20/10</td>
<td>Fri 5/28/10</td>
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<tr>
<td>265</td>
<td>100%</td>
<td>Interviews</td>
<td>Tue 12/1/09</td>
<td>Thu 2/4/10</td>
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<tr>
<td>269</td>
<td>100%</td>
<td>Communication</td>
<td>Thu 1/21/10</td>
<td>Fri 2/26/10</td>
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<tr>
<td>272</td>
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<td>Finance</td>
<td>Mon 3/29/10</td>
<td>Wed 4/14/10</td>
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<td>287</td>
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<td>Technical</td>
<td>Wed 1/27/10</td>
<td>Mon 3/1/10</td>
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<tr>
<td>302</td>
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<td>Business Operations</td>
<td>Fri 1/1/10</td>
<td>Mon 2/1/10</td>
</tr>
<tr>
<td>307</td>
<td>100%</td>
<td>Finance</td>
<td>Tue 12/1/09</td>
<td>Fri 4/30/10</td>
</tr>
<tr>
<td>308</td>
<td>100%</td>
<td>ARRA Match</td>
<td>Tue 12/1/09</td>
<td>Fri 1/29/10</td>
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<td>311</td>
<td>100%</td>
<td>Independent Workgroup</td>
<td>Tue 12/1/09</td>
<td>Fri 12/18/09</td>
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<tr>
<td>313</td>
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<td>Financial Sustainability</td>
<td>Fri 1/1/10</td>
<td>Fri 1/29/10</td>
</tr>
<tr>
<td>316</td>
<td>100%</td>
<td>Strategic Plan: Non-sustainability finance portions of plan</td>
<td>Tue 12/1/09</td>
<td>Wed 4/7/10</td>
</tr>
<tr>
<td>319</td>
<td>100%</td>
<td>Strategic Plan: Quantify cost of sustaining operations</td>
<td>Mon 2/8/10</td>
<td>Fri 4/30/10</td>
</tr>
<tr>
<td>335</td>
<td>100%</td>
<td>Operational Plan: Budget and financial inputs</td>
<td>Tue 12/1/09</td>
<td>Thu 4/15/10</td>
</tr>
<tr>
<td>347</td>
<td>100%</td>
<td>On-going review of Project Budget</td>
<td>Fri 12/18/09</td>
<td>Fri 4/9/10</td>
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<td>Privacy &amp; Security</td>
<td>Thu 12/17/09</td>
<td>Fri 4/23/10</td>
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<tr>
<td>350</td>
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<td>Sub WorkGroup Kick Off</td>
<td>Thu 12/17/09</td>
<td>Thu 1/7/10</td>
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<tr>
<td>354</td>
<td>100%</td>
<td>Meeting 1 (Jan 28)</td>
<td>Thu 12/17/09</td>
<td>Fri 1/29/10</td>
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<td>359</td>
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<td>Fri 1/29/10</td>
<td>Tue 2/2/10</td>
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<tr>
<td>371</td>
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<td>Wed 2/3/10</td>
<td>Tue 2/9/10</td>
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<td>Wed 2/10/10</td>
<td>Fri 2/26/10</td>
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<tr>
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<td>Meeting 4 (Feb 23)</td>
<td>Tue 2/23/10</td>
<td>Tue 2/23/10</td>
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<tr>
<td>390</td>
<td>100%</td>
<td>Privacy and Security Operations Plan Outline (for Tech WG (submit 2-27 for Mar)</td>
<td>Wed 2/24/10</td>
<td>Fri 2/26/10</td>
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<tr>
<td>393</td>
<td>100%</td>
<td>Meeting 5 (Mar 9)</td>
<td>Wed 2/24/10</td>
<td>Tue 3/9/10</td>
</tr>
<tr>
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<td>Operations Plan Draft</td>
<td>Wed 3/10/10</td>
<td>Fri 3/19/10</td>
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<td>100%</td>
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<td>Wed 3/10/10</td>
<td>Tue 3/16/10</td>
</tr>
<tr>
<td>417</td>
<td>100%</td>
<td>Meeting 7 (Mar 23)</td>
<td>Wed 3/17/10</td>
<td>Tue 3/23/10</td>
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<tr>
<td>431</td>
<td>100%</td>
<td>Policies to Governance WG</td>
<td>Wed 3/24/10</td>
<td>Fri 3/26/10</td>
</tr>
<tr>
<td>434</td>
<td>100%</td>
<td>Meeting 8 (Mar 30)</td>
<td>Wed 3/24/10</td>
<td>Tue 3/30/10</td>
</tr>
<tr>
<td>440</td>
<td>100%</td>
<td>Final Deliverables</td>
<td>Wed 4/7/10</td>
<td>Fri 4/23/10</td>
</tr>
<tr>
<td>447</td>
<td>100%</td>
<td>Phase 1 - Closeout</td>
<td>Mon 5/3/10</td>
<td>Thu 7/1/10</td>
</tr>
<tr>
<td>448</td>
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<td>Conduct Lessons Learned Meeting</td>
<td>Mon 5/3/10</td>
<td>Mon 5/3/10</td>
</tr>
<tr>
<td>449</td>
<td>100%</td>
<td>Review Issues Log &amp; develop action plans</td>
<td>Mon 5/3/10</td>
<td>Mon 5/3/10</td>
</tr>
<tr>
<td>450</td>
<td>100%</td>
<td>Conduct Stage exit review (DIT-0189)</td>
<td>Thu 7/1/10</td>
<td>Thu 7/1/10</td>
</tr>
<tr>
<td>451</td>
<td>100%</td>
<td>Receive sign-off</td>
<td>Thu 7/1/10</td>
<td>Thu 7/1/10</td>
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<tr>
<td>ID</td>
<td>Task Name</td>
<td>Start</td>
<td>Finish</td>
<td>Resource Names</td>
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<td>----</td>
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<td>----------------</td>
<td>-----------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Michigan Health Information Network</td>
<td>Mon 5/3/10</td>
<td>Thu 12/31/15</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Federal Approval of Strategic Plan</td>
<td>Thu 7/1/10</td>
<td>Thu 7/1/10 ONC</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Federal Approval of Operational Plan</td>
<td>Thu 7/1/10</td>
<td>Thu 7/1/10 ONC</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Establish Governance Structure</td>
<td>Mon 5/3/10</td>
<td>Thu 12/31/15</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Perform Selection Process</td>
<td>Mon 5/3/10</td>
<td>Fri 5/14/10 MDCH</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Select Board Members</td>
<td>Mon 5/17/10</td>
<td>Mon 5/17/10 ONC</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Create Bylaws</td>
<td>Mon 5/17/10</td>
<td>Fri 6/25/10 MDCH</td>
<td></td>
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<tr>
<td>8</td>
<td>File with State of Michigan</td>
<td>Mon 6/28/10</td>
<td>Mon 6/28/10 MDCH</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Hire Executive Director</td>
<td>Mon 5/17/10</td>
<td>Wed 6/30/10 MDCH</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Facilitate Legislative Changes changing makeup of HIT Commission</td>
<td>Mon 5/3/10</td>
<td>Fri 10/1/10 MDCH</td>
<td></td>
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<tr>
<td>11</td>
<td>Create Organizational Structure</td>
<td>Thu 7/1/10</td>
<td>Fri 12/31/10 MDCH</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Hire Remaining Staff</td>
<td>Thu 7/1/10</td>
<td>Thu 12/31/15 MDCH</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Governance Entity Executing</td>
<td>Mon 1/3/11</td>
<td>Mon 1/3/11 MDCH</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Create Long Term Sustainability</td>
<td>Mon 10/4/10</td>
<td>Thu 2/10/11</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Create Business Plan</td>
<td>Mon 10/4/10</td>
<td>Thu 2/10/11</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Write Business Plan</td>
<td>Mon 10/4/10</td>
<td>Wed 2/9/11 Governing Entity</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Submit Plan to ONC</td>
<td>Thu 2/10/11</td>
<td>Thu 2/10/11 Governing Entity</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Begin Stakeholder Financing</td>
<td>Mon 1/2/12</td>
<td>Mon 1/2/12 Governing Entity</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Fully Self-Sustaining</td>
<td>Thu 1/1/15</td>
<td>Thu 1/1/15 Governing Entity</td>
<td></td>
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<tr>
<td>20</td>
<td>Select Technology Vendor</td>
<td>Mon 7/5/10</td>
<td>Wed 10/6/10</td>
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<tr>
<td>21</td>
<td>Create RFP</td>
<td>Mon 7/5/10</td>
<td>Fri 7/16/10 Governing Entity</td>
<td></td>
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<td>22</td>
<td>RFP Released</td>
<td>Mon 7/19/10</td>
<td>Mon 7/19/10 Governing Entity</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Responses Received</td>
<td>Mon 8/2/10</td>
<td>Mon 8/2/10 Governing Entity</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Evaluation Process</td>
<td>Mon 8/2/10</td>
<td>Fri 8/13/10 Governing Entity</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Vendor Selected</td>
<td>Mon 8/16/10</td>
<td>Mon 8/16/10 Governing Entity</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Contract Negotiations</td>
<td>Mon 8/16/10</td>
<td>Fri 8/27/10 Governing Entity</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Contract Executed</td>
<td>Mon 8/30/10</td>
<td>Mon 8/30/10 Governing Entity</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Project Planning</td>
<td>Wed 9/15/10</td>
<td>Tue 10/5/10 Governing Entity</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Project Executing</td>
<td>Wed 10/6/10</td>
<td>Wed 10/6/10 Governing Entity</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>System Acquisition Oversight</td>
<td>Fri 10/1/10</td>
<td>Tue 1/31/12 Governing Entity</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Implement Technology</td>
<td>Fri 10/1/10</td>
<td>Tue 1/31/12</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Phase I</td>
<td>Fri 10/1/10</td>
<td>Wed 3/30/11</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Core Infrastructure Buildout</td>
<td>Thu 12/30/10</td>
<td>Wed 3/30/11</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>MPI</td>
<td>Thu 12/30/10</td>
<td>Wed 3/30/11 Vendor,Governing Entity</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Provider Directory</td>
<td>Tue 2/15/11</td>
<td>Wed 3/30/11 Vendor,Governing Entity</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Security Services</td>
<td>Wed 11/17/10</td>
<td>Fri 12/31/10</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Audit and Node Authentication and Consent</td>
<td>Wed 11/17/10</td>
<td>Fri 12/31/10 Vendor,Governing Entity</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Use Cases</td>
<td>Fri 10/1/10</td>
<td>Mon 2/28/11</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>Labs to MDSS</td>
<td>Fri 10/1/10</td>
<td>Thu 12/30/10 Vendor,SoM Business and Technology</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>Immunizations to MCIR</td>
<td>Wed 12/15/10</td>
<td>Mon 2/28/11 Vendor,SoM Business and Technology</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Phase II</td>
<td>Fri 4/1/11</td>
<td>Fri 9/30/11</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>Core Infrastructure Buildout</td>
<td>Tue 5/17/11</td>
<td>Fri 7/29/11</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>XDS Registry</td>
<td>Tue 5/17/11</td>
<td>Thu 6/30/11 Vendor,Governing Entity</td>
<td></td>
</tr>
</tbody>
</table>
# APPENDIX F: MiHIN Shared Services Project Plan

<table>
<thead>
<tr>
<th>ID</th>
<th>Task Name</th>
<th>Start</th>
<th>Finish</th>
<th>Resource Names</th>
</tr>
</thead>
<tbody>
<tr>
<td>44</td>
<td>Shared Service Bus</td>
<td>Wed 6/1/11</td>
<td>Fri 7/29/11</td>
<td>Vendor, Governing Entity</td>
</tr>
<tr>
<td>45</td>
<td>Security Services</td>
<td>Fri 7/1/11</td>
<td>Fri 9/30/11</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>Roles</td>
<td>Fri 7/1/11</td>
<td>Fri 9/30/11</td>
<td>Vendor, Governing Entity</td>
</tr>
<tr>
<td>47</td>
<td>Use Cases</td>
<td>Fri 4/1/11</td>
<td>Fri 9/30/11</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>Immunization History from MCIR</td>
<td>Fri 4/1/11</td>
<td>Fri 7/1/11</td>
<td>Vendor, SoM Business and Technology</td>
</tr>
<tr>
<td>49</td>
<td>CCDs to ED</td>
<td>Tue 8/2/11</td>
<td>Fri 9/30/11</td>
<td>Vendor, Governing Entity</td>
</tr>
<tr>
<td>50</td>
<td>CCDs to Physician Offices</td>
<td>Wed 6/1/11</td>
<td>Mon 8/1/11</td>
<td>Vendor, Governing Entity</td>
</tr>
<tr>
<td>51</td>
<td>Phase III</td>
<td>Mon 10/3/11</td>
<td>Tue 1/31/12</td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>Core Infrastructure Buildout</td>
<td>Thu 12/1/11</td>
<td>Tue 1/31/12</td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>NHIN Gateway</td>
<td>Thu 12/1/11</td>
<td>Tue 1/31/12</td>
<td>Vendor, Governing Entity</td>
</tr>
<tr>
<td>54</td>
<td>Use Cases</td>
<td>Mon 10/3/11</td>
<td>Fri 12/30/11</td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>Syndromic Results to MSSS</td>
<td>Wed 11/16/11</td>
<td>Fri 12/30/11</td>
<td>Vendor, SoM Business and Technology</td>
</tr>
<tr>
<td>56</td>
<td>Medicaid Eligibility</td>
<td>Mon 10/3/11</td>
<td>Mon 10/3/11</td>
<td>Vendor, SoM Business and Technology</td>
</tr>
<tr>
<td>57</td>
<td>Lab Results Inquiry</td>
<td>Mon 10/3/11</td>
<td>Mon 10/3/11</td>
<td>Vendor, Governing Entity</td>
</tr>
</tbody>
</table>
10 Appendix G “Project Management Documentation”
A. General Information

Information to be provided in this section is general in nature and provides the necessary information about the organization of the project and project participants.

<table>
<thead>
<tr>
<th>Project ID/Acronym:</th>
<th>MiHIN</th>
<th>Date:</th>
<th>9/1/2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controlling Agency:</td>
<td>MDIT</td>
<td>Modification Date:</td>
<td>4/30/10</td>
</tr>
<tr>
<td>Prepared by:</td>
<td>Amber Murphy</td>
<td>Authorized by:</td>
<td>Beth Nagel</td>
</tr>
</tbody>
</table>

B. Risk Management Strategy

Define the risk management methodology to be used, the risk assumptions, the roles and responsibilities, the timeframes, risk ranking / scoring techniques, establish risk thresholds, define risk communications, and develop a risk tracking process.

1. Define the risk management methodology to be used

The Dewpoint team will apply a proactive risk management approach invoked during the build of the scope of work and will continue throughout the execution of Phase 1. The successful implementation of Phase 1 depends on the diligence of the project team to manage all potential threats to its delivery.

The approach the project team will implement for risk management is a process which includes four subdivisions: Risk Planning, Risk Assessment, Risk Analysis and Risk Handling.

During the Risk Planning component, project risk factors will be assessed by identifying and documenting them. The project team members and other stakeholders will identify initial risks and assumptions. Issues and risks will be captured and documented for further analysis. Throughout the project lifecycle, the project team will continue to identify and document risks as they are identified.

Risk Assessment will entail the project team assessing the identified and documented risks in order to create a ranking. A risk value will be calculated using the probability and impact ratings. The higher the risk value, the higher the probability for managing the risk. The project manager will facilitate a review of the risks and will determine if the risk should be accepted, mitigated, or avoided, and develop a risk management plan, as appropriate.

After the high level assessment is completed using the Risk Identification List, a determination of how to respond to the risk must be made.

Risk Handling entails the creation of a risk mitigation plan for each of the identified risks. Risk Handling includes determining what steps the project team can take to avoid or mitigate the risk, determining which steps should be included in the project schedule, assigning an owner and target dates, and monitoring of the risk status and mitigation steps. If the risk event occurs, and changes to cost, schedule, or scope are required, the Change Management Process will be invoked.

2. Define the risk assumptions
3. Define the roles and responsibilities

The project team as a whole is responsible for identifying any new project risks that may occur throughout the life of the project.

4. Define the timeframes

The risk management plan will be reviewed with the project team on a monthly basis.

5. Define the risk ranking/scoring techniques

The high-level risks are identified, assessed and documented in the project log. The project log provides a general evaluation of the broad degree of risk that the project faces, based on the overall project characteristics. The high-level assessment will identify risk items, quantify the risk, and determine how to respond throughout the project lifecycle.

Although all risks are part of the risk management plan, those risks that have a high or medium level of risk exposure require documented project risk action and contingency plans. During Risk Analysis, a risk action plan is created to describe the actions to be taken to eliminate or minimize the impact. The contingency plan outlines the plan of action to be taken if the risk cannot be prevented or minimized.

6. Establish risk thresholds

The risk threshold for this project is to stay within the fixed price contract already established for the project.

7. Define risk communications

Risks will be documented within the project log and discussed with the project team for mitigation plan and to determine the qualitative and quantitative analysis of each risk identified.

8. Define risk tracking process

Risks will be documented within the project log and their status will be tracked within the same document.

C. Risk Identification

<table>
<thead>
<tr>
<th>Risk Category</th>
<th>Risk Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel</td>
<td>Project completion due to conflicting priorities of involved stakeholders</td>
</tr>
</tbody>
</table>
Other Conflicts with ARRA grant timelines
Personnel Lack of beneficial participation by stakeholders across Michigan
Financial Insufficient matching funds from stakeholders
Financial Funds from Office of the National Coordinator under ARRA not released on time
Financial Cost over-run
Organization Political influence delays project time table or direction

D. Qualitative and Quantitative Analysis

Qualitative Analysis includes assessing the impact of risk events and prioritizing risk in relation to effect on project objectives. Quantitative Analysis includes assessing the probability of risk event occurring, establishing consequences of impact on project objectives, and determining the weighting of risk.

Qualitative Analysis
- Assess the impact of each risk event
- Prioritize risk in relation to effect on project objectives

<table>
<thead>
<tr>
<th>Risk Category / Event</th>
<th>Risk Priority</th>
<th>Risk Impact Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel: Project completion due to conflicting priorities of involved stakeholders</td>
<td>Low</td>
<td>As funding from ARRA becomes available this risk is expected to be reduced as involved stakeholders identify involvement in statewide HIE as a higher priority.</td>
</tr>
<tr>
<td>Other: Conflicts with ARRA grant timelines</td>
<td>Medium</td>
<td>Changes made in the timing of communication events/kick-off have been made to reduce the work required to meet the ARRA grant timelines.</td>
</tr>
<tr>
<td>Personnel: Lack of beneficial participation by stakeholders across Michigan</td>
<td>Medium</td>
<td>Plans are being developed to formalize communication and participation by stakeholders in a workgroup driven approach to governance, finance, measurement, technical and privacy/security aspects of HIE.</td>
</tr>
<tr>
<td>Financial: Insufficient matching funds from stakeholders</td>
<td>Medium</td>
<td>Initial communication followed by active stakeholder participation through a workgroup approach and a stakeholder driven strategy for a financial match are expected to maximize stakeholder willingness to provide funds.</td>
</tr>
<tr>
<td>Financial: Cost over-run</td>
<td>Low</td>
<td>Continuous contract and budget management by the SOM and the contractor are expected to reduce this risk.</td>
</tr>
<tr>
<td>Organization: Political influence delays project time table or direction</td>
<td>Low</td>
<td>The inclusion of key SOM government representatives in leadership positions on the governance entity and workgroups will assist in reducing politically influenced project delays.</td>
</tr>
</tbody>
</table>
Quantitative Analysis (optional)

- Assess the probability of the risk event occurring
- Establish consequences of impact on project objectives
- Determine weighting of each risk factor

<table>
<thead>
<tr>
<th>Risk Category / Event</th>
<th>Probability of Occurrence</th>
<th>Consequences of Impact</th>
<th>Risk Weighting (Probability * Impact)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Risk probability: .1 = Very Low / .3 = Low / .5 = Moderate / .7 = High / .9 = Very High

E. Risk Response Planning

Determine the options and actions to enhance opportunities and reduce threats to the project's objectives. Assign responsibilities for each agreed response.

<table>
<thead>
<tr>
<th>Risk Category / Event</th>
<th>Risk Mitigation Outcomes</th>
<th>Actions Taken / To be Taken</th>
<th>Risk Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel:</td>
<td>- Communicate regularly</td>
<td>Utilize governance leadership</td>
<td>- SOM</td>
</tr>
<tr>
<td>Project completion</td>
<td>with stakeholders</td>
<td>to drive stakeholder</td>
<td></td>
</tr>
<tr>
<td>due to conflicting</td>
<td>- Address need for HIE</td>
<td>participation and decision</td>
<td>- Governance</td>
</tr>
<tr>
<td>priorities of</td>
<td>priority with leadership</td>
<td>making</td>
<td>and workgroup</td>
</tr>
<tr>
<td>involved stakeholders</td>
<td>of stakeholder</td>
<td></td>
<td>co-chairs</td>
</tr>
<tr>
<td></td>
<td>organizations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td>- Manage non-grant tasks</td>
<td>Utilize project management</td>
<td>- SOM</td>
</tr>
<tr>
<td>Conflicts with ARRA</td>
<td>given to contractor</td>
<td>tool and SOM and contractor</td>
<td></td>
</tr>
<tr>
<td>grant timelines</td>
<td>- Ensure grant data</td>
<td>project managers to manage</td>
<td>- SOM and</td>
</tr>
<tr>
<td></td>
<td>gathering and writing</td>
<td>priorities</td>
<td>Contractor</td>
</tr>
<tr>
<td></td>
<td>tasks are a priority</td>
<td></td>
<td>project</td>
</tr>
<tr>
<td>Personnel:</td>
<td>- Communicate regularly</td>
<td>Communicate regularly,</td>
<td>- SOM</td>
</tr>
<tr>
<td>Lack of beneficial</td>
<td>with stakeholders</td>
<td>engage in two kick-off</td>
<td></td>
</tr>
<tr>
<td>participation by</td>
<td>- Delegate tasks/activities to</td>
<td>sessions prior to October</td>
<td>- Facilitators</td>
</tr>
<tr>
<td>stakeholders across</td>
<td>stakeholders</td>
<td>16 and establish</td>
<td>and workgroup</td>
</tr>
<tr>
<td>Michigan</td>
<td>- Utilize Workzone tools</td>
<td>Governance/Finance and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>to monitor progress and</td>
<td>Clinical/Technical workgroups</td>
<td></td>
</tr>
<tr>
<td></td>
<td>stakeholder compliance</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Communicate</td>
<td></td>
<td>- SOM,</td>
</tr>
<tr>
<td></td>
<td>with</td>
<td></td>
<td>facilitators</td>
</tr>
</tbody>
</table>

APPENDIX G: Project Management Documentation
| Financial: Insufficient matching funds from stakeholders | - Communicate need for and expectation of key stakeholder leadership  
- Engage stakeholders in developing and implementing matching fund strategy | Utilize governance leadership representing statewide stakeholders to develop strategy along with high stakeholder engagement prior to and after application submission, develop sustainable budget based on cost and return to stakeholders | - SOM leadership  
- SOM and facilitators |
| Financial: Cost over-run | - Routine management of contract expenses  
- Routine management of budget and changes in scope of work that would impact budget | SOM and contractor project managers closely track project in accordance with contract and detailed project plan and minimize deviation from scope of work | - SOM project managers  
- SOM and contractor project managers |
| Organization: Political influence delays project time table or direction | - Regular communication with leaders of key stakeholder organizations  
- Immediate communication of politically motivated forces to SOM leadership for early intervention | Ensure communication with MDIT and MDCH directors and direct involvement of directions in MiHIN project governance entity | - SOM leadership  
- SOM and contractor project managers |
A. General Information

Information in the project summary areas that was drafted during the project concept phase and should be included here. Information includes the project name, original estimates, plan revision numbers, points of contact, etc.

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<td>Amber Murphy</td>
<td>Authorized by:</td>
<td>Beth Nagel</td>
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B. Timeliness

Describe how quickly and how often the project information will need to be communicated.

Stakeholders: Monthly

Sponsor: Monthly

Sponsors are also known as the executive steering committee which consists of the following individuals:
Janet Oleszewski, Director, Michigan Department of Community Health
Ken Theis, Director, Michigan Department of Technology, Management & Budget
Kurt Krause – Chief Deputy, MDCH
Beth Nagel – HIT Coordinator
Sue Moran - Medicaid

Project Manager: Weekly

The Dewpoint project manager will review the weekly status report during the weekly status meeting. During this meeting work accomplished, work planned, issues and risks will be reviewed, assigned, updated and assessed as necessary.

Project Team: Weekly

The Dewpoint project manager will review the weekly status report during the weekly status meeting. During this meeting work accomplished, work planned, issues and risks will be reviewed, assigned, updated and assessed as necessary.

Procurement: Monthly

Quality: Biweekly
C. Information Type  
*Describe how different types of information will be disseminated. (Voice, electronic mail, spreadsheet, formal presentation.)*

The Dewpoint/s2a team believes that timely and appropriate communication is vital to the success of any project. For this reason, the team will use several avenues to ensure healthy and thorough communication takes place during the completion of the project milestones. The project manager will provide weekly status reports and conduct weekly status meetings.

D. Existing Systems  
*Discuss the communication systems already in place and how they will be leveraged on the project. Include any political environmental considerations.*

The HIT Commission is already established and will continue to meet monthly. Members of the project team will plan on being in attendance at each HIT Commission.

E. Length of Involvement  
*Describe how long individual stakeholders will continue to receive information on the project.*

Individual stakeholders will continue to receive information on the project the entire length of the project.

F. Environmental Considerations  
*Identify the political environment, understand stakeholder requirements and other environmental considerations.*

The project will rely on involvement from stakeholders to collaborate and reach a decision upon the final solution that the State of Michigan will want to document in the RFP.

The project team will be flexible as to needs that may arise for additional travel to stakeholder sites.

G. Method for Updating the Communication Plan  
*Describe how and when the Communications Plan will be updated throughout the project.*

The Communication Plan will be updated anytime there is a change in the plan.
State of Michigan
MiHIN Project Control Office
Change Management Plan

A. General Information

Information to be provided in this section is general in nature and provides the necessary information about the organization of the project and project participants.

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B. Change Management Roles and Responsibilities

Describe the roles and responsibilities of the following project roles pertaining to reacting to, documenting, reviewing, approving, implementing, and monitoring changes imposed on this project.

Project Sponsor:

The project sponsor would only be involved in changes that would have a complete scope change to the project.

Project Manager:

The project managers on the project will be responsible for documenting the change order, submitting and reviewing the change with the customer and ultimately receiving the decision on the proposed change.

Customer/Client Management:

The customer will be responsible for accepting or rejecting all change orders.

Customer/Client Staff:

The customer will be responsible for accepting or rejecting all change orders.

Project Team Leads:

The project team leads will be responsible for raising any issues that may require a change order, however will not be involved in the change order process unless required for further explanation purposes.

Project Team Members:

Project team members will be kept up to date on any change orders that occur on the project and each change order will be documented on the weekly status reports for the entire project team to stay apprised.

C. Change Management Governance

Explain/describe in sufficient detail, the process for how changes are to be initiated, reviewed, approved, and implemented. Include a flow diagram or other pictorial representation, as appropriate. Include detail to the Project Sponsor level, Project Manager level, Project Team level, and Work Package level. Also, document any level (in amount or percentage) of delegated authority that the Project Manager has with regard to project changes.
All changes will be documented by the project manager and submitted to the customer project manager and business owners at which point the change order will require approval or rejection from the customer. It will be at the customer’s discretion as to whether a steering committee or the project sponsors are required for approval or rejection of the change order.

D. Capturing and Monitoring Project Changes
Describe the method to be employed on this project to capture and monitor approved changes, also, explain the process to be employed for changing project baselines, including applicable touch points.

All changes will be captured on the SUITE change control form. Also, a record of all change orders, either approved or rejected, will be documented on the weekly status reports and will remain on the status reports until the conclusion of the project.

E. Communicating Project Changes
Describe the proper communications channels for each category of project change, as depicted in the Change Management Governance, Section C above.

All proposed project changes will be brought to the attention of the Dewpoint/s2a project managers upon which the change request will be reviewed and a decision will be made whether or not to proceed with the change order to present to the customer. All change orders will be presented to the customer during the weekly status meetings for further discussion unless a change order is more urgent upon which a separate meeting request will be coordinated with the Dewpoint/s2a project manager and the customer.
Appendix H “MiHIN Shared Services Interoperability Specifications”
Michigan Health Information Network (MiHIN)

HIE Interoperability Specification

v1.5

May 04, 2010
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## VERSION HISTORY

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<td>05/04/10</td>
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1. **Background**

1.1 **Introduction**

This document describes the Interoperability standards to be used by the Health Information Exchange (HIE) communicating with the Michigan Health Information Network (MiHIN). The MiHIN is an infrastructure design that enables widespread interoperability among disparate healthcare systems. This specification focuses on technical standards, protocols, and architectural patterns as prescribed by HITSP, IHE and other standards bodies. The goal of this document is to provide specifications to implementers of HIEs of the various processes and services required in the implementation of transactions with the MiHIN Shared Services Bus (SSB).

1.2 **Glossary of Terms**

**Community HIE** – A local HIE that is open to all providers and data sources in a region or across an affinity group

**Connect Open Source** – The Federal Government's open source implementation of a National Health Information Network gateway.

**Documents** – For the purposes of this design and HIE systems a Document is a patient-identifiable collection of structured, unstructured or image-based clinical or administrative data that describes acts, observations and services for the purpose of exchange. Documents may be individual data points such as lab results but are more often summary collections of data for a particular episode of care.

**HIE** – A Health Information Exchange system often run by a RHIO or private organization

**Michigan Health Information Network (MiHIN)** – The name of the state-wide HIE organization and a term for describing the entire state-wide health network

**MiHIN Shared Services Bus** – The state-wide shared services bus for HIE interoperability

**National Health Information Network (NHIN)** – The federal government sponsored set of architectural constructs and standards which allow for basic interoperability among state and federal gateways and other HIEs.

**Private HIE** – A vendor sponsored, hospital-based or other privately run HIE

**Regional Health Information Organization (RHIO)** – An organization formed to operate an HIE, usually a not-for-profit.

**Service Oriented Architecture (SOA)** – An architectural concept that packages functionality as interoperable services within the context of various business domains. Several organizations may integrate or use such services — software modules provided as a service — even if their respective client systems are substantially different. It is an attempt to develop yet another means for software module integration. Rather than
defining a specific interface, SOA defines the interface in terms of protocols and functionality.

SOM – State of Michigan. Used for the entire state as well as the State Government. Also used for State of Michigan (SOM) Systems.

Sub-State HIE – An HIE which is at a regional level. These can either be Community or Private HIEs.

1.3 MiHIN Services

1.3.1 MiHIN Shared Services Bus
The MiHIN Shared Services Bus will be designed as an Enterprise Service Bus architecture. The ESB will be capable of supporting ESB nodes which can provide transaction services. The topology of the MiHIN ESB will initially be a single instance but can expand to federated services in the future. The ESB will support one or more service registries for web services provided by secure nodes. Community HIEs will be required to connect to the MiHIN with secure nodes and utilize a four level protocol stack for communication to the ESB.

1.3.2 EMPI
Enterprise Master Patient Index will be used for cross-HIE patient discovery. The EMPI will be populated by HIEs performing Patient Identity Feed transactions to the MiHIN on specific HIE EMPI updates.

1.3.3 XDS Registry
The MiHIN SSB will implement a Cross Community Document Sharing (XDS) registry which will be an index of all documents available for sharing across HIEs. HIEs will be expected to report all new documents to the registry upon registering them within the HIE.

1.3.4 Provider Index
This is an index of all health plans and care providers (both individuals and organizations) in the state. This could be part of the EMPI listed above or could be implemented as a User Directory.

1.3.5 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.

1.3.6 Security Services
Security services will provide user node authentication and auditing services. The User Directory will be a federated design and the MiHIN will trust each HIE to have authenticated users.
1.3.7 **Subject Discovery**
Other primary services provided by the EMPI will be patient matching using deterministic and probabilistic algorithms and cross community (HIE) patient inquiries. Patient inquiry does not stand alone as a separate use case but rather is always part of some other use case such as HITSP IS11 Public Health Case Reporting.

1.3.8 **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. The QFD service will utilize a patient id obtained from a Patient Discovery transaction to identify documents that are available for viewing on the MiHIN. When a user (or a system function) identifies a particular document to be retrieved the MiHIN QFD issues an XDS query to the HIE XDS repository which responds with a particular document.

1.3.9 **Service Registry**
The MiHIN ESB will maintain a service registry using UDDI v2.0.4 as documented in the NHIN Messaging Platform Specification. The services allowed to be registered there will only be the approved list of MiHIN Core Service. The service registry will keep both endpoint servers addresses and Web Services Description Language (WSDL) service definitions.

ESB Nodes shall be found by clients through the use of an ordered or random "hunt group" list. Because the UDDI Registry Nodes for the MiHIN do not all reside in the same organization or in the same network domain, use of network-level multicast technologies will not work. Instead, clients shall each be configured with a list of UDDI Registry Nodes (each containing at least one server). They shall then search for one that is available by trying one after the other, in sequential or random order.

The primary use of the UDDI Registry within the MiHIN ESB will be to find services described by some well-defined criteria. This is accomplished using the find_service UDDI call, which returns a list of services. The specific WSDL for a service can then be acquired via a get binding Detail UDDI call. The output from this can then be processed by an automated function to generate the SOAP call to the service itself. Typically, a client will thus need to make two calls to find a service and its definition.

The MiHIN intends to adopt, if viable, the NHIN Connection Management & Service Discovery interface specification when it is finalized which is consistent with the paradigm listed above.

**Typical Message Exchange Pattern**

The MiHIN ESB, will be an intermediary for service invocation and return of responses and results. The basic sequence is:
1. Service Consumer discovers the availability of a service through interrogation of the ESB’s service registry;
2. ESB does not expose true service endpoint, but rather exposes a local proxy;
3. Service Consumer invokes service through ESB;
4. ESB invokes appropriate service on Service Consumer’s behalf;
5. Service Provider sends results to ESB;
6. ESB relays results to Service Consumer.

2. Transaction Standards Specification for HIE Interoperability

This section will focus on the national standards for web services, security and health information exchange. Our intention is to follow the standards published by the Healthcare Information Technology Standards Panel (HITSP), We are recommending a strict adherence to standards for the MiHIN Shared Services Bus due to ONC guidance and also to promote an open and interoperable MiHIN. This section will focus on the interoperability requirements for Community HIE organizations which will allow them to connect to the MiHIN Shared Services Bus.

2.1 Patient Identity Feed

Patient Identity Feed is the mechanism used for loading and updating patient identities in a Master Patient Index. This section corresponds to Transaction ITI-8 of the IHE IT Infrastructure Technical Framework.

2.1.1 Summary

HIEs will receive ADT messages from various sources. Based on the Message Event Types, there are possibilities of at least four categories of messages:
1. New Patient
2. Patient Update
3. Merge Patient
4. Unmerge Patient

HIE MPI must resolve the demographic data and MPI at HIE must assign unique HIE-MPI-ID per patient. Typically this will happen by creating one-to-many relationship between HIE-MPI-ID and the MRN received from the ADT message. This HIE-MPI-ID must be sent with the demographic data in the Patient Identity Feed to MiHIN MPI. MiHIN would also receive MRN from other sources. MiHIN will resolve those and will assign a unique statewide EMPI-ID to that patient.

2.1.2 ADT MSH Segment

ADT MSH Segment carries Message Type to HIE Gateway. And based on the Message Type actions must be taken by the HIE. For example; if the Message Type in ADT feed conveys to the HIE Message Gateway the reason for the ADT message is demographic data update, then, HIE must trigger a Patient Identity Feed out-bound to MiHIN which will then communicate patient information, including corroborating demographic data, after a patient’s identity is established,
modified or merged or after the key corroborating demographic data has been modified. List of Message Types are given in Appendix H. Referenced Standards HL7 Version 2.3.1 Chapter 2 – Control, Chapter 3 – Patient Administration

HL7 version 2.3.1 was selected for this transaction for the following reasons:
- It provides a broader potential base of Patient Identity Source Actors capable of participating in the profiles associated with this transaction.
- It allows existing ADT Actors to participate as Patient Identity Source Actors.

2.1.3 Sequence Diagram

Following is a basic sequence diagram. For more detail diagram refer to Appendix B.
Figure 2.1.4 Patient Identity Sequence
2.1.4 New Patient
Sub-State HIE when receives a New Patient message. It shall process this message and generate a HL7 V3 feed inbound to MiHIN SSB.

2.1.5 Use Case for New Patient
- EMR sends New Patient to HIE with Patient Medical Record Number (MRN)
- HIE MPI Matches Demographics/MRN with existing data
- HIE MPI resolves and generates a unique HIE-MPI-Id for the patient by creating One-to-Many relationship with MRNs from other EHR
- HIE will send to MiHIN, HIE-MPI-ID with the New Patient ADT Segments
- MiHIN MPI Matches Demographics/HIE-MPI-ID with existing data
- MiHIN MPI resolves and generates a State Wide Unique ID for the Patient, MiHIN-EMPI
- MiHIN-EMPI has One-to-Many relationship with other HIE-MPI and MRNs received from other sources.

2.1.6 Patient Update
Sub-State HIE when receives an Update Patient message. It shall process this message and generate a HL7 PIXV3 query, inbound to MiHIN SSB.

2.1.7 Use Case for Update Patient
- EMR sends Patient Update to HIE with Patient Medical Record Number (MRN)
- HIE MPI Matches Demographics/MRN with existing data
- HIE MPI resolves and updates the unique patient information
- HIE will send to MiHIN, HIE-MPI-ID with the Update Patient Segments
- MiHIN MPI Matches Demographics/HIE-MPI-ID with existing data
- MiHIN MPI resolves and updates patient records.

2.1.8 Merge Patient
Sub-State HIE when receives a Merge Patient message. It shall process this message and generate a HL7 PIXV3 Update Notification query, inbound to MiHIN SSB.

2.1.9 Use Case for Merge Patient
- HIE has Merged Patient demographics information and assigned unique HIE-MPI-ID and discarded another HIE-MPI-ID
- HIE will send to MiHIN, HIE-MPI-ID with the Merge Patient Segments
- MiHIN MPI Merges Demographics/HIE-MPI-ID with existing data
- MiHIN MPI resolves and updates patient records.
2.1.10 Unmerge Patient
Sub-State HIE when receives an Unmerge Patient message. It shall process this message and generate a HL7 PIXV3 Update Notification query, inbound to MiHIN SSB.

2.1.11 Use Case for UnMerge Patient
- HIE has UnMerged Patient demographics information and Reused originally assigned unique HIE-MPI-ID for the two records HIE-MPI-ID
- HIE will send to MiHIN, HIE-MPI-ID with the Merge Patient Segments
- MiHIN MPI Merges Demographics/HIE-MPI-ID with existing data
- MiHIN MPI resolves and updates patient records.

2.2 Patient Discovery
Patient Discovery is the mechanism for looking up patients in a Master Patient Index. There are two HITSP standards for these transactions depending on whether the requesting system already has a deterministic identifier for the patient or whether a non-deterministic query is being performed.

PIX Transaction: For deterministic queries HITSP TP22 will be used. A PIX transaction against the MiHIN MPI would require either performing this query with the master ID of the patient from the MiHIN MPI or using a patient ID from an HIE which maps one-to-one to the MIHIN master ID.

PDQ Transaction: For non-deterministic queries HITSP T23, Patient Demographics Query (PDQ) Transaction will be used. A PDQ transaction would normally provides a set of patient demographics data elements, such as name, date of birth, etc. which can then be used to query the MiHIN MPI. The result of a PDQ transaction is typically a list of candidate patients from which a user (provider) can select the appropriate patient. Once the patient is selected a PIX transaction can be performed.

2.3 Patient Identifier Cross-referencing HL7 V3 (PIXV3)
The Patient Identifier Cross-referencing HL7 V3 Integration Profile (PIXV3) is targeted at cross-enterprise Patient Identifier Cross-reference Domains (as defined in ITI TF-1: 5) as well as healthcare enterprises with developed IT infrastructure. The PIXV3 profile supports the cross-referencing of patient identifiers from multiple Patient Identifier Domains. These cross-referenced patient identifiers can then be used by “identity consumer” systems to correlate information about a single patient from sources that “know” the patient by different identifiers. This allows a clinician to have more complete view of the patient information.
2.3.1 PIX - Actors / Transactions
The actors directly involved in the Patient Identifier Cross-referencing HL7 V3 Integration Profile and the relevant transactions between them are shown in the Figure 2.2.1.1.
2.3.2 **Patient Identity Feed HL7 V3**
This transaction communicates patient information, including corroborating demographic data, after a patient's identity is established, modified or merged or after the key corroborating demographic data has been modified.

2.3.3 **PIXV3 Query**
This transaction involves a request by the Patient Identifier Cross-reference Consumer Actor for a list of patient identifiers that correspond to a patient identifier known by the consumer. The request is received by the Patient Identifier Cross-reference Manager. The Patient Identifier Cross-reference Manager immediately processes the request and returns a response in the form of a list of corresponding patient identifiers, if any.

2.3.4 **PIXV3 Update Notification**
This transaction involves the Patient Identifier Cross-reference Manager Actor providing notification of updates to patient identifier cross-reference associations to Patient Identifier Cross-reference Consumers that have registered (by configuration on the Cross-reference Manager) their interest in receiving such notifications. This transaction uses HL7's generic Update Person Information message to communicate this patient-centric information.

2.3.5 **Comparative Layout of the Patient Feed, PIXV3 and Update Notification**
In-order to bring together the similarities and differences, they are presented in a tabular form in Appendix I
2.3.6 Expected Actions – Patient Identifier Cross-reference Manager Actor

The Patient Identifier Cross-reference Manager Actor shall return the attributes within the message that are required by the HL7 standard.

A RegistrationEvent, and the associated Patient class are returned only when the Patient Identifier Cross-reference Manager Actor recognizes the specified Patient ID in the query parameter, and an identifier exists for the specified patient in at least one other domain. The Patient Identifier Cross-reference Manager Actor shall use at one or more Patient.id attributes (and, optionally, zero or more OtherIDs.id attributes) to convey the patient IDs which uniquely identify the patient within each Patient Identification Domain. The identifiers are captured using an Instance Identifier (II) data type.

It is wholly the responsibility of the Patient Identifier Cross-reference Manager Actor to perform the matching of patient identifiers based on the patient identifier it receives. The information provided by the Patient Identifier Cross-reference Manager Actor to the Patient Identifier Cross-reference Consumer Actors is a list of cross-referenced identifiers in one or more of the domains managed by the cross-referencing Actor, in addition to the original identifier used in the query. The identifier used in the query is returned only in the copy of the QueryByParameter parameter list. The list of cross-references is not made available until the set of policies and processes for managing the cross-reference function have been completed. The policies of administering identities adopted by the cooperating domains are completely internal to the Patient Identifier Cross-reference Manager Actor and are outside of the scope of this framework. Possible matches should not be communicated until the healthcare institution policies and processes embodied in the Patient Identifier Cross-reference Manager Actor reach a positive matching decision.

The Patient Identifier Cross-reference Manager Actor shall respond to the query request as described by the following 6 cases:

- **Case 1:** The Patient Identifier Cross-reference Manager Actor recognizes the specified Patient ID sent by the Patient Identifier Cross-reference Consumer in PatientIdentifier.value, and corresponding identifiers exist for the specified patient in at least one of the domains requested in DataSource.value (one identifier per domain). (See Case 6 below for the required behavior if there are multiple identifiers recognized within a given Identifier Domain by the Patient Identifier Cross-reference Manager Actor.)
  - AA (application accept) is returned in Acknowledgement.typeCode (transmission wrapper).
  - OK (data found, no errors) is returned in QueryAck.queryResponseCode (control act wrapper).
  - A single RegistrationEvent class is returned, where at least one of the identifiers, which the Patient Identifier Cross-reference Manager Actor did recognize as belonging to a requested domain, is returned in Patient.id. Subsequent such identifiers, if any, are returned in either Patient.id or OtherIDs.id, not including the queried-for patient identifier that is returned in the QueryByParameter parameter list (control act wrapper).

- **Case 2:** The Patient Identifier Cross-reference Manager Actor recognizes the specified Patient ID sent by the Patient Identifier Cross-reference Consumer in
PatientIdentifier.value, there are no specific domains requested in the query (no DataSource parameters are present), and corresponding identifiers exist for the specified patient in at least one other domain known to the Patient Identifier Cross-reference Manager Actor (one identifier per domain).

- **Case 1**: A single RegistrationEvent class is returned, where at least one of the identifiers, which the Patient Identifier Cross-reference Manager Actor did recognize as belonging to a domain different from the domain of the queried-for patient identifier, is returned in Patient.id. Subsequent such identifiers, if any, are returned in either Patient.id or OtherIDs.id, not including the queried-for patient identifier, which is returned in the QueryByParameter parameter list (control act wrapper).

- **Case 3**: The Patient Identifier Cross-reference Manager Actor recognizes the specified Patient ID sent in PatientIdentifier.value, but no identifier exists for that patient in any of the domains sent in DataSource.value.
  - **AA** (application accept) is returned in Acknowledgement.typeCode (transmission wrapper).
  - **NF** (no data found, no errors) is returned in QueryAck.queryResponseCode (control act wrapper).
  - No RegistrationEvent is returned.
  - The queried-for patient identifier is returned in the QueryByParameter parameter list (control act wrapper).

- **Case 4**: The Patient Identifier Cross-reference Manager Actor does not recognize the Patient ID sent in the PatientIdentifier.value.
  - **AE** (application error) is returned in Acknowledgement.typeCode (transmission wrapper) and in QueryAck.queryResponseCode (control act wrapper).
  - No RegistrationEvent is returned.
  - The queried-for patient identifier is returned in the QueryByParameter parameter list (control act wrapper).
  - An AcknowledgmentDetail class is returned in which the attributes typeCode, code, and location are valued as follows:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>typeCode</td>
<td>E</td>
</tr>
<tr>
<td>code</td>
<td>204 (Unknown Key Identifier)</td>
</tr>
<tr>
<td>location</td>
<td>XPath expression for the value element of the PatientIdentifier parameter</td>
</tr>
</tbody>
</table>
• **Case 5**: The Patient Identifier Cross-reference Manager Actor does not recognize one or more of the Patient Identification Domains for which an identifier has been requested.
  - **AE** (application error) is returned in Acknowledgement.typeCode (transmission wrapper) and in QueryAck.queryResponseCode (control act wrapper).
  - No RegistrationEvent is returned.
  - The queried-for patient identification domains are returned in the QueryByParameter parameter list (control act wrapper).
  - For each domain that was not recognized, an AcknowledgmentDetail class is returned in which the attributes typeCode, code, and location are valued as follows:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>typeCode</td>
<td>E</td>
</tr>
<tr>
<td>code</td>
<td>204 (Unknown Key Identifier)</td>
</tr>
<tr>
<td>location</td>
<td>XPath expression for the value element of the DataSource parameter (which includes the repetition number of the parameter)</td>
</tr>
</tbody>
</table>

• **Case 6**: The Patient Identifier Cross-reference Manager Actor recognizes the specified Patient ID sent by the Patient Identifier Cross-reference Consumer in PatientIdentifier.value, and corresponding identifiers exist for the specified patient in at least one of the domains requested in DataSource.value, and there are multiple identifiers within at least one of the requested domains.
  - **AA** (application accept) is returned in Acknowledgement.typeCode (transmission wrapper).
  - **OK** (data found, no errors) is returned in QueryAck.queryResponseCode (control act wrapper)
  - A single RegistrationEvent class is returned, where at least one of the identifiers, which the Patient Identifier Cross-reference Manager Actor did recognize as belonging to a requested domain, is returned in Patient.id. Subsequent such identifiers, if any, are returned in either Patient.id or OtherIds.id, not including the queried-for patient identifier that is returned in the QueryByParameter parameter list (control act wrapper).
  - If the Patient Identifier Cross-reference Manager Actor chooses to return multiple identifiers associated with the same domain, it shall return these identifiers either grouped in a single instance of the OtherIds class, or all represented via repetitions of the Patient.id attribute.
2.3.7 Patient Demographics Query HL7 V3 (PDQV3)
Provides ways for multiple distributed applications to query a patient information server for a list of patients, based on user-defined search criteria, and retrieve a patient’s demographic information directly into the application. This profile uses HL7 V3 as the message format, and SOAP-based web services for transport. The PDQV3 profile provides ways for multiple organizations, or multiple distributed applications to query a patient information server for a list of patients, based on user-defined search criteria, and retrieve a patient’s demographic information directly into the application.

This section corresponds to Transaction ITI-21 of the IHE IT Infrastructure Technical Framework. Transaction ITI-21 is used by the Patient Demographics Consumer and Patient Demographics Supplier actors.

2.3.8 PDQ - Scope
This transaction involves a request by the Patient Demographics Consumer Actor for information about patients whose demographic data match data provided in the query message. The request is received by the Patient Demographics Supplier Actor. The Patient Demographics Supplier Actor immediately processes the request and returns a response in the form of demographic information for matching patients.

2.3.9 PDQ - Actors / Transactions

<table>
<thead>
<tr>
<th>Actor</th>
<th>Role</th>
</tr>
</thead>
</table>
| Patient Demographics Consumer  | Requests a list of patients matching a minimal set of demographic criteria (e.g., ID or partial name) from the Patient Demographics Supplier. Populates its attributes with demographic information received from the Patient Demographics Supplier.  
**Corresponding HL7 v3 Application Roles:**  
Person Registry Query Placer (PRPA_AR201303UV02) |
| Patient Demographics Supplier  | Returns demographic information for all patients matching the demographic criteria provided by the Patient Demographics Consumer.  
**Corresponding HL7 v3 Application Roles:**  
Person Registry Query Fulfiller (PRPA_AR201304UV02) |
2.3.9.1 *PDQ - Referenced Standards*


2.3.10 *PDQ – Sequence Diagram*

![Sequence Diagram](image)

2.3.1 *Comparative Layout of the Patient Demographics Query, Response, HL7V3 Continuation*

In-order to bring together the similarities and differences, they are presented in a tabular form in Appendix J
2.4 Provide and Register Document Set-b

Provide and Register Document Set-b is used by the Document Source to provide a set of documents to the Document Repository, and to request that the Document Repository store these documents and then register them with the Document Registry.

- The Provide and Register Document Set-b transaction describes only the interaction between the Document Source and Document Repository actors.
- From the point of view of the Document Source, the separate nature of the Document Registry and Document Repository actors is not relevant.
- By specifying separate Document Registry and Document Repository actors, MiHIN XDS offers additional flexibility of having a single Document Registry index content for multiple Document Repositories. The ebRIM portion of the registry standard supports this possibility through the ExternalLink object type.
- The documents and metadata go to the Document Repository actor and then the metadata is forwarded on to the Document Registry actor. They move in this direction for several reasons:
  - Allows best reuse of ebXML Registry specified metadata and web services protocols
  - Document Source only needs to know the identity of the Document Repository. Document Repository knows the identity of the Document Registry. If Provide and Register Document Set-b transaction were sent to the Document Registry then routing decisions for documents would be more complex.
  - Resulting protocols are simpler
  - Simplifies the common case where the Document Source and the Document Repository are grouped.

2.4.1 Scope

The Provide and Register Document Set-b transaction passes a Repository Submission Request from MiHIN SSB Document Source to MIHIN SSB Document Registry.

- Provide and Register Document Set-b transaction shall carry: 2100
- Metadata describing zero or more documents
- Within metadata, one XDSDocumentEntry object per document
- XDS Submission Set definition along with the linkage to new documents and references to existing documents
- Zero or more XDS Folder definitions along with linkage to new or existing documents.
- Zero or more documents
2.4.2 Use Case Roles

<table>
<thead>
<tr>
<th>Actor</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Document Source</td>
<td>A system that submits documents and associated metadata to a Document Repository.</td>
</tr>
<tr>
<td>Document Repository</td>
<td>A document storage system that receives documents and associated metadata and:</td>
</tr>
<tr>
<td></td>
<td>• Stores the documents</td>
</tr>
<tr>
<td></td>
<td>• Enhances submitted metadata with repository information to enable later retrieval of documents</td>
</tr>
<tr>
<td></td>
<td>• Forwards the enhanced metadata to the Document Registry.</td>
</tr>
</tbody>
</table>

2.4.3 Referenced Standards

Sub-state HIE implementers of this transaction shall comply with all requirements described in: ITI TF-2x: Appendix V: Web Services for IHE Transactions.

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ebRIM</td>
<td>OASIS/ebXML Registry Information Model v3.0</td>
</tr>
<tr>
<td>ebRS</td>
<td>OASIS/ebXML Registry Services Specifications v3.0</td>
</tr>
<tr>
<td>Appendix V</td>
<td>ITI TF-2x:Appendix V Web Services for IHE Transactions</td>
</tr>
<tr>
<td></td>
<td>Contains references to all Web Services standards and requirements of use</td>
</tr>
<tr>
<td>MTOM</td>
<td>SOAP Message Transmission Optimization Mechanism</td>
</tr>
<tr>
<td></td>
<td><a href="http://www.w3.org/TR/soap12-mtom/">http://www.w3.org/TR/soap12-mtom/</a></td>
</tr>
<tr>
<td>XOP</td>
<td>XML-binary Optimized Packaging</td>
</tr>
</tbody>
</table>
2.4.4 Sequence Diagram

![Sequence Diagram](http://www.w3.org/TR/2005/REC-xop10-20050125/)

**Provide and Register Document Set-b Request and Response**

2.4.5 Provide and Register Document Set-b Request

Sub-state HIE sends documents and associated metadata to a MiHIN SSB Document Repository that has an associated Document Registry.


- The Document Repository actor shall create and insert the XDSDocumentEntry.repositoryUniqueld, XDSDocumentEntry.size, and XDSDocumentEntry.hash attributes for each document received from the Provide and Register Document Set-b [ITI-41] transaction into the resulting Register Document Set-b [ITI-42] transaction metadata. The combination of XDSDocumentEntry.uniqueld and XDSDocumentEntry.repositoryUniqueld attributes value shall later be accepted in a Retrieve Document Set transaction [ITI-43] for that document and the document shall be returned by MiHIN SSB.

- The Document Repository actor shall also create and insert the XDSDocumentEntry.URI attribute for each document received from the Provide and Register Document Set-b [ITI-41] transaction into the Register Document Set-b [ITI-42] transaction metadata if it will support retrieval of that document via the Retrieve Document [ITI-17] transaction. If this attribute is present in the Provide and Register Document Set-b [ITI-41] transaction it shall be replaced. If the Retrieve Document [ITI-17] transaction is not supported then this attribute shall not be present in Register Document Set-b [ITI-42] transaction metadata (removed by the Document Repository actor if necessary).
2.4.5.1 Trigger Events
The Document Source, based on a human decision or the application of a certain rule of automatic operation, wants to submit
- A set of zero or more documents to the Document Repository and
- The associated metadata to the Document Registry.

2.4.5.2 Message Semantics
The sections in ITI TF-3: 4.1 specify the mapping of XDS concepts to ebRS and ebRIM semantics and document metadata. A full example of document metadata submission can be found in ITI TF-2x: Appendix W.

2.4.5.3 Expected Actions
- The Provide and Register Document Set-b message from Sub-state HIE to MiHIN SSB shall include the metadata attributes (as defined in ITI TF-3: 4.1.7 Document Definition Metadata) that will be forwarded by the Document Repository to the Document Registry using the Register Document Set-b transaction [ITI-42].
- The Document Repository receives this message. Each document within the message shall be stored into the Document Repository as an octet stream with an associated MIME type. A detected failure shall result in an error message being returned to the Document Source thus terminating this transaction.
- The Document Source shall supply all necessary document metadata attributes with the exception of the ones below. The Document Repository shall modify the received document metadata before initiating the Register Document Set-b transaction to the Document Registry by adding/replacing:
  - The repositoryUniqueId for this Document Repository to allow for the Document Consumer to correctly identify the proper Document Repository for each document (XDSDocumentEntry.repositoryUniqueId).
  - A hash value (XDSDocumentEntry.hash)
  - A size (XDSDocumentEntry.size).
  - Optionally a URI identifier (XDSDocumentEntry.URI) that can be used by a Document Consumer to reference the document. This is only required if the repository is an XDS.a Document Repository therefore supporting the Retrieve Document [ITI-17] transaction.
- A Register Document Set-b transaction with this modified metadata shall be issued to the Document Registry.
- The MiHIN SSB Document Repository shall ensure that when any Retrieve Document Set transaction is received requesting a specific document(s), it shall be provided to the Document Consumer unchanged from the octet stream that was submitted.
(full fidelity repository) and shall match the size and hash attributes of the XDSDocumentEntry object.

2.4.6 **Provide and Register Document Set-b Response**

The MiHIN SSB Document Repository sends a Provide and Register Document Set-b Response when the processing of a Provide and Register Document Set-b Request is complete.

- The Provide and Register Document Set-b Response message shall carry the status of the requested operation and an error message if the requested operation failed. The conditions of failure and possible error messages are given in the ebRS standard and detailed in ITI TF-3: 4.1.13 Error Reporting.

2.4.6.1 **Trigger Events**

The following events can trigger this message:

- Documents stored to repository successfully and metadata stored to registry successfully in MiHIN SSB (The registry part is carried out as part of a Register Document Set-b transaction)
- Documents stored to repository successfully but an error occurred in storing the metadata to the registry
- Documents were not successfully stored to the repository

2.4.6.2 **Message Semantics**

The Provide and Register Document Set-b Response message shall carry the status of the requested operation and an error message if the requested operation failed. The conditions of failure and possible error messages are given in the ebRS standard and detailed in ITI TF-3: 4.1.13 Error Reporting.

2.4.6.3 **Expected Actions**

The Document Source now knows that the transaction succeeded/failed and can continue. The metadata added to the registry as a result of this transaction is now available for discovery via Registry Stored Query transactions. The document(s) added to the repository are now available for retrieval.

2.4.7 **Protocol Requirements**

Sub-state HIE implementers of this transaction shall comply with all requirements described in ITI TF-2x: Appendix V: Web Services for IHE Transactions. The Provide and Register Document Set-b transaction shall use SOAP12 and MTOM with XOP encoding (labeled MTOM/XOP in this specification). See ITI TF-2x: Appendix V for details.

<table>
<thead>
<tr>
<th>WSDL Namespace Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ihe</strong></td>
</tr>
<tr>
<td><strong>Rs</strong></td>
</tr>
</tbody>
</table>

APPENDIX H: MiHIN Shared Services Interoperability Specifications
These are the requirements for the Provide and Register Document Set-b transaction presented in the 2240 order in which they would appear in the WSDL definition:

- The following types shall be imported (xsd:import) in the /definitions/types section:
  - namespace="urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0",
    schema="rs.xsd"
  - namespace="urn:ihe:iti:xds-b:2007", schemaLocation="IHEXDS.xsd"

- The /definitions/message/part/@element attribute of the Provide and Register Document Set-b Request message shall be defined as "ihe:ProvideAndRegisterDocumentSetRequest"
- The /definitions/message/part/@element attribute of the Provide and Register Document Set-b Response message shall be defined as "rs:RegistryResponse"
- The /definitions/portType/operation/input/@wsaw:Action attribute for the Provide and Register Document Set-b Request message shall be defined as "urn:ihe:iti:2007:ProvideAndRegisterDocumentSet-b"
- The /definitions/portType/operation/output/@wsaw:Action attribute for the Provide and Register Document Set-b Response message shall be defined as "urn:ihe:iti:2007:ProvideAndRegisterDocumentSet-bResponse"
- The /definitions/binding/operation/soap12:operation/@soapAction attribute shall be defined as "urn:ihe:iti:2007:ProvideAndRegisterDocumentSet-b"

These are the requirements that affect the wire format of the SOAP message. The other WSDL properties are only used within the WSDL definition and do not affect interoperability. Full sample request and response messages are in ITI TF-2b: 3.41.5.1 Sample SOAP Messages.

For informative WSDL for the Document Repository actor see ITI TF-2x: Appendix W.

The <ihe:ProvideAndRegisterDocumentSetRequest/> element is defined as:

- One <lcm:SubmitObjectsRequest/> element that contains the submission set metadata
- Zero or more <ihe:Document/> elements that contain the base64encoded data for the documents being submitted to the Document Repository. The <ihe:Document/> element also includes the document id attribute (ihe:Document/@id) of type xsd:anyURI to match the document ExtrinsicObject id in the metadata and providing the necessary linkage.

The use of MTOM/XOP is governed by the following rules:
The MiHIN SSB document Repository shall accept documents in a Provide and Register Document Set-b transaction in MTOM/XOP format. The response message shall use MTOM/XOP format.

The Document Source shall generate Provide and Registry Document Set-b transactions in MTOM/XOP format. It shall accept the response message in MTOM/XOP format.

A full XML Schema Document for the XDS.b types is available online on the IHE FTP site, see ITI TF-2x: Appendix W.

2.4.8 Sample SOAP Messages

Sub-state HIE must develop their SOAP messages based on following two samples.

- The samples in the following two sections show a typical SOAP request and its relative SOAP response.
- The sample messages also show the WS-Addressing headers <Action/>, <MessageID/>, <ReplyTo/>…; these WS-Addressing headers are populated according to the ITI TF-2x: Appendix V: Web Services for IHE Transactions.
- The body of the SOAP message is omitted for brevity; in a real scenario the empty element will be populated with the appropriate metadata.

2.4.9 Sample Provide and Register Document Set-b SOAP Request

POST /axis2/services/repository HTTP/1.1
Content-Type: multipart/related;
boundary=MIMEBoundaryurn_uuid_76A2C3D9BCD3AEFFFF31217932910180;
type="application/xop+xml";
start="<0.urn:uuid76A2C3D9BCD3AEFFFF31217932910181@apache.org>"; start-info="application/soap+xml"; action="urn:ihe:iti:2007:ProvideAndRegisterDocumentSet-b"
User-Agent: Axis2
Host: localhost:4040
Content-Length: 4567

--MIMEBoundaryurn_uuid_76A2C3D9BCD3AEFFFF31217932910180
Content-Type: application/xop+xml; charset=UTF-8; type="application/soap+xml"
Content-Transfer-Encoding: binary
Content-ID: <0.urn:uuid:76A2C3D9BCD3AEFFFF31217932910181@apache.org>

<?xml version='1.0' encoding='UTF-8'?>
<soapenv:Envelope xmlns:soapenv="http://www.w3.org/2003/05/soap-envelope"
xmlns:wsa="http://www.w3.org/2005/08/addressing">
  <soapenv:Header>
    <wsa:To>http://localhost:4040/axis2/services/test11966a</wsa:To>
    <wsa:MessageID>urn:uuid:76A2C3D9BCD3AEFFFF31217932910053</wsa:MessageID>
</soapenv:Header>
<wsa:Action
soapenv:mustUnderstand="1">urn:ihe:iti:2007:ProvideAndRegisterDocumentSet-b</wsa:Action>
</soapenv:Header>
<soapenv:Body>
<xdsb:ProvideAndRegisterDocumentSetRequest xmlns:xdsb="urn:ihe:iti:xds-b:2007">
<lcm:SubmitObjectsRequest xmlns:lcm="urn:oasis:names:tc:ebxml-regrep:xsd:lcm:3.0">
<rim:RegistryObjectList xmlns:rim="urn:oasis:names:tc:ebxml-regrep:xsd:rim:3.0">
<!-- Registry Metadata goes here -->
</rim:RegistryObjectList>
</lcm:SubmitObjectsRequest>
<xdsb:Document id="Document01">
<xop:Include
href="cid:1.urn:uuid:76A2C3D9BCD3AECFF3121793290229@apache.org"
xmlns:xop="http://www.w3.org/2004/08/xop/include"/>
</xdsb:Document>
</xdsb:ProvideAndRegisterDocumentSetRequest>
</soapenv:Body>
</soapenv:Envelope>

--MIMEBoundaryurn_uuid_76A2C3D9BCD3AECFF31217932910180
Content-Type: text/plain
Content-Transfer-Encoding: binary
Content-ID: <1.urn:uuid:76A2C3D9BCD3AECFF31217932910229@apache.org>

This is a test document to MiHIN SSB.

--MIMEBoundaryurn_uuid_76A2C3D9BCD3AECFF31217932910180--

2.4.10 Sample Provide and Register Document Set-b SOAP Response
<xs:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope"
xmlns:a="http://www.w3.org/2005/08/addressing">
<xs:Header>
<a:Action s:mustUnderstand="1">urn:ihe:iti:2007:ProvideAndRegisterDocumentSet-bResponse</a:Action>
</xs:Header>
<xs:Body>
<rs:RegistryResponse
status="urn:oasis:names:tc:ebxml-regrep:ResponseStatusType:Success"
xmlns:rs="urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0"/>

APPENDIX H: MiHIN Shared Services Interoperability Specifications
### 2.4.11 Actor Requirements

This section summarizes the responsibilities of the actors relevant to this transaction.

#### 2.4.11.1 Document Source

Sub-state HIE implementation of the Document Source actor must be capable of the following operations:

- Submit one or more documents. Whether a submission contains a single or multiple documents depends on workflows, policies, and other external factors which are outside of the scope of this profile.
- Submit a document as a replacement for another document already in the registry/repository
- An implementation of the Document Source actor may support one or more of the following XDS.b options:
  - **Document Replace Option**: In this option the Document Source offers the ability to submit a document as a replacement for another document already in the registry/repository.
  - **Document Addendum Option**: In this option the Document Source shall offer the ability to submit a document as an addendum to another document already in the registry/repository.
  - **Document Transformation Option**: In this option the Document Source shall offer the ability to submit a document as a transformation of another document already in the registry/repository.

Note: In order to support document replacement/addendum/transformation grouping with the Document Consumer may be necessary in order to Query the registry (e.g. for UUIDs of existing document entries)

- **Folder Management Option**: In this option the Document Source offers the ability to perform the following operation:
  - Create a folder
  - Add one or more documents to a folder

Note: In order to support document addition to an existing folder, grouping with the Document Consumer may be necessary in order to Query the registry (e.g. for UUIDs of existing folder).

#### 2.4.11.2 Document Repository

A Document Repository shall be capable of accepting submissions containing multiple documents.

Note: The Document Source may submit single documents or multiple documents depending on its needs.
Document Repository shall validate the following metadata elements received as part of a Provide and Register transaction:

- **XSDocumentEntry.uniqueId** – a submission shall be rejected if not unique within the repository and the hashes of the two documents do not match. If the hashes of the documents match, the Document Repository shall accept the duplicate document.

- **XDSSubmissionSet.sourceId** – a Document Repository may choose to accept submissions only from certain sources and use this field to perform the filtering.

## 2.5 Register Document Set-b

This section corresponds to transaction [ITI-42] of the IHE IT Infrastructure Technical Framework. Transaction [ITI-42] is used by the MiHIN SSB Document Repository Actor to register a set of documents with the Document Registry in XDS.b.

### 2.5.1 Scope

The Register Document Set-b transaction passes a Submission Request from a Document Repository actor to a Document Registry actor. A register Document Set-b transaction shall carry:

- Metadata describing zero or more documents
- XDS Submission Set definition along with the linkage to new documents and references to existing documents
- An optional XDS Folder definitions along with linkage to new or existing documents

### 2.5.2 Roles

<table>
<thead>
<tr>
<th>Actor</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Document Repository or Integrated Document Source/Repository</td>
<td>A document storage system that submits document metadata to a Document</td>
</tr>
</tbody>
</table>

Register Document Set-b Use Case Roles
<table>
<thead>
<tr>
<th>Document Source/Repository</th>
<th>Registry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Document Registry</td>
<td>A document indexing system that receives and stores document metadata.</td>
</tr>
</tbody>
</table>

Note: Within this transaction, the Document Repository and Integrated Document Source/Repository actors can be used interchangeably.

2.5.3 Referenced Standards

Sub-state HIE implementers of this transaction must comply with all requirements described in ITI TF-2x: Appendix V: Web Services for IHE Transactions.

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ebRIM</td>
<td>OASIS/ebXML Registry Information Model v3.0</td>
</tr>
<tr>
<td>ebRS</td>
<td>OASIS/ebXML Registry Services Specifications v3.0</td>
</tr>
<tr>
<td>HL7V2</td>
<td>HL7 Version 2.5</td>
</tr>
<tr>
<td>Appendix V</td>
<td>ITI TF-2x: Appendix V Web Services for IHE Transactions</td>
</tr>
<tr>
<td></td>
<td>Contains references to all Web Services standards and requirements of use</td>
</tr>
</tbody>
</table>

2.5.4 Sequence Diagram

2.6 Register Document Set-b Request

The Document Repository sends metadata for a set of documents to the Document Registry.
2.6.1 **Trigger Events**

The register Document Set-b Request message is triggered when:

- A Document Repository wants to register metadata for a set of documents it holds. These documents may have been stored in the Document Repository by a Document Consumer (using the Provide and Register Document Set-b transaction [ITI-41]) or generated internally by an Integrated Document Source/Repository.

2.6.2 **Message Semantics**

- The sections inrITI TF-3: 4.1 specify the mapping of XDS concepts to ebRS and ebRIM semantics and document metadata. A full example of document metadata submission can be found in ITI TF-2x: Appendix W.
- The Registry actor shall store and later include in metadata returned in a query response the XDSDocumentEntry.repositoryUniqueId attribute along with other metadata attributes received in the Register Document Set-b [ITI-42] transaction as determined by profile and transaction requirements. If the XDSDocumentEntry.URI attribute is received by the Registry actor in the Register Document Set-b [ITI-42] transaction then it shall be returned in query responses.

2.6.3 **Expected Actions**

Upon receipt of a Register Document Set-b Request message, the Document Registry with the aid of the Registry Adaptor shall do the following:

- Accept all valid SubmitObjectsRequests.
- Perform metadata validations
- Update the registry with the contained metadata
- Return a RegistryResponse message given the status of the operation.

If the registry rejects the metadata, then, the following shall occur:

- An error is returned
- The error status includes an error message
- The request is rolled back

2.6.4 **Basic Patient Privacy Enforcement Option**

Sub-state HIEs are expected to implement the Patient Privacy Enforcement:

- The Integrated Document Source / Repository actor shall populate the confidentialityCode in the document metadata with the list of OID values that identify the Patient Privacy Consent Policies that apply to the associated document. The confidentiality codes for different documents in the same submission may be different.
- The Integrated Document Source / Repository actor shall be able to be configured with the Patient Privacy Consent Policies, Patient Privacy Consent Policy Identifiers (OIDs) and associated information necessary to understand
and enforce the XDS Affinity Domain Policy. The details of this are product specific and not specified by IHE.

- The Integrated Document Source / Repository actor may have a user interface or business rule capabilities to determine the appropriate confidentiality codes for each document. The details of this are product specific and not specified by IHE. However, the information about how confidentiality codes are assigned must be part of the published policy for the XDS Affinity Domain. For example, when publishing a document, the Integrated Document Source / Repository might show a list of checkboxes where a user can select which of the available consents a document is to be published.

2.6.5 Protocol Requirements

The Register Document Set-b transaction shall use SOAP12. Furthermore:

- The Document Registry actor shall accept the Register Document Set-b Request formatted as a SIMPLE SOAP message and respond with the Register Document Set-b Response formatted as a SIMPLE SOAP message.

- The Document Repository actor shall generate the Register Document Set-b Request formatted as a SIMPLE SOAP message and accept the Register Document Set-b Response formatted as a SIMPLE SOAP message.

See ITI TF-2x: Appendix V for details.

2.7 Register Document Set-b Response

2.7.1 Trigger Events

The Document Registry finishes processing a Register Document Set-b Request Message and shall respond with:

- Register Document Set-b Response

2.7.2 Message Semantics

The MiHIN SSB Register Document Set-b Response message shall carry the status of the requested operation and an error message if the requested operation failed. The conditions of failure and possible error messages are given in the ebRS standard and detailed in ITI TF-3: 4.1.13 Error Reporting.

2.7.3 Expected Actions

The MiHIN SSB Document Repository now knows that the transaction succeeded/failed and can continue. The metadata added to the registry as a result of this transaction is now available for discovery.

2.7.4 Protocol Requirements

Sub-state HIE implementers of this transaction shall comply with all requirements described in ITI TF-2x: Appendix V: Web Services for IHE Transactions.
2.7.5 Trigger Events

### WSDL Namespace Definitions

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Namespace Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ihe</td>
<td>urn:ihe:iti:xds-b:2007</td>
</tr>
<tr>
<td>rs</td>
<td>urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0</td>
</tr>
<tr>
<td>lcm</td>
<td>urn:oasis:names:tc:ebxml-regrep:xsd:lcm:3.0</td>
</tr>
<tr>
<td>query</td>
<td>urn:oasis:names:tc:ebxml-regrep:xsd:query:3.0</td>
</tr>
</tbody>
</table>

These are the requirements for the Register Document Set-b transaction presented in the order in which they would appear in the WSDL definition:

- The following types shall be imported (xsd:import) in the /definitions/types section:
  - namespace="urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0", schema="rs.xsd"
  - namespace="urn:oasis:names:tc:ebxml-regrep:xsd:lcm:3.0", schema="lcm.xsd"

- The /definitions/message/part/@element attribute of the Register Document Set-b Request message shall be defined as "lcm:SubmitObjectsRequest"

- The /definitions/message/part/@element attribute of the Register Document Set-b Response message shall be defined as "rs:RegistryResponse"

- The /definitions/portType/operation/input/@wsaw:Action attribute for the Register Document Set-b Request message shall be defined as "urn:ihe:iti:2007:RegisterDocumentSet-b"

- The /definitions/portType/operation/output/@wsaw:Action attribute for the Register Document Set-b Response message shall be defined as "urn:ihe:iti:2007:RegisterDocumentSet-bResponse"

- The /definitions/binding/operation/soap12:operation/@soapAction attribute shall be defined as "urn:ihe:iti:2007:RegisterDocumentSet-b"

These are the requirements that affect the wire format of the SOAP message. The other WSDL properties are only used within the WSDL definition and do not affect interoperability. Full sample request and response messages are in ITI TF-2b: 3.42.5.1 Sample SOAP Messages.

For informative WSDL for the Document Registry actor see ITI TF-2x: Appendix W.

2.7.6 Sample SOAP Messages

The samples in the following two sections show a typical SOAP request and its relative SOAP response. The sample messages also show the WS-Addressing headers <Action/>, <MessageID/>, <ReplyTo/>…; these WS-Addressing headers are populated according to ITI TF-2x: Appendix V: Web Services for IHE Transactions. The body of the SOAP message is omitted for brevity; in a real scenario the empty element will be populated with the appropriate metadata.
Samples presented in this section are also available online on the IHE FTP site, see ITI TF-2x: Appendix W.

2.7.6.1 Sample Register Document SET-b SOAP Request
Refer Appendix K

2.7.6.2 Sample Register Document SET-b SOAP Request
Refer Appendix K

2.7.7 Actor Requirements
The Document Repository actor shall:

- Make (all) the new document(s) included in the XDS Submission Set available for retrieval via the Retrieve Document Set transaction before it initiates the Register Document Set-b Request message with the Registry actor.

This is necessary because:

- The Document Registry actor may choose to validate the successful storage of the document(s) before acknowledging the Register Document Set-b Request transaction.

- The Document Consumer actor may retrieve the document(s) before the Register Document Set-b Response is received by the Document Repository actor.

2.8 Retrieve Document Set
This section corresponds to Transaction ITI-43 of the IHE Technical Framework. The Document Consumer, Document Repository actors use transaction ITI-43.

2.8.1 Scope
This transaction is used by the Document Consumer to retrieve a set of documents from the Document Repository. The Document Consumer has already obtained the XDSDocumentEntry uniqueId and the Document Repository repositoryUniqueId from the Document Registry by means of the Registry Stored Query transaction.

2.8.2 Scope
Retrieve Document Set Use Case Roles

2.8.3 Use Case Roles

XDS Actors:

<table>
<thead>
<tr>
<th>Actor</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Document Consumer</td>
<td>Obtains document.</td>
</tr>
</tbody>
</table>

Note: Within this transaction, the Document Repository and Integrated Document Source/Repository actors can be used interchangeably.

2.8.4 Referenced Standard

MiHIN SSB implementers of this transaction shall comply with all requirements described in ITI TF-2x: Appendix V: Web Services for IHE Transactions.

<table>
<thead>
<tr>
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<th>Description</th>
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</tr>
<tr>
<td>ebRS</td>
<td>OASIS/ebXML Registry Services Specifications v3.0</td>
</tr>
<tr>
<td>Appendix V</td>
<td>ITI TF-2x: Appendix V Web Services for IHE Transactions Contains references to all Web Services standards and requirements of use</td>
</tr>
<tr>
<td>MTOM</td>
<td>SOAP Message Transmission Optimization Mechanism</td>
</tr>
<tr>
<td></td>
<td><a href="http://www.w3.org/TR/soap12-mtom/">http://www.w3.org/TR/soap12-mtom/</a></td>
</tr>
<tr>
<td>XOP</td>
<td>XML-binary Optimized Packaging</td>
</tr>
<tr>
<td></td>
<td><a href="http://www.w3.org/TR/2005/REC-xop10-20050125/">http://www.w3.org/TR/2005/REC-xop10-20050125/</a></td>
</tr>
</tbody>
</table>
2.9 Retrieve Document Set Request

2.9.1 Trigger Events

The Document Consumer obtains document(s) uniqueld via the Registry Stored Query transaction. If the Registry Stored Query was sent to the Initiating Gateway the Document Consumer shall address the Retrieve Document Set to the Initiating Gateway. In this case no resolution of repositoryUniqueld is needed by the Document Consumer. The Document Consumer shall specify the homeCommunityId element in the Retrieve Document Set transaction if it was found in the entry containing the uniqueld of the document being retrieved. For more information regarding the homeCommunityId see XCA supplement section 3.38.4.1.2.

Once the document(s) uniqueld have been obtained, the Document Consumer will start the Retrieve Document Set Request with the Document Repository.

2.9.2 Message Semantics

The Retrieve Document Set Request shall carry the following information:

- A required repositoryUniqueld that identifies the repository from which the document is to be retrieved. This value corresponds to XDSDocumentEntry.repositoryUniqueld.
- A required documentUniqueld that identifies the document within the repository. This value corresponds to the XDSDocumentEntry.uniqueld.
- If available, the homeCommunityId element that identifies the community holding the document. The homeCommunityId element shall be specified if the XDSDocumentEntry containing the uniqueld of the document contains the homeCommunityId attribute. See ITI TF-2a: 3.18.4.1.2 for details.

The repositoryUniqueld associated to each document requested can be different therefore allowing a single request to identify multiple repositories.
2.9.3 **Expected Actions**
When receiving a Retrieve Document Set Request, a Document Repository or an Initiating Gateway shall generate a Retrieve Document Set Response containing the requested documents or error codes if the documents could not be retrieved.

2.10 **Retrieve Document Set Response**

2.10.1 **Trigger Events**
This message will be triggered by a Retrieve Document Set Request Message.

2.10.2 **Message Semantics**
The Retrieve Document Set Response Message shall carry the following information:
- For each of the returned documents:
  - A `homeCommunityId`. This value shall be the same as the `homeCommunityId` value in the Retrieve Document Set Request Message. If the `homeCommunityId` value is not present in the Retrieve Document Set Request Message, this shall not be present.
  - A required `repositoryUniqueId` that identifies the repository from which the document is to be retrieved. This value shall be the same as the value of the `repositoryUniqueId` in the original Retrieve Document Set Request Message. This value corresponds to `XDSDocumentEntry.repositoryUniqueId`.
  - A required `documentUniqueId` that identifies the document within the repository. This value shall be the same as the `documentUniqueId` in the original Retrieve Document Set Request Message. This value corresponds to `XDSDocumentEntry.uniqueId`.
  - The retrieved document in base64binary encoded format
  - The MIME type of the retrieved document
  - Errors or warnings in case the document(s) could not be retrieved successfully

2.10.3 **Expected Actions**
A Document Repository shall retrieve the document(s) indicated in the request.

The Document Repository shall return the document or an error code in case the document could not be retrieved. The conditions of failure and possible error messages are given in the ebRS standard and detailed in ITI TF-3: 4.1.13 Error Reporting.

2.10.4 **Protocol Requirements**
Sub-state HIE implementers of this transaction shall comply with all requirements described in ITI TF-2x: Appendix V: Web Services for IHE Transactions.

The Retrieve Document Set transaction shall use SOAP12 and MTOM with XOP encoding (labeled 2700 MTOM/XOP in this specification). See ITI TF-2x: Appendix V for details. The Document Repository shall:
- Accept the Retrieve Document Set Request message in MTOM/XOP format.
• Generate the Retrieve Document Set Response message in MTOM/XOP format

The MiHIN SSB Document Consumer shall:

• Generate the Retrieve Document Set Request message in MTOM/XOP format.
• Accept the Retrieve Document Set Response message in MTOM/XOP format.

### WSDL Namespace Definitions

<table>
<thead>
<tr>
<th>Namespace</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ihe</td>
<td>urn:ihe:iti:xds-b:2007</td>
</tr>
<tr>
<td>rs</td>
<td>urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0</td>
</tr>
<tr>
<td>lcm</td>
<td>urn:oasis:names:tc:ebxml-regrep:xsd:lcm:3.0</td>
</tr>
<tr>
<td>query</td>
<td>urn:oasis:names:tc:ebxml-regrep:xsd:query:3.0</td>
</tr>
</tbody>
</table>

These are the requirements for the Retrieve Document Set transaction presented in the order in which 2710 they would appear in the WSDL definition:

- The following types shall be imported (xsd:import) in the /definitions/types section:
  - namespace="urn:ihe:iti:xds-b:2007", schema="IHEXDS.xsd"
- The /definitions/message/part/@element attribute of the Retrieve Document Set Request message shall be defined as “ihe:RetrieveDocumentSetRequest”
- The /definitions/message/part/@element attribute of the Retrieve Document Set Response message shall be defined as “ihe:RetrieveDocumentSetResponse”
- The /definitions/portType/operation/input/@wsaw:Action attribute for the Retrieve Document Set Request message shall be defined as “urn:ihe:iti:2007:RetrieveDocumentSet”
- The /definitions/portType/operation/output/@wsaw:Action attribute for the Retrieve Document Set Response message shall be defined as “urn:ihe:iti:2007:RetrieveDocumentSetResponse”
- The /definitions/binding/operation/soap12:operation/@soapAction attribute shall be defined as “urn:ihe:iti:2007:RetrieveDocumentSet”

These are the requirements that affect the wire format of the SOAP message. The other WSDL properties are only used within the WSDL definition and do not affect interoperability. Full sample request and response messages are in ITI TF-2b: 3.43.5.1 Sample SOAP Messages.

For informative WSDL for the Document Repository actor see in Appendix W.

The <ihe:RetrieveDocumentSetRequest/> element is defined as:
• One or more <ihe:DocumentRequest/> elements, each one representing an individual document that the Document Consumer wants to retrieve from the Document Repository. Each <ihe:DocumentRequest/> element contains:
  • A required <ihe:RepositoryUniqueId/> element that identifies the repository from which the document is to be retrieved. This value corresponds to XDSDocumentEntry.repositoryUniqueId.
  • A required <ihe:DocumentUniqueId/> that identifies the document within the repository. This value corresponds to the XDSDocumentEntry.uniqueId.
  • An optional <ihe:HomeCommunityId/> element that corresponds to the home attribute of the Identifiable class in ebRIM.

This allows the Document Consumer to specify one or more documents to retrieve from the Document Repository. The main difference with the existing XDS.a Retrieve Document transaction is that a series of IDs for the document are specified instead of a document URI.

The <ihe:RetrieveDocumentResponse/> element is defined as:
  • A required /ihe:RetrieveDocumentSetResponse/rs:RegistryResponse element
  • An optional sequence of <ihe:DocumentResponse/> elements containing
    o A <ihe:HomeCommunityId/> element. The value of this element shall be the same as the value of the /RetrieveDocumentSetRequest/DocumentRequest/HomeCommunityId element in the Retrieve Document Set Request Message. If the <ihe:HomeCommunityId/> element is not present in the Retrieve Document Set Request Message, this value shall not be present.
    o A required <ihe:RepositoryUniqueId/> that identifies the repository from which the document is to be retrieved. The value of this element shall be the same as the value of the /RetrieveDocumentSetRequest/DocumentRequest/RepositoryUniqueId element in the original Retrieve Document Set Request Message. This value corresponds to XDSDocumentEntry.repositoryUniqueId.
    o A required <ihe:DocumentUniqueId/> that identifies the document within the repository. The value of this element shall be the same as the value of the /RetrieveDocumentSetRequest/DocumentRequest/DocumentUniqueId element in the original Retrieve Document Set Request Message. This value corresponds to XDSDocumentEntry.uniqueId.
    o A required <ihe:Document/> element that contains the retrieved document in base64binary encoded format
    o A required <ihe:mimeType/> element that indicates the MIME type of the retrieved document

The /RetrieveDocumentSetResponse/rs:RegistryResponse/@status attributes provides the overall status of the request: It shall contain one of the following values:

urn:oasis:names:tc:ebxml-regrep:ResponseStatusType:Success
urn:ihe:iti:2007:ResponseStatusType:PartialSuccess

urn:oasis:names:tc:ebxml-regrep:ResponseStatusType:Failure

See ITI TF-3: 4.1.13 Error Reporting for the interpretation of these values.
For each document requested in a /RetrieveDocumentSetRequest/DocumentRequest element:
  o If a warning is reported when retrieving the document, then a
    /RetrieveDocumentSetResponse/RegistryResponse/RegistryErrorList/
    RegistryError element shall be returned with:
      o @severity is urn:oasis:names:tc:ebxml-regrep:ErrorSeverityType:Warning
      o @errorCode is specified
      o @codeContext contains the warning message
      o @location contains the DocumentUniqueId of the document requested
  o No corresponding
    RetrieveDocumentSetResponse/DocumentResponse element shall be returned
  o If the document is successfully retrieved (without warning) then no
    /RetrieveDocumentSetResponse/RegistryResponse/RegistryErrorList/
    RegistryError element shall be present and a
    element shall be returned containing the document as base64binary encoded data.

The /RetrieveDocumentSetResponse/RegistryResponse/ResponseSlotList
element is not used in this transaction.

The /RetrieveDocumentSetResponse/RegisteryResponse/@requestId attribute
is not used in this transaction.
A full XML Schema Document for the XDS.b types is available online on the IHE FTP site, see ITI TF-2x: Appendix W.

2.10.5 Sample SOAP Messages

The samples in the following two sections show a typical SOAP request and its
relative SOAP response. The sample messages also show the WS-Addressing
headers <Action/> , <MessageID/> , <ReplyTo/> ; these WS-Addressing
headers are populated according to ITI TF-2x: Appendix V: Web Services for IHE
Transactions. The body of the SOAP message is omitted for brevity; in a real
scenario the empty element will be populated with the appropriate metadata.
Samples presented in this section are also available online on the IHE FTP site,
see ITI TF-2x: Appendix W.

2.10.6 Sample Retrieve Document Set SOAP Requested
Refer Appendix K
2.11 Cross-Community Access (XCA) Query for Documents
The Cross-Community Access profile supports the means to query and retrieve patient relevant medical data held by other communities. A community is defined as a coupling of facilities/enterprises that have agreed to work together using a common set of policies for the purpose of sharing clinical information via an established mechanism. XCA integration profile consists of following:

2.11.1 XCA Integration Profile

<table>
<thead>
<tr>
<th>Actors</th>
<th>Transactions</th>
<th>Optional or Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiating Gateway</td>
<td>Cross Gateway Query [ITI-38]</td>
<td>Required</td>
</tr>
<tr>
<td>Initiating Gateway</td>
<td>Cross Gateway Retrieve [ITI-39]</td>
<td>Required</td>
</tr>
<tr>
<td>Initiating Gateway</td>
<td>Registry Stored Query [ITI-18]</td>
<td>Optional</td>
</tr>
<tr>
<td>Initiating Gateway</td>
<td>Retrieve Document Set [ITI-43]</td>
<td>Optional</td>
</tr>
<tr>
<td>Responding Gateway</td>
<td>Cross Gateway Query [ITI-38]</td>
<td>Required</td>
</tr>
<tr>
<td>Responding Gateway</td>
<td>Cross Gateway Retrieve [ITI-39]</td>
<td>Required</td>
</tr>
</tbody>
</table>

We are planning to use XCA Integration Profile for future MiHIN cross-state or cross-domain inquiry.

2.12 Cross Community Patient Discovery XCPD
The Cross-Community Patient Discovery (XCPD) profile supports the means to locate communities that hold patient relevant health data and the translation of patient identifiers across communities holding the same patient’s data.

A community is defined as a group of facilities/enterprises that have agreed to work together using a common set of policies for the purpose of sharing health information within the community via an established mechanism.

- Facilities/enterprises may host any type of healthcare application such as EHR, PHR, etc.
- A community is identifiable by a globally unique id called the homeCommunityId. Membership of a facility/enterprise in one community does not preclude it from being a member in another community. Such communities may be XDS Affinity Domains which define document sharing using the XDS profile or any other communities, no matter what their internal sharing structure.
2.13 Lab Orders and Result Transactions

Lab orders and result transactions will be implemented on the MiHIN Shared Services Bus for routine results delivery and public health reporting. It is our intention to provide laboratory transaction services but not to replace existing laboratory networks such as Michigan Health Connect or the Joint Venture Hospital Laboratory.

Laboratory Orders and Results transactions will initially be implemented as a basic messaging service on the MiHIN between a provider of laboratory services and a receiving site. These transactions will effectively be point-to-point. In this phase of the MiHIN implementation the sending and receiving sites must comply with the MiHIN security requirements but we will not require specific standards regarding the message payloads.

As the MiHIN matures we envision that it will support an open marketplace for laboratory services where any provider of lab services can publish a shared web service which would allow any consumer of lab services to order tests. When this is implemented there will need to be strict compliance with the HITSP ISO1 Electronic Health Records Laboratory Results Reporting Interoperability Specification and the T14 Send Laboratory Result Message Transaction. There are limited HITSP standards for laboratory order messages such as the HITSP CAP99 Communicate Lab Order Message Capability. We categorize the lab results reporting specifications as Testing and the lab ordering specifications as Emerging.

2.13.1 Lab Result Messages (HL7 2.5.1)

Our standard for lab results transactions being sent over the shared services bus will be HL7 2.5.1. We will also allow the use of CCD C36 Lab Result Message or C37 Lab Report Document. These two newer standards are preferable for interoperability but there are too few health systems using these standards to make them practical at this point. HL7 v2.5.1 is categorized as Full Production.

2.13.2 Lab Order Messages (HL7 2.5.1)

Our standard for lab orders transactions being sent over the shared services bus will be HL7 2.5.1. HL7 v2.5.1 is categorized as Full Production.

2.14 Laboratory Results Inquiry

Laboratory results inquiry will be provided by the Query for Documents capability described above and utilize the message standards described in section Error! Reference source not found. Error! Reference source not found..

2.14.1 Lab Results Inquiry (CCD C36 or C37)

Our standard for lab results that are posted to an XDS repository for query by other HIEs will be the CCD C36 Lab Result Message or C37 Lab Report Document. These two newer standards are preferable for interoperability and make sense as standards for HIE connections since HIE vendors are beginning to incorporate these XML-based standards into their products. CCD C36 and C37 are categorized as Limited Production.
2.15 Immunizations Reporting Transactions

The standard for Immunizations reporting to the Michigan Care Improvement Registry (MCIR) will be to follow the guidelines of the HITSP IS10 Immunizations and Response Management Implementation Specification. IS10 is intended to support current interoperability approaches installed between Electronic Health Records (EHRs) and Immunization Information Systems. However these requirements and alerts are largely untested at this time pending further standardization efforts. The MiHIN could be an early adopter of this standard.

2.15.1 Immunizations Reporting Messages (C72)

Immunizations records will utilize the HITSP C72 Immunization Message which provides the capability to communicate an update to a patient's vaccination record. It is based upon the Centers for Disease Control and Prevention Implementation Guide for Immunizations Data Transaction using Version 2.3.1 of the Health Level Seven (HL7) Standard Protocol message type VXU Unsolicited Vaccination Record Update. C72 is categorized as Emerging.

2.16 Immunizations Inquiry

Immunizations inquiry will be provided by the Query for Documents capability described above and utilize the message standards described in section Error! Reference source not found. Error! Reference source not found..

2.16.1 Immunizations Inquiry (CCD C32 or C78)

There are two possible standards for immunization payloads either the CCD C32 Summary Document which is a well formed XML standard and being used for document exchange. However there is a specific standard for immunizations called the Immunization Document Component (C78) which is based on the IHE Patient Care Coordination (PCC) Immunization Content (C83). A limited number of vendors are currently supporting this standard. As we engage vendors in the process we can determine the feasibility of using this new standard for immunizations that will be stored in XDS repositories. CCD C32 is categorized as Limited Production and C78 as Emerging.

2.17 Web Services Standards

The MiHIN will adopt the NHIN Messaging Platform Service Interface Specification v 1.9 which identifies the following web services standards:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple Object Access Protocol</td>
<td>1.2</td>
</tr>
<tr>
<td>Hypertext Transfer Protocol (HTTP)</td>
<td>1.1</td>
</tr>
<tr>
<td>WS-Addressing</td>
<td>1.0</td>
</tr>
<tr>
<td>Message Transmission Optimization Mechanism (MTOM) binding for SOAP 1.1</td>
<td>1.0</td>
</tr>
</tbody>
</table>
2.18 Break the Glass Capability
The purpose of break-the-glass is to allow operators, an emergency access to the system in cases where the normal authentication cannot be successfully completed or is not working properly. This provision allows licensed practitioners to review information on a patient that they otherwise would not be permitted to access. This access is temporary and auditable. Implementation of a "break the glass" capability in MiHIN SSB and in Sub-State HIE environment is based on the policy defined by each respective organization for specific process and actors for both process implementation and review, and a process owner(s).

2.18.1 Break-the-Glass Process
- Physician Logins at Sub-State HIE and sends Service Request
- Physician’s Request gets reviewed against rules
- SAML Assertion\(^1\) Occurs with;
  - User Name
  - Role
  - And other parameters
- Service Request with Credentials is then sent to MiHIN
- Credential is Review against rules
- Authorization Decision is sent to MiHIN SSB
- Service Made aware of Obligation and Tracks
- Request Full Filled

\(^1\) SAML Assertion by Sub-State HIE can be referenced from MiHIN_Information_Security_Architecture_Design_v1.9.docx
2.18.2 Break-the-Glass Actor Interaction Diagram

Break-the-Glass Actor Interaction Diagram

Service Request for a Patient

Request for Credentials and description of associated policies

SAML Request Assertion

Receive ACS-certified Assertion

Service Request for Break-the-Glass with Credentials

Review credentials against rules

Authorization Decision

Enforce Authorization

Fulfill implied obligations and rules

Service made aware of obligation and Tracks

Fulfill Requests
3. Appendix

3.1 Appendix A: MiHIN HIE Shared Services Bus Interoperability
3.2 Appendix B: Patient Demographics Query (PDQ) Sequence Diagram

Patient Demographics Query (PDQ) Sequence Diagram

Clinician Workstation

Log into Portal

Accept Login Credentials

Enter Patient Demographics

Display Patient List

HIE Portal

Patient Inquiry

Patient Data

HIE EMR

Return Patient Data

HIE Patient Web Service

Patient Inquiry Message

Return Patient Data (PDQ)

MHIN EMPI

Lookup Patient

Patient Demographics Query (PDQ)
3.3 Appendix C: Lab Result Transaction Sequence Diagram
3.4 Appendix D: Report Immunization to MCIR – Sequence Diagram

![Sequence Diagram](image)

APPENDIX H: MiHIN Shared Services Interoperability Specifications
3.5 Appendix E: Immunization Inquiry (XDS) Sequence Diagram
3.6 Appendix G: IHE Requirements for Patient Identifier Data Types in HL7 Messages

HL7 V3 II Data Type

The Health Level Seven Standard Version 3 (HL7 V3) uses data type II to express an identifier that uniquely identifies a thing or object (see HL7 Version 3 Standard Data Types), including medical record number or other patient identifiers. We discuss here how IHE IT Infrastructure profiles the use of II data type to express patient identifiers in HL7 V3 messages and HL7 V3 CDA Document Templates defined or referenced in this Technical Framework. In the following text of this section, all requirements for the II data type are specified solely in the context of patient identifier expression.

Since IHE adds additional constraints to the II data type, requirements for populating its elements vary slightly, depending on what actor is originating a transaction (or create a CDA document), in which Patient ID is expressed. If the Patient Identifier Cross-reference Manager is the source of the Patient ID in a message, the requirements (specifically, with respect to populating the assigningAuthorityName elements) are more rigorous than otherwise.

The IHE IT Infrastructure Technical Framework adds constraints to the II data type for Patient ID expression in HL7 V3 messages or CDA documents, in order to maintain compatibility with the explicit relationship between a Patient ID Domain (assigning authority) and a Patient ID issued in the Domain present in the HL7 V2 CX data type. In HL7 V2 messages defined in the IHE IT Infrastructure Technical Framework, Patient ID is expressed in the form of an identifier value (CX.ID) issued in a domain (CX.AssigningAuthority) (see ITI TF-2x: E.1). Even though HL7 V3 provides additional mechanisms for an explicit expression of the key concept of Patient ID Domain (via scoping organizations), the constraints added to the II data type in this section enable a seamless interoperability among HL7 V2 messages, HL7 V3 messages, as well as CDA documents, which may participate in the same IHE IT Infrastructure Integration Profile.

At the same time, it is also important to represent the RIM-based association between assigning authority and patient identifiers, which is expected by systems using the rich semantics of the RIM. In order to achieve that IHE imposes several constraints regarding patient IDs on the HL7 V3 models used in IHE transactions:
Identifiers for the patient are class attributes of a specific role, and never of the Person class of the patient. When the Patient role is scoped by a Provider organization, only patient IDs assigned by the provider organization are allowed in the Patient class, the root element of the patient IDs shall match the root element of the provider organization ID, and the provider organization ID shall have no extension element. When any other role associated with the Person class of the patient is scoped by an organization, the root element of the role IDs shall match the root element of the scoping organization ID, and the scoping organization ID shall have no extension element.

A receiver of an HL7 v3 message shall consider the IDs in all roles associated with the Person class of the patient as valid patient IDs.

A receiver of an HL7 v3 message shall not be required to maintain the various roles associated with the Person class of the patient, as long as, when becoming a sender, it can appropriately send all relevant patient IDs according to the requirements of a particular transaction.

**E.2.1 Patient Identifier Cross-reference Manager Actor requirements**

The Patient Identifier Cross-reference Manager Actor is expected to have access to complete information for a Patient ID value and its issuing Patient ID Domain (assigning authority). To facilitate interoperability, it is required that the Patient Identifier Cross-reference Manager Actor provide all this information in an instance of II the data type to express Patient ID. Table E-2 specifies the requirements of the II data type to the Patient Identifier Cross-reference Manager Actor.

<table>
<thead>
<tr>
<th>Table E-2.1-1 Usage of HL7 V3 II Data Type by the PIX Manager Actor Name</th>
<th>Type</th>
<th>Opt</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root</td>
<td>OID</td>
<td>R</td>
<td>An ISO OID of the Patient ID Domain (assigning authority) that guarantees the global uniqueness of the patient identifier.</td>
</tr>
<tr>
<td>Extension</td>
<td>ST</td>
<td>R+</td>
<td>A character string as a unique identifier within the scope of the Patient ID Domain (assigning authority) represented by the identifier root.</td>
</tr>
<tr>
<td>assigningAuthorityName</td>
<td>ST</td>
<td>R+</td>
<td>A human readable name or mnemonic for the assigning authority. The Assigning Authority Name has no computational value. The purpose of a Assigning Authority Name is to assist an unaided human interpreter of an II value to interpret the authority. Note: no automated processing must depend on the assigning authority name to be present in any form.</td>
</tr>
<tr>
<td>Displayable</td>
<td>BL</td>
<td>O</td>
<td>Specifies if the identifier is intended for human display and data entry (displayable = true) as opposed to pure machine interoperation (displayable = false).</td>
</tr>
</tbody>
</table>
IHE specifies that the Patient Identifier Cross-reference Manager actor must populate both elements root and extension for Patient ID Domain and Patient ID value, respectively, and element root must be an ISO OID. If the same patient identifier is populated in a HL7 V2 message, element root and extension shall correspond to CX.4.2 and CX.1, respectively, and CX.4.3 shall be ISO (see ITI TF-2x: E.1).

In addition, IHE requires that the Patient Identifier Cross-reference Manager actor populates element assigningAuthorityName. Though there is no additional requirement for the data type of this element than a text string in a HL7 V3 message or CDA document, it shall be the same value as populated in CX.4.1, if the actor participates in transactions of both HL7 V3 and HL7 V2 messages. In this case, element assigningAuthorityName shall contain a value of HL7 V2 data type IS, a code taken from user-defined Table 0363, Assigning Authority, see ITI TF-2x: E.1.
### Appendix I: Patient Identity Feed / PIXV3 Query and PIXV3 Update Notification

<table>
<thead>
<tr>
<th>Patient Identity Feed HL7 V3</th>
<th>PIXV3 Query</th>
<th>PIXV3 Update Notification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>USE Case Roles</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Actor:</strong> Patient Identity Source</td>
<td><strong>Actor:</strong> Patient Identifier Cross-reference Consumer</td>
<td><strong>Actor:</strong> Patient Identifier Cross-reference Manager</td>
</tr>
<tr>
<td><strong>Role:</strong> Provides notification to the Patient Identifier Cross-reference Manager and Document Registry for any patient identification related events including: creation, updates, merges, etc.</td>
<td><strong>Role:</strong> Queries the Patient Identifier Cross-reference Manager for a list of corresponding patient identifiers, if any</td>
<td><strong>Role:</strong> It serves a well-defined set of Patient Identification Domains. The Patient Identifier Cross-reference Manager manages the cross-referencing of patient identifiers across Patient Identification Domains by providing a list of patient ID &quot;aliases&quot; via notification to a configured list of interested Patient Identifier Cross-reference Consumers.</td>
</tr>
<tr>
<td><strong>Corresponding HL7 v3 Application Roles:</strong> Patient Registry Informer (PRPA_AR201301UV02)</td>
<td><strong>Corresponding HL7 v3 Application Roles:</strong> Patient Registry Query Placer (PRPA_AR201303UV02)</td>
<td><strong>Corresponding HL7 v3 Application Roles:</strong> Patient Registry Informer (PRPA_AR201301UV02)</td>
</tr>
<tr>
<td><strong>Actor:</strong> Patient Identifier Cross-reference Manager</td>
<td><strong>Actor:</strong> Patient Identifier Cross-reference Manager</td>
<td><strong>Actor:</strong> Patient Identifier Cross-reference Consumer</td>
</tr>
<tr>
<td><strong>Role:</strong> Serves a well-defined set of Patient Identification Domains. Based on information provided in each Patient Identification Domain by a Patient Identification Source Actor, it manages the cross-referencing of patient identifiers across Patient Identification Domains.</td>
<td><strong>Role:</strong> Manages the cross-referencing of patient identifiers across Patient Identification Domains. Upon request it returns a list of corresponding patient identifiers, if any.</td>
<td><strong>Role:</strong> Receives notifications from the Patient Identifier Cross-reference Manager of changes to patient ID aliases. Typically the Patient Identifier Cross-reference Consumer Actor uses this information to maintain information links about patients in a different patient ID domain.</td>
</tr>
<tr>
<td><strong>Corresponding HL7 v3 Application Roles:</strong> Patient Registry Tracker (PRPA_AR201302UV02)</td>
<td><strong>Corresponding HL7 v3 Application Roles:</strong> Patient Registry Query Fulfiler (PRPA_AR201304UV02)</td>
<td><strong>Corresponding HL7 v3 Application Roles:</strong> Patient Registry Tracker (PRPA_AR201302UV02)</td>
</tr>
<tr>
<td><strong>Actor:</strong> Document Registry</td>
<td><strong>Actor:</strong> Document Registry</td>
<td><strong>Actor:</strong> Document Registry</td>
</tr>
<tr>
<td><strong>Role:</strong> Uses patient identifiers provided by Patient Identity Source to ensure that XDS Documents metadata registered is associated with a known patient and updates patient identity in document metadata by tracking identity change operations (e.g. merge).</td>
<td><strong>Role:</strong> Uses patient identifiers provided by Patient Identity Source to ensure that XDS Documents metadata registered is associated with a known patient and updates patient identity in document metadata by tracking identity change operations (e.g. merge).</td>
<td><strong>Role:</strong> Uses patient identifiers provided by Patient Identity Source to ensure that XDS Documents metadata registered is associated with a known patient and updates patient identity in document metadata by tracking identity change operations (e.g. merge).</td>
</tr>
</tbody>
</table>
### Patient Identity Feed HL7 V3

#### Corresponding HL7 v3 Application Roles:
- Patient Registry Tracker (PRPA_AR201302UV02)

#### Patient Identity Management – Add or Revise Patient Record

<table>
<thead>
<tr>
<th>PIXV3 Query</th>
<th>PIXV3 Update Notification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Corresponding Identifiers</td>
<td>Update Patient Information</td>
</tr>
</tbody>
</table>

### Trigger Events

- **Patient Registry Record Added (PRPA_TE201301UV02)**
  
  This trigger event signals that a new patient was added to a Patient Identity Source.

  - A Patient Identifier Cross-reference Consumer's need to get the patient identifier associated with a domain for which it needs patient related information will trigger the request for corresponding patient identifiers message based on the following HL7 trigger event:
    - **Patient Registry Get Identifiers Query (PRPA_TE201309UV02)**
      
      This query requests all other identifiers associated with a particular person identifier.

  - The Patient Identifier Cross-reference Manager shall notify a Patient Identifier Cross-reference Consumer when there is a change in a set of cross-referenced patient identifiers for any of the patient identifiers belonging to Patient Identifier Domains of interest to the consumer. The configuration of the domains of interest to a Patient Cross-reference Consumer is maintained by the Patient Cross-reference Manager Actor. Several notifications may have to be issued to communicate a single update to a set of cross-reference patient identifiers as required to reflect all the changes on the resulting sets of cross-reference patient Identifiers belonging to Patient Identifier Domains of interest to the Patient Identifier Cross-referencing Consumer.

  - The following HL7 trigger event will be used to update to the list of patient identifiers:
    - **Patient Registry Record Revised (PRPA_TE201302UV02)**
      
      This trigger event signals that patient information was revised in a Patient Identity Source.

### Message Semantics

---

**APPENDIX H: MiHIN Shared Services Interoperability Specifications**
## Major Components of the Patient Registry Record Added/Revised Messages

### Patient
The `Patient` class is the entry point to the R-MIMs for the `Patient Activate (PRPA_RM201301UV02)` and `Patient Revise (PRPA_RM201302UV02)` models.

### Provider Organization
The `Patient` class is scoped by the provider organization where this person is a patient. The HL7 definition of the CMET requires that the provider organization needs to be identified by an `id` attribute, and at least one of address, telecommunications address, or contact person to be present. The `id` attribute SHALL have only a root, expressed as an ISO OID.

### Person
The `Person` class contains identifying and demographic data elements for the focal person similar to those in the HL7 v2.x PID segment such as name, gender, date of birth, marital status and deceased indicator and time.

### Language Communication
Information about what language(s) should be used to communicate with the focal person can be sent in the `LanguageCommunication` class.

### PersonalRelationship
This is used for sending information pertaining to the mother’s maiden name.

## Major Components of the Patient Registry Query by Identifier

### PatientIdentifier Parameter
This required parameter specifies the identifier associated with the person whose information is being queried. For this parameter item, a single patient identifier is specified in the `PatientIdentifier.value` attribute. Please see Appendix E for the use of the II data type for patient identifiers.

### DataSource Parameter
This optional parameter specifies the assigning authority/authorities of the Patient Identity Domain(s) whose identifiers need to be returned. If no such parameter is supplied, the PIX Manager is required to return the identifiers from all known Patient Identity Domains.

## Major Components of the Patient Registry Record Revised

Refer section 2.3.2

### Patient

### Person

### Provider Organization

### Other Identifiers
### Patient Identity Feed HL7 V3

<table>
<thead>
<tr>
<th>Citizen</th>
<th>Other Identifiers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citizenship information for a person, including citizen identifier and effective time can be sent in the Citizen class. The nation that scopes the Citizen role, as identified by Nation.code, is mandatory.</td>
<td></td>
</tr>
<tr>
<td>The OtherIDs class is used to capture other identifiers associated with the person such as a driver's license number or social security number. In this transaction the IDs assigned by the scoping provider organization are represented in the id attribute of the Patient class. All other IDs are represented in the OtherIDs class. For the purposes of interoperability where both HL7 V3 and HL7 v2.x based transactions are used, the following requirement is imposed on the OtherIDs.id attribute and on the scopingOrganization.id attribute: OtherIDs.id.root SHALL be identical to scopingOrganization.id.root scopingOrganization.id.extension SHALL NOT have any value.</td>
<td></td>
</tr>
</tbody>
</table>

### Message Information Model

<table>
<thead>
<tr>
<th>Patient Registry Record Added/Revised Messages</th>
<th>Patient Registry Query by Identifier Message</th>
<th>Patient Registry Record Revise Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRPA_HD201301IHE</td>
<td>(PRPA_RM201307UV02) RMIM</td>
<td>(PRPA_RM201302UV02) RMIM</td>
</tr>
<tr>
<td>Patient</td>
<td>QueryByParameter</td>
<td>Patient</td>
</tr>
<tr>
<td>The primary record for the focal person in a Patient Identity Source</td>
<td>The entry point for the domain content in this query</td>
<td>The primary record for the focal person in a Patient Identity Cross-Reference Manager</td>
</tr>
<tr>
<td>classCode [1..1] (M) Patient (CS) {CNE: PAT}</td>
<td>queryId [1..1] QueryByParameter (II)</td>
<td>classCode [1..1] (M)</td>
</tr>
<tr>
<td>Structural attribute; this is a &quot;patient&quot; role</td>
<td>Unique identifier for the query</td>
<td>Patient (CS) {CNE: PAT}</td>
</tr>
<tr>
<td></td>
<td>statusCode [1..1] (M) QueryByParameter (CS)</td>
<td>Structural attribute; this is a &quot;patient&quot; role</td>
</tr>
</tbody>
</table>

APPENDIX H: MiHIN Shared Services Interoperability Specifications
<table>
<thead>
<tr>
<th><strong>Patient Identity Feed HL7 V3</strong></th>
<th><strong>PIXV3 Query</strong></th>
<th><strong>PIXV3 Update Notification</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>id [1..*] (M) Patient (SET&lt;ll&gt;)</td>
<td>{CNE:QueryStatusCode, fixed value=&quot;new&quot;} There are no continuations necessary for this type of query, so the status is always &quot;new&quot;</td>
<td>id [1..*] (M) Patient (SET&lt;ll&gt;) Linked identifiers from one or more Identity Domains</td>
</tr>
<tr>
<td>Patient (CS) (CNE:active, fixed value= &quot;active&quot;)</td>
<td>responsePriorityCode [1..1] QueryByParameter (CS) {CNE:QueryPriority, fixed value=&quot;I&quot;} The PIX manager is required to send an immediate response.</td>
<td>statuscode [1..1] Patient (CS) {CNE:active, fixed value= &quot;active&quot;} A value specifying the state of this record in a patient registry (based on the RIM role class state-machine). This record is active.</td>
</tr>
<tr>
<td>Identiﬁers designated by this patient identity source for the focal person</td>
<td>confidentialityCode [0..*] Patient (SET&lt;CE&gt;) {CWE:Confidentiality} Value(s) that control the disclosure of information about this living subject as a patient</td>
<td></td>
</tr>
<tr>
<td>statusCode [1..1] Patient (CS) (CNE:active, fixed value= &quot;active&quot;)</td>
<td>veryImportantPersonCode [0..1] Patient (CE) {CWE:PatientImportance} A code specifying the patient's special status granted by the scoper organization, often resulting in preferred treatment and special considerations. Examples include board member, diplomat.</td>
<td></td>
</tr>
<tr>
<td>A value specifying the state of this record in a patient registry (based on the RIM role class state-machine). This record is active.</td>
<td>DataSource Optional parameter specifying the assigning authority of a Patient Identity Domain</td>
<td>Person A subtype of LivingSubject representing a human being. Either Person.name or Patient.id must be non-null.</td>
</tr>
<tr>
<td>confidentialityCode [0..*] Patient (SET&lt;CE&gt;) {CWE:Confidentiality} Value(s) that control the disclosure of information about this living subject as a patient</td>
<td>value [1..1] ParameterItem (II) The identifier for the Patient Identity Domain's assigning authority. IHE restriction: The value.root attribute SHALL be a valid ISO OID. The value.extension attribute SHALL NOT be present</td>
<td>classCode [1..1] (M) Person (CS) {CNE:PSN, fixed value= &quot;PSN&quot;} Structural attribute; this is a &quot;person&quot; entity</td>
</tr>
<tr>
<td>A code specifying the patient's special status granted by the scoper organization, often resulting in preferred treatment and special considerations. Examples include board member, diplomat.</td>
<td>determinerCode [1..1] (M) Person (CS) {CNE:INSTANCE, fixed value= &quot;INSTANCE&quot;} Structural attribute; this is a specific person</td>
<td>determinerCode [1..1] (M) Person (CS) {CNE:INSTANCE, fixed value= &quot;INSTANCE&quot;} Structural attribute; this is a specific person</td>
</tr>
<tr>
<td>Person A subtype of LivingSubject representing a human being. Either Person.name or Patient.id must be non-null.</td>
<td>semanticsText [1..1] ParameterItem (ST){default= &quot;DataSource.id&quot;}</td>
<td></td>
</tr>
<tr>
<td>Patient Identity Feed HL7 V3</td>
<td>PIXV3 Query</td>
<td>PIXV3 Update Notification</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>name [1..*] Person (BAG&lt;PN&gt;)</td>
<td>name [1..*] Person (BAG&lt;PN&gt;)</td>
<td>name [1..*] Person (BAG&lt;PN&gt;)</td>
</tr>
<tr>
<td>Name(s) for this person</td>
<td>Name(s) for this person</td>
<td>Name(s) for this person</td>
</tr>
<tr>
<td>telecom [0..*] Person (BAG&lt;TEL&gt;)</td>
<td>telecom [0..*] Person (BAG&lt;TEL&gt;)</td>
<td>telecom [0..*] Person (BAG&lt;TEL&gt;)</td>
</tr>
<tr>
<td>Telecommunication address(es) for communicating with this person</td>
<td>Telecommunication address(es) for communicating with this person</td>
<td>Telecommunication address(es) for communicating with this person</td>
</tr>
<tr>
<td>administrativeGenderCode [0..1] Person (CE) {CWE:AdministrativeGender}</td>
<td>administrativeGenderCode [0..1] Person (CE) {CWE:AdministrativeGender}</td>
<td>administrativeGenderCode [0..1] Person (CE) {CWE:AdministrativeGender}</td>
</tr>
<tr>
<td>A value representing the gender (sex) of this person. Note: this attribute does not include terms related to clinical gender which is a complex physiological, genetic and sociological concept that requires multiple observations in order to be comprehensively described.</td>
<td>A value representing the gender (sex) of this person. Note: this attribute does not include terms related to clinical gender which is a complex physiological, genetic and sociological concept that requires multiple observations in order to be comprehensively described.</td>
<td>A value representing the gender (sex) of this person. Note: this attribute does not include terms related to clinical gender which is a complex physiological, genetic and sociological concept that requires multiple observations in order to be comprehensively described.</td>
</tr>
<tr>
<td>birthTime [0..1] Person (TS)</td>
<td>birthTime [0..1] Person (TS)</td>
<td>birthTime [0..1] Person (TS)</td>
</tr>
<tr>
<td>The date and time this person was born</td>
<td>The date and time this person was born</td>
<td>The date and time this person was born</td>
</tr>
<tr>
<td>deceasedInd [0..1] Person (BL)</td>
<td>deceasedInd [0..1] Person (BL)</td>
<td>deceasedInd [0..1] Person (BL)</td>
</tr>
<tr>
<td>An indication that this person is dead</td>
<td>An indication that this person is dead</td>
<td>An indication that this person is dead</td>
</tr>
<tr>
<td>deceasedTime [0..1] Person (TS)</td>
<td>deceasedTime [0..1] Person (TS)</td>
<td>deceasedTime [0..1] Person (TS)</td>
</tr>
<tr>
<td>The date and time this person died</td>
<td>The date and time this person died</td>
<td>The date and time this person died</td>
</tr>
<tr>
<td>multipleBirthInd [0..1] Person (BL)</td>
<td>multipleBirthInd [0..1] Person (BL)</td>
<td>multipleBirthInd [0..1] Person (BL)</td>
</tr>
<tr>
<td>An indication that this person was part of a multiple birth</td>
<td>An indication that this person was part of a multiple birth</td>
<td>An indication that this person was part of a multiple birth</td>
</tr>
</tbody>
</table>
### Patient Identity Feed HL7 V3

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>multipleBirthOrderNumber [0..1]</td>
<td>The order in which this person was born if part of a multiple birth</td>
</tr>
<tr>
<td>addr [0..*]</td>
<td>Address(es) for corresponding with this person</td>
</tr>
<tr>
<td>maritalStatusCode [0..1]</td>
<td>A value representing the domestic partnership status of this person</td>
</tr>
<tr>
<td>religiousAffiliationCode [0..1]</td>
<td>A value representing the primary religious preference of this person</td>
</tr>
<tr>
<td>raceCode [0..*]</td>
<td>A set of values representing the races of this person</td>
</tr>
<tr>
<td>ethnicGroupCode [0..*]</td>
<td>A set of values representing the ethnic groups of this person</td>
</tr>
<tr>
<td>OtherIDs</td>
<td>Used to capture additional identifiers for the person such as a Drivers' license or Social Security Number. Please see notes above in the Major Components section on the use of OtherIDs.</td>
</tr>
<tr>
<td>classCode [1..1] (M)</td>
<td>Structural attribute. This can be any specialization of &quot;role&quot; except for Citizen, or Employee.</td>
</tr>
</tbody>
</table>

### PIXV3 Query

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PatientIdentifier value [1..1] (M)</td>
<td>The patient identifier known to the PIX Consumer</td>
</tr>
<tr>
<td>semanticsText [1..1]</td>
<td>Structural attribute. This can be any specialization of &quot;role&quot;</td>
</tr>
</tbody>
</table>

### PIXV3 Update Notification

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OtherIDs</td>
<td>Used to capture additional identifiers for the person such as a Drivers' license or Social Security Number. Please see notes above in the Major Components section on the use of OtherIDs.</td>
</tr>
<tr>
<td>classCode [1..1] (M)</td>
<td>Structural attribute. This can be any specialization of &quot;role&quot;</td>
</tr>
</tbody>
</table>
## Patient Identity Feed HL7 V3

<table>
<thead>
<tr>
<th><strong>id [1..*] (M)</strong></th>
<th><strong>Role (SET&lt;II&gt;)</strong></th>
<th><strong>One or more identifiers issued to the focal person by the associated scoping Organization (e.g. a Driver’s License number issued by a DMV)</strong></th>
</tr>
</thead>
</table>

## PIXV3 Query

<table>
<thead>
<tr>
<th><strong>id [1..*] (M)</strong></th>
<th><strong>Role (SET&lt;II&gt;)</strong></th>
<th><strong>One or more identifiers issued to the focal person by the associated scoping Organization (e.g. a Driver’s License number issued by a DMV)</strong></th>
</tr>
</thead>
</table>

## PIXV3 Update Notification

<table>
<thead>
<tr>
<th><strong>id [1..*] (M)</strong></th>
<th><strong>Role (SET&lt;II&gt;)</strong></th>
<th><strong>One or more identifiers issued to the focal person by the associated scoping Organization (e.g. a Driver’s License number issued by a DMV)</strong></th>
</tr>
</thead>
</table>

### PersonalRelationship

A personal relationship between the focal living subject and another living subject.

<table>
<thead>
<tr>
<th><strong>classCode [1..1] (M)</strong></th>
<th><strong>Role (CS) {CNE:PRS, fixed value= &quot;PRS&quot;]</strong></th>
<th><strong>Structural attribute; this is a &quot;personal relationship&quot; role</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>id [0..*]</strong></th>
<th><strong>Role (SET&lt;II&gt;)</strong></th>
<th><strong>Identifier(s) for this personal relationship</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>code [1..1] (M)</strong></th>
<th><strong>Role (CE) {CWE:PersonalRelationshipRoleType}</strong></th>
<th><strong>A required value specifying the type of personal relationship between the relationshipHolder and the scoping living subject drawn from the PersonalRelationshipRoleType domain, for example, spouse, parent, unrelated friend.</strong></th>
</tr>
</thead>
</table>

### Citizen

Used to capture person information relating to citizenship.

<table>
<thead>
<tr>
<th><strong>classCode [1..1] (M)</strong></th>
<th><strong>Role (CS) {CNE:CIT, fixed value= &quot;CIT&quot;]</strong></th>
<th><strong>Structural attribute; this is a &quot;citizen&quot; role</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>id [0..*]</strong></th>
<th><strong>Role (SET&lt;II&gt;)</strong></th>
<th><strong>Identifier(s) for the focal person as a citizen of a</strong></th>
</tr>
</thead>
</table>
## Patient Identity Feed HL7 V3

<table>
<thead>
<tr>
<th>Nation</th>
<th>PIXV3 Query</th>
<th>PIXV3 Update Notification</th>
</tr>
</thead>
<tbody>
<tr>
<td>A politically organized body of people bonded by territory and known as a nation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>classCode [1..1] (M)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organization (CS) {CNE:NAT, fixed value= &quot;NAT&quot;}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structural attribute; this is a 'nation' type of entity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>determinerCode [1..1] (M)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organization (CS) {CNE:INSTANCE, fixed value= &quot;INSTANCE&quot;}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structural attribute; this is a specific entity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>code [1..1] (M)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organization (CD) {CWE:NationEntity}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A value that identifies a nation state</td>
<td></td>
<td></td>
</tr>
<tr>
<td>name [0..1]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organization (ON)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A non-unique textual identifier or moniker for this nation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Employee

A relationship of the focal person with an organization to receive wages or salary. The purpose of this class is to identify the type of relationship the employee has to the employer rather than the nature of the work actually performed. For example, it can be used to capture whether the person is a Military Veteran or not..

<p>| classCode [1..1] (M) | | |
| Employee (CS) {CNE:EMP} | | |
| Structural attribute; this is an &quot;employee&quot; role | | |
| statusCode [0..1] | | |</p>
<table>
<thead>
<tr>
<th><strong>Patient Identity Feed HL7 V3</strong></th>
<th><strong>PIXV3 Query</strong></th>
<th><strong>PIXV3 Update Notification</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Employee (CS) {CNE:RoleStatus}</strong>&lt;br&gt;A value specifying the state of this employment relationship (based on the RIM Role class state-machine), for example, active, suspended, terminated.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>occupationCode [0..1]</strong>&lt;br&gt;<strong>Employee (CE) {CWE:EmployeeOccupationCode}</strong>&lt;br&gt;A code qualifying the classification of kind-of-work based upon a recognized industry or jurisdictional standard. OccupationCode is used to convey the person's occupation as opposed to jobClassCode (not used in this transaction) which characterizes this particular job. For example, it can be used to capture whether the person is a Military Veteran or not.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>LanguageCommunication</strong>&lt;br&gt;A language communication capability of the focal person</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>languageCode [1..1] (M)</strong>&lt;br&gt;A language communication capability of the focal person</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>LanguageCommunication (CE)</strong>&lt;br&gt;{CWE:HumanLanguage}&lt;br&gt;A value representing a language for which the focal person has some level of proficiency for written or spoken communication. Examples: Spanish, Italian, German, English, American Sign</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>preferenceInd [0..1]</strong>&lt;br&gt;<strong>LanguageCommunication (BL)</strong>&lt;br&gt;An indicator specifying whether or not this language is preferred by the focal person for the associated mode</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Control Act and Transmission Wrappers

<table>
<thead>
<tr>
<th><strong>Transmission Wrapper</strong></th>
<th><strong>Transmission Wrapper</strong></th>
<th><strong>Transmission Wrapper</strong></th>
</tr>
</thead>
</table>

APPENDIX H: MiHIN Shared Services Interoperability Specifications
### Patient Identity Feed HL7 V3

- **MCCI_MT000100UV01** – Send Message Payload
- **Trigger Event Control Act Wrapper**
  - **MFMI_MT700701UV01** – Master File / Registry Notification Control Act, Role Subject

### PIXV3 Query

- **MCCI_MT000100UV01** – Send Message Payload
- **Trigger Event Control Act Wrapper**
  - **QUQI_MT021001UV01** – Query Control Act Request: Query By Parameter

### PIXV3 Update Notification

- **MCCI_MT000100UV01** – Send Message Payload
- **Trigger Event Control Act Wrapper**
  - **MFMI_MT700701UV01** – Master File / Registry Notification Control Act, Role Subject

### Transmission Wrapper

- The value of interactionId SHALL be set to `PRPA_IN201301UV02` or `PRPA_IN201302UV02`
- The value of processingModeCode SHALL be set to `T`
- The acceptAckCode SHALL be set to `AL`
- There SHALL be only one receiver Device

### Trigger Event Control Act Wrapper

- The trigger event code in `ControlActProcess.code` SHALL be set to `PRPA_TE201301UV02` or `PRPA_TE201302UV02` respectively
- The value of `RegistrationEvent.statusCode` SHALL be set to "active"
- There SHALL be no `InReplacementOf` act relationship for these interactions.

### Web Services Types and Messages

#### The following WSDL naming conventions SHALL apply:

- **add** message -> "PRPA_IN201301UV02_Message"
- **revise** message -> "PRPA_IN201302UV02_Message"
- acknowledgement -> "MCCI_IN000002UV01_Message"

The following WSDL snippet describes the types for these messages:

```xml
<types>
  <xsd:schema elementFormDefault="qualified"
   targetNamespace="urn:hl7-org:v3"
   xmlns:hl7="urn:hl7-org:v3">
    <!-- Include the message schema -->
  </xsd:schema>
  <xsd:import namespace="urn:hl7-org:v3"
    schemaLocation="../schema/HL7V3/NE2008/multicacheschemas/PRPA_IN201301UV02.xsd"/>
</types>
```

#### The following WSDL naming conventions SHALL apply:

- **Query by Identifier** -> "PRPA_IN201309UV02_Message"
- **Query Response** -> "PRPA_IN201310UV02_Message"

The following WSDL snippet describes the types for these messages:

```xml
<types>
  <xsd:schema elementFormDefault="qualified"
   targetNamespace="urn:hl7-org:v3"
   xmlns:hl7="urn:hl7-org:v3">
    <!-- Include the message schema -->
  </xsd:schema>
  <xsd:import namespace="urn:hl7-org:v3"
    schemaLocation="../schema/HL7V3/NE2008/multicacheschemas/PRPA_IN201309UV02.xsd"/>
</types>
```

#### The following WSDL naming conventions SHALL apply:

- **revise** message -> "PRPA_IN201302UV02_Message"
- acknowledgement -> "MCCI_IN000002UV01_Message"

The following WSDL snippet describes the types for these messages:

```xml
<types>
  <xsd:schema elementFormDefault="qualified"
   targetNamespace="urn:hl7-org:v3"
   xmlns:hl7="urn:hl7-org:v3">
    <!-- Include the message schema -->
  </xsd:schema>
  <xsd:import namespace="urn:hl7-org:v3"
    schemaLocation="../schema/HL7V3/NE2008/multicacheschemas/PRPA_IN201309UV02.xsd"/>
</types>
```
### Patient Identity Feed HL7 V3

The messages are described by the following snippet:

```xml
<message name="PRPA_IN201301UV02_Message">
  <part element="hl7:PRPA_IN201301UV02" name="Body"/>
</message>
<message name="PRPA_IN201302UV02_Message">
  <part element="hl7:PRPA_IN201302UV02" name="Body"/>
</message>
<message name="MCCI_IN000002UV01_Message">
  <part element="hl7:MCCI_IN000002UV01" name="Body"/>
</message>
```

### PIXV3 Query

The messages are described by the following snippet:

```xml
<message name="PRPA_IN201309UV02_Message">
  <part element="hl7:PRPA_IN201309UV02" name="Body"/>
</message>
<message name="PRPA_IN201310UV02_Message">
  <part element="hl7:PRPA_IN201310UV02" name="Body"/>
</message>
<message name="MCCI_IN000002UV01_Message">
  <part element="hl7:MCCI_IN000002UV01" name="Body"/>
</message>
```

### PIXV3 Update Notification

The messages are described by the following snippet:

```xml
<message name="PRPA_IN201302UV02_Message">
  <part element="hl7:PRPA_IN201302UV02" name="Body"/>
</message>
<message name="MCCI_IN000002UV01_Message">
  <part element="hl7:MCCI_IN000002UV01" name="Body"/>
</message>
```
<table>
<thead>
<tr>
<th>Patient Identity Feed HL7 V3</th>
<th>PIXV3 Query</th>
<th>PIXV3 Update Notification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Expected Actions – PIX Manager</strong></td>
<td><strong>Expected Actions</strong></td>
<td><strong>Expected Actions - Patient Identifier Cross-reference Consumer</strong></td>
</tr>
<tr>
<td>The Patient Identifier Cross-reference Manager Actor shall only recognize a single Patient Identity Source Actor per domain. The cross-referencing process (algorithm, human decisions, etc.) is performed within the Patient Identifier Cross-reference Manager Actor. Once the Patient Identifier Cross-reference Manager has completed its cross-referencing function, it shall make the newly cross-referenced identifiers available to PIX queries and send out notification to any Patient Identifier Cross-reference Consumers that have been configured as being interested in receiving such notifications using the PIX Update Notification HL7 V3 transaction.</td>
<td>The Patient Identifier Cross-reference Manager shall be capable of accepting attributes as specified in Table 3.45.4.1.2-1 above. The Patient Identifier Cross-reference Manager Actor shall be capable of accepting multiple concurrent PIX Query requests (Get Corresponding Identifiers messages) and responding correctly using the Return Corresponding Identifiers message.</td>
<td>Whenever the Patient Identifier Cross-reference Consumer receives updated identifier information in a Patient Revise message that results in a change to the cross-referencing of a patient, the actor shall update its internal identifier information for the affected patient(s) in all domains in which it is interested. The identifiers found in both Patient.id and OtherIDs.id attributes shall be considered together to form a complete list of patient identifiers from the different Patient Identity domains in which this actor is interested. In the case where the returned list of identifiers contains multiple identifiers for a single domain, thePatient Identifier Cross-reference Consumer shall either use ALL of the multiple identifiers from the given domain or it shall ignore ALL of the multiple identifiers from the given domain. This allows Patient Identifier Cross-reference Consumer Actors capable of handling multiple identities for a single patient within a single domain (i.e., those that can correctly aggregate the information associated with the different identifiers) to do so. For those Patient Identifier Cross-reference Consumer Actors not capable of handling this situation, ignoring the entire list of different identifiers prevents the consumer from presenting incomplete data.</td>
</tr>
</tbody>
</table>

**Web Services Port Type and Binding Definitions IHE-WSP201**  
The attribute /wsdl:definitions/@name SHALL be “PIXManager”

<table>
<thead>
<tr>
<th>The following WSDL naming conventions SHALL apply:</th>
<th>The following WSDL naming conventions SHALL apply:</th>
<th>The following WSDL naming conventions SHALL apply:</th>
</tr>
</thead>
<tbody>
<tr>
<td>wsdl:definitions/@name=&quot;PIXManager&quot;:</td>
<td>wsdl:definitions/@name=&quot;PIXManager&quot;:</td>
<td>wsdl:definitions/@name=&quot;PIXManager&quot;:</td>
</tr>
<tr>
<td>&quot;add&quot; message -&gt;</td>
<td>&quot;get identifiers&quot; query -&gt;</td>
<td>PIX update message -&gt;</td>
</tr>
<tr>
<td>Patient Identity Feed HL7 V3</td>
<td>PIXV3 Query</td>
<td>PIXV3 Update Notification</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>&quot;PRPA_IN201301UV02_Message&quot; revise message -&gt; &quot;PRPA_IN201302UV02_Message&quot; acknowledgement -&gt; &quot;MCCI_IN000002UV01_Message&quot; portType -&gt; &quot;PIXManager_PortType&quot; add operation -&gt; &quot;PIXManager_PRPA_IN201301UV02&quot; revise operation -&gt; &quot;PIXManager_PRPA_IN201302UV02&quot; SOAP 1.2 binding -&gt; &quot;PIXManager_Binding_Soap12&quot; SOAP 1.2 port -&gt; &quot;PIXManager_Port_Soap12&quot;</td>
<td>&quot;PRPA_IN201309UV02_Message&quot; get identifiers&quot; response -&gt; &quot;PRPA_IN201310UV02_Message&quot;</td>
<td>&quot;PRPA_IN201302UV02_Message&quot; acknowledgement -&gt; &quot;MCCI_IN000002UV01_Message&quot; portType -&gt; &quot;PIXManager_PortType&quot; get identifiers operation -&gt; &quot;PIXManager_PRPA_IN201309UV02&quot; SOAP 1.2 binding -&gt; &quot;PIXManager_BINDING_Soap12&quot; SOAP 1.2 port -&gt; &quot;PIXManager_PORT_Soap12&quot;</td>
</tr>
<tr>
<td>Port Type</td>
<td>Port Type</td>
<td>Port Type</td>
</tr>
<tr>
<td>&lt;portType name=&quot;PIXManager_PortType&quot;&gt; &lt;operation name=&quot;PIXManager_PRPA_IN201301UV02&quot;&gt; &lt;input message=&quot;tns:PRPA_IN201301UV02_Message&quot; wsaw:Action=&quot;urn:hl7-org:v3:PRPA_IN201301UV02&quot;/&gt; &lt;output message=&quot;tns:MCCI_IN000002UV01_Message&quot; wsaw:Action=&quot;urn:hl7-org:v3:MCCI_IN000002UV01&quot;/&gt; &lt;/operation&gt; &lt;operation name=&quot;PIXManager_PRPA_IN201302UV02&quot;&gt; &lt;input message=&quot;tns:PRPA_IN201302UV02_Message&quot; wsaw:Action=&quot;urn:hl7-org:v3:PRPA_IN201302UV02&quot;/&gt; &lt;output message=&quot;tns:MCCI_IN000002UV01_Message&quot; wsaw:Action=&quot;urn:hl7-org:v3:MCCI_IN000002UV01&quot;/&gt; &lt;/operation&gt;</td>
<td>&lt;portType name=&quot;PIXManager_PortType&quot;&gt; &lt;operation name=&quot;PIXManager_PRPA_IN201309UV02&quot;&gt; &lt;input message=&quot;tns:PRPA_IN201309UV02_Message&quot; wsaw:Action=&quot;urn:hl7-org:v3:PRPA_IN201309UV02&quot;/&gt; &lt;output message=&quot;tns:PRPA_IN201310UV02_Message&quot; wsaw:Action=&quot;urn:hl7-org:v3:PRPA_IN201310UV02&quot;/&gt; &lt;/operation&gt; &lt;/portType&gt;</td>
<td>&lt;portType name=&quot;PIXConsumer_PortType&quot;&gt; &lt;operation name=&quot;PIXConsumer_PRPA_IN201302UV02&quot;&gt; &lt;input message=&quot;tns:PRPA_IN201302UV02_Message&quot; wsaw:Action=&quot;urn:hl7-org:v3:PRPA_IN201302UV02&quot;/&gt; &lt;output message=&quot;tns:MCCI_IN000002UV01_Message&quot; wsaw:Action=&quot;urn:hl7-org:v3:MCCI_IN000002UV01&quot;/&gt; &lt;/operation&gt; &lt;/portType&gt;</td>
</tr>
</tbody>
</table>
### Patient Identity Feed HL7 V3

</portType>

### Bindings

**SOAP 1.2 binding:**

```xml
<binding name="PIXManager_Binding_Soap12" type="PIXManager_PortType">
  <wsoap12:binding style="document" transport="http://schemas.xmlsoap.org/soap/http"/>
  <operation name="PIXManager_PRPA_IN201301UV02">
    <wsoap12:operation soapAction="urn:hl7-org:v3:PRPA_IN201301UV02"/>
    <input>
      <wsoap12:body use="literal"/>
    </input>
    <output>
      <wsoap12:body use="literal"/>
    </output>
  </operation>
  <operation name="PIXManager_PRPA_IN201302UV02">
    <wsoap12:operation soapAction="urn:hl7-org:v3:PRPA_IN201302UV02"/>
    <input>
      <wsoap12:body use="literal"/>
    </input>
    <output>
      <wsoap12:body use="literal"/>
    </output>
  </operation>
</binding>
```

### PIXV3 Query

### PIXV3 Update Notification

### Bindings

**SOAP 1.2 binding:**

```xml
<binding name="PIXManager_Binding_Soap12" type="PIXManager_PortType">
  <wsoap12:binding style="document" transport="http://schemas.xmlsoap.org/soap/http"/>
  <operation name="PIXManager_PRPA_IN201301UV02">
    <wsoap12:operation soapAction="urn:hl7-org:v3:PRPA_IN201301UV02"/>
    <input>
      <wsoap12:body use="literal"/>
    </input>
    <output>
      <wsoap12:body use="literal"/>
    </output>
  </operation>
  <operation name="PIXManager_PRPA_IN201302UV02">
    <wsoap12:operation soapAction="urn:hl7-org:v3:PRPA_IN201302UV02"/>
    <input>
      <wsoap12:body use="literal"/>
    </input>
    <output>
      <wsoap12:body use="literal"/>
    </output>
  </operation>
</binding>
```

### PIXV3 Update Notification

### Bindings

**SOAP 1.2 binding:**

```xml
<binding name="PIXManager_Binding_Soap12" type="PIXManager_PortType">
  <wsoap12:binding style="document" transport="http://schemas.xmlsoap.org/soap/http"/>
  <operation name="PIXManager_PRPA_IN201301UV02">
    <wsoap12:operation soapAction="urn:hl7-org:v3:PRPA_IN201301UV02"/>
    <input>
      <wsoap12:body use="literal"/>
    </input>
    <output>
      <wsoap12:body use="literal"/>
    </output>
  </operation>
  <operation name="PIXManager_PRPA_IN201302UV02">
    <wsoap12:operation soapAction="urn:hl7-org:v3:PRPA_IN201302UV02"/>
    <input>
      <wsoap12:body use="literal"/>
    </input>
    <output>
      <wsoap12:body use="literal"/>
    </output>
  </operation>
</binding>
```
### Expected Actions – Document Registry

The Document Registry shall be capable of accepting attributes in the Patient Registry Record Added or Patient Registry Record Revised messages. The Patient Identity Feed transaction contains more than what the XDS Document Registry needs for its operation.

### Web Services Port Type and Binding Definitions

IHE-WSP201) The attribute /wsdl:definitions/@name SHALL be “DocumentRegistry”.

The following WSDL naming conventions SHALL apply:

- add message -> "PRPA_IN201301UV02_Message"
- revise message -> "PRPA_IN201302UV02_Message"
- acknowledgement -> "MCCI_IN000002UV01_Message"
- portType -> "DocumentRegistry_PortType"
- add operation -> "DocumentRegistry_PRPA_IN201301UV02"
<table>
<thead>
<tr>
<th>Patient Identity Feed HL7 V3</th>
<th>PIXV3 Query</th>
<th>PIXV3 Update Notification</th>
</tr>
</thead>
</table>
| `revise operation ->
  "DocumentRegistry_PRPA_IN201302UV02"
SOAP 1.2 binding ->
"DocumentRegistry_Binding_Soap12"
SOAP 1.2 port ->
"DocumentRegistry_Port_Soap12"` |             |                           |

**Port Type**

```xml
<portType
  name="DocumentRegistry_PortType">
  <operation
    name="DocumentRegistry_PRPA_IN201301UV02">
    <input
      message="tns:PRPA_IN201301UV02_Message" wsaw:Action="urn:hl7-org:v3:PRPA_IN201301UV02"/>
    <output
      message="tns:MCCI_IN000002UV01_Message" wsaw:Action="urn:hl7-org:v3:MCCI_IN000002UV01"/>
  </operation>
  <operation
    name="DocumentRegistry_PRPA_IN201302UV02">
    <input
      message="tns:PRPA_IN201302UV02_Message" wsaw:Action="urn:hl7-org:v3:PRPA_IN201302UV02"/>
    <output
      message="tns:MCCI_IN000002UV01_Message" wsaw:Action="urn:hl7-org:v3:MCCI_IN000002UV01"/>
  </operation>
</portType>
```
APPENDIX H: MiHIN Shared Services Interoperability Specifications

<table>
<thead>
<tr>
<th>Patient Identity Feed HL7 V3</th>
<th>PIXV3 Query</th>
<th>PIXV3 Update Notification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bindings</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SOAP 1.2 binding:**

```xml
<binding
name="DocumentRegistry_Binding_Soap12"
type="DocumentRegistry_PortType">  
<wsoap12:binding style="document"
transport="http://schemas.xmlsoap.org/soap/http"/>
<operation
name="DocumentRegistry_PRPA_IN201301UV02">
<wsoap12:operation
soapAction="urn:hl7-org:v3:PRPA_IN201301UV02"/>
<input>
<wsoap12:body use="literal"/>
</input>
<output>
<wsoap12:body use="literal"/>
</output>
</operation>
<operation
name="DocumentRegistry_PRPA_IN201302UV02">
<wsoap12:operation
soapAction="urn:hl7-org:v3:PRPA_IN201302UV02"/>
<input>
<wsoap12:body use="literal"/>
</input>
<output>
<wsoap12:body use="literal"/>
</output>
</operation>
```

APPENDIX H: MiHIN Shared Services Interoperability Specifications
<table>
<thead>
<tr>
<th>Patient Identity Feed HL7 V3</th>
<th>PIXV3 Query</th>
<th>PIXV3 Update Notification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Message Examples</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Patient Identity Management – Patient Identity Merge</strong></td>
<td><strong>Return Corresponding Identifiers</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Trigger Events - Patient Registry Duplicates Resolved</strong></td>
<td><strong>Trigger Events - Patient Registry Get Identifiers Query Response</strong></td>
<td></td>
</tr>
</tbody>
</table>

When two patients' records are found to identify the same patient by a Patient Identity Source Actor in a Patient Identifier Domain.

This trigger event signals that duplicate records were resolved in a patient registry. A Patient Registry Duplicates Resolved message indicates that the Patient Identity Source Actor has done a merge within a specific Patient Identification Domain. That is, the surviving identifier (patient ID) has subsumed a duplicate patient identifier.

**Message Semantics**

The Patient Registry Duplicates Resolved interaction is carried out by the HL7 v3 Patient Demographics message (PRPA_MT201303UV02). The message shall be generated by the system (Patient Identity Source Actor) that performs the update whenever two patient records are found to reference the same person.

The Return Corresponding Identifiers message is conducted by the HL7 Patient Identifiers message. The Patient Identifier Cross-reference Manager Actor shall generate this message in direct response to the Patient Registry Query by Identifier message previously received. This message satisfies the Application Level, Original Mode Acknowledgement for the query message.

**Major Components of the Patient Registry Duplicates Resolved**

**Major Components of the Get Corresponding Identifiers Query Response**
<table>
<thead>
<tr>
<th>Patient Identity Feed HL7 V3</th>
<th>PIXV3 Query</th>
<th>PIXV3 Update Notification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient</td>
<td>Patient</td>
<td>Patient</td>
</tr>
<tr>
<td>Provider Organization</td>
<td>Person</td>
<td>Person</td>
</tr>
<tr>
<td>Person</td>
<td>Provider Organization</td>
<td></td>
</tr>
</tbody>
</table>

**Patient Registry Duplicates Resolved Message**

**Patient**
The primary record for the focal person in a Patient Identity Source

classCode [1..1] (M)
Patient (CS) (CNE:PAT)
Structural attribute; this is a "patient" role

id [1..*] (M)
Patient (SET<>)
Identifiers designated by various patient identity sources for the focal person

statusCode [1..1]
Patient (CS) {CNE:active, fixed value= "active"}
A value specifying the state of this record in a patient registry (based on the RIM role class state-machine). This record is active.

**Person**
A subtype of LivingSubject representing a human being, both Person.name and Patient.id must be non-null

classCode [1..1] (M)
Person (CS) (CNE:PSN, fixed value= "PSN")
Structural attribute; this is a "person" entity
<table>
<thead>
<tr>
<th>Patient Identity Feed HL7 V3</th>
<th>PIXV3 Query</th>
<th>PIXV3 Update Notification</th>
</tr>
</thead>
<tbody>
<tr>
<td>determinerCode [1..1] (M)</td>
<td>determinerCode [1..1] (M)</td>
<td></td>
</tr>
<tr>
<td>Person (CS) {CNE:INSTANCE, fixed value= &quot;INSTANCE&quot;)</td>
<td>Person (CS) {CNE:INSTANCE, fixed value= &quot;INSTANCE&quot;)</td>
<td></td>
</tr>
<tr>
<td>Structural attribute; this is a specific person</td>
<td>Structural attribute; this is a specific person</td>
<td></td>
</tr>
<tr>
<td>name [1..*]</td>
<td>name [1..*]</td>
<td></td>
</tr>
<tr>
<td>Person (BAG&lt;PN&gt;)</td>
<td>Person (BAG&lt;PN&gt;)</td>
<td></td>
</tr>
<tr>
<td>Name(s) for this person</td>
<td>Name(s) for this person</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>OtherIDs</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Used to capture additional identifiers for the person such as a Drivers' license or Social Security Number.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>classCode [1..1] (M)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Role (CS) {CNE:ROL}</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Structural attribute; This can be any specialization of &quot;role&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>id [1..*] (M)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Role (SET&lt;II&gt;)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>One or more identifiers issued to the focal person by the associated scopingOrganization (e.g. a Driver’s License number issued by a DMV)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Control Act and Transmission Wrappers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Transmission Wrapper</strong></td>
<td><strong>Transmission Wrapper</strong></td>
<td></td>
</tr>
<tr>
<td>MCCI_MT000100UV01 – Send Message Payload</td>
<td>MCCI_MT000300UV01 – Send Application Ack</td>
<td></td>
</tr>
<tr>
<td><strong>Trigger Event Control Act Wrapper</strong></td>
<td><strong>Trigger Event Control Act Wrapper</strong></td>
<td></td>
</tr>
<tr>
<td>MFMI_MT700701UV01 – Master File / Registry Notification Control Act, Role Subject</td>
<td>MFMI_MT700701UV01 – Master File / Registry Query Response Control Act (Role Subject)</td>
<td></td>
</tr>
<tr>
<td>Transmission Wrapper</td>
<td>PIXV3 Query</td>
<td>PIXV3 Update Notification</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td><strong>Transmission Wrapper</strong></td>
<td>The value of interactionId SHALL be set to PRPA_IN201304UV02</td>
<td>The value of interactionId SHALL be set to PRPA_IN201310UV02</td>
</tr>
<tr>
<td>The value of processingModeCode SHALL be set to T</td>
<td>The value of processingModeCode SHALL be set to T</td>
<td>The acceptAckCode SHALL be set to AL</td>
</tr>
<tr>
<td>The acceptAckCode SHALL be set to AL</td>
<td>The acceptAckCode SHALL be set to T</td>
<td>There SHALL be only one receiver Device</td>
</tr>
<tr>
<td>There SHALL be only one receiver Device</td>
<td>There SHALL be only one receiver Device</td>
<td></td>
</tr>
</tbody>
</table>

**MFMI_MT700701UV01 – Master File / Registry Notification Control Act, Role Subject**

The trigger event code in ControlActProcess.code SHALL be set to PRPA_TE201304UV02

RegistrationEvent.statusCode SHALL be set to "active"

There SHALL be an InReplacementOf act relationship

The value of PriorRegistration.statusCode SHALL be "obsolete"

There SHALL be a PriorRegisteredRole role

There SHALL be a single PriorRegisteredRole.id attribute, representing the subsumed patient identifier.

**Web Services Types and Messages**

The Patient Registry Resolve Duplicates message will be transmitted using Web Services.

The following WSDL naming conventions SHALL apply:

"resolve duplicates" message -> "PRPA_IN201304UV02_Message"

Acknowledgement -> "MCCI_IN000002UV01_Message"

The following WSDL snippet describes the types for these messages:

**Web Services Types and Messages**

The Patient Registry Query by Identifier message and response will be transmitted using Web Services,

The following WSDL naming conventions SHALL apply:

Query by Identifier -> "PRPA_IN201309UV02_Message"

Query Response -> "PRPA_IN201310UV02_Message"

The following WSDL snippet describes the types for these messages:
<table>
<thead>
<tr>
<th><strong>Patient Identity Feed HL7 V3</strong></th>
<th><strong>PIXV3 Query</strong></th>
<th><strong>PIXV3 Update Notification</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
<td>&lt;types&gt;</td>
<td></td>
</tr>
<tr>
<td>&lt;xsd:schema elementFormDefault=&quot;qualified&quot; targetNamespace=&quot;urn:hl7-org:v3&quot; xmlns:hl7=&quot;urn:hl7-org:v3&quot;&gt;</td>
<td>&lt;xsd:import namespace=&quot;urn:hl7-org:v3&quot; schemaLocation=&quot;/schema/HL7V3/NE2008/multicacheschemas/PRPA_IN201304UV02.xsd&quot;&gt;</td>
<td></td>
</tr>
<tr>
<td>&lt;!-- Include the message schema --&gt;</td>
<td>&lt;xsd:element name=&quot;PRPA_IN201304UV02&quot;/&gt;</td>
<td></td>
</tr>
<tr>
<td><a href="">xsd:schema</a></td>
<td>&lt;xsd:import namespace=&quot;urn:hl7-org:v3&quot; schemaLocation=&quot;/schema/HL7V3/NE2008/multicacheschemas/MCCI_IN000002UV01.xsd&quot;&gt;</td>
<td></td>
</tr>
<tr>
<td>&lt;xsd:element name=&quot;MCCI_IN000002UV01&quot;/&gt;</td>
<td>&lt;xsd:element name=&quot;PRPA_IN201309UV02&quot;/&gt;</td>
<td></td>
</tr>
<tr>
<td>&lt;/xsd:schema&gt;</td>
<td>&lt;xsd:element name=&quot;PRPA_IN201310UV02&quot;/&gt;</td>
<td></td>
</tr>
<tr>
<td>&lt;/xsd:schema&gt;</td>
<td>&lt;/xsd:schema&gt;</td>
<td></td>
</tr>
<tr>
<td>The messages are described by the following snippet:</td>
<td>The messages are described by the following snippet:</td>
<td>The messages are described by the following snippet:</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>&lt;message name=&quot;PRPA_IN201304UV02_Message&quot;&gt;</td>
<td>&lt;message name=&quot;PRPA_IN201309UV02 Message&quot;&gt;</td>
<td></td>
</tr>
<tr>
<td>&lt;part element=&quot;hl7:PRPA_IN201304UV02&quot; name=&quot;Body&quot;/&gt;</td>
<td>&lt;part element=&quot;hl7:PRPA_IN201309UV02&quot; name=&quot;Body&quot;/&gt;</td>
<td></td>
</tr>
<tr>
<td>&lt;/message&gt;</td>
<td>&lt;message name=&quot;MCCI_IN000002UV01 Message&quot;&gt;</td>
<td></td>
</tr>
<tr>
<td>&lt;message name=&quot;MCCI_IN000002UV01_Message&quot;&gt;</td>
<td>&lt;part element=&quot;hl7:MCCI_IN000002UV01&quot; name=&quot;Body&quot;/&gt;</td>
<td></td>
</tr>
<tr>
<td>&lt;/message&gt;</td>
<td>&lt;message name=&quot;PRPA_IN201310UV02 Message&quot;&gt;</td>
<td></td>
</tr>
<tr>
<td>...</td>
<td>&lt;message name=&quot;PRPA_IN201310UV02 Message&quot;&gt;</td>
<td></td>
</tr>
<tr>
<td>&lt;part element=&quot;hl7:PRPA_IN201310UV02&quot; name=&quot;Body&quot;/&gt;</td>
<td>&lt;part element=&quot;hl7:PRPA_IN201310UV02&quot; name=&quot;Body&quot;/&gt;</td>
<td></td>
</tr>
<tr>
<td>&lt;/message&gt;</td>
<td>&lt;message name=&quot;PRPA_IN201310UV02 Message&quot;&gt;</td>
<td></td>
</tr>
</tbody>
</table>

**Expected Actions – PIX Manager**

**Expected Actions - Patient Identifier**
When the Patient Identifier Cross-reference Manager receives the Resolve Duplicates message type of the Patient Identity Feed transaction, it shall cross-reference the patient identifiers provided in the wrapper and the payload of the message by replacing any references it is maintaining internally to the patient ID provided in the wrapper by the patient ID included in the payload. After the identifier references are replaced, the Patient Identifier Cross-reference Manager shall reapply its internal cross-referencing logic/policies before providing the updated information via either the PIX Query or PIX Notification Transactions.

**Cross-reference Manager Actor**

The Patient Identifier Cross-reference Manager Actor shall return the attributes within the message that are required by the HL7 standard.

A RegistrationEvent, and the associated Patient class are returned only when the Patient Identifier Cross-reference Manager Actor recognizes the specified Patient ID in the query parameter, and an identifier exists for the specified patient in at least one other domain. The Patient Identifier Cross-reference Manager Actor shall use at one or more Patient.id attributes (and, optionally, zero or more OtherIds.id attributes) to convey the patient IDs which uniquely identify the patient within each Patient Identification Domain. The identifiers are captured using an Instance Identifier (II) data type. See Appendix (X) for further detail section 2.3.1.

**Web services Port Type and Binding Definitions**

IHE-WSP201) The attribute /wsdl:definitions/@name SHALL be “PIXManager”.

The following WSDL naming conventions SHALL apply:

```
wsdl:definitions/@name="PIXManager"

"merge" message -> "PRPA_IN201304UV02_Message"
acknowledgement -> "MCCI_IN000002UV01_Message"
portType -> "PIXManager_PortType"
```
<table>
<thead>
<tr>
<th>Patient Identity Feed HL7 V3</th>
<th>PIXV3 Query</th>
<th>PIXV3 Update Notification</th>
</tr>
</thead>
<tbody>
<tr>
<td>merge operation -&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;PIXManager_PRPA_IN201304UV02&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOAP 1.2 binding -&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;PIXManager_Binding_Soap12&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOAP 1.2 port -&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;PIXManager_Port_Soap12&quot;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Port Type**

```
<portType
name="PIXManager_PortType">
<operation
name="PIXManager_PRPA_IN201304UV02">
<input
message="tns:PRPA_IN201304UV02_Mess
age" wsaw:Action="urn:hl7-org:v3:PRPA_IN201304UV02"/>
<output
message="tns:MCCI_IN000002UV01_Mess
age" wsaw:Action="urn:hl7-org:v3:MCCI_IN000002UV01"/>
</operation>
</portType>
```

**SOAP 1.2 binding:**

```
...<binding
name="PIXManager_Binding_Soap12"
type="PIXManager_PortType">
<wsoap12:binding style="document"
transport="http://schemas.xmlsoap.org/soap/http"/>
<operation
name="PIXManager_PRPA_IN201304UV02">
<wsoap12:operation
soapAction="urn:hl7-"
### Expected Actions – Document Registry

The Document Registry shall be capable of accepting attributes in the Resolve Duplicates message.

The following conditions shall be detected by the Document Registry actor. Messages containing these conditions shall not update the state of the Document Registry actor.

- The subsumed patient identifier is not issued by the correct Assigning Authority according to the Affinity Domain configuration.
- The surviving patient identifier is not issued by the correct Assigning Authority according to the Affinity Domain configuration.
- The subsumed and surviving patient identifiers are the same.
- The subsumed patient identifier has already been subsumed by an earlier message.
- The surviving patient identifier has already been subsumed by an earlier message.
- The subsumed patient identifier does not convey a

```xml
  <soap12:Header/>
  <soap12:Body use="literal"/>
</soap12:Envelope>
```
<table>
<thead>
<tr>
<th>Patient Identity Feed HL7 V3</th>
<th>PIXV3 Query</th>
<th>PIXV3 Update Notification</th>
</tr>
</thead>
<tbody>
<tr>
<td>currently active patient identifier known to the Registry actor.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Web Services Port Type and Binding Definitions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IHE-WSP201) The attribute /wsdl:definitions/@name SHALL be “DocumentRegistry”.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The following WSDL naming conventions SHALL apply:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*wsdl:definitions/@name=&quot;DocumentRegistry&quot;:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;resolve duplicates&quot; message -&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;PRPA_IN201304UV02_Message&quot; acknowledgement -&gt; &quot;MCCI_IN000002UV01_Message&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>portType -&gt; &quot;DocumentRegistry_PortType&quot; resolve duplicates operation -&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;DocumentRegistry_PRPA_IN201304UV02&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOAP 1.2 binding -&gt; &quot;DocumentRegistry_Binding_Soap12&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOAP 1.2 port -&gt; &quot;DocumentRegistry_Port_Soap12&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Port Type</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;portType name=&quot;DocumentRegistry_PortType&quot;&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;operation name=&quot;DocumentRegistry_PRPA_IN201304UV02&quot;&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;input message=&quot;tns:PRPA_IN201304UV02_Message&quot; wsaw:Action=&quot;urn:hl7-org:v3:PRPA_IN201304UV02&quot;/&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;output message=&quot;tns:MCCI_IN000002UV01_Message&quot; wsaw:Action=&quot;urn:hl7-org:v3:MCCI_IN000002UV01&quot;/&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;/operation&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;/portType&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bindings</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOAP 1.2 binding:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;binding name=&quot;DocumentRegistry_Binding_Soap12&quot; type=&quot;DocumentRegistry_PortType&quot;&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;operation name=&quot;DocumentRegistry_PRPA_IN201304UV02&quot;&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;wssoap12:operation soapAction=&quot;urn:hl7-org:v3:PRPA_IN201304UV02&quot;/&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;input&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient Identity Feed HL7 V3</td>
<td>PIXV3 Query</td>
<td>PIXV3 Update Notification</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td><code>&lt;wsoap12:body use=&quot;literal&quot;/&gt;</code></td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>&lt;/input&gt;</code></td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>&lt;soap12:body use=&quot;literal&quot;/&gt;</code></td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>&lt;/output&gt;</code></td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>&lt;/operation&gt;</code></td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>&lt;/binding&gt;</code></td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>...</code></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Referenced Standards**


The composite message schemas which describe the full payload of these interactions, including the wrappers, can be found online on the IHE FTP site, see ITI TF-2x: Appendix W (the HL7 V3 2008 Normative Edition schemas are at

Edition2008/processable/multicacheschemas/PRPA_IN201301UV02.xsd

Edition2008/processable/multicacheschemas/PRPA_IN201302UV02.xsd
3.7.1 Appendix I: Message Information Model of the Patient Registry Record Added/Revised
3.7.2 Message Information Model of the Patient Registry Query by Identifier Message

**Patient Registry Query By Identifier**

HPRPA_RM20130713ED

The payload message used for a query to a Patient Registry for records matching a person identifier and, optionally, a data source.

**QueryByParameter (QueryByParameter)**

- `queryId`: II [1..1]
- `statusCode`: CS CNE [1..1] = "new"
- `responsePriorityCode`: CS CNE [1..1] = "1"

**ParameterList (ParameterList)**

1..*parameterList* +

**PatientIdentifier (ParameterItem)**

- `value`: II [1..1]
- `semanticsText`: ST [1..1] "Patient.id"

**DataSource (ParameterItem)**

- `value`: II [1..1]
- `semanticsText`: ST [1..1] "DataSource.id"
3.7.3 Message Information Model of the Patient Registry Duplicates Resolved

Surviving Patient Information

CMET: (ORG)
E_Organization [contact]
(COCT_MT15003UV)

Patient
classCode*: = PAT
id*: SET<ill> [1..1]
statusCode*: CS CWE [1..1] = "active"

Person
classCode*: = "PSN"
deterninerCode*: = "INSTANCE"
name*: BAG<PN> [1..*]
3.7.4  Message Information Model of the Patient Identifiers Message (PIXV3 QRY)
3.7.5 Message Information Model of the Patient Registry Record Revise Message

**Patient Revise**

The payload message used for notifications for revised records in a patient registry

**Person**

- `classCode`: `<PSN`
- `determinerCode`: `<INSTANCE`
- `name`: `BAG<PN>`

**CMET: (ORG) E_Organization**

- `classCode`: `<PAT`
- `id`: `SET<II>`
- `statusCode`: `CS CNE [1..1] = "active"`

**CMET: (ORG) E_Organization**

- `classCode`: `<ROL`
- `id`: `SET<II>`
- `statusCode`: `CS CNE [1..1] = "active"`

**OtherIDs**

- `classCode`: `<ROD`
- `id`: `SET<II>`
- `statusCode`: `CS CNE [1..1] = "active"`

- `0..* asOtherIDs`

- `1..1 patientPerson`

- `0..1 providerOrganization`

- `1..1 scopingOrganization`
### 3.8 Appendix J: Patient Demographics Query, Patient Demographics Query Response and Patient Demographics Query HL7V3 Continuation

<table>
<thead>
<tr>
<th>Patient Demographics Query</th>
<th>Patient Demographics Query Response</th>
<th>Patient Demographics Query HL7V3 Continuation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trigger Events</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A Patient Demographics Consumer's need to select a patient based on demographic information about patients whose information matches a set of known data will trigger the Patient Demographics Query based on the following HL7 trigger event: <strong>Find Candidates Query (PRPA_TE201305UV02)</strong> An application, in the role of Query Placer, sends a query-by-parameter message to request that the application return all person records that match the demographic information sent in the query parameters.</td>
<td>The Patient Demographics Supplier’s response to the Find Candidates Query message is triggered by the following trigger: <strong>Find Candidates Response (PRPA_TE201306UV02)</strong> An application returns a Patient Registry Find Candidates Response message populated with information it holds for each person whose record matches the demographic information sent as parameters in a query-by-parameter message.</td>
<td>A Patient Demographics Consumer's need to get another set of matching records to a previously sent Patient Demographics query will trigger the Patient Demographics Query Continuation based on the following HL7 trigger event: <strong>Query General Activate Query Continuation (QUQI_TE000003UV01)</strong> An application, in the role of Query Placer, sends a query continuation message to request that the application return up to a specified number of matching records based on a previous demographics query.</td>
</tr>
</tbody>
</table>

<p>| <strong>Message Semantics</strong>      |                                    |                                             |
| The Find Candidates Query is supported by the Patient Registry Query by Demographics (PRPA_MT201306UV02) message. The Patient Demographics Consumer actor shall generate the query message whenever it needs to select from a list of patients whose information matches a set of demographic data. The receiver shall respond to the query by sending the Patient Registry Find Candidates Response message (PRPA_MT201310UV02), which uses the Application Level Acknowledgement transmission wrapper. This satisfies the requirements of original mode acknowledgment; no intermediate Accept | The Patient Registry Find Candidates Response message (PRPA_MT201310UV02) is sent by the Patient Demographics Supplier Actor in direct response to the query (PRPA_MT201306UV02) or query continuation (QUQI_MT000001UV01) message previously received. The components of the message with cardinality greater than 0 are required, all other attributes of the message are optional. | The Query continuation is supported by the Query Control Act Request Continue / Cancel (QUQI_MT000001UV01) message. The Patient Demographics Consumer actor shall generate the continuation message whenever it needs to receive another set of matching records based on the results of a previously sent query. The receiver shall respond to the continuation request by sending the Patient Registry Find Candidates Response message (PRPA_MT201310), which uses the Application Level Acknowledgement transmission wrapper. This satisfies the requirements of original mode acknowledgment; no intermediate Accept |</p>
<table>
<thead>
<tr>
<th>Patient Demographics Query</th>
<th>Patient Demographics Query Response</th>
<th>Patient Demographics Query HL7V3 Continuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acknowledgement is to be sent. The response message shall contain demographic records that reflect the best fit to all of the search criteria received in the Patient Registry Query by Demographics message.</td>
<td></td>
<td>Acknowledgement is to be sent. If a cancellation request is sent by the Patient Demographics Consumer, then the receiver shall respond by sending an Accept Acknowledgement.</td>
</tr>
</tbody>
</table>

**Major Components of the Patient Registry Query by Demographics**

**LivingSubjectName Parameter**
This optional parameter specifies the name of the person whose information is being queried. For this parameter item, a single person name (PN) data item shall be specified in the LivingSubjectName.value attribute. Only certain name parts within the PN data type (e.g., family name) may be specified. If the sender needs to indicate that the name parts specified are not limited to an exact match, then the use attribute of the value element shall be set to "SRCH".

**LivingSubjectAdministrativeGender Parameter**
This optional parameter specifies the administrative gender of the person whose information is being queried. For this parameter item, a single administrative gender code shall be specified in the LivingSubjectAdministrativeGender.value attribute.

**LivingSubjectBirthTime Parameter**
This optional parameter specifies the birth data and time of the person whose information is being queried. This parameter can convey an exact moment (e.g., January 1, 1960 @ 03:00:00 EST), an approximate date (e.g., January 1960), or even a range of dates (e.g., December 1, 1959 through

**Major Components of the Patient Registry Find Candidates Response Message**

**PatientIdentifier Parameter**
This required parameter specifies the identifier associated with the person whose information is being queried. For this parameter item, a single patient identifier is specified in the PatientIdentifier.value attribute. Please see Appendix E for the use of the II data type for patient identifiers.

**DataSource Parameter**
This optional parameter specifies the assigning authority/authorities of the Patient Identity Domain(s) whose identifiers need to be returned. If no such parameter is supplied, the PIX Manager is required to return the identifiers from all known Patient Identity Domains.

**Query Match Observation**

**Major Components of the Patient Registry Record Revised**
This message contains no domain payload, it is built from a transmission and control act wrappers.
### Patient Demographics Query

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PatientAddress Parameter</td>
<td>This optional parameter specifies one or more addresses associated with the person whose information is being queried.</td>
</tr>
<tr>
<td>LivingSubjectId Parameter</td>
<td>This optional repeating parameter specifies an identifier associated with the patient whose information is being queried. If multiple instances of this parameter are provided in the query, all of the associated identifiers must match. The identifier specified in the LivingSubjectId.value attribute is expressed using the OtherIdsScopingOrganization.value attribute shall be expressed using the II data type, where the root element contains a valid ISO OID, and there is no extension element. If no such parameter is supplied, the patient demographics supplier is required to return the identifiers from all Patient Identity Domains known to it. Any parameter value which is not recognized by the target patient information source shall cause an error condition.</td>
</tr>
<tr>
<td><strong>Patient Demographics Query</strong></td>
<td><strong>Patient Demographics Query Response</strong></td>
</tr>
<tr>
<td>---------------------------------</td>
<td>----------------------------------------</td>
</tr>
</tbody>
</table>
| **parameter**                   | - Only the LivingSubjectId, OtherIDsScopingOrganization, and LivingSubjectName parameters can have more than one instance  
- The optional attributes ParameterList.id, MatchCriterionList.id, QueryByParameter responseElementGroupld, QueryByParameter.modifyCode, and QueryByParameter.executionAndDeliveryTime were omitted from the model  
- QueryByParameter.responsePriorityCode is required and is fixed to I (Immediate)  
- QueryByParameter.responseModalityCode is required and is fixed to R (Real Time)  
- QueryByParameter.statusCode is defaulted to "new".  
- The data type of MatchAlgorithm.value is constrained to ST 1660  
- The data type of MinimumDegreeMatch.value is constrained to INT  
- The data type of LivingSubjectName.value is | - The focal entity choice is restricted to be only a person  
- The relationship holder of the personal relationship is restricted to be a person (using CMET COCT_MT030207UV)  
- The following roles are omitted:  
  - asPatientOfOtherProvider  
  - birthPlace  
  - guarantor  
  - guardian  
  - contactParty  
  - asMember  
  - careGiver  
  - asStudent  
- The following participations are omitted:  
  - subjectOf (administrativeObservation)  
  - coveredPartyOf (coverage) |
<table>
<thead>
<tr>
<th>Patient Demographics Query</th>
<th>Patient Demographics Query Response</th>
<th>Patient Demographics Query HL7V3 Continuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>constrained to PN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The optional SortControl was omitted from the model</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The optional MatchWeight was omitted from the model</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The following optional parameters were omitted from the model: 1665 PatientTelecom PrincipalCareProviderId PrincipalCareProvisionId MothersMaidenName LivingSubjectDeceasedTime PatientStatusCode LivingSubjectBirthPlaceName LivingSubjectBirthPlaceAddress</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>QueryByParameter</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>The entry point for the domain content in this query</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>queryId [1..1] QueryByParameter (II)</td>
<td>Unique identifier for the query</td>
<td></td>
</tr>
<tr>
<td>statusCode [1..1] (M) QueryByParameter (CS)</td>
<td>{CNE:QueryStatusCode, default=&quot;new&quot;}</td>
<td>The status of the query, default is &quot;new&quot;</td>
</tr>
<tr>
<td>responseModalityCode [1..1] QueryByParameter (CS)</td>
<td>{CNE:ResponseModality, fixed value=&quot;R&quot;}</td>
<td>The mode of the response – always real-time.</td>
</tr>
<tr>
<td><strong>Patient</strong></td>
<td></td>
<td>Patient Demographics Supplier</td>
</tr>
<tr>
<td>classCode [1..1] (M)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient Demographics Query</td>
<td>Patient Demographics Query Response</td>
<td>Patient Demographics Query HL7V3 Continuation</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-----------------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td><strong>Patient (CS) {CNE:PAT}</strong></td>
<td><strong>Patient (CS) {CNE:PAT}</strong></td>
<td></td>
</tr>
<tr>
<td>Structural attribute; this is a &quot;patient&quot; role</td>
<td>Structural attribute; this is a &quot;patient&quot; role</td>
<td></td>
</tr>
<tr>
<td></td>
<td>id [1..*] (M)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Patient (SET&lt;II&gt;)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Patient identifiers. Patient Identifiers from different Identity Domains may be contained either here, or in the OtherIDs.id attributes, but not in both places. At least one Patient Identifier shall be present in this attribute</td>
<td></td>
</tr>
<tr>
<td></td>
<td>statusCode [1..1]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Patient (CS) {CNE:active, fixed value= &quot;active&quot;}</td>
<td>A value specifying the state of this record in a patient registry (based on the RIM role class state-machine). This record is active.</td>
</tr>
<tr>
<td></td>
<td>confidentialityCode [0..*]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Patient (SET&lt;CE&gt;) {CWE:Confidentiality}</td>
<td>Value(s) that control the disclosure of information about this living subject as a patient</td>
</tr>
<tr>
<td></td>
<td>veryImportantPersonCode [0..1]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Patient (CE) {CWE:PatientImportance}</td>
<td>A code specifying the patient's special status granted by the scoper organization, often resulting in preferred treatment and special considerations. Examples include board member, diplomat.</td>
</tr>
<tr>
<td></td>
<td>responsePriorityCode [1..1]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>QueryByParameter (CS)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>{CNE:QueryPriority, fixed value=&quot;I&quot;}</td>
<td>The Patient Demographics Supplier is required to send an immediate response.</td>
</tr>
<tr>
<td></td>
<td>Person</td>
<td></td>
</tr>
<tr>
<td>A subtype of LivingSubject representing a human being Either Person.name or Patient.id must be non-null.</td>
<td>Person</td>
<td></td>
</tr>
<tr>
<td></td>
<td>classCode [1..1] (M)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Person (CS) {CNE:PSN, fixed value= &quot;PSN&quot;}</td>
<td></td>
</tr>
<tr>
<td>Patient Demographics Query</td>
<td>Patient Demographics Query Response</td>
<td>Patient Demographics Query HL7V3 Continuation</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Structural attribute; this is a &quot;person&quot; entity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>determinerCode [1..1] (M)</td>
<td>Person (CS) {CNE:INSTANCE, fixed value= &quot;INSTANCE&quot;)</td>
<td></td>
</tr>
<tr>
<td>Structural attribute: this is a specific person</td>
<td></td>
<td></td>
</tr>
<tr>
<td>name [1..*]</td>
<td>Person (BAG&lt;PN&gt;)</td>
<td></td>
</tr>
<tr>
<td>Name(s) for this person</td>
<td></td>
<td></td>
</tr>
<tr>
<td>telecom [0..*]</td>
<td>Person (BAG&lt;TEL&gt;)</td>
<td></td>
</tr>
<tr>
<td>Telecommunication address(es) for communicating with this person</td>
<td></td>
<td></td>
</tr>
<tr>
<td>administrativeGenderCode [0..1]</td>
<td>Person (CE) {CWE:AdministrativeGender}</td>
<td></td>
</tr>
<tr>
<td>A value representing the gender (sex) of this person. Note: this attribute does not include terms related to clinical gender which is a complex physiological, genetic and sociological concept that requires multiple observations in order to be comprehensively described.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>birthTime [0..1]</td>
<td>Person (TS)</td>
<td></td>
</tr>
<tr>
<td>The date and time this person was born</td>
<td></td>
<td></td>
</tr>
<tr>
<td>deceasedInd [0..1]</td>
<td>Person (BL)</td>
<td></td>
</tr>
<tr>
<td>An indication that this person is dead</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient Demographics Query</td>
<td>Patient Demographics Query Response</td>
<td>Patient Demographics Query HL7V3 Continuation</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>deceasedTime [0..1] Person (TS)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The date and time this person died</td>
<td></td>
</tr>
<tr>
<td></td>
<td>multipleBirthInd [0..1] Person (BL)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>An indication that this person was part of a multiple birth</td>
<td></td>
</tr>
<tr>
<td></td>
<td>multipleBirthOrderNumber [0..1] Person (INT)</td>
<td>The order in which this person was born if part of a multiple birth</td>
</tr>
<tr>
<td></td>
<td>addr [0..*] Person (BAG&lt;AD&gt;) Address(es) for corresponding with this person</td>
<td></td>
</tr>
<tr>
<td></td>
<td>maritalStatusCode [0..1] Person (CE) {CWE:MaritalStatus} A value representing the domestic partnership status of this person</td>
<td></td>
</tr>
<tr>
<td></td>
<td>religiousAffiliationCode [0..1] Person (CE) {CWE:ReligiousAffiliation} A value representing the primary religious preference of this person</td>
<td></td>
</tr>
<tr>
<td></td>
<td>raceCode [0..*] Person (SET&lt;CE&gt;) {CWE:Race} A set of values representing the races of this person</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ethnicGroupCode [0..*] Person (SET&lt;CE&gt;) {CWE:Ethnicity}</td>
<td></td>
</tr>
<tr>
<td>Patient Demographics Query</td>
<td>Patient Demographics Query Response</td>
<td>Patient Demographics Query HL7V3 Continuation</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td><strong>initialQuantity [0..1]</strong> QueryByParameter (INT) <strong>defines the maximum size of the response that can be accepted by the requesting application</strong></td>
<td><strong>OtherIDs</strong></td>
<td><strong>Continuation</strong></td>
</tr>
<tr>
<td>A set of values representing the ethnic groups of this person</td>
<td>Used to capture additional identifiers for the person such as a Drivers’ license or Social Security Number.</td>
<td></td>
</tr>
<tr>
<td><strong>classCode [1..1]</strong> (M) <strong>Role (CS) {CNE:ROL}</strong> Structural attribute. This can be any specialization of &quot;role&quot; except for Citizen, or Employee.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>id [1..*]</strong> (M) <strong>Role (SET&lt;II&gt;)</strong> One or more identifiers issued to the focal person by the associated scoping Organization (e.g., a Driver's License number issued by a DMV)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>initialQuantityCode [0..1]</strong> QueryByParameter (CE) (CWE:QueryRequestLimit, default=&quot;RD&quot;) <strong>defines the units associated with the initialQuantity; default is &quot;records&quot;</strong></td>
<td><strong>PersonalRelationship</strong></td>
<td></td>
</tr>
<tr>
<td>A personal relationship between the focal living subject and another living subject</td>
<td><strong>classCode [1..1]</strong> (M) <strong>Role (CS) {CNE:PRS, fixed value= &quot;PRS&quot;}</strong> Structural attribute; this is a &quot;personal relationship&quot; role</td>
<td></td>
</tr>
<tr>
<td><strong>id [0..*]</strong> <strong>Role (SET&lt;II&gt;)</strong> Identifier(s) for this personal relationship</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>code [1..1]</strong> (M) <strong>Role (CE) {CWE:PersonalRelationshipRoleType}</strong> A required value specifying the type of personal relationship between the relationshipHolder and the scoping living subject drawn from the PersonalRelationshipRoleType domain. for</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient Demographics Query</td>
<td>Patient Demographics Query Response</td>
<td>Patient Demographics Query HL7V3 Continuation</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-----------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td><strong>MatchAlgorithm</strong></td>
<td><strong>Citizen</strong></td>
<td><strong>Continuation</strong></td>
</tr>
<tr>
<td>This parameter conveys instructions to the patient demographics supplier specifying the preferred matching algorithm to use.</td>
<td>Used to capture person information relating to citizenship.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>classCode [1..1] (M)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Role (CS) {CNE:CIT, fixed value= &quot;CIT&quot;}</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Structural attribute; this is a &quot;citizen&quot; role</td>
<td></td>
</tr>
<tr>
<td></td>
<td>id [0..*]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Role (SET&lt;II&gt;)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identifier(s) for the focal person as a citizen of a nation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>value [1..1] ParameterItem (ST)</td>
<td></td>
</tr>
<tr>
<td>The name of the algorithm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>classCode [1..1] (M)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organization (CS) {CNE:NAT, fixed value= &quot;NAT&quot;}</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Structural attribute; this is a 'nation' type of entity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>determinerCode [1..1] (M)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organization (CS) {CNE:INSTANCE, fixed value= &quot;INSTANCE&quot;}</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Structural attribute; this is a specific entity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>code [1..1] (M)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organization (CD) {CWE:NationEntityType}</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A value that identifies a nation state</td>
<td></td>
</tr>
<tr>
<td></td>
<td>name [0..1]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organization (ON)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A non-unique textual identifier or moniker for this nation</td>
<td></td>
</tr>
<tr>
<td>Patient Demographics Query</td>
<td>Patient Demographics Query Response</td>
<td>Patient Demographics Query HL7V3 Continuation</td>
</tr>
<tr>
<td>----------------------------</td>
<td>------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>semanticsText [1..1]</td>
<td><strong>Employee</strong></td>
<td></td>
</tr>
<tr>
<td>ParameterItem (ST){default= &quot;MatchAlgorithm&quot;}</td>
<td>A relationship of the focal person with an organization to receive wages or salary. The purpose of this class is to identify the type of relationship the employee has to the employer rather than the nature of the work actually performed. For example, it can be used to capture whether the person is a Military Veteran or not..</td>
<td></td>
</tr>
<tr>
<td></td>
<td>classCode [1..1] (M)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Employee (CS) {CNE:EMP}</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Structural attribute; this is an &quot;employee&quot; role</td>
<td></td>
</tr>
<tr>
<td></td>
<td>statusCode [0..1]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Employee (CS) {CNE:RoleStatus}</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A value specifying the state of this employment relationship (based on the RIM Role class state-machine), for example, active, suspended, terminated.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>occupationCode [0..1]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Employee (CE) {CWE:EmployeeOccupationCode}</td>
<td>A code qualifying the classification of kind-of-work based upon a recognized industry or jurisdictional standard. OccupationCode is used to convey the person's occupation as opposed to jobClassCode (not used in this transaction) which characterizes this particular job. For example, it can be used to capture whether the person is a Military Veteran or not.</td>
</tr>
<tr>
<td>MinimumDegreeMatch</td>
<td><strong>LanguageCommunication</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>This parameter conveys instructions to the patient demographics supplier specifying minimum degree of match to use in filtering results</td>
<td>A language communication capability of the focal person</td>
</tr>
<tr>
<td></td>
<td>languageCode [1..1] (M)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A language communication capability of the focal person</td>
<td></td>
</tr>
<tr>
<td>Patient Demographics Query</td>
<td>Patient Demographics Query Response</td>
<td>Patient Demographics Query HL7V3 Continuation</td>
</tr>
<tr>
<td>---------------------------</td>
<td>------------------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>LanguageCommunication (CE) (CWE:HumanLanguage)</td>
<td>A value representing a language for which the focal person has some level of proficiency for written or spoken communication. Examples: Spanish, Italian, German, English, American Sign</td>
<td></td>
</tr>
<tr>
<td>preferenceInd [0..1] LanguageCommunication (BL)</td>
<td>An indicator specifying whether or not this language is preferred by the focal person for the associated mode</td>
<td></td>
</tr>
<tr>
<td>value [1..1] ParameterItem (INT) The numeric value of the degree of match</td>
<td>QueryMatchObservation Used to convey information about the quality of the match for each record.</td>
<td></td>
</tr>
<tr>
<td>semanticsText [1..1] ParameterItem (ST)(default= &quot;MatchAlgorithm&quot;)</td>
<td>classCode [1..1] (M) Observation (CS) (CNE:, default= &quot;OBS&quot;) Structural attribute – this is an observation</td>
<td></td>
</tr>
<tr>
<td>LivingSubjectAdministrativeGender This query parameter is a code representing the administrative gender of a person in a patient registry.</td>
<td>moodCode [1..1] (M) Observation (CS) (CNE:, default= &quot;E VN&quot;) Structural attribute – this is an event</td>
<td></td>
</tr>
<tr>
<td>value [1..1] ParameterItem (CE) (CWE:AdministrativeGender)</td>
<td>code [1..1] (M) Observation (CD) (CWE:QueryMatchObservationType) A code, identifying this observation as a query match observation.</td>
<td></td>
</tr>
<tr>
<td>semanticsText [1..1] ParameterItem (ST)(default= &quot;LivingSubject.administrativeGender&quot;)</td>
<td>value [1..1] (M) QueryMatchObservation (INT) A numeric value indicating the quality of match for this record. It shall correspond to the MinimumDegreeMatch.value attribute of the original query, and it shall have the same meaning</td>
<td></td>
</tr>
<tr>
<td><strong>Patient Demographics Query</strong></td>
<td><strong>Patient Demographics Query Response</strong></td>
<td><strong>Patient Demographics Query HL7V3 Continuation</strong></td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>(e.g. percentage, indicating confidence in the match).</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>LivingSubjectBirthTime</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>This query parameter is the birth date of a living subject.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>value [1..1] ParameterItem (IVL&lt;TS&gt;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A date or date range. This parameter can convey an exact moment (e.g., January 1, 1960 @ 03:00:00 EST), an approximate date (e.g., January 1960), or even a range of dates (e.g., December 1, 1959 through March 31, 1960).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>semanticsText [1..1] ParameterItem (ST) {default= &quot;LivingSubject.birthTime&quot;}</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>LivingSubjectId</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>value [1..1] (M) ParameterItem (II)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A patient identifier, used to assist in finding a match for the query.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>semanticsText [1..1] ParameterItem (ST) {default= &quot;LivingSubject.id&quot;}</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>LivingSubjectName</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>This query parameter is the name of a person. If multiple instances of LivingSubjectName are provided, the receiver must consider them as possible alternatives, logically connected with an &quot;or&quot;.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>value [1..1] ParameterItem (PN)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The name &quot;use&quot; attribute can convey that a name is to be matched using &quot;fuzzy&quot; matching, and does not require exact match. Only some of the name parts may be populated. If, for example, only a family name part of a person's name is sent, then the query</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient Demographics Query</td>
<td>Patient Demographics Query Response</td>
<td>Patient Demographics Query HL7V3 Continuation</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-------------------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>would match all persons with that family name regardless of their given names or initials.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>semanticsText [1..1] ParameterItem (ST){default= &quot;LivingSubject.name&quot;}</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PatientAddress</strong>&lt;br&gt;This query parameter is a postal address for corresponding with a patient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>value [1..1] ParameterItem (AD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>semanticsText [1..1] ParameterItem (ST){default= &quot;Patient.addr&quot;}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OtherIDsScopingOrganization Optional parameter specifying the assigning authority of a Patient Identity Domain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>value [1..1] ParameterItem (II) The identifier for a Patient Identity Domain's assigning authority. IHE restriction: The value.root attribute SHALL be a valid ISO OID The value.extension attribute SHALL NOT be present</td>
<td></td>
<td></td>
</tr>
<tr>
<td>semanticsText [1..1] ParameterItem (ST){default= &quot;OtherIDs.scopingOrganization.id&quot;}</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Control Act and Transmission Wrappers**

<table>
<thead>
<tr>
<th>Transmission Wrapper</th>
<th>Transmission Wrapper</th>
<th>Transmission Wrapper</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCCI_MT000100UV01 – Send Message Payload</td>
<td>MCCI_MT000300UV01 – Send Application Acknowledgement</td>
<td>MCCI_MT000300UV01 – Send Application Acknowledgement</td>
</tr>
<tr>
<td><strong>Trigger Event Control Act Wrapper</strong>&lt;br&gt;QUQI_MT021001UV01 – Query Control Act Request: Query By Parameter</td>
<td><strong>Trigger Event Control Act Wrapper</strong>&lt;br&gt;MCCI_MT000300UV01 – Send Application Acknowledgement</td>
<td><strong>Trigger Event Control Act Wrapper</strong>&lt;br&gt;QUQI_MT000001UV01 – Query Control Act Request Continue / Cancel</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Transmission Wrapper</strong></td>
<td><strong>Transmission Wrapper</strong></td>
<td><strong>Transmission Wrapper</strong></td>
</tr>
<tr>
<td><strong>Patient Demographics Query</strong></td>
<td><strong>Patient Demographics Query Response</strong></td>
<td><strong>Patient Demographics Query HL7V3 Continuation</strong></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
</tbody>
</table>
| The value of interactionId SHALL be set to PRPA_IN201305UV02  
The value of processingModeCode SHALL be set to T  
The acceptAckCode SHALL be set to AL  
There SHALL be only one receiver Device | The value of interactionId SHALL be set to PRPA_IN201306UV02  
The value of processingModeCode SHALL be set to T  
The acceptAckCode SHALL be set to NE  
There SHALL be only one receiver Device | The value of interactionId SHALL be set to QUQI_IN000003UV01  
The value of processingModeCode SHALL be set to T  
The acceptAckCode SHALL be set to AL  
There SHALL be only one receiver Device  
The Acknowledgement.typeCode SHALL be set to AA  
The TargetMessage.id SHALL be the message ID of the immediately preceding Query response message |
| **Trigger Event Control Act Wrapper**  
The value of ControlActProcess.moodCode SHALL be set to RQO  
The trigger event code in ControlActProcess.code SHALL be set to PRPA_TE201305UV02  
If an authorOrPerformer participation is present, the value of authroOrPerformer.typeCode SHALL be set to AUT | **Trigger Event Control Act Wrapper**  
The value of ControlActProcess.moodCode SHALL be set to EVN  
The trigger event code in ControlActProcess.code SHALL be set to PRPA_TE201306UV02  
There SHALL be zero or more RegistrationEvents present in this message.  
For each matching record returned, there SHALL be exactly one RegistrationEvent present in this message.  
If a RegistrationEvent is part of the message, there SHALL be exactly one Patient role present in the payload.  
There SHALL be no replacementOf act-relationship present in this message  
There SHALL be a QueryByParameter copy of the original query.  
The QueryAck.resultTotalQuantity, QueryAck.resultCurrentQuantity, and QueryAck.resultRemainingQuantity attributes SHALL have the appropriate values populated. | **Trigger Event Control Act Wrapper**  
The trigger event code in ControlActProcess.code SHALL be set to PRPA_TE000003UV01  
QueryContinuation.queryId SHALL be set to the original query identifier |

The composite message schemas which describe the full payload of this interaction, including the wrappers, can be found online Edition2008/processable/multicacheschemas/PRPA_IN201305UV02.xsd

The composite message schemas which describe the full payload of this interaction, including the wrappers, can be found online Edition2008/processable/multicacheschemas/PRPA_IN201306UV02.xsd

The composite message schemas which describe the full payload of this interaction, including the wrappers, can be found online Edition2008/processable/multicacheschemas/QUQI_IN000003UV01.xsd

**Web Services Types and Messages**
### Patient Demographics Query

The Patient Registry Query by Demographics message will be transmitted using Web Services, according to the requirements specified in ITI TF-2x: Appendix V.

The following WSDL naming conventions SHALL apply:
- query message -> "PRPA_IN201305UV02_Message"
- response message -> "PRPA_IN201306UV02_Message"

The following WSDL snippet describes the type for this message:

```xml
<types>
  <xsd:schema elementFormDefault="qualified" targetNamespace="urn:hl7-org:v3" xmlns:hl7="urn:hl7-org:v3">
    <!-- Include the message schema -->
    <xsd:import namespace="urn:hl7-org:v3" schemaLocation="../schema/HL7V3/NE2008/multicaschemas/PRPA_IN201305UV02.xsd"/>
    <xsd:element name="PRPA_IN201305UV02"/>
  </xsd:schema>
</types>
```

The message is described by the following snippet:

```xml
<message name="PRPA_IN201305UV02_Message">
  <part element="hl7:PRPA_IN201305UV02" name="Body"/>
</message>
```

The port types for the WSDL describing the Patient Demographics Service are described together with the expected actions of the actors which receive these messages.

### Patient Demographics Query Response

The Patient Registry Query by Demographics message will be transmitted using Web Services, according to the requirements specified in ITI TF-2x: Appendix V.

The following WSDL naming conventions SHALL apply:
- query message -> "PRPA_IN201305UV02_Message"
- response message -> "PRPA_IN201306UV02_Message"

The following WSDL snippet describes the type for this message:

```xml
<types>
  <xsd:schema elementFormDefault="qualified" targetNamespace="urn:hl7-org:v3" xmlns:hl7="urn:hl7-org:v3">
    <!-- Include the message schema -->
    <xsd:import namespace="urn:hl7-org:v3" schemaLocation="../schema/HL7V3/NE2008/multicaschemas/PRPA_IN201306UV02.xsd"/>
    <xsd:element name="PRPA_IN201306UV02"/>
  </xsd:schema>
</types>
```

The message is described by the following snippet:

```xml
<message name="PRPA_IN201306UV02_Message">
  <part element="hl7:PRPA_IN201306UV02" name="Body"/>
</message>
```

### Patient Demographics Query HL7V3 Continuation

The Query Continuation message will be transmitted using Web Services, according to the requirements specified in ITI TF-2x: Appendix V.

The following WSDL naming conventions SHALL apply:
- query continuation -> "QUQI_IN000003UV01_Message"

The following WSDL snippet describes the type for this message:

```xml
<types>
  <xsd:schema elementFormDefault="qualified" targetNamespace="urn:hl7-org:v3" xmlns:hl7="urn:hl7-org:v3">
    <!-- Include the message schema -->
    <xsd:import namespace="urn:hl7-org:v3" schemaLocation="../schema/HL7V3/NE2008/multicaschemas/QUQI_IN000003UV01.xsd"/>
    <xsd:element name="QUQI_IN000003UV01"/>
  </xsd:schema>
</types>
```

The message is described by the following snippet:

```xml
<message name="QUQI_IN000003UV01_Message">
  <part element="hl7:QUQI_IN000003UV01" name="Body"/>
</message>
```
**Immediate Response**

The Patient Demographics Supplier shall immediately return a Find Candidates Response message as specified. The response message uses the Application Acknowledgement transmission wrapper, as specified and no other acknowledgments are part of this transaction.

**Query Parameter Processing**

The Patient Demographics Supplier Actor shall be capable of accepting, searching on, and responding with attributes in the Query Person by Demographics message. Handling of phonetic issues, alternate spellings, upper and lower case, wildcards, accented characters, etc., if deemed appropriate, is to be supported by the Patient Demographics Supplier rather than by the Patient Demographics Consumer. The Supplier shall return at least all exact matches to the query parameters sent by the Consumer; IHE does not further specify matching requirements, except as already discussed in the LivingSubjectName parameter description.

**Incremental Response Processing**

The Patient Demographics Supplier Actor shall be capable of accepting and processing the QueryByParameter.responsePriorityCode attribute. In particular, the Patient Demographics Supplier Actor shall respond in immediate mode.

Also, the Patient Demographics Supplier Actor shall be able to interpret

The Patient Demographics Supplier shall perform the matching of patient data based on the query parameter values it receives. The information provided by the Patient Demographics Supplier Actor to Patient Demographics Consumer Actors is a list of possible matching patients from the patient information source associated with the value that the Consumer sent in the Device class of the transmission wrapper of the query message.

If OtherIDsScopingOrganization parameters were part of the query, and they were recognized by the Patient Demographics Supplier as identifying known Patient Identity Domains, the response will also, for each patient, contain any Patient ID values found in the specified domains.

The Patient Demographics Supplier Actor shall respond to the query request as described by the following 3 cases:

**Case 1** The Patient Demographics Supplier Actor finds (in the patient information source associated with Receiver.Device in the query transmission wrapper) at least one patient record matching the criteria sent in the query parameters. There were no OtherIDsScopingOrganization parameters in the query.

AA is returned in Acknowledgement.typeCode (transmission wrapper).

OK is returned in QueryAck.queryResponseCode.
### Patient Demographics Query

**QueryByParameter.initialQuantity** to return successive responses of partial lists of records. When processing incremental responses, the Patient Demographics Consumer actor shall request additional responses using the Query Control Act Request Continue/Cancel message (QUQI_MT000001UV01)

---

### Patient Demographics Query Response

( control act wrapper )

**Case 2**: The Patient Demographics Supplier Actor finds (in the patient information source associated with Receiver.Device in the query transmission wrapper) at least one patient record matching the criteria sent in the query parameters. One or more OtherIdsScopingOrganization parameters are present in the query; the Supplier recognizes all the requested domains.

**Case 3**: The Patient Demographics Supplier Actor does not recognize one or more OtherIdsScopingOrganization parameters as representing valid Patient Identity Domains.

For each domain that was not recognized, an AcknowledgmentDetail class is returned in which the attributes typeCode, code, and location are valued.

---

### Web Services Port Type and Binding Definitions

**IHE-WSP201** The attribute /wsdl:definitions/@name SHALL be “PDSupplier”.

The following WSDL naming conventions SHALL apply:

- wsdl:definitions/@name="PDSupplier":
  - patient demographics query -> "PRPA_IN201305UV02_Message"
  - patient demographics response -> "PRPA_IN201306UV02_Message"
  - continuation query -> "QUQI_IN000003UV01_Message"
  - accept acknowledgement -> "MCCI_IN000002UV01_Message"
  - portType -> "PDSupplier_PortType"
  - get candidates operation -> "PDSupplier_PRPA_IN201305UV02"
  - continuation operation -> "PDSupplier_PRPA_IN201305UV02_Continue"
  - cancel operation -> "PDSupplier_PRPA_IN201305UV02_Cancel"
- SOAP 1.2 binding -> "PDSupplier_Binding_Soap12"
- SOAP 1.2 port -> "PDSupplier_Port_Soap12"

The following WSDL snippets specify the Patient Demographics Query Port Type and Binding definitions,
<table>
<thead>
<tr>
<th>Patient Demographics Query</th>
<th>Patient Demographics Query Response</th>
<th>Patient Demographics Query HL7V3 Continuation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Port Type</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;portType name=&quot;PDSupplier_PortType&quot;&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;operation name=&quot;PDSupplier_PRPA_IN201305UV02&quot;&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;input message=&quot;tns:PRPA_IN201305UV02_Message&quot; wsaw:Action=&quot;urn:hl7-org:v3:PRPA_IN201305UV02&quot;/&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;output message=&quot;tns:PRPA_IN201305UV02_Message&quot; wsaw:Action=&quot;urn:hl7-org:v3:PRPA_IN201305UV02&quot;/&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;/operation&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;operation name=&quot;PDSupplier_QUQI_IN000003UV01_Continue&quot;&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;input message=&quot;tns:QUQI_IN000003UV01_Message&quot; wsaw:Action=&quot;urn:hl7-org:v3:QUQI_IN000003UV01_Continue&quot;/&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;output message=&quot;tns:PRPA_IN201305UV02_Message&quot; wsaw:Action=&quot;urn:hl7-org:v3:PRPA_IN201305UV02&quot;/&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;/operation&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;operation name=&quot;PIXManager_QUQI_IN000003UV01_Cancel&quot;&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;input message=&quot;tns:QUQI_IN000003UV01_Message&quot; wsaw:Action=&quot;urn:hl7-org:v3:QUQI_IN000003UV01_Cancel&quot;/&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;output message=&quot;tns:MCCI_IN000002UV01_Message&quot; wsaw:Action=&quot;urn:hl7-org:v3:MCCI_IN000002UV01&quot;/&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;/operation&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;/portType&gt;</td>
<td></td>
</tr>
<tr>
<td><strong>Bindings</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SOAP 1.2 binding:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>...</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;binding name=&quot;PDSupplier_Binding_Soap12&quot; type=&quot;PDSupplier_PortType&quot;&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;operation name=&quot;PDSupplier_PRPA_IN201305UV02&quot;&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;wssoap12:operation soapAction=&quot;urn:hl7-org:v3:PRPA_IN201305UV02&quot;/&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;input&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;wssoap12:body use=&quot;literal&quot;/&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;/input&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;output&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;wssoap12:body use=&quot;literal&quot;/&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;/output&gt;</td>
</tr>
</tbody>
</table>
```xml
<operation name="PDSupplier_QUQI_IN000003UV01_Continue">
<wsoap12:operation soapAction="urn:hl7-org:v3:QUQI_IN000003UV01_Continue"/>
<input>
<wsoap12:body use="literal"/>
</input>
<output>
<wsoap12:body use="literal"/>
</output>
</operation>
<operation name="PDSupplier_QUQI_IN000003UV01_Cancel">
<wsoap12:operation soapAction="urn:hl7-org:v3:QUQI_IN000003UV01_Cancel"/>
<input>
<wsoap12:body use="literal"/>
</input>
<output>
<wsoap12:body use="literal"/>
</output>
</operation>
...
3.8.1 Information Model of the Patient Registry Query by Demographics Message
3.8.2 Message Information Model of the Patient Registry Find Candidates Response
3.9 Appendix K

3.9.1 Sample Provide and Register Document Set-b SOAP Request

POST /axis2/services/repository HTTP/1.1
Content-Type: multipart/related; boundary=MIMEBoundaryurn_uuid_76A2C3D9BCD3AEFFFF31217932910180;
type="application/xop+xml"; start-"<0.urn:uuid76A2C3D9BCD3AEFFFF31217932910181@apache.org>"; start-info="application/soap+xml"; action="urn:ihe:iti:2007:ProvideAndRegisterDocumentSet-b"
User-Agent: Axis2
Host: localhost:4040
Content-Length: 4567

--MIMEBoundaryurn_uuid_76A2C3D9BCD3AEFFFF31217932910180
Content-Type: application/xop+xml; charset=UTF-8; type="application/soap+xml"
Content-Transfer-Encoding: binary
Content-ID: <0.urn:uuid:76A2C3D9BCD3AEFFFF31217932910181@apache.org>

<?xml version='1.0' encoding='UTF-8'?>
<soapenv:Envelope xmlns:soapenv="http://www.w3.org/2003/05/soap-envelope"
xmlns:wsa="http://www.w3.org/2005/08/addressing">
  <soapenv:Header>
    <wsa:To>http://localhost:4040/axis2/services/test11966a</wsa:To>
    <wsa:MessageID>urn:uuid:76A2C3D9BCD3AEFFFF31217932910053</wsa:MessageID>
  </soapenv:Header>
  <soapenv:Body>
    <xdsb:ProvideAndRegisterDocumentSetbRequest xmlns:xdsb="urn:ihe:iti:xds-b:2007">
      <!-- Registry Metadata goes here -->
    </xdsb:ProvideAndRegisterDocumentSetbRequest>
  </soapenv:Body>
</soapenv:Envelope>
3.9.2 Sample Provide and Register Document Set-b SOAP Response

<s:Envelope
 xmlns:s="http://www.w3.org/2003/05/soap-envelope"
 xmlns:a="http://www.w3.org/2005/08/addressing">
 <s:Header>
  <a:Action s:mustUnderstand="1">
   urn:ihe:iti:2007:ProvideAndRegisterDocumentSet-bResponse
  </a:Action>
  <a:RelatesTo>urn:uuid:6d296e90-e5dc-43d0-b455-7c1f3eb35d83</a:RelatesTo>
 </s:Header>
 <s:Body>
  <rs:RegistryResponse
   status="urn:oasis:names:tc:ebxml-regrep:ResponseStatusType:Success"
   xmlns:rs="urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0" />
 </s:Body>
</s:Envelope>
3.9.3 **Sample Retrieve Document Set SOAP Requested**

```xml
<Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope"
  xmlns:a="http://www.w3.org/2005/08/addressing">
  <Header>
    <Action s:mustUnderstand="1">urn:ihe:iti:2007:RetrieveDocumentSet</Action>
    <MessageID>urn:uuid:0fbfdced-6c01-4d09-a110-2201afedaa02</MessageID>
    <ReplyTo s:mustUnderstand="1">
      <Address>http://www.w3.org/2005/08/addressing/anonymous</Address>
    </ReplyTo>
    <To>http://localhost:2647/XdsService/IHEXDSRepository.svc</To>
  </Header>
  <Body>
    <RetrieveDocumentSetRequest xmlns="urn:ihe:iti:xds-b:2007">
      <DocumentRequest>
        <RepositoryUniqueId>1.3.6.1.4...1000</RepositoryUniqueId>
        <DocumentUniqueId>1.3.6.1.4...2300</DocumentUniqueId>
      </DocumentRequest>
      <DocumentRequest>
        <RepositoryUniqueId>1.3.6.1.4...1000</RepositoryUniqueId>
        <DocumentUniqueId>1.3.6.1.4...2301</DocumentUniqueId>
      </DocumentRequest>
    </RetrieveDocumentSetRequest>
  </Body>
</Envelope>
```
12 Appendix I “MiHIN Information Security Architecture and Requirements”
APPENDIX I: MiHIN Information Security Architecture and Requirements

Michigan Health Information Network (MiHIN)

Information Security Architecture and Requirements V 1.8

April 28, 2010
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1.0 Information Security Architecture and Requirements -
Summary

The purpose of this document is to specify those technical security capabilities required to interoperate with the MiHIN Shared Services Bus. These specifications can be used to procure and plan for security implementation. The scope of this document is to provide interoperability specifications, detailed standards and implementation guidance relevant to the information security architecture and requirements for Michigan Health Information Network (MiHIN) and the technical analysis efforts of the MiHIN Privacy and Security Subgroup.

The MiHIN Information Security Architecture and Requirements document primarily provides information for technical architects and implementers responsible for building systems that are compliant with the stated requirements. These requirements are driven by the use cases and need to securely interoperate using nationally recognized standards. The privacy and security workgroup set some policy guidelines that would be enforced by the security architecture. They are compliant, or consistent, with standards published by the Healthcare Information Technology Standards Panel (HITSP) and where appropriate, will be informed by existing HIE efforts, including the efforts of the Nationwide Health Information Network (NHIN) trial implementations.

These information security specifications should be read in conjunction with additional MiHIN specifications including the MiHIN Technical Architecture Overview. These specifications are intended to be implemented for all MiHIN Shared Services participants.

1.1 Glossary of Terms

Sub-state HIE – A local HIE that is open to all providers and data sources in a region or across an affinity group.

Connect Open Source – The Federal Governments open source implementation of a National Health Information Network backbone.

Cipher suites -- To allow users to select the level of security that suits their needs, and to enable communication with others who might have different security requirements, SSL defines cipher suites, or sets of ciphers. When a TLS connection is established, the client and server exchange information about which cipher suites they have in common. They then communicate using the common cipher suite that offers the highest level of security. If they do not have a cipher suite in common, then secure communication is not possible and CICS closes the connection.

ATNA -- Audit Trail and Node Authentication (IHE-ITI-TF ATNA).

Policy administration point (PAP) - The system entity that creates a policy or policy set for example Sub-State HIE.

Policy decision point (PDP) - The system entity that evaluates applicable policy and renders an authorization decision.
Policy enforcement point (PEP) - The system entity that performs access control, by making decision requests and enforcing authorization decisions.

Bag – An unordered collection of values, in which there may be duplicate values

Policy information point (PIP) - The system entity that acts as a source of attribute values

Policy set - A set of policies

Predicate - A statement about attributes whose truth can be evaluated

Resource - Data, service or system component

Rule - A target, an effect and a condition. A component of a policy

Rule-combining algorithm - The procedure for combining decisions from multiple rules

Subject - An actor whose attributes may be referenced by a predicate

Target - The set of decision requests, identified by definitions for resource, subject and action, a rule, policy or policy set is intended to evaluate

Type Unification - The method by which two type expressions are "unified".
2.0 Information Security for Implementation - Summary

2.1 Overview

Information security architectures are based on trust models (or perhaps more accurately ‘trust, but verify’ models), the most prominent today being the federated trust model. The implementation specified here will support a range of trust architectures. The primary goal is to enable secure and reliable communications across the MiHIN. The three areas that work together in the implementation include:

Transport security: Using secure transport between nodes prevents many types of attacks, establishes encrypted traffic paths and provides assurance that only verified nodes are sharing information.

Authentication/authorization/consent attestations: this layer specifies attributes that describe the authentication, authorization and consent mechanisms and rules applied to validate the legitimacy of a request for information.

Support Infrastructure

Audit: this function specifies event information that must be captured and stored in an audit repository, making it possible to review or analyze past events for security breaches, reporting of information access or other analyses.

Public Key Infrastructure: this infrastructure consists of a Certificate Authority that creates and manages digital certificates and checks the validity of a digital certificate upon request and issues X.509 (RFC 5280) certificate revocation lists on a regular periodic basis.
2.2 Creating a Secure MiHIN Node - Summary

2.2.1 Security Architecture of MiHIN

Readers should be familiar with the MiHIN_Architecture_Design_Final_v1.3 documentation. These documents describe the relationship of the nodes of the Shared Services Bus (SSB). The basis for the implementation of this security architecture is the practical, realistic security infrastructure that meets the use case and State HIE Cooperative Grant requirements. The security architecture discussed here is a federated model of trust among all nodes connected to the MiHIN SSB. The nodes are sub-state HIEs which are, in turn, connected to the consumers and sources of health information.

All traffic on the MiHIN SSB must adhere strictly to the security specifications in this document. Many of the constructs we will use are described in HITSP TN900 – HITSP Security and Privacy Technical Note.

2.2.2 Platform Specific References

Specifications are based on HISTP with some small implementation variations required for the MiHIN SSB:

- The term “Secure Node” is used throughout this document and is based on the IHE Secure Node actor as mentioned in IHE-ITI-TF ATNA
- Use of sender-vouches rather than holder-of-key for the subject confirmation method – see section 3.10.1.1 for details.
- Additional SAML attributes to support MiHIN specific information. See section 3.10.1.1 for details.

The messaging platform components are reviewed here for convenience:

<table>
<thead>
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<th>Component</th>
<th>Description</th>
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<tr>
<td>WS-I Basic Profile 1.2</td>
<td><a href="http://www.ws-i.org/Profiles/BasicProfile-1.2.html">http://www.ws-i.org/Profiles/BasicProfile-1.2.html</a></td>
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</tr>
<tr>
<td>Consistent Time</td>
<td>HITSP T16</td>
</tr>
<tr>
<td>Audit</td>
<td>HITSP T15, <a href="http://www.mihin.org/services/audit/log/query">NHIN Audit Log Query Service</a>, Statewide Health Information Network for Michigan (MIHIN) Core Services: Audit Log Query Service</td>
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</tr>
<tr>
<td>Document Integrity and Non-Repudiation</td>
<td>HITSP TP13, HITSP C26</td>
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</tbody>
</table>
2.2.3 Implementing the MiHIN Security Model

This specification is primarily concerned with the digital representations and mechanics of the security model. It is a fairly straightforward model. A trusted authority issues digital certificates to all MiHIN nodes. These nodes use digital certificates to construct encrypted messages between MiHIN nodes for sending, and to authenticate messages that are received. SAML tokens are used to transmit detailed information assertions about entities (typically users) requesting information that are used to present identity assertions for logging purposes and role assertions for access control. Audited events are logged by each node and stored by that node. Auditable events can be retrieved by periodic XML extracts.

Beyond these specifications of the digital transmissions and representations for security purposes, there are prerequisite environmental requirements that are labeled Baseline Requirements. These requirements address availability and physical security. The Baseline Requirements define the expectations for environment and process supporting the security of a node connected to the MiHIN.

Section 3 provides the specific details with example XML for implementing the MiHIN security model.

2.3 MiHIN Secure Node Communication

Consistent with the MIHIN Service Oriented Architecture (SOA), Sub-state HIE node communicates with other nodes, the MiHIN requires use of TLS (RFC 2246) for ensuring that these nodes are mutually authenticated. This requirement is consistent with IHE’s ATNA Secure Node actor\(^1\). MiHIN fully supports this mandate, and requires TLS whenever an HIE communicates with a service hosted on an external node.

When validating certificates, Secure Node actors must adhere to the following guidelines:

- Certificate validation must be performed either directly to a set of trusted certificates or through a signature issued by a trusted Certificate Authority (CA)
- Required certificate fields shall be limited to those specified in the X.509 PKI Certificate Profile (RFC 5280), and non-critical extensions that are not recognized shall be ignored.
- Certificates used for mutual authentication shall be X.509 certificates based on RSA key, with a key length between 1024 and 4096 bytes.

Consistent with IHE, the MiHIN security team recommends that certificate expiration time be 2 years.

Note: Sub-State HIE Secure Nodes must create the following audit events during the node authentication phase and adhere to Transmission of Syslog Messages over UDP (RFC 5226):

- Node Authentication Failure: A Secure Node authentication failure has occurred during the TLS negotiation, e.g. invalid certificate

The reference documents for Secure Nodes are IHE ITI-TF 5.0 Vol. 2 December 12, 2008, Section 9, Audit Trail and Node Authentication

\(^1\) See section 3.19 of the IHE IT Infrastructure Technical Framework volume 2 for detailed information
2.4 MiHIN Entity Identity Assertion Component

The Entity Identity Assertion Component (HISTP/C19) provides the mechanisms to ensure that an entity is the person or application that claims the identity provided.

The specific perspective chosen for this Component is to leverage the IHE Cross-Enterprise User Authentication (XUA) Supplement to the IHE-ITI-TF-2. The technological mechanism that this IHE profile relies on is Security Assertion Markup Language (SAML) assertions. This Component also provides support for evolving and ongoing work to support web services through constraining the Web Service-Security standards.

2.5 XACML

XACML forms the core mechanism for expressing security and privacy policy and for making and enforcing access control decisions based upon evaluating access control information. Currently, the OASIS Cross Enterprise Security and Privacy Authorization (XSPA) XACML Profile (U.S. Realm) is on track to become an OASIS standard. This profile provides key vocabulary and value sets required to achieve interoperability of access control services within an enterprise as specified by this Transaction Package and will be included as a normative standard in future versions.


2.6 Audit

Audit Log Retention Requirement is discussed in 3.8.1

- ATNA
  - The Audit Trail and Node Authentication (ATNA) Integration Profile: contributes to access control by limiting network access between nodes and limiting access to each node to authorized users. Secure nodes limit access to authorized users as specified by the local authentication and access control policy.

- User Authentication
  - The Audit Trail and Node Authentication Integration Profile requires only local user authentication. The profile allows each secure node to use the access control technology of its choice to authenticate users. The use of Enterprise User Authentication is one such choice, but it is not necessary to use this profile.

- Connection Authentication
o The Audit Trail and Node Authentication Integration Profile requires the use of bi-directional certificate-based node authentication for connections to and from each node.

- Audit Trails
  o User Accountability is provided through Audit Trail. The Audit Trail needs to allow a security officer in an institution to audit activities, to assess compliance with a secure domain’s policies, to detect instances of non-compliant behavior, and to facilitate detection of improper creation, access, modification and deletion of Protected Health Information (PHI).
3.0 Implementation Requirements

MiHIN Information Security Requirements include implementation of many measures and mechanisms. These measures are all required for all MiHIN SSB nodes and for all communications between any combination of MiHIN SSB and Sub-State HIE SSB nodes.

This section lists them in an order generally aligned with a sequential, building blocks approach to implementation.

3.1 Public Key Infrastructure (PKI)

The MiHIN and HIEs shall utilize Public Key Infrastructure (PKI) technologies to manage X.509 digital certificates for Secure Node authentication.

This step-by-step guide will help MiHIN security implementation set up a public key certification authority (CA) in a network.

A CA is a service that issues and manages electronic credentials or certificates in a public key infrastructure (PKI). PKI is a system of digital certificates, CAs, and other registration authorities (RAs) that verify and authenticate the validity of each party that is involved in an electronic transaction through the use of public key cryptography. Standards for PKIs are still evolving, even as they are being widely implemented as a necessary element of electronic commerce. The certificate holder uses PKI-enabled applications and technologies to enable centrally managed strong authentication, to ensure data confidentiality, and to secure data exchange.

3.1.1 Digital Certificates

A Digital Certificate establishes non-repudiation, which is the ability to guarantee the authenticity of the sender. MiHIN SSB will issue and manage X.509 certificates for the entities transmitting and receiving information. Authenticating entities will be required to check digital signatures and stay in sync with the revocation list.

3.1.2 Installing PKI Certificate in Microsoft IIS

MiHIN SSB shall develop a Certificate Authority; these certificates could be in bundles.

Once your SSL certificate has been signed and issued, MiHIN will send you an email message that allows you to download the signed certificate and applicable intermediate certificates, all of which must be installed on sub-state HIE website.

The specific installation procedure is determined by your choice of Web server software. Installation instructions are available for the Web servers listed below.

Once you have downloaded and saved the certificate bundle, you must first install it.
3.1.2.1 To Install Intermediate Certificate Bundles

1. Click the Start menu and click Run.... Type mmc in the Run window and click OK to start the Microsoft Management Console (MMC).
2. In the Management Console, select File then Add/Remove Snap In.
3. In the Add or Remove Snap-ins dialog, click the Add button and then select Certificates.
4. Choose Computer Account then click Next.
5. Choose Local Computer, then click Finish.
6. Close the Add or Remove Snap-ins dialog and click OK to return to the main MMC window.
7. If necessary, click the + icon to expand the Certificates folder so that the Intermediate Certification Authorities folder is visible.
8. Right-click on Intermediate Certification Authorities and choose All Tasks, then click Import.
9. Follow the wizard prompts to complete the installation procedure.
10. Choose Place all certificates in the following store; then use the Browse function to locate Intermediate Certification Authorities. Click Next. Click Finish.
11. Expand the Trusted Root Certification Authorities folder
12. Double-click the Certificates folder to show a list of all certificates.
13. Find the Go to MiHIN Class 2 Certification Authority certificate.
14. Right-click on the certificate and select Properties.
15. Select the radio button next to Disable all purposes for this certificate.
16. Click OK.

NOTE: Do not disable the MiHIN Secure Certification Authority certificate located in the Intermediate Certification Authorities folder. Doing so will break the server, causing it to stop sending the correct certificate chain to the browser.

3.1.2.2 To Install SSL Certificates

1. Select the Internet Information Service console within the Administrative Tools menu.
2. Select the website (host) for which the certificate was made.
3. Right mouse-click and select Properties.
5. Select the Server Certificate option.
6. The Welcome to the Web Server Certificate Wizard windows opens. Click OK.
7. Select Process the pending request and install the certificate. Click Next.
8. Enter the location for the certificate file at the Process a Pending Request window. The file extension may be .txt or .crt instead of .cer (search for files of type all files).
9. When the correct certificate file is selected, click Next.
10. Verify the Certificate Summary to make sure all information is accurate. Click Next.
11. Select Finish
Examples for other OS can be found at the following links.

<table>
<thead>
<tr>
<th>Apache</th>
<th>Microsoft IIS 5.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tomcat 4.x/5.x</td>
<td>Microsoft IIS 6.0</td>
</tr>
<tr>
<td>cPanel/Webhost Manager</td>
<td>Microsoft IIS 7.0</td>
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<tr>
<td>Plesk</td>
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<td>Mac OS X 10.5</td>
</tr>
<tr>
<td>Mac OS X 10.6</td>
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</tr>
</tbody>
</table>

3.2 Secured Communication Channel (TLS)

3.2.1 Introduction

As mentioned earlier, the MiHIN SSB security specification is primarily concerned with establishing standard method of communication between a Sub-State HIE and the MiHIN SSB. That is, specifying how connections within local communities should be encrypted is outside the scope of this document. That said, it is highly recommended that nodes connecting within any particular HIE follow the same guidelines outlined here for their internal connections.

As per HITSP/T17, the scope of the Secured Communication Channel Transaction is limited to a session oriented, synchronous, and point-to-point communication channel. The focus is on the establishment of a secure path through which data can be transmitted, and not on the content of the data being transmitted. In addition, this Transaction does not include local user authentication in its scope.

The following are the requirements derived from the initial Use Cases for this Transaction:

1. Session used to transmit data has mutual authentication of the nodes involved

2. Data are transmitted with confidentiality and transmission integrity

This construct utilizes the Authenticate Node Transaction from the Integrating the Healthcare Enterprise (IHE) IT Infrastructure Technical Framework (ITI-TF) Audit Trail and Node Authentication (ATNA) Integration Profile (IHE-ITI-TF ATNA).

3.2.2 Transaction Constraints

- Only communications requiring the attributes of transmission authenticity, transmission confidentiality, and transmission integrity need to utilize this construct for session oriented, synchronous, and point-to-point communication channels.
3.2.3 Pre-Conditions

- A policy defining what is to be audited exists, such as:
  - User Name, IP, Time Stamp, Host, Facility, Priority, Process, Message
- Audit record repository is active and designated as the destination for recorded audit events
  - MiHIN SSB shall have a Federated Syslog, which will monitor and automatic create alerts. The users of Sub-State HIE will login in their own HIE. It is only the syslog that shall be monitored using off-the-shelf management software.
- Audit record source is initialized to the audit policy
  - As MiHIN Certificate receives condition, Sub-state HIE must keep Audit Enable flag on in systems setting.
- Consistent Time construct is a pre-requisite for this Transaction, as per HISTP T17
- Existence of active and network accessible nodes
- Identities are managed
  - Sub-state HIEs must implement an identity management method.
- Policy defining the protection of the log and audit exists and is being enforced

3.2.4 Trigger Events

- The sub-state HIE Node starts the authentication process with the MiHIN SSB Node when information exchange between the two nodes is requested. The first transaction shall be the Authenticate Node transaction (equivalent to the secure node interface in the IHE-ITI-TF ATNA Transaction)
• , and all other PHI transactions performed by IHE actors shall be secure transactions. This authentication process is needed when a secure connection is established.
• The Basic Secure Node shall always apply the Authenticate Node process to every TLS connection.

3.2.5 Certificate Validation

The Authenticate node transaction involves the exchange of certificates representing the identities of the nodes. These identities are used to authenticate the nodes, to inform authorization, and audit logging.

3.2.5.1 Chain to a trusted certificate authority

• A guide to create Certificate Authority is given in Appendix D. MiHIN SSB shall create a Certification Authority, and Sub-State HIE shall request for the Certificate.
• Sub-state HIE shall support digital certificates encoded using both Deterministic Encoding Rules (DER) and Basic Encoding Rules (BER).
• Shall accept communications for which there is a certificate that is signed by a CA that is listed as a trusted signing authority.

3.2.5.2 Connection Type

• Sub- state HIE are required to adhere to the specifications in this document.
• Shall support digital certificates encoded using both Deterministic Encoding Rules (DER) and Basic 4650 Encoding Rules (BER).
• Sub-State HIE shall accept communications for which there is a certificate that is signed by a CA that is listed as a trusted signing authority.
• When configured for use not on a physically secured network implementations shall use the TLS protocol, and the following cipher suite shall be supported:
  TLS_RSA_WITH_NULL_SHA
• If the ATNA Encryption Option is implemented, the following cipher suite shall also be supported: TLS_RSA_WITH_AES_128_CBC_SHA.
• The recommended "well-known port 443 to be open for this.

TLS Examples - EAP-TLS Authentication

Extensible Authentication Protocol – Transport Layer Security
It comprise of three protocol
• Handshake protocol.
  o The handshake protocol negotiates the parameters for the SSL session.
  o The SSL client and server negotiate the protocol version, encryption algorithms, authenticate each another, and derive encryption keys
• Record protocol
  o The record protocol facilitates encrypted exchanges between the SSL client and the server.
  o The negotiated encryption scheme and encryption keys are used to provide a secure tunnel for application data between the SSL endpoints
• Alert protocol.
The alert protocol is the mechanism used to notify the SSL client or server of errors as well as session termination

http://www.google.com/imgres?imgurl=http://www.golzari.nl/jpg/eaptls.jpg&imgrefurl=http://www.golzari.nl/wlan/eaptls.html&usg=__c-HuHoZGvtQAgvRVX_dp5kuap0=&h=398&w=658&sz=32&hl=en&start=25&itbs=1&tbnid=LY_gxadpp4TmK8:&tbnh=83&tbnw=138&prev=/images%3Fq%3DTLS%26start%3D18%26hl%3Den%26sa%3DN%26gbv%3D2%26ndsp%3D18%26tbnsp%3Disch:1

http://upload.wikimedia.org/wikipedia/commons/d/db/EAP-TLS_handshake.png

3.3 Access Control

3.3.1 Overview

Access Control methods ensure that an entity can access protected resources if and only if it is permitted to do so. As described in the HITSP/TP20 "Access Control" these methods are a composite of Authentication, Authorization, Audit and Consent and operating procedures to support these functions. The specification is included here for reference reading.

These requirements follow from HITSP Transaction Package TP20.

The workgroup members believe that XACML is the standard to use for this problem, the problem being the ability to “share” access control rules across the MiHIN.

Initially, our use cases will not call for access control. The ability to authenticate nodes should be sufficient.

As we add more use cases, we will have a need to implement both consent policies and statutory requirements (no mental health disclosures, etc).

Today, applications have proprietary methods for access control. No vendor in the HIE space is implementing XACML as the policy language for their access control engine.

It would be possible to implement access control at the network level, reading the patient id from the soap header and the role or user id from the SAML assertion.

Access control may be implemented at the network level, with an access control engine permitting only authorized requests to the fulfilling service point. In this model, any request that makes it to the service point is considered valid and honored.

Nobody is centralizing large scale XACML rules at this time.

It is cost/time effective to key in the written access policies in to proprietary systems then do the work to build an access control system for today. However, requirements may change in the future as the number of nodes and number of policies grows.

Sub-state HIE shall meet following requirements:
1. Access Control policies are managed, created, modified, deleted, suspended, restored, and provisioned based on defined rules and attributes.
2. Data access policy is enforced
3. Data access policy bypass is enforced (emergency access)
4. User data are located by an entity with the ability (privileges) to search across systems
5. Protected data are accessed based on access control decisions, information attributes for subjects, resources, actions or the environment
6. Protected data are modified, updated or corrected only by authenticated, authorized users
7. Selected protected data may be blocked from users otherwise authorized to access the information resource
8. Requests for changes to protected data are made by users to providers/sources of data
9. Obligations may be placed upon providing systems prior to granting data access. Obligations may also be placed upon users receiving data that must be honored as a condition or restriction on use
10. Protected data is any data or information of any type requiring the evaluation and enforcement of access control decisions prior to granting user access

3.3.2 Transaction Package Constraints

- The user registration in Sub-state HIE must be well defined with information domains under the authorization control of a defined set of policies.
- The Transaction Package applies to any circumstance in which authorizations need to be adjudicated for access to protected information.

3.3.3 Technical Actors

- **Access Control Service (ACS)**
  - The Access Control Service is the Sub-state HIE enterprise security service that supports and implements user-side and/or service side access control capabilities.
  - This service would be utilized by the Service User, and/or Service Provider.

- **Service Provider**
  - MiHIN SSB is the system providing a service to all entities that need an assertion or authentication. The service (or assertion) provider is the trusted third party issuer of the trustable identity assertion.

- **Service User**
  - The entity represents any individual entity (such as an EHR/PHR system) that needs to make a service request of a Service Provider. The Entity may also be known as a principal and/or entity, which represents an application, a machine, or any other type of entity that may act as a requester in a transaction. A principal is typically represented in a transaction with a digital identity and the principal may have multiple valid digital identities to use with different transactions. Any Service User may also be a Service Provider.

3.3.4 Actor Interactions

The interaction between the relevant parties in an access control decision is described as follows:
• The Access Control Service (ACS) on the Sub-state HIE side receives the Service User request and responds with a SAML assertion containing user authorizations and attributes.
• To perform its function, the ACS may acquire additional attribute information related to user location, role, purpose of use, and requested resource requirements and actions.
• The ACS on the MiHIN SSB side is responsible for the parsing of assertions, evaluating the assertions against the security and privacy policy, and making and enforcing a decision on behalf of the
• The security policy includes the rules regarding authorizations required to access a protected resource and additional security conditions (location, time of day, cardinality, separation of duty purpose, etc.) that constrain enforcement. Matching the user attributes against the security policy provides the means to determine if access is to be permitted.
• The privacy policy includes the set of patient preferences, consent directives, and other privacy conditions (object masking, object filtering, user, role, purpose, etc.) that constrain enforcement. This transaction package can retrieve the currently acknowledged consent directives using the Request Consent Directive functionality from HITSP/TP30 Manage Consent Directives.
• The Service User sends the service request with specified attributes. Attributes include access control information (location, role, purpose of use, data sensitivity, etc.) necessary to make an access control decision.
3.4 Manage Consent Directives

The Manage Consent Directives Transaction Package describes the messages needed to capture, manage, and communicate rights granted or withheld by a consumer to one or more identified entities in a defined role to access, collect, use, or disclose Individually Identifiable Health Information (IIHI), and also supports the delegation of the patients right to consent.
According to HISTP/TP30, a consent directive is a record of a healthcare consumers privacy policy, which is in accordance with governing jurisdictional and organization privacy policies that grant or withhold consent:

- To one or more identified entities in a defined role
- To perform one or more operations (e.g., collect, access, use, disclose, amend, or delete)
- On an instance or type of Individually Identifiable Health Information (IIHI)
- For a purpose such as treatment, payment, operations, research, public health, quality measures, health status evaluation by third parties, or marketing
- Under certain conditions, e.g., when unconscious
- For specified time period, e.g., effective and expiration dates
- In certain context, e.g., in an emergency

A consent directive is an instance of governing jurisdictional and organization privacy policies, which may or may not be backed up by a signed document (paper or electronic).

Sub-state HIEs participating in MiHIN SSB shall implement consent management to assure proper confidentiality of Protected Health Information (PHI) in accordance with the requirements developed by the Privacy and Security Work Group. There are two levels of concern for implementation: between sub-state HIEs via the MiHIN SSB and with the community domain of a single sub-state HIE.

The consent is managed like any other access control, e.g. via SOAP and SAML using the SOAP header with Patient ID. The NHIN model specifies how consensus to be communicated and exchanged between nodes on the MiHIN SSB. The NHIN model is based on subscribe-notify model for exchanging consent. This is not essential because the MiHIN Privacy and Security Specifications specify consent based on the relationship that time of an access request for PHI, a different policy from that used in the NHIN Trial. The MiHIN policy is that sub-state HIEs shall not directly pass any information regarding consent though the MiHIN SSB so that privacy and confidentiality is maintained. When a trigger event occurs that requires checking consent, the consent directives within the community domain of the HIE are processed to determine whether there is consent for the desired access. If so the function is processed, if not it is rejected with no indication to the requesting system why the request failed, so that the failure of consent checking is not visible.

The primary reasons for adopting the specification is because it provides detailed information on how to use XACML for representing and exchanging consent directives, something that may be necessary, and to stay in alignment with emerging national standards so that entities within MiHIN can be part of the NHIN. While the MiHIN model does not specify how consent directives are captured and stored within a local community, it is highly recommended that nodes connecting within any particular HIE follow the standards listed here and use XACML for their internal representations of consent.

Identity Assertion: The Secure Node within the sub-state HIEs starts the authentication process with a user when the user wants to log onto the node. The Secure Node shall not allow access to Personal Health Information (PHI) to a user who has not successfully completed the local user authentication.

There are many options for Secure Nodes to establish user identity within the local community, including username and password, biometrics, smart card, or magnetic card. The MiHIN SSB
does not impose any particular user authentication mechanism within a local community, but
does mandate that the user log in using his or her individually assigned identity.

The MiHIN is, however, concerned with how user authentication occurs when services hosted
by an external community are accessed. Once a user is locally authenticated, and once that
same user attempts to access an external service, a second round of user authentication by the
external HIE must occur. The MIHIN security team feels that Security Assertion Markup
Language (SAML), and in particular WS-Security’s SAML Token Profile 2.0, provides a robust
mechanism for performing inter-HIE authentications of users accessing web services, and
mandates its use.

Each sub-state HIE must be able to generate proper SAML tokens when issuing requests
through the MiHIN and interpret them when received from the MiHIN. SAML Tokens are not
authenticated with a SAML authority. Authentication is limited to validation of Certificate.

Note, Secure Nodes must create the following audit events related to user authentication:

- Local User Login: A user has attempted to login to the local Secure Node, whether
  successful or not
- Local User Logout: A user has attempted to logout from the local Secure Node, whether
  successful or not
- External User Login: A user has attempted to login to the external Secure Node,
  whether successful or not
- External User Logout: A user has attempted to logout from the external Secure Node,
  whether successful or not

3.4.1 Manage Consent Directives

<s:Header>
  <a:MessageID>urn:uuid:def119ad-dc13-49c1-a3c7-e3742531f9b3</a:MessageID>
  <a:ReplyTo s:xonsent="Yes">http://www.w3.org/2005/08/addressing/anonymous</a:ReplyTo>
  <a:To>http://localhost/service/IHEMPQRegistry.svc</a:To>
</s:Header>

3.5 Discussion on WS-Federation and SAML Assertion

WS-Federation extends WS-Trust to provide a flexible Federated Identity architecture with clean
separation between trust mechanisms, security token formats, and the protocol for obtaining
tokens. This architecture enables a reusable security token service model and protocol to
address the identity requirements of both web applications and web services in a variety of trust
relationships.

The features of WS-Federation can be used directly by SOAP clients and web services. WS-
Federation also defines syntax for expressing the WS-Trust protocol and WS-Federation
extensions in a browser based environment. The intention of this functionality is to provide a
common model for performing Federated Identity operations for both web services and browser-
based applications. However, there are some key features in SAML which are required in Sub-State HIE and MiHIN SSB interactions. Following are those features:

- WS-Federation is a passive requestor, a browser based requestor
- WS-Federation Passive Requestor Profile defines “front-channel” bindings
- WS-Federation is complex query/request profile
- WS-Federation mimics the SAML 2.0 profiles while failing to profile the interesting use-cases, such as constrained delegation, that it hints at.
- SAML 2.0 defines a common request/response protocol model
- SAML 2.0 defines common bindings to transport

3.6 SAML Assertion Structure

The Sub-State HIE shall configure its SAML to point to MiHIN SSB Identity Services Provider. The SAML configuration requires schema definitions to generate the code. Sub-State HIE can get that information from [http://docs.oasis-open.org/security/saml/v2.0/](http://docs.oasis-open.org/security/saml/v2.0/)

Appendix D also shows example for WebSphere®.

HISTP/C19 defines Interoperability Specifications that specify a set of transactions, the content, and the representation of the content for the exchange of information within a defined context between a service consumer and a service provider.

3.6.1 Pre-Conditions

The pre-conditions are used to convey any conditions that must be true at the outset of a Component. They describe the context that must be established before the Component is executed. They are not however the triggers that initiate the Component. Where one or more pre-conditions are not met, the behavior of the Component should be considered uncertain.

- Entities must have been identified and provisioned (credentials issued, privileges assigned)
- Audit services are initialized as outlined in the HITSP/T15 Collect and Communicate Security Audit Trail Transaction
- Secure channels are initialized in accordance with HITSP/T17 Secured Communication Channel Transaction
- All interface(s) are synchronized to a consistent time base by the HITSP/T16 Consistent Time Transaction

3.6.2 Process Triggers

- Entity successfully connects to a local authentication mechanism and provides identity credentials and authentication information.

3.6.3 Post-Conditions

- Entity has authenticated.
- An error condition occurs. This can include errors in the verification step – malformed assertion; assertion from a distrusted identity provider; assertion from individual without enough information to perform verification; or identity provider is unknown.
- Entity identity assertion is verified.

### 3.6.4 Required Outputs

This section identifies the required outputs that must be produced at the end of the Component in order for the Component to be deemed successfully completed.

- The results of the assertion are made available to the assertion provider and shall be used in further processing of requests, such as Clinical documents from MiHIN SSB.
- A security audit event is generated and logged in syslog and is available for forensic purposes
- Authentication information that was verified is available.

### 3.6.5 Code Example of SAML Assertion for Sub-State HIE

A SAML assertion example is provided in Appendix E with an element breakdown following. Note that the example and element breakdown is not the complete SAML specification and omits many optional elements and attributes that may be included, also note that some elements are optional in the SAML specification but have been declared required for MiHIN SSB.

Example:
- A user with certain role login a Sub-state HIE
- User request a document from MiHIN for a Patient
- A SAML assertion is sent to MiHIN
- X509 Certificate is been checked
- A verification signature is generated
- Tracked in MiHIN SSB
- The document list is going to be attached with signature
- When requester submits the list back for documents, the saved signature goes with it

<table>
<thead>
<tr>
<th>SAML Assertion Attributes and Elements</th>
<th>R or O</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>assertion.Version</td>
<td>R</td>
<td>The version of the assertion. The identifier for SAML 2.0 is &quot;2.0&quot;.</td>
</tr>
<tr>
<td>assertion.ID</td>
<td>R</td>
<td>The identifier for this assertion - Guid</td>
</tr>
<tr>
<td>assertion.IssueInstant</td>
<td>R</td>
<td>The time instant of issue in UTC. The SAML specifications also specify that systems should not rely on time resolution finer than milliseconds.</td>
</tr>
<tr>
<td>ConditionsType</td>
<td>R</td>
<td>Not before, not after conditions</td>
</tr>
<tr>
<td>AudienceRestrictionType</td>
<td>Domain</td>
<td></td>
</tr>
<tr>
<td>Issuer Name Identifier to be used in Saml Subject</td>
<td>R</td>
<td>The SAML authority that is making the claim(s) about the assertion. The format of the content can be specified by a</td>
</tr>
</tbody>
</table>
Refer to Appendix E

3.6.6 User Category Attribute

Sub-state HIE shall define at minimum the following user categories:

- Practitioner with access to clinical information and Break the Glass authority
- Practitioner with access to clinical information but no Break the Glass authority
- Non-Practitioner with access to clinical information
- Non-Practitioner with access to non-clinical information
- Sub-state HIE administrators with access to non-clinical information
- RHIO administrators with access to clinical information in order to engage in public health reporting purposes

These categories do not have an obvious correspondence to the user roles defined in NHIN. Therefore this new attribute is added to convey the user category. The service provider can examine the attribute and make policy decisions based on it.

For detail please refer to Healthcare Permission Tables in Appendix A.
3.7 Authorization

3.7.1 Overview

The security policy of MiHIN SSB and sub-state HIE has many elements and many points of enforcement. Elements of policy may be managed by the Information Systems department, by Human Resources, by the Legal department and by the Finance department. And the policy may be enforced by the extranet, mail, WAN and remote-access systems; platforms which inherently implement a permissive security policy. The current practice is to manage the configuration of each point of enforcement independently in order to implement the security policy as accurately as possible. Consequently, it is an expensive and unreliable proposition to modify the security policy. And, it is virtually impossible to obtain a consolidated view of the safeguards in effect throughout the enterprise to enforce the policy. At the same time, there is increasing pressure from NIHIN, consumers, stakeholders and regulators to demonstrate "best practice" in the protection of the information assets of the NHIN SSB and its customers. For these reasons, there is a pressing need for a common language for expressing security policy. If implemented throughout an enterprise, a common policy language allows the enterprise to manage the enforcement of all the elements of its security policy in all the components of its information systems.

Managing security policy may include some or all of the following steps:
- writing
- reviewing
- testing
- approving
- issuing
- combining
- analyzing
- modifying
- withdrawing
- retrieving
- enforcing policy

3.7.2 Authorization/Access Control Functionality

An overview of the authorization/access control functionality of the MiHIN SSB. Basically, MiHIN is starting with consent based on patient identity transmitted in the SOAP message. MiHIN may add the ability to deny access based on the type of data requested, or filter the data sent. Such data would be the legislatively protected data, such as substance abuse or mental health. Such filtering would likely use metadata regarding document type in the XDS registry to work, combining patient identity and data type for enforcement via XACML policies at an access control engine. Now that MU incentives may be extended to the behavioral health provider community, this sort of filtering may be needed sooner rather than later.

Sub-State HIE shall at least provide following data elements when seeking authorization;
- User Name,
- User Id
3.7.3 Requirement for XACML for Authorization

The basic requirements of a policy language for expressing information system security policy are:
- To provide a method for combining individual rules and policies into a single policy set that applies to a particular decision request.
- To provide a method for flexible definition of the procedure by which rules and policies are combined.
- To provide a method for dealing with multiple subjects acting in different capacities.
- To provide a method for basing an authorization decision on attributes of the subject and resource.
- To provide a method for dealing with multi-valued attributes.
- To provide a method for basing an authorization decision on the contents of an information resource.
- To provide a set of logical and mathematical operators on attributes of the subject, resource and environment.
- To provide a method for handling a distributed set of policy components, while abstracting the method for locating, retrieving and authenticating the policy components.
- To provide a method for rapidly identifying the policy that applies to a given action, based upon the values of attributes of the subjects, resource and action.
- To provide an abstraction-layer that insulates the policy-writer from the details of the application environment.
- To provide a method for specifying a set of actions that must be performed in conjunction with policy enforcement.

The motivation behind XACML is to express these well-established ideas in the field of access control policy using an extension language of XML.

Using XACML following can be performed.
- **Rule and Policy Combination**
  - The complete policy applicable to a particular decision request may be composed of a number of individual rules or policies. For instance, Sub-State HIE may define certain aspects of disclosure policy, whereas the MiHIN SSB may define certain other aspects. In order to render an authorization decision, it must be possible to combine the two separate policies to form the single policy applicable to the request.

- **Combining Algorithms**
  - The rule-combining algorithm defines a procedure for arriving at an authorization decision given the individual results of evaluation of a set of rules.
Similarly, the **policy-combining algorithm** defines a procedure for arriving at an **authorization decision** given the individual results of evaluation of a set of **policies**.

- **Multiple Subjects**
  - XACML recognizes that there may be more than one **subject** relevant to a **decision request**.
  - An **attribute** called “subject-category” is used to differentiate between **subjects** acting in different capacities.

- **Policies based on subject and resource attributes**
  - Another common requirement is to base an **authorization decision** on some characteristic of the **subject** other than its identity.

- **Multi-valued attributes**
  - The most common techniques for communicating **attributes** (LDAP, XPath, SAML, etc.) support multiple values per **attribute**.
  - Therefore, when an XACML **PDP** retrieves the value of a **named attribute**, the result may contain multiple values.
  - A collection of such values is called a **bag**.

- **Policies based on resource contents**
  - In many applications, it is required to base an **authorization decision** on data contained in the information **resource** to which **access** is requested.

- **Operators**
  - Information security **policies** operate upon **attributes** of **subjects**, the **resource**, the **action** and the **environment** in order to arrive at an **authorization decision**.

- **Policy distribution**
- **Policy indexing**
- **Abstraction layer**
- **Actions performed in conjunction with enforcement**

### 3.7.4 XACML Data Flow Model for MiHIN SSB and Sub-State HIE

Note: some of the data-flows shown in the diagram may be facilitated by a repository. For instance, the communications between the **context handler** and the **PIP** or the communications between the **PDP** and the **PAP** may be facilitated by a repository. The XACML specification is not intended to place restrictions on the location of any such repository, or indeed to prescribe a particular communication protocol for any of the data-flows.

The model operates by the following steps.
1. **PAPs** write **policies** and **policy sets** and make them available to the **PDP**. These **policies** or **policy sets** represent the complete policy for a specified **target**.
2. The access requester sends a request for access to the **PEP**.
3. The **PEP** sends the request for **access** to the **context handler** in its native request format, optionally including **attributes** of the **subjects**, **resource**, **action** and **environment**.
4. The **context handler** constructs an XACML request **context** and sends it to the **PDP**.
5. The **PDP** requests any additional **subject**, **resource**, **action** and **environment attributes** from the **context handler**.
6. The context handler requests the attributes from a **PIP**.
7. The **PIP** obtains the requested **attributes**.
8. The **PIP** returns the requested **attributes** to the **context handler**.
9. Optionally, the **context handler** includes the **resource** in the **context**.
10. The context handler sends the requested attributes and (optionally) the resource to the PDP. The PDP evaluates the policy.
11. The PDP returns the response context (including the authorization decision) to the context handler.
12. The context handler translates the response context to the native response format of the PEP. The context handler returns the response to the PEP.
13. The PEP fulfills the obligations.
14. If access is permitted, then the PEP permits access to the resource; otherwise, it denies access. (Not shown)

In this model following terms are used;

<table>
<thead>
<tr>
<th>Access requester = A user at sub-state HIE</th>
<th>PEP = Policy Enforcement Point, Sub-State HIE application.</th>
<th>Obligations Service = Specific operation for authorization decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDP = Policy Decision Point,</td>
<td>Context Handler = Converts Decision Request to XACML</td>
<td>Resource = Data, service or system component</td>
</tr>
<tr>
<td>PIP = Policy Information Point,</td>
<td>PAP = Policy Administration Point</td>
<td>Subjects = An actor</td>
</tr>
<tr>
<td>Environment = The set of attributes that are relevant to an authorization decision and are independent of a particular subject, resource or action.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 3.7.5 Example of Plain-Language Rules

The following plain-language rules are to be enforced:

- **Rule 1:** A person, identified by his or her patient number, may read any record for which he or she is the designated patient.
- **Rule 2:** A person may read any record for which he or she is the designated parent or guardian, and for which the patient is under 16 years of age.
- **Rule 3:** A physician may write to any medical element for which he or she is the designated primary care physician, provided an email is sent to the patient.
- **Rule 4:** An administrator shall not be permitted to read or write to medical elements of a patient record.
These *rules* may be written by different sub-state HIE and/or by MiHIN SSB.

### 3.7.6 Example of XACML rule Instances

- Rule 1 – Refer Appendix C1
- Rule 2 – Refer Appendix C2
- Rule 3 – Refer Appendix C3
- Rule 4 – Refer Appendix C4

### 3.8 Event Auditing

The following serve as key influencers in shaping MiHIN’s requirements in audit event creation, submission, and reporting:

- The [Audit Trail and Node Authentication](#) (ATNA) profile from Integrating the Healthcare Enterprise (IHE)
- The [Collect and Communicate Security Audit Trail Transaction Specification](#) from the Healthcare Information Technology Standards Panel (HITSP)
- The [Standard Specification for Audit and Disclosure Logs for Use in Health Information Systems](#) from the American Society for Testing and Materials (ASTM)
- The [Audit Log Query Specification](#) from the Nationwide Health Information Network (NHIN) committee

### 3.8.1 Audit Log Retention Requirement

Audit logs and retention policies have become an essential proactive step in any organization’s information security preparedness. Information retention in its various forms also has intrinsic value. Regular logging and auditing of user and administrator activities can support later troubleshooting, incident responses and forensic efforts and is essential for establishing accountability. In many cases, security incidents and legal issues may not present themselves immediately so it is important to keep data records long enough to facilitate investigations several months after the fact, and to include procedures to preserve records during the course of an investigation. MiHIN will comply with all federal and state regulation regarding log retention. During the implementation phase of the project the MiHIN governance will determine applicable Audit log retention duration for the Sub-State HIE.

### 3.8.2 Audit Creation

Audit messages must conform to the XML schema defined in the Security Audit and Access Accountability Message XML Data Definitions for Healthcare Applications ([RFC 3881](#)). The XML schema for an audit event can be found within RFC 3881 itself.

---

2 Note, the IHE Provisional Audit Record format is *not* supported by the MiHIN
3.9 Audit Submission

As an ATNA Secure Node, actors must use BSD Syslog (RFC 3164) as the protocol for submitting audit events to an Audit Repository. BSD Syslog is based on User Datagram Protocol (UDP), and has some disadvantages particularly in the following areas:

- A single message shouldn’t exceed 1024 bytes in length
- Message delivery is often unreliable
- UDP network tracing and debugging is difficult

Currently, there are no plans within the MiHIN architecture to support a centrally-hosted statewide Audit Repository. Instead, each HIE participant will manage their own local Audit Repository comprised only of its local events. Later, when an authorized security officer wishes to create an audit report, a federated query will be issued across HIEs as needed, and responses will be aggregated for viewing by the user.

3.9.1 Code Example

```java
// Code from Consumer.sendQuery():
// Consumer is about to send the ebXML formatted query to the registry. Sending the query is surrounded by auditing statements in order to capture this auditable event and its outcome in the audit record repository. Upon completion of the SOAP message exchange, the outcome (success, failure, etc.) of the query, along with PHI data and initiating user information are sent to the audit repository.

int eventOutcome = ATNAAuditClient.SUCCESS_EVENT_OUTCOME;
AdhocQueryResponseType qr = null;

try {
    qr = sendQuery(ebXMLQuery);
} catch (Exception e) {
    eventOutcome = ATNAAuditClient.SERIOUS_FAILURE_EVENT_OUTCOME;
    throw e;
} finally {
    if (isDoAudit()) {
        auditor.audit(eventOutcome, initiatingUser, ebXMLQuery);
    }
}
```
3.9.2 Data Flow Diagram

ATNA Audit Submission

Sub-state HIE
User Login

MIHN XDS Registry

ATNA Audit Client

ATNA Audit Repository

ITI-16: Registry Query

ITI-16: Query
Registry
Acknowledgement

Audit Query PHI Import Event

ITI-20: Record Audit Event
3.10 Audit Reporting

Each Sub-state HIE within the MiHIN SSB is expected to minimally support the following audit reports:

1. Date and time of the event (in ISO 8601 format)
2. The user identity of request (where applicable)
3. The role presented in the request (where applicable)
4. Type of event (including: service and patient identifier when relevant)
5. The outcome (success or failure) of the event
6. The FQDN and IP address of the remote node

Need to add requirements for retention of audit logs (3 years minimum)

3.11 Consistent Time

Given base-line secure environments, the next building block can reasonably be Consistent Time.

Consistent Time, ensuring that all the entity systems that are communicating within the network have synchronized system clocks is essential to several security measures.

MiHIN and sub-state HIE nodes shall use Network Time Protocol RFC 1305 to connect to the ntp.org pool of servers at http://support.ntp.org/bin/view/Servers/NTPPoolServers. The standards for this requirement are HITSP/T16 Consistent Time and in ITI Technical Framework Version 4.0 Volume 2.

3.12 Future of Healthcare Security – XSPA TC

The proposed interoperable exchange of healthcare privacy policies, consent directives, and authorizations has a space to grow in future by adopting OASIS Cross-Enterprise Security and Privacy Authorization (XSPA) TC when it is mature and available.

The OASIS XSPA TC works to standardize the way healthcare providers, hospitals, pharmacies, and insurance companies exchange privacy policies, consent directives, and authorizations within and between healthcare organizations. The OASIS Cross-Enterprise Security and Privacy Authorization (XSPA) Technical Committee will specify healthcare profiles of existing OASIS standards to support reliable, auditable methods of confirming personal identity, official authorization status, and role attributes. This work aligns with security specifications being developed within the U.S. Healthcare Information Technology Standards Panel (HITSP).
Appendix A – Healthcare Permission Tables

Listed below are non-normative examples of “Standard” Healthcare permissions that may be assigned to licensed, certified and non-licensed healthcare personnel created from the normative vocabulary. For detail please refer to Role Based Access Control (RBAC) Healthcare Permission Catalog.

Legend for the following healthcare permission table examples:

- **ID (xyy-nnn) Legend:**
  - x = P (permission)
  - S (scenario)
  - yy = OE (order entry)
  - RD (review documentation)
  - PD (perform documentation)
  - SC (scheduling)
  - AD (administration)
  - nnn = Sequential number starting at 001 (note: permissions may be eliminated as a result of on-going analysis and review, thus numbers may not be sequential in this document)

- **Scenario ID** - refers to the scenario (reference the RBAC Healthcare Scenarios document) from which the abstract permission name was derived

- **Unique Permission ID** - refers to the identifier assigned to the abstract permission name

- **Basic Permission Name Operations:**
  - A = Append
  - C = Create
  - R = Read
  - U = Update
  - D = Delete
  - E = Execute

Permissions are organized according to the following tasks:

- Order Entry
- Review Documentation
- Perform Documentation
- Scheduling
- Administration
Appendix B – XACML - Code Example

Policy xmlns="urn:oasis:names:tc:xacml:2.0:policy:schema:os"
xmlns:nhin="http://www.hhs.gov/healthit/nhin"
PolicyId="12345678-1234-1234-1234-123456789abc"
RuleCombiningAlgId="urn:oasis:names:tc:xacml:1.0:rule-combining-algorithm:first-applicable">
<Description>Sample XACML policy showing access by user role</Description>

<!-- The Target element at the Policy level identifies the subject to whom the Policy applies -->
<Target>
<Actions>
<Action>
<ActionMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
<AttributeValue DataType="http://www.w3.org/2001/XMLSchema#anyURI">
http://www.hhs.gov/healthit/nhin#retrieveDocument
</AttributeValue>
</ActionMatch>
</Action>
</Actions>

<Environments>
<Environment>
<EnvironmentMatch MatchId="http://www.hhs.gov/healthit/nhin/function#instance-identifier-equal">
<AttributeValue DataType="http://www.hhs.gov/healthit/nhin#instance-identifier">
<nhin:PatientId root="2.16.840.1.113883.3.18.103" extension="00375"/>
</AttributeValue>
</EnvironmentMatch>
</Environment>
</Environments>
</Target>

<Rule RuleId="122" Effect="Deny">
<Description>Deny nurses access to mental health documents</Description>
<Target>
<Subjects>
<Subject>
<SubjectMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
<AttributeValue
DataType="http://www.w3.org/2001/XMLSchema#string">106292003</AttributeValue>
</SubjectMatch>
</Subject>
</Subjects>
</Target>
</Rule>
<Rule RuleId="123" Effect="Permit">
  <Description>Permit access to all documents to all physicians and nurses</Description>
  <Target>
    <Subjects>
      <Subject>
        <SubjectMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
          <!-- coded value for physicians -->
          <AttributeValue DataType="http://www.w3.org/2001/XMLSchema#string">112247003</AttributeValue>
        </SubjectMatch>
        <SubjectAttributeDesignator
          AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
          DataType="http://www.w3.org/2001/XMLSchema#string"/>
      </Subject>
      <Subject>
        <SubjectMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
          <!-- coded value for nurses -->
          <AttributeValue DataType="http://www.w3.org/2001/XMLSchema#string">106292003</AttributeValue>
        </SubjectMatch>
        <SubjectAttributeDesignator
          AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
          DataType="http://www.w3.org/2001/XMLSchema#string"/>
      </Subject>
    </Subjects>
    <!-- since there is no Resource element, this applies to all resources -->
  </Target>
</Rule>

<Rule RuleId="124" Effect="Permit">
  <Description>Permit access to all documents to all physicians and nurses</Description>
  <Target>
    <Subjects>
      <Subject>
        <SubjectMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
          <!-- coded value for physicians -->
          <AttributeValue DataType="http://www.w3.org/2001/XMLSchema#string">112247003</AttributeValue>
        </SubjectMatch>
        <SubjectAttributeDesignator
          AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
          DataType="http://www.w3.org/2001/XMLSchema#string"/>
      </Subject>
    </Subjects>
    <!-- since there is no Resource element, this applies to all resources -->
  </Target>
</Rule>
<Description>Permit access to any Psychiatrist for mental health related documents</Description>

<Target>
  <Subjects>
    <Subject>
      <SubjectMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
        <AttributeValue 
        DataType="http://www.w3.org/2001/XMLSchema#string">80584001</AttributeValue>
        <SubjectAttributeDesignator
          AttributeId="urn:oasis:names:tc:xacml:2.0:subject:role"
          DataType="http://www.w3.org/2001/XMLSchema#string"/>
      </SubjectMatch>
    </Subject>
  </Subjects>
  <Resources>
    <Resource>
      <ResourceMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
        <AttributeValue 
        DataType="http://www.w3.org/2001/XMLSchema#string">34903-5</AttributeValue>
        <ResourceAttributeDesignator
          AttributeId="http://www.hhs.gov/healthit/nhin#document-class"
          DataType="http://www.w3.org/2001/XMLSchema#string"/>
      </ResourceMatch>
    </Resource>
  </Resources>
</Target>

<Rule RuleId="125" Effect="Deny">
  <Description>deny all access to documents. Since this rule is last, it will be selected if no other rule applies.</Description>
</Rule>

</Policy>
Appendix C – Example XACML rule Instances

Refer XACML in detail

Appendix C.1 Rule 1

This illustrates a simple rule with a single <Condition> element. It also illustrates the use of the <VariableDefinition> element to define a function that may be used throughout the policy. The following XACML <Rule> instance expresses Rule 1:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<Policy
    xmlns="urn:oasis:names:tc:xacml:2.0:policy:schema:os"
    xmlns:xacml
    context="urn:oasis:names:tc:xacml:2.0:context:schema:os"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="
        urn:oasis:names:tc:xacml:2.0:policy:schema:os
        http://docs.oasis-open.org/xacml/access_control-xacml-2.0-context-schema-os.xsd"
    xmlns:md="http://www.med.example.com/schemas/record.xsd"
    PolicyId="urn:oasis:names:tc:xacml:2.0:example:policyid:1"
    RuleCombiningAlgId="urn:oasis:names:tc:xacml:1.0:rule-combining:algorithm:deny-overrides"
    <PolicyDefaults>
        <XPathVersion>http://www.w3.org/TR/1999/Rec-xpath-1.0</XPathVersion>
    </PolicyDefaults>
    <Target/>
    <VariableDefinition VariableId="17590034">
        <Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
            <Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:string-one-and-only">
                <SubjectAttributeDesignator
                    AttributeId="urn:oasis:names:tc:xacml:2.0:example:attribute:patient-number"
                    DataType="http://www.w3.org/2001/XMLSchema#string"/>
            </Apply>
        </Apply>
    </VariableDefinition>
    <Rule
        RuleId="urn:oasis:names:tc:xacml:2.0:example:ruleid:1"
        Effect="Permit">
        <Description>
            A person may read any medical record in the
            http://www.med.example.com/schemas/record.xsd namespace for which he or she is the
            designated patient
        </Description>
        <Target>
            <Resources>
                <Resource>
                    <ResourceMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                        <AttributeValue DataType="http://www.w3.org/2001/XMLSchema#string">
                            urn:example:med:schemas:record
                        </AttributeValue>
                        <ResourceAttributeDesignator AttributeId="urn:oasis:names:tc:xacml:2.0:resource:target-namespace"
```
XPath expressions in the policy are to be interpreted according to the 1.0 version of the XPath specification.

A <VariableDefinition> element. It defines a function that evaluates the truth of the statement: the patient-number subject attribute is equal to the patient-number in the resource.

The FunctionId attribute names the function to be used for comparison. In this case, comparison is done with the "urn:oasis:names:tc:xacml:1.0:function:string-equal" function; this function takes two arguments of type "http://www.w3.org/2001/XMLSchema#string". The first argument of the variable definition is a function specified by the FunctionId attribute. Since urn:oasis:names:tc:xacml:1.0:function:string-equal takes arguments of type "http://www.w3.org/2001/XMLSchema#string" and SubjectAttributeDesignator selects a bag of type "http://www.w3.org/2001/XMLSchema#string", "urn:oasis:names:tc:xacml:1.0:function:string-one-and-only" is used. This function guarantees that its argument evaluates to a bag containing exactly one value.

The SubjectAttributeDesignator selects a bag of values for the patient-number subject attribute in the request context. The second argument of the variable definition is a function specified by the FunctionId attribute. Since "urn:oasis:names:tc:xacml:1.0:function:string-equal" takes arguments of type "http://www.w3.org/2001/XMLSchema#string" and the AttributeSelector selects a bag of type "http://www.w3.org/2001/XMLSchema#string", "urn:oasis:names:tc:xacml:1.0:function:string-one-and-only" is used. This function guarantees that its argument evaluates to a bag containing exactly one value.

The <AttributeSelector> element selects a bag of values from the request context using a free-form XPath expression. In this case, it selects the value of the patient-number in the resource. Note that the namespace prefixes in the XPath expression are resolved with the standard XML namespace declarations.

Rule identifier.
Rule effect declaration. When a rule evaluates to ‘True’ it emits the value of the Effect attribute. This value is then combined with the Effect values of other rules according to the rule combining algorithm.

Free form description of the rule.

A rule target defines a set of decision requests that the rule is intended to evaluate. In this example, the <Subjects> and <Environments> elements are omitted.

The <Resources> element contains a disjunctive sequence of <Resource> elements. In this example, there is just one.

The <Resource> element encloses the conjunctive sequence of ResourceMatch elements. In this example, there are two.

The first <ResourceMatch> element compares its first and second child elements according to the matching function. A match is positive if the value of the first argument matches any of the values selected by the second argument. This match compares the target namespace of the requested document with the value of “urn:example:med:schemas:record”.

The MatchId attribute names the matching function. Literal attribute value to match.

The <ResourceAttributeDesignator> element selects the target namespace from the resource contained in the request context. The attribute name is specified by the AttributeId.

The second <ResourceMatch> element. This match compares the results of two XPath expressions. The second XPath expression is the location path to the requested XML element and the first XPath expression is the literal value “/md:record”. The “xpath-node-match” function evaluates to “True” if the requested XML element is below the “/md:record” element.

The <Actions> element contains a disjunctive sequence of <Action> elements.

In this case, there is just one <Action> element.

The <Action> element contains a conjunctive sequence of <ActionMatch> elements. In this case, there is just one <ActionMatch> element. The <ActionMatch> element compares its first and second child elements according to the matching function. The match is positive if the value of the first argument matches any of the values selected by the second argument. In this case, the value of the action-id action attribute in the request context is compared with the literal value “read”.

The <Condition> element. A condition must evaluate to “True” for the rule to be applicable. This condition contains a reference to a variable definition defined elsewhere in the policy.

Appendix C.2 Rule 2

Rule 2 illustrates the use of a mathematical function, i.e. the <Apply> element with functionId "urn:oasis:names:tc:xacml:1.0:function:date-add-yearMonthDuration" to calculate the date of the patient’s sixteenth birthday. It also illustrates the use of predicate expressions, with the functionId "urn:oasis:names:tc:xacml:1.0:function:and". This example has one function embedded in the <Condition> element and another one referenced in a <VariableDefinition> element.

<?xml version="1.0" encoding="UTF-8"?>
 xmlns:md="http://docs.oasis-open.org/md/schemas/record.xsd"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:schemaLocation="urn:oasis:names:tc:xacml:1.0:policy:schema-os.xsd"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:schemaLocation="urn:oasis:names:tc:xacml:1.0:policy:schema-os.xsd"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:schemaLocation="urn:oasis:names:tc:xacml:1.0:policy:schema-0
<PolicyDefaults>
<XPathVersion>http://www.w3.org/TR/1999/Rec-xpath-19991116</XPathVersion>
</PolicyDefaults>

<VariableDefinition VariableId="17590035">
<Apply FunctionId="urn:oasis:names:tc:xacml:2.0:function:date-less-or-equal">
<Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:date-one-and-only">
<EnvironmentAttributeDesignator AttributeId="urn:oasis:names:tc:xacml:1.0:environment:current-date" DataType="http://www.w3.org/2001/XMLSchema#date"/>
</Apply>
<Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:date-add-yearMonthDuration">
<Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:date-one-and-only">
</Apply>
<AttributeValue DataType="http://www.w3.org/TR/2002/WD-xquery-operators-20020816#yearMonthDuration">
<xf:dt-yearMonthDuration>P16Y</xf:dt-yearMonthDuration>
</AttributeValue>
</Apply>
</Apply>
</VariableDefinition>

<Rule RuleId="urn:oasis:names:tc:xacml:2.0:example:ruleid:2" Effect="Permit">
<Description>
A person may read any medical record in the http://www.med.example.com/records.xsd namespace for which he or she is the designated parent or guardian, and for which the patient is under 16 years of age
</Description>
<Target>
<Resources>
<Resource>
<ResourceMatch MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
<AttributeValue DataType="http://www.w3.org/2001/XMLSchema#string">http://www.med.example.com/schemas/record.xsd</AttributeValue>
</ResourceMatch>
</Resource>
</Resources>
<AttributeValue DataType="http://www.w3.org/2001/XMLSchema#yearMonthDuration">
P16Y</AttributeValue>
</Rule>
<Actions>
  <Action>
    <ActionMatch>
      <AttributeValue DataType="http://www.w3.org/2001/XMLSchema#string">
        read
      </AttributeValue>
      <ActionAttributeDesignator AttributeId="urn:oasis:names:tc:xacml:1.0:action:action-id" DataType="http://www.w3.org/2001/XMLSchema#string"/>
    </ActionMatch>
  </Action>
</Actions>

The <VariableDefinition> element contains part of the condition (i.e. is the patient under 16 years of age?). The patient is under 16 years of age if the current date is less than the date computed by adding 16 to the patient’s date of birth. "urn:oasis:names:tc:xacml:1.0:function:date-less-or-equal" is used to compute the difference of two date arguments. The first date argument uses "urn:oasis:names:tc:xacml:1.0:function:date-one-and-only" to ensure that the bag of values selected by its argument contains exactly one value of type "http://www.w3.org/2001/XMLSchema#date". The current date is evaluated by selecting the "urn:oasis:names:tc:xacml:1.0:environment:current-date" environment attribute.

The second date argument uses "urn:oasis:names:tc:xacml:1.0:function:date-add yearMonthDuration" to compute the date of the patient’s sixteenth birthday by adding 16 years to the patient’s date of birth. The first of its arguments is of type "http://www.w3.org/2001/XMLSchema#date" and the second is of type "http://www.w3.org/TR/2002/WD-xquery-operators-20020816#yearMonthDuration".

The <AttributeSelector> element selects the patient’s date of birth by taking the XPath expression over the resource content.

Year Month Duration of 16 years.

Rule declaration and rule target. See Rule 1 in Section 4.2.4.1 for the detailed explanation of these elements.

The <Condition> element. The condition must evaluate to “True” for the rule to be applicable. This condition evaluates the truth of the statement: the requestor is the designated parent or guardian and the patient is under 16 years of age. It contains one embedded <Apply> element and one referenced <VariableDefinition> element.

The condition uses the “urn:oasis:names:tc:xacml:1.0:function:and” function. This is a...
Boolean function that takes one or more Boolean arguments (2 in this case) and performs the logical "AND" operation to compute the truth value of the expression. The first part of the condition is evaluated (i.e. is the requestor the designated parent or guardian?). The function is "urn:oasis:names:tc:xacml:1.0:function:string-equal" and it takes two arguments of type "http://www.w3.org/2001/XMLSchema#string".

designates the first argument. Since "urn:oasis:names:tc:xacml:1.0:function:string-equal" takes arguments of type "http://www.w3.org/2001/XMLSchema#string", "urn:oasis:names:tc:xacml:1.0:function:string-one-and-only" is used to ensure that the subject attribute "urn:oasis:names:tc:xacml:2.0:example:attribute:parent-guardian-id" in the request context contains exactly one value.

designates the second argument. The value of the subject attribute "urn:oasis:names:tc:xacml:2.0:example:attribute:parent-guardian-id" is selected from the request context using the <SubjectAttributeDesignator> element.

As above, the "urn:oasis:names:tc:xacml:1.0:function:string-one-and-only" is used to ensure that the bag of values selected by it's argument contains exactly one value of type "http://www.w3.org/2001/XMLSchema#string".

The second argument selects the value of the <md:parentGuardianId> element from the resource content using the <AttributeSelector> element. This element contains a free-form XPath expression, pointing into the request context. Note that all namespace prefixes in the XPath expression are resolved with standard namespace declarations. The AttributeSelector evaluates to the bag of values of type "http://www.w3.org/2001/XMLSchema#string".

references the <VariableDefinition> element, where the second part of the condition is defined.

Appendix C.3 Rule 3

Rule 3 illustrates the use of an obligation. The XACML <Rule> element syntax does not include an element suitable for carrying an obligation, therefore Rule 3 has to be formatted as a <Policy> element.

```xml
<?xml version="1.0" encoding="UTF-8"?>
<Policy
<Description>
Policy for any medical record in the http://www.med.example.com/schemas/record.xsd namespace
</Description>
<PolicyDefaults>
<XPathVersion>http://www.w3.org/TR/1999/Rec-xpath-19991116</XPathVersion>
</PolicyDefaults>
<Target>
/Resources>
<Resource>
<ResourceMatch
MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
<AttributeValue DataType="http://www.w3.org/2001/XMLSchema#string">
urn:example:med:schemas:record
</AttributeValue>
<ResourceAttributeDesignator AttributeId="urn:oasis:names:tc:xacml:1.0:resource:target-namespace" DataType="http://www.w3.org/2001/XMLSchema#string"/>
```
A physician may write any medical element in a record for which he or she is the designated primary care physician, provided an email is sent to the patient.
<apply>
  <function id="urn:oasis:names:tc:xacml:1.0:function:string-one-and-only"/>
</apply>

<apply>
    data-type="http://www.w3.org/2001/XMLSchema#string"/>
</apply>

<rule>
<obligations>
<obligation
  obligation-id="urn:oasis:names:tc:xacml:example:obligation:email"
  fulfill-on="permit">
  <attribute-assignment
    attribute-id="urn:oasis:names:tc:xacml:2.0:example:attribute:mailto"
    data-type="http://www.w3.org/2001/XMLSchema#string">
    <attribute-selector context="/md:record/md:patient/md:patientContact/md:email"
      data-type="http://www.w3.org/2001/XMLSchema#string"/>
  </attribute-assignment>

  <attribute-assignment
    attribute-id="urn:oasis:names:tc:xacml:2.0:example:attribute:text"
    data-type="http://www.w3.org/2001/XMLSchema#string">
    Your medical record has been accessed by:
  </attribute-assignment>

  <attribute-assignment
    attribute-id="urn:oasis:names:tc:xacml:1.0:subject:subject-id"
    data-type="http://www.w3.org/2001/XMLSchema#string"/>
</obligation>
</obligations>
</rule>
</policy>

The <policy> element includes standard namespace declarations as well as policy specific parameters, such as PolicyId and RuleCombiningAlgId. The Policy identifier. This parameter allows the policy to be referenced by a policy set.

The Rule combining algorithm identifies the algorithm for combining the outcomes of rule evaluation.

The Policy target. The policy target defines a set of applicable decision requests. The structure of the <target> element in the <policy> is identical to the structure of the <target> element in the <rule>. In this case, the policy target is the set of all XML resources that conform to the namespace "urn:example:med:schemas:record".

The only <rule> element included in this <policy>. Two parameters are specified in the rule header: RuleId and Effect.

The rule target further constrains the policy target. The <subject-match> element targets the rule at subjects whose "urn:oasis:names:tc:xacml:2.0:example:attribute:role" subject attribute is equal to "physician".

The <resource-match> element targets the rule at resources that match the XPath expression "//md:record/md:medical".

The <action-match> element targets the rule at actions whose "urn:oasis:names:tc:xacml:2.0:example:attribute:action-id" action attribute is equal to "write".

The <condition> element. For the rule to be applicable to the decision request, the condition must evaluate to "True". This condition compares the value of the "urn:oasis:names:tc:xacml:2.0:example:attribute:physician-id" subject attribute with the value of
the `<registrationId>` element in the medical record that is being accessed. The `<Obligations>` element. **Obligations** are a set of operations that must be performed by the **PEP** in conjunction with an **authorization decision**. An **obligation** may be associated with a “Permit” or “Deny” **authorization decision**. The element contains a single **obligation**.

The `<Obligation>` element consists of the **ObligationId** attribute, the **authorization decision** value for which it must be fulfilled, and a set of attribute assignments. The **PDP** does not resolve the attribute assignments. This is the job of the **PEP**.

The **ObligationId** attribute identifies the **obligation**. In this case, the **PEP** is required to send email.

The **FulfillOn** attribute defines the **authorization decision** value for which this **obligation** must be fulfilled. In this case, when access is permitted.

The first parameter indicates where the **PEP** will find the email address in the resource.

The second parameter contains literal text for the email body.

The third parameter indicates where the **PEP** will find further text for the email body in the resource.

### Appendix C.4 Rule 4

Rule 4 illustrates the use of the "Deny" **Effect** value, and a `<Rule>` with no `<Condition>` element.

```xml
<?xml version="1.0" encoding="UTF-8"?>
<Policy
xmlns="urn:oasis:names:tc:xacml:2.0:policy:schema:os"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:oasis:names:tc:xacml:2.0:policy:schema:os
http://docs.oasis-open.org/xacml/access_control-xacml-2.0-policy-schema-os.xsd"
xmlns:md="http:www.med.example.com/schemas/record.xsd"
PolicyId="urn:oasis:names:tc:xacml:2.0:example:policyid:4"
RuleCombiningAlgId="urn:oasis:names:tc:xacml:1.0:rule-combining
algorithm:deny-overrides">
   <PolicyDefaults>
      <XPathVersion>http://www.w3.org/TR/1999/Rec-xpath-
19991116</XPathVersion>
   </PolicyDefaults>
   <Target/>
   <Rule
RuleId="urn:oasis:names:tc:xacml:2.0:example:ruleid:4"
Effect="Deny">
   <Description>
   An Administrator shall not be permitted to read or write medical elements of a patient
record in the http://www.med.example.com/records.xsd namespace.
   </Description>
   <Target/>
   <Subject>
   <SubjectMatch
MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
   <AttributeValue DataType="http://www.w3.org/2001/XMLSchema#string">administrator
   </AttributeValue>
   </SubjectMatch>
   </Subject>
   <Resources>
   </Resources>
</Policy>
```
The `<Rule>` element declaration.

**Rule Effect.** Every rule that evaluates to “True” emits the **rule effect** as its value. This rule Effect is “Deny” meaning that according to this rule, access must be denied when it evaluates to “True”.

Free form description of the rule.

**Rule target.** The **Rule target** defines the set of **decision requests** that are applicable to the rule.

The `<SubjectMatch>` element targets the rule at **subjects** whose “urn:oasis:names:tc:xacml:2.0:example:attribute:role” **subject attribute** is equal to “administrator”.

The `<Resources>` element contains one `<Resource>` element, which (in turn) contains two `<ResourceMatch>` elements. The **target** matches if the **resource** identified by the request context matches both **resource** match criteria.

The first `<ResourceMatch>` element targets the **rule** at **resources**
whose "urn:oasis:names:tc:xacml:2.0:resource:target-namespace" resource attribute is equal to "urn:example:med:schemas:record".

The second <ResourceMatch> element targets the rule at XML elements that match the XPath expression "/md:record/md:medical".

The <Actions> element contains two <Action> elements, each of which contains one <ActionMatch> element. The target matches if the action identified in the request context matches either of the action match criteria.

The <ActionMatch> elements target the rule at actions whose "urn:oasis:names:tc:xacml:1.0:action:action-id" action attribute is equal to "read" or "write".

This rule does not have a <Condition> element.
Appendix D – Setting up the SAML configuration

To use the SAML default policy sets, sample SAML general bindings, and JAAS login configuration settings for SAML that are included with WebSphere® Application Server Version 7.0.0.7 and later, you must set up the SAML configuration, which is stored in a profile.

Appendix D.1 Example of SAML Configuration - WebSphere

To use the SAML default policy sets, sample SAML general bindings, and JAAS login configuration settings for SAML that are included with WebSphere® Application Server Version 7.0.0.7 and later, you must set up the SAML configuration, which is stored in a profile.

About this task
To use the SAML features that are installed with WebSphere Application Server Version 7.0.0.7 and later, you must create a new profile, or update existing profiles. If you create a new profile after installation of Version 7.0.0.7, the new profile contains all the required SAML configuration information. Existing Version 7.0 profiles are not automatically updated with SAML configuration information, and therefore, do not contain the Version 7.0.0.7 SAML policy sets, sample general bindings, and JAAS login configuration settings. You can update existing profiles manually using the following steps. For a network deployment, update the deployment manager profile. For a base installation of WebSphere Application Server that is not a network deployment, update the single server profile. These profiles are the only profiles that you need to update.

Note: If you update existing application server profiles to use the SAML feature, you must install WebSphere Application Server Version 7.0.0.7 on all nodes first.
The profile update procedure can be performed in either stopped server mode, or in running server mode.

Stopped server mode
In this mode, the deployment manager is stopped in the network deployment, and the single server is stopped in the base installation. Copy the profile files and run the following command to update the deployment manager profile, or base server profile.

```
wsadmin -conntype NONE
```

Restart the deployment manager or single server.

Running server mode
In this mode, the deployment manager is running in the network deployment, and the single server is running in the base installation. You do not have to stop and restart the server process. Copy the profile files and run the wsadmin command in connected mode. In addition, run the refreshRepositoryEpoch command using wsadmin.AdminConfig so that the repository can pick up the copied files.

Procedure

1. Copy the directories containing the additional SAML policy sets from the profile templates directory, `app_server_root/profileTemplates/default/documents/config/templates/PolicySets`, to the profile configuration directory, `profile_root/config/templates/PolicySets`. Each additional SAML policy set is contained in a separate directory. The directory names are:

   - SAML11 Bearer WSHTTPS default
   - SAML20 Bearer WSHTTPS default
   - SAML11 Bearer WSSecurity default
   - SAML20 Bearer WSSecurity default
   - SAML11 HoK Public WSSecurity default
   - SAML20 HoK Public WSSecurity default
To confirm that the SAML policy sets are available for use, follow these steps in the administrative console:

j. Click Services > Policy Sets > Application policy sets.

k. Click Import > From Default Repository.

l. The list of policy sets available for import includes the list of policies you copied into the profile configuration directory.

m. Select the SAML default policy sets, and click OK to import them. After importing, the default policy sets are available for use.

Unpackage and copy the sample SAML general bindings to the profile bindings directory. Follow the appropriate procedure depending on whether you are working with a network deployment profile, or a profile for the base installation of WebSphere Application Server that is not a network deployment.

For a network deployment:

a. Extract the directories and files from the package file, app_server_root/profileTemplates/management/configArchives/Dmgr.car, into a temporary directory.

b. Copy the following general binding directories from the temporary directory <temp_dir>/cells/managementCell/bindings/, to the profile configuration directory for the cell, profile_root/config/cells/<cellName>/bindings. Each general binding is contained in a separate directory. Only copy the general binding directories in the list. If you copy additional binding directories, the copied directories will overwrite the existing general bindings in your profile.
   - Saml Bearer Client sample
   - Saml Bearer Provider sample
   - Saml HoK Symmetric Client sample
   - Saml HoK Symmetric Provider sample

For a base deployment that is not a network deployment:

a. Extract the directories and files from the package file, app_server_root/profileTemplates/default/configArchives/AppSrvWos.car, into a temporary directory.

b. Copy the following general binding directories from the temporary directory <temp_dir>/cells/defaultCell/bindings/, to the profile configuration directory for the cell, profile_root/config/cells/<cellName>/bindings. Each general binding is contained in a separate directory. Only copy the general binding directories in the list. If you copy additional binding directories, the copied directories will overwrite the existing general bindings in your profile.
   - Saml Bearer Client sample
   - Saml Bearer Provider sample
   - Saml HoK Symmetric Client sample
   - Saml HoK Symmetric Provider sample

To use WS-Policy and dynamic policy configuration with a client that is configured to use SAML, that client must be configured to use general bindings. A service provider that is configured to use SAML can also use WS-Policy to share its policy configuration with a WebSphere Application Server client or a service registry. For more information, see the topic Learning about WS-Policy.

To confirm that the SAML sample bindings are available for use, follow these steps in the administrative console:

. Click Services > Policy sets > General provider policy set bindings.

a. Verify that the list of sample provider bindings includes these SAML bindings:
- Saml Bearer Provider sample
- Saml HoK Symmetric Provider sample

Run the `app_server_root/bin/addSamlLoginConfigs.py` command to add a JAAS system login configuration for SAML to the cell scope security configuration document. Run the following command to add the `wss.generate.saml` and `wss.consume.saml` system JAAS login configurations.

```
wsadmin.sh -conntype NONE -lang jython -f app_server_root/bin/addSamlLoginConfigs.py
```

```
wsadmin.bat -conntype NONE -lang jython -f app_server_root\bin\addSamlLoginConfigs.py
```

The command also adds a SAMLCallerLoginModule to the `wss.caller JAAS system login configuration`.

To confirm that the JAAS login configuration for SAML has been added, follow these steps in the administrative console:

   a. Verify that the list of login configurations includes `wss.consume.saml` and `wss.generate.saml`.

Copy the JAAS configuration files `wsjaas.conf` and `wsjaas_client.conf` from `app_server_root/profileTemplates/default/documents/properties` to the profile properties directory, `profile_root/properties`. You can also modify existing `wsjaas` configuration files. After copying or modifying the files, the following SAML configuration entries are in the files:

```
system.wss.generate.saml {
  com.ibm.ws.wssecurity.wssapi.token.impl.SAMLGenerateLoginModule required;
  com.ibm.ws.wssecurity.wssapi.token.impl.DKTGenerateLoginModule required;
};
```

```
system.wss.consume.saml {
  com.ibm.ws.wssecurity.wssapi.token.impl.SAMLConsumeLoginModule required;
  com.ibm.ws.wssecurity.wssapi.token.impl.DKTConsumeLoginModule required;
};
```

Copy the SAMLIssuerConfig.properties file to the profile directory.

- For a network deployment:
  - Copy the properties file from `app_server_root/profileTemplates/cell/dmgr/documents/config/cells/AdvancedDeploymentCell/sts` To `app_server_root/profiles/<profile_name>/config/cells/<node_name>/sts`.
  - Also copy the properties file to `app_server_root/profiles/<profile_name>/config/cells/<cell_name>/nodes/<node_name>/servers/<server_name>`.
- For a base deployment that is not a network deployment, copy the properties file from `app_server_root/profileTemplates/cell/default/documents/config/cells/AdvancedDeploymentCell/sts` To `app_server_root/profiles/default/config/cells/AdvancedDeploymentCell/sts`.
Restart the server.
Appendix E - Code Example for SAML Assertion

**Code Example for SAML Assertion**

```csharp
// Create the schema classes using the .Net

ResponseType response = new ResponseType();
// Response Main Area
response.ID = "_" + Guid.NewGuid().ToString();
response.Destination = recipient;
response.Version = "2.0";
response.IssueInstant = System.DateTime.UtcNow;

NameIDType issuerForResponse = new NameIDType();
issuerForResponse.Value = issuer.Trim();

response.Issuer = issuerForResponse;

StatusType status = new StatusType();

status.StatusCode = new StatusCodeType();

response.Status = status;

// Here we create some SAML assertion with ID and Issuer name.
AssertionType assertion = new AssertionType();
assertion.ID = "_" + Guid.NewGuid().ToString();

NameIDType issuerForAssertion = new NameIDType();
issuerForAssertion.Value = issuer.Trim();

assertion.Issuer = issuerForAssertion;

assertion.Version = "2.0";

assertion.IssueInstant = System.DateTime.UtcNow;

// Not before, not after conditions
ConditionsType conditions = new ConditionsType();
conditions.NotBefore = DateTime.UtcNow;
conditions.NotBeforeSpecified = true;
conditions.NotOnOrAfter = DateTime.UtcNow.AddMinutes(5);
conditions.NotOnOrAfterSpecified = true;

AudienceRestrictionType audienceRestriction = new AudienceRestrictionType();
audienceRestriction.Audience = new string[] { domain.Trim() };

conditions.Items = new ConditionAbstractType[] {audienceRestriction};
```
// Name Identifier to be used in Saml Subject
NameIDType nameIdentifier = new NameIDType();
nameIdentifier.NameQualifier = domain.Trim();
nameIdentifier.Value = subject.Trim();

SubjectConfirmationType subjectConfirmation =
    new SubjectConfirmationType();

SubjectConfirmationDataType subjectConfirmationData =
    new SubjectConfirmationDataType();

subjectConfirmation.Method = "urn:oasis:names:tc:SAML:2.0:cm:bearer";
subjectConfirmation.SubjectConfirmationData = subjectConfirmationData;

// Create some SAML subject.

SubjectType samlSubject = new SubjectType();

AttributeStatementType attrStatement = new AttributeStatementType();
AuthnStatementType authStatement = new AuthnStatementType();
authStatement.AuthnInstant = DateTime.UtcNow;
AuthnContextType context = new AuthnContextType();
context.ItemsElementName =
    new ItemsChoiceType5[] { ItemsChoiceType5.AuthnContextClassRef };
context.Items = new object[] { "AuthnContextClassRef" };
authStatement.AuthnContext = context;

samlSubject.Items = new object[] { nameIdentifier, subjectConfirmation };

assertion.Subject = samlSubject;

IPHostEntry ipEntry =
    Dns.GetHostEntry(System.Environment.MachineName);

SubjectLocalityType subjectLocality = new SubjectLocalityType();
subjectLocality.Address = ipEntry.AddressList[0].ToString();

assertion.Conditions = conditions;
assertion.Items =
    new StatementAbstractType[] { authStatement, attrStatement };
return assertion;

attrStatement.Items = new AttributeType[attributes.Count];
int i = 0;
// Create userName SAML attributes.
foreach (KeyValuePair attribute in attributes) {
    AttributeType attr = new AttributeType();
    attr.Name = attribute.Key;
    attr.NameFormat = "urn:oasis:names:tc:SAML:2.0:attrname-format:basic";
    attr.AttributeValue = new object[] { attribute.Value };
    attrStatement.Items[i] = attr;
    i++;
}
assertion.Conditions = conditions;
assertion.Items =
    new StatementAbstractType[] { authStatement, attrStatement };
return assertion;

public static XmlElement SignDoc(XmlDocument doc, X509Certificate2 cert2,
string referenceId, string referenceValue) {
    SamlSignedXml sig = new SamlSignedXml(doc, referenceId);
    // Add the key to the SignedXml xmlDocument.
    sig.SigningKey = cert2.PrivateKey;

    // Create a reference to be signed.
    Reference reference = new Reference();
    reference.Uri = String.Empty;
    reference.Uri = "#" + referenceValue;

    // Add an enveloped transformation to the reference.
    XmlDsigEnvelopedSignatureTransform env = new
    XmlDsigEnvelopedSignatureTransform();
    XmlDsigC14NTransform env2 = new XmlDsigC14NTransform();
    reference.AddTransform(env);
    reference.AddTransform(env2);

    // Add the reference to the SignedXml object.
    sig.AddReference(reference);

    // Add an RSAKeyValue KeyInfo
    // (optional; helps recipient find key to validate).
    KeyInfo keyInfo = new KeyInfo();
    KeyInfoX509Data keyData = new KeyInfoX509Data(cert2);
    keyInfo.AddClause(keyData);
    sig.KeyInfo = keyInfo;

    // Compute the signature.
    sig.ComputeSignature();

    // Get the XML representation of the signature
    // and save it to anXmlElement object.
    XmlElement xmlDigitalSignature = sig.GetXml();
    return xmlDigitalSignature;
}

public class SamlSignedXml : SignedXml {
    private string _referenceAttributeId = "";
    public SamlSignedXml(XmlDocument document,
        string referenceAttributeId) : base(document) {
        _referenceAttributeId = referenceAttributeId;
    }
public override XmlElement GetIdElement(
    XmlDocument document, string idValue) {
    return (XmlElement)
        document.SelectSingleNode(
            string.Format("//*[@{0}='{1}'"]",
                _referenceAttributeId, idValue));
}

XmlElement signature =
    SigningHelper.SignDoc(doc, cert, "ID",
        signatureType == SigningHelper.SignatureType.Response ? response.ID :
        assertionType.ID);

public static class SamlHelper {
    private static ILog Logger =
        LogManager.GetLogger(typeof(SamlHelper));

    /// <summary>
    /// Creates a Version 1.1 Saml Assertion
    /// </summary>
    /// <param name="issuer">Issuer</param>
    /// <param name="subject">Subject</param>
    /// <param name="attributes">Attributes</param>
    /// <returns>returns a Version 1.1 Saml Assertion</returns>
    private static AssertionType CreateSamlAssertion(string issuer,
        string recipient, string domain, string subject, Dictionary<string, string>
        attributes) {
        // Here we create some SAML assertion with ID and Issuer name.
        AssertionType assertion = new AssertionType();
        assertion.ID = "_" + Guid.NewGuid().ToString();

        NameIDType issuerForAssertion = new NameIDType();
        issuerForAssertion.Value = issuer.Trim();

        assertion.Issuer = issuerForAssertion;
        assertion.Version = "2.0";

        assertion.IssueInstant = System.DateTime.UtcNow;

        //Not before, not after conditions
        ConditionsType conditions = new ConditionsType();
        conditions.NotBefore = DateTime.UtcNow;
        conditions.NotBeforeSpecified = true;
        conditions.NotOnOrAfter = DateTime.UtcNow.AddMinutes(5);
        conditions.NotOnOrAfterSpecified = true;

        AudienceRestrictionType audienceRestriction = new
            AudienceRestrictionType();
        audienceRestriction.Audience = new string[] { domain.Trim() };

        conditions.Items = new ConditionAbstractType[] { audienceRestriction };
    }
// Name Identifier to be used in SAML Subject
NameIDType nameIdentifier = new NameIDType();
nnameIdentifier.NameQualifier = domain.Trim();
nnameIdentifier.Value = subject.Trim();

SubjectConfirmationType subjectConfirmation = new
SubjectConfirmationType();
SubjectConfirmationDataType subjectConfirmationData = new
SubjectConfirmationDataType();

subjectConfirmation.Method = "urn:oasis:names:tc:SAML:2.0:cm:bearer";
subjectConfirmation.SubjectConfirmationData = subjectConfirmationData;

// Create some SAML subject.
SubjectType samlSubject = new SubjectType();

AttributeStatementType attrStatement = new
AttributeStatementType();
AuthnStatementType authStatement = new AuthnStatementType();
authStatement.AuthnInstant = DateTime.UtcNow;

AuthnContextType context = new AuthnContextType();
context.ItemsElementName = new ItemsChoiceType5[] {
  ItemsChoiceType5.AuthnContextClassRef };
context.Items = new object[] { "AuthnContextClassRef" };
authStatement.AuthnContext = context;

samlSubject.Items = new object[] { nameIdentifier, subjectConfirmation };

assertion.Subject = samlSubject;

IPHostEntry ipEntry =
  Dns.GetHostEntry(System.Environment.MachineName);

SubjectLocalityType subjectLocality = new SubjectLocalityType();
subjectLocality.Address = ipEntry.AddressList[0].ToString();

attrStatement.Items = new AttributeType[attributes.Count];
int i = 0;
// Create userName SAML attributes.
foreach (KeyValuePair<string, string> attribute in attributes) {
  AttributeType attr = new AttributeType();
  attr.Name = attribute.Key;
  attr.NameFormat = "urn:oasis:names:tc:SAML:2.0:attrname-format:basic";
  attr.AttributeValue = new object[] { attribute.Value };
  attrStatement.Items[i] = attr;
  i++;
}

assertion.Conditions = conditions;

assertion.Items = new StatementAbstractType[] { authStatement, attrStatement };

return assertion;
/// <summary>
/// GetPostSamlResponse - Returns a Base64 Encoded String with the
/// SAMLResponse in it.
/// </summary>
/// <param name="recipient">Recipient</param>
/// <param name="issuer">Issuer</param>
/// <param name="domain">Domain</param>
/// <param name="subject">Subject</param>
/// <param name="storeLocation">Certificate Store Location</param>
/// <param name="storeName">Certificate Store Name</param>
/// <param name="findType">Certificate Find Type</param>
/// <param name="certLocation">Certificate Location</param>
/// <param name="findValue">Certificate Find Value</param>
/// <param name="certFile">Certificate File (used instead of the
/// above Certificate Parameters)</param>
/// <param name="certPassword">Certificate Password (used instead of
/// the above Certificate Parameters)</param>
/// <param name="attributes">A list of attributes to pass</param>
/// <param name="signatureType">Whether to sign Response or
/// Assertion</param>
/// <returns>A base64Encoded string with a SAML response.</returns>
public static string GetPostSamlResponse(string recipient, string
issuer, string domain, string subject,
StoreLocation storeLocation, StoreName storeName, X509FindType
findType, string certFile, string certPassword, object findValue,
Dictionary<string, string> attributes,
SigningHelper.SignatureType signatureType) { 
    ResponseType response = new ResponseType();
    // Response Main Area
    response.ID = "_" + Guid.NewGuid().ToString();
    response.Destination = recipient;
    response.Version = "2.0";
    response.IssueInstant = System.DateTime.UtcNow;
    NameIDType issuerForResponse = new NameIDType();
    issuerForResponse.Value = issuer.Trim();
    response.Issuer = issuerForResponse;

    StatusType status = new StatusType();
    status.StatusCode = new StatusCodeType();
    response.Status = status;

    XmlSerializer responseSerializer =
        new XmlSerializer(response.GetType());

    StringWriter stringWriter = new StringWriter();
    XmlWriterSettings settings = new XmlWriterSettings();
    settings.OmitXmlDeclaration = true;
    settings.Indent = true;
    settings.Encoding = Encoding.UTF8;

    stringWriter.Write(responseSerializer.Serialize(stringWriter, response));
}
XmlWriter responseWriter = XmlTextWriter.Create(stringWriter, settings);

string samlString = string.Empty;

AssertionType assertionType = SamlHelper.CreateSamlAssertion(issuer.Trim(), recipient.Trim(), domain.Trim(), subject.Trim(), attributes);

response.Items = new AssertionType[] { assertionType };
responseSerializer.Serialize(responseWriter, response);
responseWriter.Close();
samlString = stringWriter.ToString();
samlString = samlString.Replace("SubjectConfirmationData", string.Format("SubjectConfirmationData NotOnOrAfter="{0:o}" Recipient="{1}"", DateTime.UtcNow.AddMinutes(5), recipient));

stringWriter.Close();

XmlDocument doc = new XmlDocument();
doc.LoadXml(samlString);
X509Certificate2 cert = null;
if (System.IO.File.Exists(certFile)) {
cert = new X509Certificate2(certFile, certPassword);
} else {
    X509Store store = new X509Store(storeName, storeLocation);
    store.Open(OpenFlags.ReadOnly);
    X509CertificateCollection coll = store.Certificates.Find(findType, findValue, true);
    if (coll.Count < 1) {
        throw new ArgumentException("Unable to locate certificate");
    }
cert = coll[0];
    store.Close();
}

XmlElement signature = SigningHelper.SignDoc(doc, cert, "ID", signatureType == SigningHelper.SignatureType.Response ? response.ID : assertionType.ID);

if (SamlHelper.Logger.IsDebugEnabled) {
    SamlHelper.Logger.DebugFormat("Saml Assertion before encoding = {0}", doc.OuterXml.ToString());
}

string responseStr = doc.OuterXml;
byte[] base64EncodedBytes = Encoding.UTF8.GetBytes(responseStr);

string returnValue = System.Convert.ToBase64String(base64EncodedBytes);

return returnValue;

/// GetPostSamlResponse - Returns a Base64 Encoded String with the SamlResponse in it with a Default Signature type.
/// <summary>
/// GetPostSamlResponse - Returns a Base64 Encoded String with the SamlResponse in it with a Default Signature type.
/// </summary>
/// <param name="recipient">Recipient</param>
/// <param name="issuer">Issuer</param>
/// <param name="domain">Domain</param>
/// <param name="subject">Subject</param>
/// <param name="storeLocation">Certificate Store Location</param>
/// <param name="storeName">Certificate Store Name</param>
/// <param name="findType">Certificate Find Type</param>
/// <param name="certLocation">Certificate Location</param>
/// <param name="certFile">Certificate File (used instead of the above Certificate Parameters)</param>
/// <param name="certPassword">Certificate Password (used instead of the above Certificate Parameters)</param>
/// <param name="attributes">A list of attributes to pass</param>
/// <returns>A base64Encoded string with a SAML response.</returns>
public static string GetPostSamlResponse(string recipient, string issuer, string domain, string subject, StoreLocation storeLocation, StoreName storeName, X509FindType findType, string certFile, string certPassword, object findValue, Dictionary<string, string> attributes) {
    return GetPostSamlResponse(recipient, issuer, domain, subject, storeLocation, storeName, findType, certFile, certPassword, findValue, attributes,
        SigningHelper.SignatureType.Response);
}
STATE OF MICHIGAN SYSTEMS
TECHNICAL ENVIRONMENT
ANALYSIS

By: The MiHIN Project Control Office
Date: November 18, 2009
Version: Final
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APPENDIX J: State of Michigan Systems Technical Environment Analysis
Executive Summary

A study and analysis of the State of Michigan (SOM) healthcare related systems was conducted as a prelude to the design and subsequent implementation of the Michigan Health Information Network (MiHIN), and as part of the required activities to satisfy the Office of the National Coordinator’s (ONC) State Cooperative Agreements grant application. The analysis focused on a number of SOM systems that were identified as key to this effort. The systems fall into several functional areas that may be part of a single department, and may sometimes be comprised of several components that might include a Registry, a Web application, ancillary systems, etc. To simplify reference to, and discussion of, these multi-component systems, the names of the functional areas they belong to will be used to refer to the collection of components that serve that functional area. The functional areas which might have multiple components will be loosely referred to as a system. The following were the SOM Systems that were analyzed:

- Vital Records Department
  - Birth Registry
  - Death Registry
- Bureau of Epidemiology
  - Michigan Disease Surveillance System (MDSS)
  - Michigan Syndromic Surveillance System (Syndromic)
  - Michigan Care Improvement Registry (MCIR)
- Michigan Bureau of Laboratories (BOL)
- Department of Corrections Health System (Corrections)

The analysis was conducted to uncover these systems’ capabilities in the following three main categories:

- Identity Matching
- Security and Access Management,
- Health Information Exchange

The analysis also focused on some of the supporting infrastructure for these systems. This included:

- Security and Identity Management products in use
- The Data Warehouse
- Integration and Communications engines such as Rhapsody and DEG.
- Enterprise Architecture products such as IBM Data Stage and Quality Stage ETL tools, Business Objects and SAP reporting tool, and IBM’s WebSphere SOA Enterprise Service Bus.

The outcome of this analysis provided the MiHIN PCO with a comprehensive view of the SOM Systems’ condition as it relates to the MiHIN, both as potential users of it, and as contributors to it. This view will be essential in the coming phases of the design and implementation of the MiHIN as the SOM systems and related infrastructure will play a significant role in meeting the
State’s and the ONC’s goals related to Public Health Reporting, Healthcare Quality Measurement and Reporting, and Security and Privacy.

As it relates to Public Health Reporting and Monitoring, the view that has emerged is that of a solid, well functioning group of systems that, despite of the lack of any statewide health information network are able to carry out their mandates. The building of the MiHIN will most certainly allow these systems to reach an even more advanced level that will not only serve the Public Health needs, but also help providers more easily report the needed data and benefit from the compilation and analysis of the data that the SOM Systems perform.

As it relates to Healthcare Quality Measurement and Reporting, the State has been performing this on a limited scale, mainly on the data under its control (e.g. Medicaid) utilizing the State’s Data Warehouse. With the MiHIN in place, this activity can easily be extended to cover quality of care statewide. This is an important activity which the State already has a head start in because Medicare and Medicaid incentives under the American Reinvestment and Recovery Act (ARRA) are directly tied measurable outcomes.

As it relates to Privacy and Security, the State has several security and identity management products implemented. Those range from the simple Single Sign On in use in several systems, to the highly secure Michigan State Police system, to the soon to be implemented Death Registry system with its certification using a fingerprint reader. The State’s data systems house a multitude of data; some are protected by HIPAA, others by State or other Federal statues and laws. This multitude of experience will give the Michigan Department of Information Technology (MDIT) and other State agencies a significant advantage when it is time to implement the MiHIN.

Another outcome of this analysis was that additional SOM Systems were identified that might either be affected by MiHIN or might interact with it. These systems are:

- Cancer Registry
- CHAMPS
- Women, Infants, and Children (WIC)
- VA hospitals
- State Hospitals
- BRIDGES
- Michigan Health Alert Network (MIHAN)

A further analysis of these systems identified during the current analysis will be conducted at a later date.

This report concludes that the State of Michigan has the systems, infrastructure, and expertise to take advantage of a statewide health information network and to make very valuable contributions to it and to its ultimate mission of improving the quality of care and public health.
Introduction

The State of Michigan (SOM) is embarking on a major effort to create an infrastructure to support Health Information Exchange (HIE). This effort, still in the formulation and design stages, is the Michigan Health Information Network (MiHIN). As part of this effort, the State is examining its internal systems and infrastructure components that are healthcare related, would be impacted by MiHIN, or can be utilized by MiHIN. The purpose of this examination is to:

- Determine the means by which the SOM systems can participate in cross enterprise patient identity cross referencing.
- Identify any security, identity, and access management products and/or capabilities in use. Identify the encryption standards currently used by the identified SOM applications for electronic health record data in storage and in transit.
- Identify any third-party products that are currently used in the SOM environment that are pertinent to the MiHIN.
- Describe the SOM systems current state of health information exchange. Is electronic health information being exchanged now? If so, what is being exchanged electronically and with whom?

Methodology and Scope of Analysis

The SOM identified several systems that would be part of this analysis. The SOM provided some general background and documentation on these systems. The MiHIN Project Control Office (MiHIN PCO) began a series of activities designed to compile information that is pertinent to the objectives of the examination that was described in the Introduction above. These activities were:

1. Create and distribute a Business Questionnaire.
2. Conduct interviews with the Business Owners of each targeted system.
3. Create and distribute a Technical Assessment.
4. Conduct interviews with Technical Resources of each targeted system.
5. Compile, verify, and analyze the information collected.
6. Conduct additional interviews or assessments as needed based on information discovered.

The results of these activities were compiled into a standard spreadsheet and a Data Flow Model for each system that was analyzed. Table 1 lists the categories of data in the spreadsheets.

Table 1 List of the major categories on which information was gathered for the SOM Systems and documented in the Analysis Spreadsheets.

<table>
<thead>
<tr>
<th>Category</th>
<th>System</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td></td>
</tr>
<tr>
<td>A.</td>
<td>Name</td>
</tr>
<tr>
<td>B.</td>
<td>Description and Purpose</td>
</tr>
<tr>
<td>II.</td>
<td>Patient identity matching</td>
</tr>
</tbody>
</table>
A. What homegrown or third party products are being used for identity matching?
B. Are you satisfied with what you have?
C. What do you use for your person/patient ID?

III. Security and Access management
A. List and describe Identity and Access management software in use, specifically:
B. Describe user access provisioning/de-provisioning
C. Describe encryption in use
D. Describe Authorization Models
E. Describe transmission security
F. Describe Auditing and audit trails:

IV. Health Information Exchange
A. Description of data records being exchanged
B. Is a copy of the data being stored, if so, then:
C. Interfaces utilized for the data exchange
D. Exchange partners
E. Data flow diagram(s)
F. Significant workflow and Use Cases

V. Pertinent Third Party products utilized by SOM Systems
A. Vendor and version both in use at the State and the latest
B. Mode of use at the State
C. Certification status, if any, of the State version and the latest version of the product

VI. Additional Pertinent Information
A. Roadmap
B. How do you see the system utilizing/aiding/interacting with/coexisting with MiHIN?
C. Other information

The systems analyzed were:
- Birth Registry
- Death Registry
- Michigan Disease Surveillance System (MDSS)
- Michigan Syndromic Surveillance System (Syndromic)
- Michigan Care Improvement Registry (MCIR)
- Michigan Bureau of Laboratories (BOL)
- Department of Corrections Health System (Corrections)

The description and business purpose of each system is detailed under Category I. in the appropriate Appendix for each system.

The SOM also identified some infrastructure components; others were identified as the analysis of the SOM Systems was being conducted. These infrastructure components are:
Analysis of Systems

Master Data Management (MDM) and Identity Matching

MDM is a general term that refers to the technology and products that are used to match and keep track of persons, products, or items that exist on multiple systems and refer to the same person, product, or item. A Master Patient Index (MPI) is a specialization of an MDM that deals with persons in a healthcare setting.

All of the SOM Systems analyzed, with the exception of Syndromic, have their own person/patient index and their own identity matching subsystems. Syndromic collects de-identified information submitted by providers; it does not collect any demographic information aside from the zip code and therefore has no need for this capability. As shown in Table 2, some Master Patient Index (MPI) components are homegrown; others came as part of a Commercial off the Shelf (COTS) application, and some are remnants of applications whose vendors are not around anymore.

Table 2 SOM Systems and their identity matching capabilities.

<table>
<thead>
<tr>
<th>SOM System</th>
<th>Person/Patient Index</th>
<th>Identity Matching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth Registry</td>
<td>30 character smart</td>
<td>Homegrown, unique because of newborn person characteristics</td>
</tr>
<tr>
<td>Death Registry</td>
<td>30 character based on demographic fields</td>
<td>Homegrown, weeds out duplicate death reports. Also matches births with deaths</td>
</tr>
<tr>
<td>MDSS</td>
<td>Internal ID based on demographics and other fields</td>
<td>3rd party internal algorithm. Suspect duplicates are sent to a workflow queue where a person evaluates them and then makes a decision</td>
</tr>
<tr>
<td>Syndromic</td>
<td>None, only zip collected</td>
<td>None</td>
</tr>
<tr>
<td>MCIR</td>
<td>30 digit smart</td>
<td>Homegrown, performs both patient and vaccine matching to remove duplicates</td>
</tr>
<tr>
<td>BOL</td>
<td>Internal in StarLims, the BOL COTS</td>
<td>Uses at least 3 out of 5 demographic information collected</td>
</tr>
<tr>
<td>Corrections</td>
<td>Internal in NextGen, Corrections COTS</td>
<td>Uses proprietary algorithm based on demographic data.</td>
</tr>
<tr>
<td>Data Warehouse</td>
<td>Internally generated Universal Client ID (UIC)</td>
<td>Homegrown, sophisticated multi-system ID matching. See Appendix G for details on elements from each system.</td>
</tr>
</tbody>
</table>

With this variety of systems, and the added variety that healthcare providers external to the State would have, it is important to capture detailed and accurate requirements of any potential MiHIN MDM solution. The fact that each SOM System has its own MDM solution is a clear indication...
that interoperability between the various SOM Systems is not very high. Standardizing on a single MPI would be a first and significant step in increasing the SOM Systems interoperability.

**Security and Access Management**

Aside from the two SOM Systems that utilize a COTS application (BOL and Corrections), all the other SOM Systems utilize the Tivoli SSO environment deployed at the State for authentication. None of these systems utilize the newer Novell Identity and Access Management (IAM) suite which the State has a contract for, and is using only in the Michigan Criminal Justice Information Network (MiCJIN). The Tivoli SSO does not provide any authorization capability, so each of the applications utilizing it provides their own authorization functionality. Some are quite sophisticated offering delegated administration at multiple levels. One system, the Death Registry also implements an additional fingerprint based security which is used mainly for proof of certification. The systems and their method of authentication and authorization are summarized in Table 3.

Table 3 SOM Systems and their methods of authentication and authorization.

<table>
<thead>
<tr>
<th>SOM System</th>
<th>Authentication</th>
<th>Authorization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth Registry</td>
<td>SOM SSO</td>
<td>Application</td>
</tr>
<tr>
<td>Death Registry</td>
<td>SOM SSO, fingerprint reader for certification</td>
<td>Application, sophisticated delegated administration.</td>
</tr>
<tr>
<td>MDSS</td>
<td>SOM SSO</td>
<td>Application, sophisticated delegated administration.</td>
</tr>
<tr>
<td>Syndromic</td>
<td>SOM SSO</td>
<td>Application</td>
</tr>
<tr>
<td>MCIR</td>
<td>SOM SSO</td>
<td>Application, sophisticated delegated administration.</td>
</tr>
<tr>
<td>BOL</td>
<td>StarLims COTS built in security</td>
<td>StarLims COTS built in security</td>
</tr>
<tr>
<td>Corrections</td>
<td>NextGen COTS built in security</td>
<td>NextGen COTS built in security</td>
</tr>
<tr>
<td>Data Warehouse</td>
<td>Database Security</td>
<td>Views are created on the data. In the warehouse. Access to the views is controlled by security.</td>
</tr>
</tbody>
</table>

In terms of auditing capability, all the systems analyzed audit changes to the data, some more robustly than others. Only the Birth Registry, Death Registry, and MCIR are also auditing the viewing of data. The Corrections system has the capability to audit viewing of data but it is not clear if that is being utilized.

**Health Information Exchange**

A comprehensive analysis of the different data exchanges and flows between the SOM Systems that this analysis focused on, as well as between these systems and other systems is documented in the appropriate Appendix for each system, both in their Data Flow Models as well as in their Analysis Spreadsheets. The data exchanges are summarized in Table 4 for the exchanges between the analyzed SOM systems, and in Table 5 between the analyzed SOM systems and other systems.
As can be seen from Table 4, the SOM Systems that were focused on communicate mainly through the following mechanisms:

1. Web Services
2. HL7 through Rhapsody or directly
3. Direct Database access of another system’s database
4. Flat file transfers
5. Data Extracts (ETL) to Warehouse

Table 4 A matrix of the SOM systems showing the types of exchanges that exist between them. Rows show the “From” system, columns show the “To” system.

<table>
<thead>
<tr>
<th>SOM System</th>
<th>Birth Registry</th>
<th>Death Registry</th>
<th>MDSS Syndrome</th>
<th>MCIR</th>
<th>BOL</th>
<th>Corrections</th>
<th>Data Warehouse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth Registry</td>
<td></td>
<td></td>
<td>Direct to WIBIS Database via DTS</td>
<td></td>
<td></td>
<td></td>
<td>Data Extract</td>
</tr>
<tr>
<td>Death Registry</td>
<td>Web Service</td>
<td>HL7 via Rhapsody</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Data Extract</td>
</tr>
<tr>
<td>MDSS Syndrome</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCIR</td>
<td></td>
<td></td>
<td>Data Extract</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BOL Corrections</td>
<td>HL7</td>
<td>Flat File of New Born Screen data</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Warehouse</td>
<td></td>
<td></td>
<td>Display Child Lead and other data.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It also appears that MCIR and the Data Warehouse are the recipients of data from several systems. This is consistent with:

1. The fact that MCIR is widely deployed in provider’s offices and is thus its Web Interface is being used to “piggyback” onto to get information to the providers.
2. The Warehouse is used to tie person data from multiple systems together for various business reasons.

Communications with other SOM systems as well as entities outside the SOM environment are shown in Table 5 and are also characterized by similar modes of data exchange as well as some additional ones:

1. Web Services
2. HL7 direct or through Rhapsody
3. File transfer (flat or through ANSI X.12 such as BOL to CHAMPS) using ftp or the Data Exchange Gateway (DEG)
4- Use of CDC supplied PHIN-MS and other CDC provided software to exchange data with the CDC.

Not many of the systems analyzed are enforcing semantic interoperability. Some are performing translation or normalization of content as part of their business functionality. The standards used are primarily: SNOMED, LOINC, ICD-9, ICD-10, CPT, and NDC.

Table 5 SOM Systems and their electronic information exchange with other external and SOM internal systems.

<table>
<thead>
<tr>
<th>System</th>
<th>Birth Registry</th>
<th>Death Registry</th>
<th>MDSS</th>
<th>Syndromic</th>
<th>MCIR</th>
<th>BOL</th>
<th>Corrections</th>
<th>Data Warehouse</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>External</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>CDC</td>
<td></td>
<td></td>
<td></td>
<td>Flat File via PHINMS</td>
<td>Flat File via PHINMS</td>
<td>Flat File to PHINMS, Flat File from PHINMS to CDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HL7 via Rhapsody via PHINMS</td>
<td>HL7 via Biosense via PHINMS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSA</td>
<td>Flat File</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private Labs</td>
<td></td>
<td></td>
<td></td>
<td>HL7, Flat File</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency Rooms</td>
<td></td>
<td></td>
<td></td>
<td>HL7 via VPN, Flat File via DEG</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Internal</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Bridges</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Data Extract</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHAMPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HIPAA 837 file</td>
<td>Data Extract</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CGI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Web Service</td>
<td>Web Service</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDL/BAM</td>
<td>Web Service</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Data Extract</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ORS</td>
<td>Flat File</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Data Extract</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sec. of State</td>
<td>Flat File</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Data Extract</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WIC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Web Service</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Analysis of Infrastructure Components

Security, Identity, and Access Management

Security Zones
The SOM has created multiple security zones within its systems environment that provide varying degrees of security depending on the needs of the data and the applications that reside within them. All these zones are secured by firewalls. Figure 1 illustrates these zones. The following narrative briefly describes each of them:

Zone 0:
Public – internet: This is the public internet.

Zone 1:
Public Facing presentation zone, semi-trusted: This contains public facing Web Servers and applications. Port 80 is allowed. It contains some legacy Web Application servers that are being moved to zone 1.49.

Zone 1.49:
Web Application zone, semi-trusted: Provides added security by not allowing traffic to Zone 0. It contains no databases. Contains application servers that are isolated physically from each other (cannot see each other). Requires two form authentication for administrative access, or access from outside the State. It uses SSL to communicate with the Web Servers in zone 1.

Zone 2:
Internal Trusted zone: Trusted zone, only controlled traffic allowed. Most databases live in this zone which contains data that has no special additional security requirements.

Zone PCI:
This is a zone where everything has to be compliant with the Payment Card Industry Data Security Standards (PCIDSS). This zone enforces these standards and is certified.

Zone 3:
Enterprise protected: This is a highly secure zone that contains databases with special security needs. It requires two factor authentication for administrative access.
SOM Single Sign On (SSO) and Tivoli IDM Tools

The SOM SSO utilizes the IBM Tivoli LDAP compliant product. The SOM SSO primarily provides authentication services to applications. Most all application utilizing the SOM SSO provide their own authorization services.
The state has several of the IBM Tivoli Identity Manager products including the Tivoli Access Manager (TAM) and the Tivoli Identity Manager (TIM). IBM’s TIM provides identity management and provisioning relating to many types of logical assets (e.g. some databases and applications), network infrastructure (e.g. Cisco ACS), and access control systems (including those that are card-operated for building access). In all, it enables integration with a broad range of heterogeneous systems across multiple types of platforms. IBM’s TAM for e-business (TAMeb) is a versatile solution for handling authentication and authorization problems, which is primarily focused on Web-based applications, and can be implemented in varying forms from simple Web Single Sign-On (SSO) to more complex security infrastructure deployments.

The state does not currently have the IBM Tivoli Federated Identity Manager (TFIM) which provides the necessary framework to support standards-based, federated identity interactions between partners, with capabilities in the areas of Web SSO, Web services security management, and federated provisioning. This product would be an important addition for the MiHIN which will operate using a federated security model by implementing the IHE Cross Enterprise User Assertion (XUA).

The IBM Tivoli Identity Management products are considered one of the top products by Gartner which ranks them in their Leaders Magic Quadrant. IBM’s Identity Management solution is intended to support a process-based approach to IAM, and a ‘trusted system of record’, in that it can act as a single point in the enterprise where access privileges are defined, and enforced as policies throughout the target systems and assets. Unauthorized access to information resources can be prevented, and a single audit trail is provided for regulatory and audit compliance. A notable feature is the breadth and depth of support for heterogeneous managed systems. IBM offers a wide variety of connectors for operating systems, directories, databases, applications, networks, and other infrastructure components. Pre-built adapters are provided, all of which support rich provisioning and compliance checking capabilities, and can be run either locally or ‘agentlessly’, within secure communication frameworks. IBM identity products have passed Liberty Interoperable™ SAML 2.0 interoperability testing. The IBM products appear to be suited to the MiHIN infrastructure requirements and should be considered during the Architecture Design process.

**Michigan State Police (MSP) Novell Environment**

The Michigan State Police’s (MSP) criminal justice domain portal, known as the Michigan Criminal Justice Information Network (MiCJIN) is the main portal used by the State Police. It provides secure single-sign-on infrastructure for multiple law enforcement applications, based on the need to comply with federal security rules for securing criminal justice information. The system meets the federal National Crime Information Center (NCIC) security standards, including:

- Unique user sessions and IDs: Michigan needed to move from a model where users shared an ID and logon session at a given location, to a model where users had unique authenticated IDs with appropriate authorization controls.
- Strong secondary authentication for Internet access: Traffic from outside the MSP’s trusted network would require more than a user ID and password for authentication.
• Encryption: 128-bit encryption is required for criminal justice applications and data traversing the network.

The following are some of the requirements MiCJIN had to meet:

• Comply with new NCIC security regulations.
• Build an identity-based portal that could:
  1. Integrate disparate applications from the criminal justice community and other state agencies
  2. Enable secure Web access to criminal justice applications and data
  3. Enable users to access applications from their offices or remote locations.
• Implement a standardized, secure IAM architecture that:
  1. Centralized management, but allowed local administration of users to reduce the cost of managing user identities
  2. Centralized user identity information
  3. Synchronized user identity information across multiple applications
  4. Provided application-level authentication and authorization based on the unique identity of the user, as opposed to a shared logon ID.
• Use standards-based technology to ease application integration, provide for reuse of components and remain adaptable in the face of changing technology products.
• Offer support and incentives to replace legacy systems within the agency by leveraging the new IAM architecture, and provide opportunities for other agencies to leverage their application development technologies.
• Ensure the solution could scale for statewide use — 3 million to 4 million users, including commercial vehicle system users, as well as 55,000 executive-branch state employees and operate with high availability and reliability to support 20,000 concurrent users.

Figure 2 shows a schematic architecture; the Novell products used were:

• Novell Nsure iChain for single sign-on
• Novell Nsure Identity Manager for identity management
• Novell eDirectory for the directory
• Novell exteNd for the portal XML interface and legacy application wrapper
• RSA Security's Secure ID for authentication via remote access tokens, rather than passwords only, for access to a subset of applications with higher assurance requirements
The Novell IAM products are also considered one of the top products by Gartner who ranks them in their Leaders Magic Quadrant. Novell identity products have passed Liberty Interoperable™ SAML 2.0 interoperability testing.

The Novell products also appear to be well suited to the MiHIN infrastructure requirements and should be considered during the Architecture Design process. We found no immediate gaps in the Novell product suite which would prohibit it from performing the functions of authorization, authentication, access, and audit as well as managing consent. Novell uses Security Assertion Markup Language (SAML) 2.0 which is a proposed standard for the MiHIN. The products are capable of identifying and authorizing both applications and users. Should the MiHIN require two-factor authentication, Novell supports this technology. Novell also has the capability to map user roles from each HIE or other connecting entity to those that might be present in the MiHIN backbone. While there are many details that must be flushed out we believe that Novell can meet the security requirements of the MiHIN.

**Rhapsody**

The Rhapsody integration engine is in use in several of the SOM Systems, to communicate with other systems and transform the content exchanged between these systems. Rhapsody is used either explicitly as part of the workflow, or implicitly as an integral part of a system. A single instance of Rhapsody exists at the State which can be used explicitly by SOM Systems and is used by MDSS, Death Registry, and MCIR. Other SOM Systems such as STARLIMS and PHINMS (provided by the CDC), come bundled with their own version of Rhapsody which is used as an integral part of their systems.

The Rhapsody Integration Engine can be divided into three distinct components as shown in Figure 3, each of which communicates with the others using secure sockets layer (SSL).
The Engine supports numerous message formats (including user defined formats):

- HL7 2.1 to 2.6 & version 3
- X.12, ranging from 2001-5022
- HIPAA 837, 997, 277, 275, 835 V. 4020
- EDIFACT ranging from 901-I06B
- HCFA X.12 837A
- UB92 V.4.1 and V.5.0
- ASTM
- NCPDP
- DICOM, image and data extraction
- W3C compatible
- Microsoft schema compatible
- ebXML
- IHE
- Web Services

The included development environment is used to control and manage functionality of the 'Engine'. The current configuration information, including existing routes and available filters, can be changed by user. An integrated monitoring component allows the sorting, viewing, editing, and resending of messages in the Engine and monitoring of system logs and error conditions.

Rhapsody is currently in use by several DCH systems as detailed in Table 4 and Table 5 above. Most of this use is part of the CDC Public Health Information Network project. We believe that Rhapsody should be investigated and analyzed further as it could be an excellent choice for the MiHIN Messaging Gateway. We cite several reasons for this:
1. Rhapsody is routinely rated among the leaders in Gartner’s Magic Quadrant for integration engines
2. Rhapsody has a special product called Rhapsody Connect which is specifically tailored for public health reporting (see below)
3. The engine is easy to use and is very scalable

Rhapsody Connect offers a number of preconfigured Profiles to support different public health programs including:

**Electronic Laboratory Reporting (ELR) Profile**
The Rhapsody Connect Electronic Laboratory Reporting Profile enables the secure transmission of laboratory results to Health Departments. Coding and content-normalized test results are messaged to appropriate public health agencies in near real-time.

**CSTE Case Reporting Profile**
The CSTE Case Reporting Profile detects reportable conditions using available clinical information and the rules developed by the Council for State and Territorial Epidemiologists (CSTE). Infection Control Practitioners (ICP) are provided with a task list of suspected reportable conditions that can be reviewed, annotated and queued for timely reporting to Health Departments. This results in substantial time savings that allow the ICP to focus on primary infection control activities rather than filling out case report forms.

**Hospital Acquired Infection Profile**
The Rhapsody Connect Hospital Acquired Infection (HAI) Profile enables reporting on the number of nosocomial infections using available clinical information and patient demographic data. This profile also helps hospital staff to identify patients that are at risk of hospital-acquired infections, thus enabling health care professionals to reduce or eliminate the risk.

**Biosurveillance Profile**
The Rhapsody Connect Biosurveillance Profile is based on the BioSense Integrator developed by the U.S. Centers for Disease Control (CDC) using Rhapsody. This profile will extract data that meets the BioSense minimum data set from hospital systems. Based on configuration rules determined by the state, this data will be securely sent to the state Health Department, CDC’s BioSense program, and/or a NHIN gateway.

**Immunization Registry Profile**
The Rhapsody Connect Immunization Registry Profile enables clinical systems to automatically and securely upload records of immunization administrations to one or more state registries without requiring changes to existing clinical systems.

**Discharge Reporting Profile**
The Rhapsody Connect Discharge Reporting Profile provides secure delivery of UB04 (HIPAA 837) billing data and clinical content related to public health. Rhapsody Connect Discharge Reporting is currently being implemented in 70 Mississippi hospitals.
Regional Reporting Requirements
The Rhapsody Connect Custom Profiles allow State Health Departments and Health Information Exchanges (HIE) to define custom information and formats to be reported. Rhapsody Connect provides the transformation layer required to convert available data into the desired format and securely deliver it to its destination.

**DEG**
In the course of conducting State business, the State of Michigan shares information with its business partners. These trading partners include local government entities, federal government agencies, and private businesses supplying services to the State. The State chose a spoke and hub architecture for this communication system. All file transfers originating on State servers are FTP’ed to the DEG to be forwarded to their destination using a partner specific communication protocol. All incoming file transfers are received by the DEG and then FTP’ed to the correct State server. This approach makes the DEG the only platform that needs to support multiple communication protocols and interfaces.

The DEG was designed as a “software firewall”. The external and internal networks are only connected through the mailbox application on the DEG. This approach reduces opportunities for intrusion and minimizes maintenance for firewall rule changes. The Gateway resides on the internal state network and communicates with FTP proxy servers and WEB file transfer application interface servers in the State’s Internet DMZ and Vender Net.

The DEG uses the MessageWay Open and Sterling’s Connect:Direct products to accomplish the functionality described above. The MessageWay product offers additional Electronic Data interchange (EDI) functionality which is not currently utilized by the SOM but which might be useful in an HIE context. Additional investigation of this product may be warranted to determine if there are features that might be of use to the MiHIN and what the licensing implications for these features are. Features such as the ability to perform transactions or create C32 documents might be useful and remain to be investigated.

**Data Warehouse**
The Michigan Department of Community Health (MDCH) has the responsibility to manage healthcare delivery to about two million Michigan residents in addition to its mission in insuring public health. The Data Warehouse plays a critical role in the former and an important role in the later. The multitude of programs MDCH administers for the disadvantaged residents of the State, with the disparate systems that support them, creates many opportunities for errors, waste, and fraud. The Data Warehouse, and the analytical capabilities it possesses, allows MDCH to improve care and care coordination, as well as uncover fraud. It also provides the ability to analyze historical data to advance public health. The Data Warehouse utilizes a Teradata V2 database with Hummingbird BI Query User and Hummingbird BI Reports. More details on the Data Warehouse can be found in Appendix H.

As with any typical data warehouse, data flowing in is transformed and loaded into the Warehouse and queries are run and data and reports are extracted based on analytical needs. The SOM Data Warehouse is atypical in that certain data is extracted in real time for operational use. One such example is the Lead Screening results being displayed in the MCIR Portal. One of the
main features of the Warehouse is its ability to match the identity of persons from several systems. The Warehouse reports that in their ETL, they are able to link individuals from the systems of the following programs:

1- Medicaid Data  
2- WIC  
3- Children Special Health  
4- MCIR  
5- Birth Registry  
6- Death Registry  
7- New Born and Lead Screens  
8- Maternal, Infant Health  
9- Pregnancy Assessment, Aging  
10- MH/SA Encounter Data

**Additional State Infrastructure Products**

There are three additional State of Michigan infrastructure components that may be suitable for being part of the MiHIN at some point. The State has agreed that an analysis of each of these products is not required at this time. Based on the current SOM architecture and current implementation plan, two of these products would not be ready to implement for about 2 years. The third is an IBM product that will be very likely be part of an IBM response to the RFP but is unlikely to be used if another backbone vendor is chosen. In this document we will, however, discuss the functionality of these products and how they may fit into the MiHIN architecture at a high level.

**IBM Data Stage and Quality Stage ETL Tools**

Extract, Transform, and Load (ETL) tools have traditionally been used to extract data from source systems, perform any required translations and load the data into a data warehouse for analytical purposes. While this is still their strength, more recently ETL tools have been used to move data between operational systems. For example if a hospital has a provider directory in their main admitting system an ETL tool can be used to update the provider dictionary in any other system which requires providers. ETL tools are also beginning to be used to perform nomenclature translations between systems.

For the State we envision two main functions for the ETL tool. First it can be used internally at the State for mapping data between SOM Systems and for performing translations. For example if a reportable disease test code is modified on the STARLIMS system the ETL tool could be used to automatically update all the systems which use this code including the MDSS system. This functionality is not directly part of the MiHIN but would be an important capability for SOM systems. The State could begin using the ETL tool for this today.

Secondly, as the MiHIN begins to aggregate data in the proposed federated repository the ETL tool can be used to collect this data into the states data warehouse. Initially this will likely be de-identified data for use in syndromic surveillance or for health sciences research. Both of these capabilities are pretty far off in the future since there must be a critical mass of data being collected at the Community HIE level for this to be most useful.
SAP Business Objects and Reporting Tools
Reporting tools are an essential part of any computer system and associated databases. They are used to provide information in an organized and human readable format that is essential for the proper and efficient use of the information. Business Objects takes this reporting even further by providing Data Mining and Business Intelligence tools. These tools allow advanced analytics, dashboards and visualization, trend analysis and pattern recognition, and much more. With the MiHIN, an enormous amount of data will either be collected or will pass through one part or another of the backbone. The SAP Business Objects and Reporting tools will potentially play an important role in making the voluminous amount of data in the MiHIN accessible and manageable. In addition, quality reporting is one of the seven ONC priorities for the ONC’s “Meaningful Use”. As this service is implemented on the MiHIN, the SAP Business Objects tools may play an important role in meeting that capability.

IBM WebSphere SOA Enterprise Service Bus
This technology has the potential to be the main MiHIN ESB infrastructure. As we analyze the vendor solutions one of them will be IBM and it is quite likely that they will propose this as the main backbone. While it is possible to use this backbone with other vendor products we will have to carefully analyze the cost-benefit of this choice. The cost of integrating third party products into the IBM bus if IBM is not chosen as the vendor could be more costly and time consuming than choosing a different product.

Opportunities and Challenges
One of the adages that seem to apply constantly in the world of computer systems is the one that goes “if it works, don’t mess with it”. Everyone who has ever been involved in the development or maintenance of a system knows too well the reason why. With the unprecedented push, and funding, from the Federal Government to move towards adoption of health information technology and electronic health information exchange, and with the promised rewards in efficiency, quality of care, and cost savings, this adage is about to be seriously put to the test, especially when it comes to the SOM Systems. Our analysis of the SOM Systems has uncovered a wide spectrum ranging from those that are “state of the art” EMR’s to those that are based on code originally obtained from academia. Those that communicate via the latest standards and those that use flat files manually copied. In this section, we go through each SOM System and attempt to summarize the impact the MiHIN might have on it, discussing opportunities and challenges. We summarize this analysis by categorizing the SOM Systems as they relate to the MiHIN into groups. We then discuss what we believe the impact the MiHIN might have on the organizational and procedural practices at the State. It is anticipated that this analysis will aid the State in determining how best to design the MiHIN and what requirements to put forward for an eventual implementation of the MiHIN.

Birth Registry
Serving as a legal record of birth, this system would benefit from electronic reporting facilitated by the MiHIN. Birthing Hospitals can potentially report a birth and associated information to the Birth Registry via the MiHIN possibly utilizing information from their EHRs. Since the Birth
Registry also utilizes Identity Matching, it can potentially leverage any MDM software or services the State may acquire as part of the MiHIN to replace the homegrown version it has. MDM implementations have a considerable learning curve; the fact that new born demographics are not always complete complicates matters and a new MDM solution will require effort to tune. The MiHIN would benefit significantly from the data contained in the Birth Registry as it is the first place a “record of a person” is created and this would be useful in creating an initial entry for that newly born person in the MiHIN’s MPI. Unfortunately, there are legal restrictions on sharing the Birth Registry data (Michigan Law MCL§333.2813(3)). The only legally allowable sharing of Birth Registry data is that which is currently being performed with the MCIR System (Michigan Law MCL§333.2821(3)). Opportunities for utilizing that data with MiHIN will be discussed in the section dealing with MCIR.

**Death Registry**
Similar to the Birth Registry, the Death Registry serves as a legal record of death. Because a person’s death carries significant financial and legal consequences, and because the cause of death is of major importance to Public Health, the timely reporting of death to State, Federal, and other entities is essential. As with the Birth Registry, the MiHIN can be leveraged as a reporting mechanism, and its MDM solution can be utilized also. Since the death of a person needs to be flagged in multiple SOM Systems as well as Federal systems thus providing the State with financial benefits and preventing fraud, the MiHIN could be utilized to streamline and speedup this reporting through the electronic exchange of data. The MiHIN’s MPI would certainly need to be flagged with the death event for the person. Entities external to SOM may also benefit; this, however, would depend on many factors that are outside the scope of this analysis.

**MDSS**
This is an essential system in tracking infectious diseases and outbreaks which are reported by laboratories, healthcare providers, local health departments, and schools. It currently receives information electronically from both private sector laboratories and the State’s Bureau of Laboratories. MDSS is able to accept HL7 and utilizes Rhapsody to convert information received from private laboratories that is not HL7 to HL7 format. With infectious diseases on the rise, the MiHIN could be utilized in many ways to enhance disease surveillance: from simply transporting a required report from the provider to MDSS, to the highly sophisticated message monitoring and automated alerting, the possibilities are many. The current manual entry of reports through the MDSS portal can certainly be minimized with the advent of the MiHIN through integration with the healthcare providers’ EMR and use of standards. MDSS can also benefit from any MDM solution the MiHIN acquires since its own MDM engine was acquired as part of the existing legacy application.

MDSS is a critical system whose importance has only increased with the recent emergence of several pandemics. The ongoing H1N1 pandemic highlights the potential benefits of implementing a statewide backbone for electronic health information exchange: The volume of paper reports coming in was such that manual data entry into the electronic system presented a challenge. More automation and electronic integration through facilities that would be offered by the MiHIN will certainly avoid such issues and allow MDSS to provide more up-to-date information in such critical times.
**Syndromic**

This system could be thought of as the “early warning” version of MDSS. While MDSS captures reports of laboratory confirmed diseases, Syndromic captures only the “Chief Complaint” of a patient, and only the zip code of where it is reported. Similar to MDSS, Syndromic can benefit from both: the MiHIN’s ability to transport the required reports and thus eliminating the need for the costly VPN’s that run through Altarum; and the MiHIN’s potential capability of inspecting messages and garnering “Chief Complaint” so that patterns can be detected and an alarm sounded.

**MCIR**

MCIR is the SOM System that has the most widespread use by providers and other entities outside the State. Its Web interface is accessed by hospitals, schools, local health departments, and others. The ubiquitous nature of MCIR has allowed other State programs to use it to provide results, such as lead and new born screening, to providers. The ubiquity of MCIR can possibly be a tremendous advantage to MiHIN since it could provide important incentives to providers to maintain their Public Health reporting. By using the MCIR interface to give providers access to statistical and analytical data produced by the State from the cumulative data reported to Public Health.

MCIR can benefit from MiHIN by utilizing it as the route EHRs can send the required reports to the State. In addition, MCIR can utilize the MiHIN MDM solution if that is seen to provide an advantage over its current Identity Matching module. MCIR does not have native support for HL7 thus it would have to utilize Rhapsody or some other means of communications.

A critical opportunity for MCIR and the MiHIN is the potential ability to populate the statewide MPI via the Birth Registry records available from MCIR. As previously discussed, Michigan law MCL §333.2813(3) prohibits the disclosure of Birth Records in general. There is an exception to allow transfer of birth data to the MCIR system (MCL §333.2821(3)). A legal opinion should be obtained to ensure that the subsequent transfer from the MCIR system to MiHIN is permitted. If the subsequent transfer of birth records from MCIR is permissible, then MCIR could be the system that notifies the MiHIN MPI of new patient identities. Allowing identity and demographic information to be available statewide via the MiHIN shortly after birth would greatly enhance identity matching and care coordination starting at a person’s birth.

**Bureau of Laboratories (BOL)**

BOL is in the process of upgrading its main system to STARLIMS, a COTS laboratory information management system. BOL has two other software products that are bundled with the Perkin-Elmer hardware used to perform New Born Screening and Lead Screening. All these systems can benefit from automated laboratory order entry, which is currently being done manually as samples are received. The MiHIN can be used, in combination with the EHRs and laboratory systems of the ordering providers, to eliminate this manual order entry. Results reporting can also be routed via the MiHIN. Elimination of manual order entry and MiHIN routing of laboratory results means that the paper associated with orders and results will be eliminated resulting in cost savings.
STARLIMS is a state of the art system which implements many of the current standards and therefore should be easy to connect to the MiHIN provided the manufacturer of the system continues to keep up with the evolving standards. STARLIMS has its own identity matching algorithms, but the other smaller systems do not and may benefit from the MiHIN’s MDM solution.

**Corrections**

Corrections is also in the process of upgrading to a COTS version of its system, NextGen EMR. As a modern system, it is standards compliant. Corrections is already electronically filling prescriptions and its transactions with providers outside the NextGen system would certainly benefit from the connectivity that the MiHIN would provide.

**Data Warehouse**

The data warehouse at the State of Michigan was first implemented by the DCH and currently has 27 health data sets. Future plans include adding claims and eligibility data sets. With this wealth of data from this many systems and the Data Warehouse’s accumulated experience in matching the identity of persons from multiple State systems, as well as its large repository of citizen demographic information will allow it to contribute to the initial load and startup of the MiHIN’s MPI. With the increased emphasis on pay for performance and the ONC’s “meaningful use” mandate, the Warehouse is poised to play a very important role in the MiHIN. A statewide Clinical Data Repository (CDR) for analytical and research purposes could potentially be created utilizing the SOM Data Warehouse. The CDR would be populated by the data crossing the MiHIN and capturing transactions as they occur for health operations. The data would be available via the MiHIN to authorized and authenticated parties. This would provide a standard and secure method to enable reporting and research.

**Classification of the Systems**

Based on our analysis, we believe that the SOM Systems can be classified into four categories that represent the degree to which the MiHIN healthcare providers and stakeholders, including the State, would benefit when and if these SOM systems are connected to or integrated into the MiHIN:

1. SOM Operational Systems that enhance the “Meaningful Use” criteria via the MiHIN. These are SOM Systems that require interaction with a number of providers across the State and would provide benefit to stakeholders through real time two-way interoperability with those providers. These systems would eventually become shared services utilized by stakeholders of the MiHIN to meet “Meaningful Use” criteria. 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, BOL, MDSS, Death Registry, and possibly Syndromic.

**Opportunities**

- Share the MiHIN MPI because a central MPI would be lower in cost to administer and upgrade compared to solutions built for individual systems. This prevents “reinventing the wheel” for each system. All these systems...
depend on a clear patient identity and need to communicate with other systems that also require coordination of the patient identity.

- The state is currently using Rhapsody which is a robust interface engine. Expanding its use to all interfaces will increase utilization of this resource.
- Develop interfaces to the MiHIN through the interface engine which will allow laboratory orders, results, immunizations and other clinical data to flow between state and stakeholder systems.
- Interfaces can be developed to the Federal Government using the MiHIN and this will mesh with the NHIN going forward. This will allow Michigan to share its citizens’ health data with other states, providing true portability of healthcare records across the nation.

### Challenges

- Most of these systems are ill equipped for interfacing
- New technologies and interfaces will require training and education efforts. Current staffs are fully utilized maintaining current operations; it will be a challenge to acquire the necessary skills and operational methodologies.

### Opportunities

- Corrections NextGen system should be able to plug into either a Community HIE or the statewide backbone and get all the benefits (higher quality care, lower cost, ability to share data with DCH, DHS) of data sharing as the MiHIN is built out and linked with the various Corrections and referral sites (specialty, inpatient, x-ray, etc) across the state. This will enable coordination between public health and welfare programs at the DCH and DHS with the Department of Corrections regarding their substantial shared populations. This coordination will result in better outcomes for traditionally troubled populations (indigents and prisoners) resulting in better life chances through better health and a lowered cost to the public.
- By quickly establishing positive links between Birth and Death records using the MiHIN MPI, and later by coordinating identity with other consumers of their records (e.g. DHS, Secretary of State, etc.) in an authoritative fashion, Vital Records will streamline and accelerate its reporting processes. This will reduce the operating cost, reduce healthcare costs due to repetition of demographic data collection and entry, and save
Michigan citizens the time wasted in filling out the same data on every provider’s forms.

- The Syndromic system could utilize hospital and eventually clinic ADT feeds into the MiHIN once visit histories are captured as a matter of routine from all MiHIN connected organizations. This would increase the data points sending information without the expense of creating dedicated, proprietary links. This will benefit the public by reducing the cost to operate and would better protect the health of citizens through more efficient operation enabled by the MiHIN.

In general, Federal standardization of reporting formats and methods will reduce costs to both the SOM systems that are required to report to various government agencies (predominantly the CDC) resulting again in lowered costs to the public to meet Federal mandates. Standardized, scalable reporting via the MiHIN will enable national data to be quickly aggregated and analyzed to help protect every Citizen’s good health.

**Challenges**

- The specific nature of the data required by the Birth and Death Registries may not make them good candidates to be connected to the MiHIN for quite some time.

3. SOM Infrastructure that can be used for the MiHIN. The Novell IAM solution, Tivoli Identity Management tools, Rhapsody, the Data Warehouse and ETL tools are in this category. All of these infrastructure components should be considered for inclusion as MiHIN core components.

**Opportunities**

- Rhapsody and the Data Warehouse and ETL tools look like they clearly should be useful as MiHIN infrastructure components.
- The Novell IAM solution should be investigated for meeting the MiHIN requirements.

**Challenges**

- Licensing restrictions may be an issue depending on state regulations and rules.
- The Novell solution may be a good solution that satisfies the security needs of the MiHIN for the long term, but integrating a complex security capability such this might prove difficult.

4. SOM Systems with limited use on the MiHIN. These systems may connect to the MiHIN at some point for communications but in general do not provide any stakeholder benefit from connection to the MiHIN nor do they provide any services that the MiHIN stakeholders need. The Data Exchange Gateway is in this category.
Opportunities

• As a short term fix the DEG might be the vehicle for uploading and transferring some documents or for reporting.
• Additional planned features such as the ability to perform transactions or create C32 documents might be useful and remain to be investigated.

Challenges

• The technology as it is presently used at the State is not a fit for the current architecture.

Technical Interoperability Analysis

Birth Registry
While the Birth Registry may only share its information with the MCIR system due to legal constraints (MCL§333.2813(3)), a standardized method to query and coordinate identity with MCIR will ease any changes to either system, removing the need to change the matching method when either system needs to change for new operational or legal requirements. The Birth Registry does not presently use HL7; a capability to create CCD documents based on HITSP C32 specification (‘CCD C32’ or commonly ‘C32’) would be useful for the same reason using standardized identity method: changes to either system will be transparent to the other and won’t required changes to both systems. Use of an interface engine such as Rhapsody represents one option for meeting this requirement. Currently, there are no HITSP standards for Birth Records; therefore any standard format developed may need modification when a HITSP specification is eventually released. Such a modification could be accomplished easily using Rhapsody, which the State has.

Data input requirements for the Birth Registry are largely met using the existing WebEBC Web application. This reduces the need for a standards-based interface for incoming data. One opportunity may be to automate the reporting of birth events from Obstetrics hospitals via HL7 messages from the clinical systems. That could automate the start of a work cycle associated with a birth. However, this will require closer analysis due to the likelihood of significant variations in business process, and variations in capabilities of hospital information systems to support this requirement.

One Use Case that may alter any document sharing arrangement is the one dealing with adoption Birth Records. It may be of clinical (or other) significance to link such records and a “break the glass functionality” may have to be designed at the MPI, XDS or application level.

Death Registry
Like most SOM Systems, it needs some requires functionality to match internal patient IDs to external systems patient identifiers. The commonly used HIE technology is an MPI. It also has the same needs for secure transport, authentication, role based authorization and audit as discussed previously. Its use of 2 factor authentication for its web application is interesting. It may also be of no consideration if the method to authenticate information retrieved from the Death Registry for assimilation into other systems is different; the two methods will not have to
be reconciled instead. That should be assessed when implementation level decisions have been made.

The web based inbound transport security does not have to meet the HIE secure node standards. Audit standard would only apply to data requests. The same possibility of using XDS or the Data Warehouse to proxy these requirements applies here.

There is some preliminary HITSP work to specify Death Registry transactions. It may be a year or more before it is available as a HITSP specification, however, using an interim specification based on the document-centric C32 concepts, would simplify adoption of the final standard.

Through Rhapsody, the Death Registry can format HL7 messages, but would need to develop a C32 formatted message. The ability of Rhapsody to update an XDS registry and move a processed document to an XDS repository should be investigated.

**MDSS**

The system is currently getting HL7 laboratory result messages. These could be routed through an HIE Messaging Gateway that could perform any needed translation/normalization. The feeds are coming in as HL7 2.x so they would required translation to HL7 3.0 to be of use to an XDS repository of laboratory results. There may be significant benefits compared to the current baseline from standardization of interfaces. Such a repository could be populated by skimming laboratory messages passing through the messaging gateway. This would reduce the load on the MDSS system to serve up data requests.

Laboratory codes will be an issue. Most laboratory orders will not have a standards compliant laboratory code. The mapping could be done at an HIE level to avoid work at the MDSS level. That would also add value to the XDS repository information by including a normalized laboratory codes. The inbound data feeds (laboratory results) to MDSS are Protected Health Information (PHI) and would need transports, authentication, and audit requirements consistent with protections to PHI. This could be done by establishing a proxy and relying on the Zone 2 and Zone 3 trust as was discussed previously.

There is a need to match patient identities using an MPI. Presently, there is no requirement for XDS style document sharing with external partners to accomplish the primary MDSS purpose: workflow management and reporting of disease surveillance. However, the infrastructure used to manage laboratory reports could potentially be reused for this purpose in addition to supporting disease surveillance requirements.

Stakeholders may be able to enhance clinical value by allowing reporting from and case resolution through EHRs. This would allow quicker communication loops and easier follow ups. If such functionality is added, it would require the XDS and security requirements and possible implementation options (the proxy of data requests).

**Syndromic**

As previously mentioned, there may be cost savings for changing the transport method. Since the data comes in without any PHI, there is no need to follow enhanced security controls. Since there
is no PHI, the data may have relatively less clinical research value. Its main value is as an early warning system to prevent or mitigate outbreaks.

**MCIR**

There will soon be support for HL7 data into and out of provider EMRs to MCIR. Such data exchanges would benefit from going through a Messaging Gateway to be normalized and ‘skimmed’ for inclusion into a clinical data warehouse. When immunization record transactions occur via HL7, the security and XDS requirements apply. The State may want to leverage a central interface engine to translate data to/from the MCIR database in order to leverage the skill set and administrative benefits of a centralized interface engine.

MCIR currently supports a large number of legacy data exchanges. The State may realize substantial administrative savings by migrating those legacy data exchanges to an HIE standardized exchange.

**Bureau of Laboratories (BOL)**

The BOL core system STARLIMS is highly HIE capable. The STARLIMS system is capable of formatting and parsing HL7 2.x for reporting laboratory results. Combined with its Rhapsody interface engine, it is ready to plug into a HITSP standards based HIE, likely using a Messaging Gateway to route laboratory orders to, and laboratory results from the system.

To comply with the document centric XDS/TP13 file, the State would have to establish an XDS repository at the BOL or use a State XDS repository.

STARLIMS can create HIPAA 837 files for billing purposes. Combined with Rhapsody, STARLIMS can process the range of electronic claims files (835, 837, 277, etc). While this is of little clinical value, it allows for efficient business operations and aligns with Federal priorities.

Use of LOINC and SNOMED coding allows comparisons of laboratory information in a meaningful manner across systems and allows analysis of structured data by healthcare information systems.

Ordering laboratories are currently unlikely to use standardized codes, barring enactment of statutory requirements. As a result, stakeholders will need to normalize the codes, either at the BOL with the Rhapsody product, or at the Messaging Gateway level. Alternatively, the State may impose standardization requirements upon its business partners. If the State opts for normalizing at the messaging gateway level, this will minimize administrative change at the BOL.

**Corrections**

The Corrections system is highly HIE capable. It is robustly standards compliant, but requires the ability to interoperate with external business partners via a broader HIE infrastructure and the support services it provides. The System has limited import and export capability for C32 documents. It requires MPI and RLS capabilities to locate external information. It requires XDS capabilities to publish documents. An exception to this general data exchange statement is that claims data (X12 835, etc.) the transport of claims files is usually proprietary. eRx capabilities exist and are currently done through SureScripts proprietary network. Laboratory orders and
results can be imported via HL7 2.x messages via a NextGen proprietary interface. A Messaging Gateway service would be needed to allow ad hoc laboratory results reporting or ordering.

Using an external MPI, which would also be used by systems in use by DCH and DHS, would allow coordinating patient identity across these systems without doing substantial mapping at the data warehouse level as currently considered. If systems exchanging data with Corrections route messages through an HIE, then C32 documents with the necessary information could be exchanged, eliminating the need to map between each system and Corrections.

**Security and Identity**

All State of Michigan systems that deliver data outside of State’s Zone 2 and Zone 3 will most likely have to comply with the “Secure Node” concept as illustrated in HITSP specifications TP13, TP20, TP30. The Secure Node concept generally uses TLS and PKI, with SAML as the security message envelope. Instead of building the capacity into every SOM system, it may be desirable to proxy the access, relying on the secure nature of the internal zones to protect any traffic that does not use the secure node concept.

For any Web applications that may be associated with the MiHIN, the State may wish to mitigate the risk of any future regulatory changes by moving all Web Application security to use TLS. Modern browsers support the protocol by default and the change could be initiated at the web server/proxy side by restricting allowed protocols to TLS only.

Authentication and authorization are also important aspects of HIE. SOM Systems use a mixed bag of authorization and authentication systems and methods as discussed previously. To allow interoperable authentication (“system to system” authentication), the systems will need to be able to assert authentication via the Secure Node concept. The State systems will need the ability to accept an external entities’ assertion that a user is presenting a true authentication token.

To engage in HIE, SOM systems will need to implement RBAC authorization methods as specified in the HL7 permissions catalog and the ANSI INCITS standards. These standards are currently being integrated in to HITSP specifications.

Auditing requirements for HIE mandate the ATNA standard, which is basically syslog-transported over TLS between nodes authenticated by PKI. Again, proprietary systems that enter or operate on data (such as the MICR web interface), are not engaging in HIE per se and may not need to log in an ATNA compliant method. Any system that delivers data to a user or system outside of SOM Zone 2 or Zone 3 should have that transaction logged in an ATNA compliant fashion. Certain events (login success and failure, query, data export, etc.) are mandated to be tracked. A secondary review of systems which will have ATNA requirements should be done in the design phase.

The State may be able to consolidate audit and authentication requirements for every system by implementing a front end XDS system. This XDS system would perform these functions for the external systems while communicating to the SOM Systems that hold the data.
Organizational Impact

With change this significant and wide ranging, we believe that the State should consider also looking at the impact the introduction of the MiHIN will have on the manner on which these systems are maintained, upgraded, and administered. Below are some preliminary ideas:

Opportunities

- It is clear that there are opportunities to change the organizational structures of the support teams for the DCH systems which can lead to more robust system integration. This shown by the possibilities of reducing legacy data exchanges through HIE.
- We recommend creating a system integration team which is responsible for all system interfaces between SOM Systems and the MiHIN as it is created. Such a team would need to have members who collectively cover multiple skills in order to effectively connect or integrate the SOM Systems to the MiHIN. These skills should include: knowledge in the business areas of the various SOM Systems, knowledge of HIE and Public health Reporting Standards, knowledge of Interfacing Technology and Standards.
- Training the staff on the capabilities of an MPI, and interface engine, as well as making this a requirement for system interactions should be considered.
- The State should set a strict policy that systems that interconnect to the MiHIN must use the established standards or works through an intermediary HIE to adopt the standards.
- There are probably several opportunities to replace some of the vendor-managed network connections. Specifically VPN circuits are quite easy to set up and manage. This should reduce costs.

Challenges

- Support teams are compartmentalized by system rather than functional area. This causes duplication of core services and inefficiencies in interface development.
- Many system interfaces use several manual steps and have limited documentation.
- DCH’s current strategy of creating Web portals for manual entry of data required by SOM Systems may need to be re-evaluated. As providers increasingly install EHRs and other clinical and administrative systems, there will be concerns about duplicate data entry involving EHRs and State web portals. There are pros and cons to either method, and it is unclear whether all such capabilities will be handled by EHRs internally. EHR applications are developed by vendors for clients nationwide; as such, they may not be capable of fully supporting requirements specific to the State of Michigan. Assuming redundancy of data entry can be minimized by various strategies, there is also no pressing reason for consolidating all provider interactions within a single application, as it is

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commonplace across industries to use distinct applications for distinct purposes. The State portals may benefit from front-end integration across applications to present a unified view and single sign-on capability to business partners and citizens.

Conclusions

The analysis of the SOM Systems has provided a comprehensive “big picture” of the current and near future state of these systems as they relate to the MiHIN both in terms of connecting and interacting with it, and in terms of providing infrastructure or other benefits to it. This “big picture” will be an essential tool in helping design a sound architecture for the MiHIN that both leverages existing State resources and insures that the State systems can connect to, and benefit from the MiHIN. One of the main categories in the ONC’s mandate for “Meaningful Use” is Public Health Reporting. Many of the SOM Systems fall squarely in this category and it is, therefore, essential to insure that they are included and accounted for in any future MiHIN architecture.

We have attempted to compile as much information as we believe is relevant to the task at hand. The SOM Systems have been developed over many years and contain the collective knowledge of many people, the collective influence of many legislative mandates, and the collective work of many developers. The inferences we have gathered and the recommendations we have made are preliminary and will need to be validated in an iterative fashion as the architecture of the MiHIN is flushed out and as more details of the SOM Systems as they relate to this architecture are uncovered.

This report provides a summary of the findings provides a subjective view of what we believe to be the opportunities and challenges that the State will face as it moves forward with MiHIN and attempts to integrate and leverage its existing systems and infrastructure resources with it. The report also includes several appendixes which contain the detailed data collected. This report is a “living document” that will be continuously updated as new information is received by the MiHIN PCO, and as this information is disseminated and accounted for in our analysis.
Appendix A – Birth Registry

<table>
<thead>
<tr>
<th>I. System</th>
<th>Birth Registry</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Name</td>
<td>Birth Registry</td>
</tr>
<tr>
<td>B. Description and Purpose</td>
<td>The Birth Registry System is a secure database of birth data for the state of Michigan. It receives reports on newborns, archives historic live birth records and provides access to, management of and certification of the records within the database by state and (shortly) local vital records registrars. The main interface to the Birth Registry is WebEBC. It is a web based application with a dual MSSQL database, a holding area where providers input the birth data and then release it to the State’s database when they believe the record is complete. Users are typically medical record staff or clerical obstetric staff affiliated with the hospital newborn nursery. There are approximately 300 users at present.</td>
</tr>
</tbody>
</table>

II. Patient identity matching

| A. What homegrown or third party products are being used for identity matching? List and describe. | Homegrown identity matching. Challenging because newborns may not be given names till later and may have the names changed. |
| B. Are you satisfied with what you have? | Prefer to use a standardized identity matching product. |
| C. What do you use for your person/patient ID? | Birth registry uses 30 character id smart numbers with proprietary algorithm |

III. Security and Access management

| A. List and describe Identity and Access management software in use, specifically: | SSO and Custom built Security through BRS User Manager |
| 1. The current version | |
| 2. Vendor’s latest version | |
| 3. Whether home grown or customized | Homegrown |
| 4. Standards compliance | |
| a) HIPAA, required or voluntary | No |
| b) DOD | No |
| c) Other | Regulated by State Law |
| B. Describe user access provisioning/de-provisioning | Deligated |
| C. Describe encryption in use | None |
| D. Describe Authorization Models | Delegated administration. Through legal agreements, providers designate administrators who in turn provision and authorize their own users. |
| E. Describe transmission security | SSL |
| F. Describe Auditing and audit trails: | All access is to data is being audited. |
2. How is it being audited
Through the application

3. Is viewing of data being audited
Yes.

### IV. Health Information Exchange

A. Description of data records being exchanged
The Birth Record follows a national standard for registration of births. Michigan has adopted the most current version of the national form:
- Administrative Information
- Child’s name
- Date of birth
- Time of birth
- Place of birth
- Sex
- Mother’s and father’s names, dates of birth and social security numbers
- Mother’s address (residence and mailing)
- Medical Information
- Birth weight
- Apgar score
- Mother’s prior pregnancies
- Method of delivery
- A variety of other information may be collected at the same time. This includes information about birth defects, paternity, fetal death (mandatory) and newborn screenings (Early Hearing Detection and Intervention and Metabolic Screening)

B. Is a copy of the data being stored, if so, then:

<table>
<thead>
<tr>
<th>1. Is it a permanent copy?</th>
<th>Export Data is not stored, it is pulled from database.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Where is it stored?</td>
<td>NA</td>
</tr>
<tr>
<td>3. What are the security controls on the data that is being stored?</td>
<td>Database</td>
</tr>
</tbody>
</table>

C. Interfaces utilized for the data exchange

| 1. Are standard protocols being used directly, e.g. HL7, CDA, etc? List and provide version. | No |
| 2. If standard protocols are not used directly, list and describe the integration or interface engine: | NA |
| a) Describe the capabilities of the engine. | NA |
| b) Describe certification status and standards in use. | NA |
| 3. Is content being translated and normalized? If so, then: | No |
| a) List and describe the type of content. | NA |
| b) List and describe homegrown or third | NA |
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party software being used.
c) Describe certification status of these products. NA

D. Exchange partners

Bridges: through a Web Service to validate birth for payment purposes.
Data Warehouse: through an extract and batch feed to the warehouse.
EDRS: Web Service to report the death of a Child in the birth Registry.
Department of State: Web Service to verify the birth.
New Born Screening: Flat files
MCIR: MSSQL DTS
DHS: Flat files
STEVE: NAPHSIS Interstate exchange to report on births for various State residents.
EVVE: A database view with a Yes/No answer to “Was this person born in Michigan?”

E. Data flow diagram(s)

Follows this Table

F. Significant workflow and Use Cases

1) Allows storing Birth record information for all births occurring in State of Michigan. The
information is reported directly by Birthing hospitals via the web EBC.
2) Adoption
A unique set of requirements relates to adoptions. Michigan has approximately 1,000 adoptions
per year. The Department has a legal obligation to never reveal adoption-related information
such as the circumstances surrounding adoption.
All children are recorded in the system upon birth, and a subset of children subsequently
undergoes adoption. Vital Records maintains records for children prior to adoption and also
maintains a separate set of records following adoption. The post-adoption record is distinct
from the pre-adoption record, and there can never be a linkage between these two records.
Within the Michigan Care Improvement Registry, the original filing is deleted upon adoption.
Initiate Systems has prepared an RFI for the State of Michigan to address this issue. There are
other circumstances where it should not be possible to trace a person’s identity. This includes
cases of spousal abuse, etc.
3) Birth Record Maintenance
Allows to maintain the information on the birth record due to legal and other changes.
Generating a version of birth records for maintaining the history of changes.
The system is a legal record of birth; as such it allows the issue of Birth Certificates which are
based this legal record and are recognized as such for meeting any of the legal and other
situations where a legal proof of birth is required.

V. Pertinent Third Party products utilized by SOM Systems

A. Vendor and version both in use at the State and the latest
B. Mode of use at the State
<table>
<thead>
<tr>
<th>C. Certification status, if any, of the State version and the latest version of the product</th>
</tr>
</thead>
<tbody>
<tr>
<td>VI. Additional Pertinent Information</td>
</tr>
<tr>
<td>A. Roadmap</td>
</tr>
<tr>
<td>B. How do you see the system utilizing/aiding/interacting with/coexisting with MIHIN?</td>
</tr>
<tr>
<td>C. Other information</td>
</tr>
</tbody>
</table>
APPENDIX J: State of Michigan Systems Technical Environment Analysis

BRS—Birth Registry System
WIBIS—BRS Database
EDRS—Electronic Death Registry System
EVVE—Electronic Verification of Vital Events
EBC—Electronic Birth Certificate
Bridges—DHS Application
EDL—Electronic Driver’s License (MDOS Application)
FileNet—Document Management System

Birth Registry

FileNet

FileNet Image Viewer Web GUI Interface

Direct/SOAP Real TimeBirth Image Data

BRS Web GUI Interface

Direct Real TimeBirth Data

SOM Single Sign On (SSO)

Direct Real TimeUser Data

EDRS Web GUI Interface

Direct Real TimeBirth Data

Web Service Real TimeDeath Data

Web Service Real TimeBirth Verification

WIBIS

Through external view Real TimeBirth Verification

DailyBirth Data File Real TimeBirth Verification

Bridges Interface (under revision)

MCIR

EDL Interface (Transitioning to BAM)

Direct Database via DTS

EBC Interface

Michigan Department of Community Health
## Appendix B – Death Registry

### I. System

<table>
<thead>
<tr>
<th>A. Name</th>
<th>Electronic Death Registry (EDR)</th>
</tr>
</thead>
</table>

### B. Description and Purpose

The purpose of the death registry is to centrally record the death of Michigan citizens to notify various agencies about the death so they can take appropriate actions, usually the termination of services the agency provided. It also serves as a check against fraud by notifying agencies that the person is dead and no longer should be seeking services. Information about deaths is used by multiple parties. Reports are currently being sent to: the Social Security Agency, the National Center for Health Statistics, Medicaid, the State Retirement System, Secretary of State, DMV, voter registration.

Of secondary value is use of causes of death for public health and research.

Death reporting is more complicated than births. There are multiple parties involved in reporting the same death event. Information is collected from both physicians, medical examiners and funeral homes.

The Death Registry currently involves a paper-based reporting process. The current workflow involves collection of paper once a month from 109 offices (Local Jurisdictional offices). All deaths must be electronically filed within 90 days.

When data comes in, there is a great deal of manual paper-handling. Tasks include data entry and editing; it currently takes a long time to clean up the data.

Currently in development, this secure web-based system will allow funeral directors, physicians and medical examiners to file electronically the certificate required to report within 72 hours of death. It also incorporates functionality required by local and state vital records registration and certification and provides a messaging system allowing users to message others involved in death registration. The EDR will enable cancer case reporting associated with a death.

Planning for electronic reporting system began in 2005. A pilot project of an electronic EDR system is currently underway in six offices. The project is grant funded through an RFP mechanism. The planned go-live timeframe is late 2009; there is a slow rollout planned involving extensive user training.

### II. Patient identity matching

<table>
<thead>
<tr>
<th>A. What homegrown or third party products are being used for identity matching? List and</th>
<th>Security number is collected whenever possible. Duplicate checking is performed to rule out multiple reports of the same death. Person matching is performed to reconcile birth and death</th>
</tr>
</thead>
</table>
**III. Security and Access management**

| B. Are you satisfied with what you have? | No. |
| C. What do you use for your person/patient ID? | Uses 30 character id; proprietary algorithm using name, DOB, Date of Death, and file id |

**A. List and describe Identity and Access management software in use, specifically:**

| 1. The current version |
| 2. Vendor’s latest version |
| 3. Whether home grown or customized | homegrown |
| 4. Standards compliance |
| a) HIPAA, required or voluntary | Not a covered entity plus deaths are exempt. |
| b) DOD |
| c) Other | State Law |

**B. Describe user access provisioning/de-provisioning**

| Tier 1 - SSO and Tier 2 - EDRS User Manager |

**C. Describe encryption in use**

| Tier 1 - SSO and Tier 2 - EDRS User Manager |

**D. Describe Authorization Models**

| SOM SSO. Fingerprint verification used for certification. Users are able to login without fingerprint authentication. |

**E. Describe transmission security**

| HTTPS |

**F. Describe Auditing and audit trails:**

| All information is being audited after it has been certified. |
| Through the EDRS Audit Module |
| Yes |

**IV. Health Information Exchange**

| A. Description of data records being exchanged | Demographic information as well as place and cause of death. |
| B. Is a copy of the data being stored, if so, then: |
| 1. Is it a permanent copy? | No. |
| 2. Where is it stored? | Stored temporarily on File Server and deleted once downloaded. |
| 3. What are the security controls on the data that is being stored? |

| C. Interfaces utilized for the data exchange |
| 1. Are standard protocols being used directly, e.g. HL7, CDA, etc? List and provide version. | HL7 V2.5 |
| 2. If standard protocols are not used directly, list and describe the integration or interface engine: |
| a) Describe the capabilities of the engine. | Allow users to design and custom generate the export files. |
b) Describe certification status and standards in use. | NA
---|---

3. Is content being translated and normalized? If so, then:

| a) List and describe the type of content. | ICD-9, ICD-10, SNOMED |
| b) List and describe homegrown or third party software being used. | NA |
| c) Describe certification status of these products. | NA |

D. Exchange partners

| Secretary of State |
| Social Security Administration |
| DHS |
| Office of Retirement Services (ORS) |
| Michigan Disease Surveillance System (MDSS) |
| National Center for Health Statistics |
| National Death Index (Federal) |
| Data Warehouse |
| MCIR |
| MSU |
| MSP |

E. Data flow diagram(s)

| Follows this Table |

F. Significant workflow and Use Cases

By using a web-based reporting system, Vital Records hopes to reduce the current lag time of 120 days to 5 days.

System will be valuable for funeral directors. Currently, funeral directors are required to manually obtain physician signatures, which often require driving extended distances all over the state to the physician’s location.

The web-based system will be rolled out to hospitals, nursing homes, funeral directors, physicians and their staff, who will be required to obtain their supervisor’s signature. The primary user roles of the web-based EDR system are funeral director and physician. With the web-based system, any user can start a case. The system allows messaging between physician and funeral directors; one party can signal to the other that a case has been started and needs the other party to fill in their information.

The web-based system will employ biometric devices and will not required signatures; the system will rely on fingerprint certification rather than a signed document. Users will need to use biometric authentication to log into the system. The biometric requirement arose because of the need to ensure the system is as secure as obtaining a signed document. The use of a username and password was not considered secure enough. Other alternatives to the biometric approach were evaluated but were considered technically complex and costly. Upon initial new
user login, the system will require five fingerprint scans.

The system will require two separate certifications for each record. The physician will be required to provide either a biometric scan or upload a signed and scanned paper medical certificate. The funeral director is always required to provide a biometric scan.

When registering new users, Vital Records will respond to any requests for new user access by sending a paper letter to the physician verifying the request for access. Vital Records will require that all new users sign agreements applying to use of EDRS.

V. Pertinent Third Party products utilized by SOM Systems

| A. Vendor and version both in use at the State and the latest |
| B. Mode of use at the State |
| C. Certification status, if any, of the State version and the latest version of the product |

VI. Additional Pertinent Information

| A. Roadmap | Moving from a paper based legacy system to a modern Web based system. Primarily describing the new system in this analysis. Developing a web interface to the system; nearly live; Plan to start in 2 counties in December. Planning to develop interfaces with BAM, CHAMPS and Bridges. |
| B. How do you see the system utilizing/aiding/interacting with/coexisting with MiHIN? |
| C. Other information |
Electronic Death Registry System

Shapes to use are from the Visio Data Flow Model using Gane-Sarson Notation

APPENDIX J: State of Michigan Systems Technical Environment Analysis
## Appendix C – MDSS

### I. System

<table>
<thead>
<tr>
<th>A. Name</th>
<th>Michigan Disease Surveillance System (MDSS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Description and Purpose</td>
<td>MDSS is a secure web-based statewide integrated surveillance system that can transfer appropriate public health, laboratory, and clinical data efficiently and securely over the Internet; improving Michigan’s abilities to identify and track emerging infectious diseases and potential bioterrorism attacks as well as to investigate outbreaks and monitor public health trends. The system fulfills physician communicable disease reporting requirements, provides case follow-up information and generates reports on all reportable disease in Michigan. Over 930 healthcare providers access the system, including 45 health departments and 241 health care organizations. MDSS is used to track infectious diseases. The system is primarily used for case tracking. MDSS creates ‘case referrals’ requiring follow-up by public health departments at the local level. Geocoding is used to assign cases to specific public health jurisdictions for follow-up. The reportable conditions that are in scope for tracking by MDSS are established by the Council of State and Territorial Epidemiologists. Most reportable conditions are national in scope, with approximately 75 requiring reporting to the CDC. States have the option to locally track an additional set of reportable conditions beyond those required at the national level. Once a case referral is generated, a variety of secondary extensions to this primary use case take place involving the local public health departments. Resources from these agencies follow-up directly with patients, using a variety of forms to gather additional condition-specific data. MDSS is an implementation of the NEDSS specifications as defined by the US CDC. System is a Web application running on Apache on UNIX with Clustered Oracle for the database also on UNIX. It is a 24x7 system.</td>
</tr>
</tbody>
</table>

### II. Patient identity matching

| A. What homegrown or third party products are being used for identity matching? List and describe. | Came with the original source code from STG Corp. which is “not available” to answer questions. Has not been modified or enhanced since then even though system in general is being maintained by Altarum. Has built in de-duplication. When a suspected match is found, the pertinent information is sent to a Pending Queue where a person looks at the record and makes a decision. Uses Name, Gender, and DOB for matching. |
| B. Are you satisfied with what you have? | No |
| C. What do you use for your person/patient ID? | Has its own MPI for every person; uses internal ID based on Name, DOB, and other fields. |
### III. Security and Access Management

<table>
<thead>
<tr>
<th>A. List and describe Identity and Access management software in use, specifically:</th>
<th>SOM Single Sign On utilizing Tivoli for Web interface access. Rhapsody handles security for system to system interfaces.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The current version</td>
<td></td>
</tr>
<tr>
<td>2. Vendor’s latest version</td>
<td></td>
</tr>
<tr>
<td>3. Whether home grown or customized</td>
<td></td>
</tr>
<tr>
<td>4. Standards compliance</td>
<td></td>
</tr>
<tr>
<td>a) HIPAA, required or voluntary</td>
<td>No</td>
</tr>
<tr>
<td>b) DOD</td>
<td></td>
</tr>
<tr>
<td>c) Other</td>
<td></td>
</tr>
</tbody>
</table>

**B. Describe user access provisioning/de-provisioning**

SOM Single Sign On administration for Web access. Application to Local Health Dept or State gets created by local or State respectively. Rhapsody security is administered by Ray Humphreys of MDIT.

**C. Describe encryption in use**

**D. Describe Authorization Models**

**E. Describe transmission security**

SOM standard Zone 2 with DMZ Web Access

**F. Describe Auditing and audit trails:**

| 1. What is being audited | Minimal. |
| 2. How is it being audited | Application level, no database level audits. |
| 3. Is viewing of data being audited | No |

### IV. Health Information Exchange

| A. Description of data records being exchanged | Name, Address, Laboratory Result, Diagnosis |
| B. Is a copy of the data being stored, if so, then: | Is it a permanent copy? Yes |
| 1. Where is it stored? | Oracle Database |
| 3. What are the security controls on the data that is being stored? | Database |

**C. Interfaces utilized for the data exchange**

<p>| 1. Are standard protocols being used directly, e.g. HL7, CDA, etc? List and provide version. | HL7 V2.x is standard for MDSS. Rhapsody is used to translate from other systems to the MDSS HL7 |
| 2. If standard protocols are not used directly, list and describe the integration or interface engine: | System has a Web Frontend for data entry. Interfaces using HL7 v2.x. Interfaces using Web services to CGI. XML file to Rhapsody which translates to PHIN-M5. Currently not implemented and requires manual intervention. |</p>
<table>
<thead>
<tr>
<th>a) Describe the capabilities of the engine.</th>
<th>Rhapsody, PHIN-MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Describe certification status and standards in use.</td>
<td>CDC Standards for PHIN-MS</td>
</tr>
<tr>
<td>3. Is content being translated and normalized? If so, then:</td>
<td></td>
</tr>
<tr>
<td>a) List and describe the type of content.</td>
<td>Laboratory and diagnosis to SNOMED codes</td>
</tr>
<tr>
<td>b) List and describe homegrown or third party software being used.</td>
<td></td>
</tr>
<tr>
<td>c) Describe certification status of these products.</td>
<td></td>
</tr>
</tbody>
</table>

### D. Exchange partners

- Laboratories
- SOM Bureau of Laboratories (Starlims)
- CDC (report Tuberculosis, Coming soon: Varicella)
- CGI

### E. Data flow diagram(s)

Follows this Table

### F. Significant workflow and Use Cases

MDSS serves as a case tracking system. Once a case is generated for a patient with a reportable condition, it is tracked through resolution. Each case is identified as either suspected, probable or confirmed with respect to the associated condition.

A newly created case is initially identified as a ‘suspected’ case of the identified condition. These cases are referred to the local public health agency for follow-up with the patient; additional information about the patient is obtained and recorded in the system by a resource at the local agency.

Cases are reviewed against standard case definitions in order to determine whether the patient may be confirmed as having the suspected condition, the status is updated to ‘confirmed’.

Once a case has been confirmed, it is closed and the relevant data associated with the case is included in routine reports generated subsequently. These reports are made available to local and state health departments as well as individual providers.

### V. Pertinent Third Party products utilized by SOM Systems

#### A. Vendor and version both in use at the State and the latest

Rhapsody runs on a Windows 2003 box which is used by all SOM systems that need to use Rhapsody.

#### B. Mode of use at the State

#### C. Certification status, if any, of the State version and the latest version of the product

### VI. Additional Pertinent Information

---

**APPENDIX J: State of Michigan Systems Technical Environment Analysis**
A. Roadmap

B. How do you see the system utilizing/aiding/interacting with/coexisting with MiHIN?

C. Other information
APPENDIX J: State of Michigan Systems Technical Environment Analysis

MDSS

Shapes to use are from the Visio Data Flow Model using Gane-Sarson Notation.
Appendix D – Syndromic

<table>
<thead>
<tr>
<th>I. System</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Name</td>
<td>Michigan Syndromic Surveillance System (Syndromic)</td>
</tr>
</tbody>
</table>
| B. Description and Purpose | This Syndromic System captures emergency room diagnosis. This includes surveillance for purposes such as tracking influenza outbreaks. The system receives patient chief complaints reported at Emergency Care facilities statewide and classifies this information into a defined set of groups based on the syndromes reported. The system employs a variety of detection algorithms to generate alerts of potential outbreaks. Alerts will allow public health officials to react in a timely fashion to mitigate the effects of any outbreak. 

The system relies on interfaces with all Emergency Care facilities operated within the State of Michigan. There are currently 80 facilities online, including all hospital Emergency Departments and hospital-affiliated urgent care facilities. About 80% report. 

The Syndromic was built on the RODS system initially developed by the University of Pittsburgh. It has undergone significant modification over the years. |

<table>
<thead>
<tr>
<th>II. Patient identity matching</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A. What homegrown or third party products are being used for identity matching? List and describe.</td>
<td>No identifying information is collected.</td>
</tr>
<tr>
<td>B. Are you satisfied with what you have?</td>
<td>NA</td>
</tr>
<tr>
<td>C. What do you use for your person/patient ID?</td>
<td>De-identified data. No person ID.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>III. Security and Access management</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A. List and describe Identity and Access management software in use, specifically:</td>
<td>Uses SOM SSO for the Web Interface</td>
</tr>
<tr>
<td>1. The current version</td>
<td></td>
</tr>
<tr>
<td>2. Vendor’s latest version</td>
<td></td>
</tr>
<tr>
<td>3. Whether home grown or customized</td>
<td></td>
</tr>
<tr>
<td>4. Standards compliance</td>
<td></td>
</tr>
<tr>
<td>a) HIPAA, required or voluntary</td>
<td>No</td>
</tr>
<tr>
<td>b) DOD</td>
<td></td>
</tr>
<tr>
<td>c) Other</td>
<td></td>
</tr>
<tr>
<td>B. Describe user access provisioning/de-provisioning</td>
<td></td>
</tr>
<tr>
<td>C. Describe encryption in use</td>
<td></td>
</tr>
<tr>
<td>D. Describe Authorization Models</td>
<td></td>
</tr>
<tr>
<td>E. Describe transmission security</td>
<td>VPN to Altarum from reporting facilities which is collected and forwarded to the State.</td>
</tr>
<tr>
<td>F. Describe Auditing and audit trails:</td>
<td></td>
</tr>
<tr>
<td>1. What is being audited</td>
<td>IP of reporting facility and connection information.</td>
</tr>
<tr>
<td>2. How is it being audited</td>
<td></td>
</tr>
<tr>
<td>3. Is viewing of data being audited</td>
<td>No</td>
</tr>
</tbody>
</table>

**IV. Health Information Exchange**

| A. Description of data records being exchanged | Chief complaint  
Age  
Sex  
Date of Birth  
Zip code of facility  
Zip code of patient  
FIPS code |
| B. Is a copy of the data being stored, if so, then: | |
| 1. Is it a permanent copy? | Yes |
| 2. Where is it stored? | Oracle on Unix |
| 3. What are the security controls on the data that is being stored? | |

**C. Interfaces utilized for the data exchange**

| 1. Are standard protocols being used directly, e.g. HL7, CDA, etc? List and provide version. | HL7 V2.x ADT only. About 90% of reporting uses this method. |
| 2. If standard protocols are not used directly, list and describe the integration or interface engine: | |
| a) Describe the capabilities of the engine. | DEG using MessageWay software. Biosense from CDC |
| b) Describe certification status and standards in use. | |
| 3. Is content being translated and normalized? If so, then: | |
| a) List and describe the type of content. | Maps ADT’s and Chief complaints to internal descriptions and syndrome groupings. |
| b) List and describe homegrown or third party software being used. | Homegrown |
| c) Describe certification status of these products. | |

**D. Exchange partners**

Interface through VPN from Altarum to system sending HL7 ADT.  
Altarum collects information from ER’s through VPN. Flat files are sent through DEG using MessageWay technology and services. Interfaces using Web services to CGI.
A web interface allows viewing only of compiled data.

<table>
<thead>
<tr>
<th>E. Data flow diagram(s)</th>
<th>Follows this Table</th>
</tr>
</thead>
</table>

**F. Significant workflow and Use Cases**

The system employs a variety of detection algorithms to generate alerts of potential outbreaks. The system automatically runs detection algorithms and generates alerts based on identification of trends and case numbers that exceed certain defined thresholds. It relies on comparisons of case numbers to known averages (including weighting by day of week).

Alerts are generally based on the presence of cluster of cases. The system normally requires the presence of a cluster that is three standard deviations above the mean expected number in order to trigger an alert. Most alerts represent “rule-out conditions” – there are defined protocols for evaluating alerts and ruling out the presence of a specific outbreak. Alerts are communicated to recipients as emails. The system provides a web page that lists current alerts. The regional staff is able to add notes against each of the alerts.

Users from each of the reporting facilities can login and review their own cases. Users from each of the public health agencies can review cases in their jurisdiction. The system provides a variety of canned reports and supports various ad hoc queries. For example, it can provide a report of ambient air temperature vs. heat-related case reports. Information is reported to the CDC (which uses a slightly different classification system) through an automated data feed using Biosense and PHIN-MS, both systems provided free by the CDC. Not all data collected goes to CDC, only data from reporting facilities that had agreements in place.

<table>
<thead>
<tr>
<th>V. Pertinent Third Party products utilized by SOM Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Vendor and version both in use at the State and the latest</td>
</tr>
<tr>
<td>B. Mode of use at the State</td>
</tr>
<tr>
<td>C. Certification status, if any, of the State version and the latest version of the product</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VI. Additional Pertinent Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Roadmap</td>
</tr>
<tr>
<td>B. How do you see the system utilizing/aiding/interacting with/coexisting with MiHIN?</td>
</tr>
<tr>
<td>C. Other information</td>
</tr>
</tbody>
</table>
Syndromic

Shapes to use are from the Visio Data Flow Model using Gane-Sarson Notation.

APPENDIX J: State of Michigan Systems Technical Environment Analysis
## Appendix E – MCIR

### I. System

<table>
<thead>
<tr>
<th>A. Name</th>
<th>Michigan Care Improvement Registry (MCIR)</th>
</tr>
</thead>
</table>

**B. Description and Purpose**

MCIR is a statewide web-based program that contains 70 million shot records of 5.3 million people, primarily children under the age of 20 years. The MCIR is broadly used by state and local health departments, Pediatric/Family practitioners, large Health Systems, health/managed care organizations/insurance, schools and childcare centers, etc. Due to the breadth of its reach into provider practices the MCIR system is also used to present additional information managed by other MDCH programs to the provider such as newborn screening/hearing, lead test results, etc. The MCIR is also used to manage the vaccine inventory, ordering, distribution, and reporting processes for the Vaccines For Children (VFC) program to ensure accountability of publicly funded vaccines. MDCH works thru subcontracts with 6 MCIR regions to enroll and support every immunization provider in the state. Providers administering H1N1 or SNS antivirals must also report to MCIR.

Currently the facilities using the MCIR consist of 4,500 immunization providers/healthcare organizations, 6,600 schools/school districts, 6,500 childcare programs, and public facilities such as local health departments and WIC clinics. Over 15,000 user log-in to system daily. The MCIR system produces a forecast of immunizations due and will generate recall/reminder notices for children who are behind in their immunization requirements.

All years but currently concentrated on persons born on or after 1/1/1994. 15,000 daily logins; 30-100 transactions per second; 15,000+ daily reports. 25-30% of immunization records are captured electronically.

### II. Patient identity matching

#### A. What homegrown or third party products are being used for identity matching? List and describe.

MCIR has its own internal identity matching algorithms. It performs both patient-level and vaccination de-duplication. A process runs nightly and files generated that allow staff at the regional levels merge records. The nightly algorithm identifies potential duplicates and flags them for review.

#### B. Are you satisfied with what you have?

Maybe

#### C. What do you use for your person/patient ID?

Patient id is unique to MICR; It is a smart number; it is numeric and is typically 30 digits.

### III. Security and Access management

#### A. List and describe Identity and Access management software in use, specifically:

SOM Single Sign On utilizing Tivoli for Web interface access.

1. The current version
2. Vendor’s latest version
3. Whether home grown or customized

   Homegrown
APPENDIX J: State of Michigan Systems Technical Environment Analysis

4. Standards compliance
   a) HIPAA, required or voluntary
      Yes
   b) DOD
   c) Other

B. Describe user access provisioning/de-provisioning
   Delegated administration. MCIR is administratively managed through regional offices. In each of
   the 6 MCIR regions (5 local health, and one is SEMHA), a local Health Department holds the
   contract from the state; this is the self-designed fiduciary for the rest of the counties within the
   region. Each regions handles user creation in the system. Each user site can add users to their
   own office account.

C. Describe encryption in use
D. Describe Authorization Models
E. Describe transmission security
F. Describe Auditing and audit trails:
   1. What is being audited
      All data access
   2. How is it being audited
   3. Is viewing of data being audited
      Yes

IV. Health Information Exchange
A. Description of data records being exchanged
   Demographic as well as immunization
B. Is a copy of the data being stored, if so, then:
   1. Is it a permanent copy?
      Yes
   2. Where is it stored?
   3. What are the security controls on the data that is being stored?
C. Interfaces utilized for the data exchange
   1. Are standard protocols being used directly, e.g. HL7, CDA, etc? List and provide
      version.
   2. If standard protocols are not used directly, list and describe the integration or interface
      engine:
      Planning to support HL7 through Rhapsody
      a) Describe the capabilities of the engine.
      b) Describe certification status and standards in use.
   3. Is content being translated and normalized?
      If so, then:
      a) List and describe the type of content.
      CPT and NDC, LOINC is planned.
      b) List and describe homegrown or third party software being used.
      c) Describe certification status of these
| D. Exchange partners | Birth Registry  
|                      | Newborn Screening  
|                      | Newborn Hearing  
|                      | Lead Blood Testing System  
|                      | Women, Infants, and Children Program (WIC)  
|                      | Medicaid  
|                      | EPSDT - Medicaid  
|                      | CDC - VAERS reporting (in development)  
|                      | CDC Counter Measurers Response Administration (CRA) |
| E. Data flow diagram(s) | Follows this Table |
| F. Significant workflow and Use Cases | MCIR is used in all schools and day care centers. Schools are fined if they are below a threshold of immunization coverage – this applies to all public (state-funded) schools. Schools need to have 90% coverage rate for all new entrants and 6th graders (December – 90%, Feb –95%). Schools are allowed waivers if an immunization is missing, it depends on the school district whether the decision is made to pass out waiver forms for parents to sign. Schools often get paper records of immunizations for new incoming students (i.e. from out-of-state). School vaccination records are generally entered by a non-clinician (typically a secretary). They use MCIR to check a student’s immunization status. If they see a dose is missing on the registry but have it available on paper, can enter the missing doses. For intrastate relocation, the students are already in the system. Federal regulations apply to MCIR records provided by schools (FERPA – equivalent of HIPAA for schools). The State cannot data about school compliance to providers. The system can be used to identify vaccines entered by schools, but this is only available to local Health Departments. MCIR receives approximately 800,000 Medicaid lookups per month. The Medicaid lookups are from health plans and health departments. MCIR receives a Medicaid file of all children enrolled in Medicaid with their Medicaid IDs; this is a periodic file transfer from Medicaid. The Medicaid file updates the patient information in the MCIR records with the name of the health plan the patient is enrolled in. MCIR is partly used by providers for Medicaid eligibility verification.  
|                      | V. Pertinent Third Party products utilized by SOM Systems  
|                      | A. Vendor and version both in use at the State and the latest  
|                      | B. Mode of use at the State  
|                      | C. Certification status, if any, of the State version and the latest version of the product  
|                      | VI. Additional Pertinent Information  
|                      | A. Roadmap  
|                      | B. How do you see the system | Reduce provider duplicative data entry and capture higher quality clinical data utilizing HL7 |
| **utilizing/aiding/interacting with/coexisting with MiHIN?** | feeds; Reduce missed opportunities by allowing EMR’s to leverage MCIR data and next dose due recommendations. Increase the % of MCIR data that is captured electronically |
| **C. Other information** |  |
# Appendix F – BOL

## I. System

<table>
<thead>
<tr>
<th>A. Name</th>
<th>Bureau of Laboratories (BOL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Description and Purpose</td>
<td>Its mission is to provide selected laboratory services to providers, hospitals, health departments, animal control, the FBI, DHS and other laboratories in the State of Michigan. Its purpose is to discover critical health issues (e.g. new born screening, rabies) quickly and in time. It is also entrusted with ensuring adequate statewide laboratory capacity to perform new and public health critical tests which may not be available commercially yet (e.g. the West Nile virus). Currently in transition from EPIC to STARLIMS (expected completion is early 2010) these Michigan laboratory information management systems enable tracking and reporting of laboratory tests as performed by the State Bureau of Laboratories and regional laboratory partners. The implementation of STARLIMS will allow real-time, secure electronic transfers of data via the intranet and/or internet to public health, laboratories, and healthcare providers. Uses an integrated hardware-software system from Perkin-Elmer for New Born Screening, and another similar one from Perkin-Elmer for Lead Screening (Labworks).</td>
</tr>
</tbody>
</table>

## II. Patient identity matching

| A. What homegrown or third party products are being used for identity matching? List and describe. | Collect 5 pieces of information including SSN. Require at least 3 for matching. |
| B. Are you satisfied with what you have? |
| C. What do you use for your person/patient ID? | StarLims internal |

## III. Security and Access management

| A. List and describe Identity and Access management software in use, specifically: | |
| 1. The current version | Comes as part of the StarLims system |
| 2. Vendor’s latest version | |
| 3. Whether home grown or customized | |
| 4. Standards compliance | |
| a) HIPAA, required or voluntary | Yes |
| b) DOD | |
| c) Other | |
| B. Describe user access provisioning/de-provisioning | Centralized to two people who provision the user IDs and passwords. |
### C. Describe encryption in use

### D. Describe Authorization Models

### E. Describe transmission security

### F. Describe Auditing and audit trails:
1. **What is being audited**
   - Full auditing
2. **How is it being audited**
3. **Is viewing of data being audited**
   - No

### IV. Health Information Exchange

#### A. Description of data records being exchanged
- Demographic Information, Laboratory Test Results.

#### B. Is a copy of the data being stored, if so, then:
1. **Is it a permanent copy?**
   - Yes
2. **Where is it stored?**
   - StarLims
3. **What are the security controls on the data that is being stored?**

#### C. Interfaces utilized for the data exchange
1. **Are standard protocols being used directly, e.g. HL7, CDA, etc? List and provide version.**
   - HL7 V2.3
2. **If standard protocols are not used directly, list and describe the integration or interface engine:**
   - Rhapsody
   - a) **Describe the capabilities of the engine.**
     - See Rhapsody documentation.
   - b) **Describe certification status and standards in use.**
3. **Is content being translated and normalized? If so, then:**
   - a) **List and describe the type of content.**
     - SNOMED or LOINC
     - Assigned manually when test is set up by Laboratory
   - b) **List and describe homegrown or third party software being used.**
   - c) **Describe certification status of these products.**

#### D. Exchange partners
- CDC
- CHAMPS
- MDSS
- MCIR
- State Laboratories

#### E. Data flow diagram(s)
- Follows this Table

#### F. Significant workflow and Use Cases
- Typical inbound laboratory request is sent with paper laboratory form and specimen. Data is
manually entered into system. Paper results mailed back, fax possible if HIPAA “secure fax” paperwork on file.

Newborn screening:
Baby born
Sample Card filled in, sample taken within 24 hours of birth at hospital
Hospital sends card
BOL gets card, and manually enters data into PerkinElmer System.
Results feed goes to CDW
EPI reviews with information from Birth Registry.
MCIR can see results as PDF from CDW via web service.

<table>
<thead>
<tr>
<th><strong>V. Pertinent Third Party products utilized by SOM Systems</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Vendor and version both in use at the State and the latest</strong></td>
</tr>
<tr>
<td><strong>B. Mode of use at the State</strong></td>
</tr>
<tr>
<td><strong>C. Certification status, if any, of the State version and the latest version of the product</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>VI. Additional Pertinent Information</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Roadmap</strong></td>
</tr>
<tr>
<td><strong>B. How do you see the system utilizing/aiding/interacting with/coexisting with MiHIN?</strong> Use to send HL7 messages to BOL with demographics and sample ID to avoid manual entry Report results using HL7 messages Send alerts and other non-clinical information to interested parties</td>
</tr>
<tr>
<td><strong>C. Other information</strong></td>
</tr>
</tbody>
</table>
APPENDIX J: State of Michigan Systems Technical Environment Analysis

Bureau of Labs (BOL)

Shapes to use are from the Visio Data Flow Model using Gane-Sarson Notation.

APPENDIX J: State of Michigan Systems Technical Environment Analysis
## Appendix G – Corrections

### I. System

<table>
<thead>
<tr>
<th>A. Name</th>
<th>Department of Corrections NextGen EMR</th>
</tr>
</thead>
</table>

| B. Description and Purpose | The purpose of the DoC EHR is to provide high quality care to the prison population at an efficient cost. Modern process, such as eRx, is used for efficient process. Future enhancement will support bidirectional data flows with the SoM DW. Since many of the inmates are in the SoM systems (DCH, DHS) prior to and after incarceration, sharing of the information will allow the reduction of duplicate testing when a new patient/inmate enters the BoC system and allow the DHS/DCH to fill in the gap in their records while the person was in prison. |

### II. Patient identity matching

<table>
<thead>
<tr>
<th>A. What homegrown or third party products are being used for identity matching? List and describe.</th>
<th>NextGen has a proprietary system for checking for duplicate patients based on such factors as same social security number, name, and address.</th>
</tr>
</thead>
</table>

| B. Are you satisfied with what you have? | |

| C. What do you use for your person/patient ID? | COTS |

### III. Security and Access management

<table>
<thead>
<tr>
<th>A. List and describe Identity and Access management software in use, specifically:</th>
<th>Proprietary to NextGen, role based.</th>
</tr>
</thead>
</table>

| 1. The current version | |
| 2. Vendor’s latest version | |
| 3. Whether home grown or customized | |
| 4. Standards compliance | |
| a) HIPAA, required or voluntary | HIPAA compliant |
| b) DOD | |
| c) Other | |

<table>
<thead>
<tr>
<th>B. Describe user access provisioning/de-provisioning</th>
<th>Proprietary to NextGen, performed by administrative user</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>C. Describe encryption in use</th>
<th>No encryption at application level, assumes trusted network.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>D. Describe Authorization Models</th>
<th>Authorization is role based, defined in system.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>E. Describe transmission security</th>
<th>Transmission security would have to be handled at the network and/or transport level.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>F. Describe Auditing and audit trails:</th>
<th></th>
</tr>
</thead>
</table>

| 1. What is being audited | Auditing is CCHIT compliant, ATNA compliance planned. |
| 2. How is it being audited | Proprietary logs, ATNA compliance planned. |
| 3. Is viewing of data being audited | Can be enabled, causes performance decrease due to increased system load. |

### IV. Health Information Exchange
<table>
<thead>
<tr>
<th>A. Description of data records being exchanged</th>
<th>eRx with PharmCORR via SureScripts, likely NCPDP; laboratory results sent back via hl7 from Garcia Laboratories; claims data loaded into system from x.12 835 files sent from AETNA; Data from OMNI system is loaded into NextGen Mon-Fri to load patient demographic data.</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Is a copy of the data being stored, if so, then:</td>
<td></td>
</tr>
<tr>
<td>1. Is it a permanent copy?</td>
<td></td>
</tr>
<tr>
<td>2. Where is it stored?</td>
<td></td>
</tr>
<tr>
<td>3. What are the security controls on the data that is being stored?</td>
<td></td>
</tr>
<tr>
<td>C. Interfaces utilized for the data exchange</td>
<td></td>
</tr>
<tr>
<td>1. Are standard protocols being used directly, e.g. HL7, CDA, etc? List and provide version.</td>
<td>HL7 v2.x for laboratory results inbound via Rosetta tool, Surescripts network for eRx, Ability to export and import CCD/C32 documents</td>
</tr>
<tr>
<td>2. If standard protocols are not used directly, list and describe the integration or interface engine:</td>
<td></td>
</tr>
<tr>
<td>a) Describe the capabilities of the engine.</td>
<td></td>
</tr>
<tr>
<td>b) Describe certification status and standards in use.</td>
<td></td>
</tr>
<tr>
<td>3. Is content being translated and normalized? If so, then:</td>
<td></td>
</tr>
<tr>
<td>a) List and describe the type of content.</td>
<td></td>
</tr>
<tr>
<td>b) List and describe homegrown or third party software being used.</td>
<td></td>
</tr>
<tr>
<td>c) Describe certification status of these products.</td>
<td></td>
</tr>
<tr>
<td>D. Exchange partners</td>
<td>PharmCORR, AETNA, Garcia Laboratories, Prison Health Services (OMNI data)</td>
</tr>
<tr>
<td>E. Data flow diagram(s)</td>
<td>Follows this Table</td>
</tr>
<tr>
<td>F. Significant workflow and Use Cases</td>
<td></td>
</tr>
<tr>
<td>V. Pertinent Third Party products utilized by SOM Systems</td>
<td></td>
</tr>
<tr>
<td>A. Vendor and version both in use at the State and the latest</td>
<td></td>
</tr>
<tr>
<td>B. Mode of use at the State</td>
<td></td>
</tr>
<tr>
<td>C. Certification status, if any, of the State version and the latest version of the product</td>
<td></td>
</tr>
<tr>
<td>VI. Additional Pertinent Information</td>
<td></td>
</tr>
<tr>
<td>A. Roadmap</td>
<td>Plan to send to and load from DW to allow data to/from DHS, DCH.</td>
</tr>
<tr>
<td>B. How do you see the system</td>
<td></td>
</tr>
<tr>
<td>utilizing/aiding/interacting with/coexisting with MiHIN?</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>C. Other information</td>
<td></td>
</tr>
</tbody>
</table>
Appendix H – Data Warehouse

I. System

<table>
<thead>
<tr>
<th>A. Name</th>
<th>Data Warehouse</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>B. Description and Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>As one of the largest departments in the State of Michigan, the Michigan Department of Community Health (MDCH) is responsible for managing the delivery of health care services to approximately two million Michigan residents and overseeing an annual budget of $10 billion. MDCH administers many of the State’s most critical programs, including: Medicaid (fee-for-service and managed care), the Women, Infant and Children (WIC) assistance program, the Childhood Lead Poisoning Prevention Program (CLPPP), the Michigan Care Improvement Registry (MCIR), and Vital Records (e.g., births and deaths). Many of MDCH’s clients are enrolled in multiple programs supported by the department. However, until the implementation of the data warehouse it was virtually impossible to track and monitor services and costs associated with a single client through separate health-related agencies included under the MDCH umbrella. Each agency administers state and/or federally mandated programs with overlapping client bases in an environment of expanding populations, increasing costs, and an ever-changing set of complex regulations. The MDCH Data Warehouse meets the challenge of tracking individual clients and providing decision support capability by integrating 27 separate health-related agency data sources into a single integrated environment.</td>
</tr>
</tbody>
</table>

II. Patient identity matching

<table>
<thead>
<tr>
<th>A. What homegrown or third party products are being used for identity matching? List and describe.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homegrown patient identity matching as well as an Master Patient Index (MPI) and Record Locator Service (RLS)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. Are you satisfied with what you have?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C. What do you use for your person/patient ID?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uses a Unique Client ID (UCI) for the MPI which ties all the records for that person from all the other systems together.</td>
</tr>
</tbody>
</table>

III. Security and Access management

<table>
<thead>
<tr>
<th>A. List and describe Identity and Access management software in use, specifically:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uses SOM Single Sign On</td>
</tr>
</tbody>
</table>

| 1. The current version |
| 2. Vendor’s latest version |
| 3. Whether home grown or customized |
| 4. Standards compliance |
| a) HIPAA, required or voluntary |
| b) DOD |
| c) Other |
| Yes. Has Business Partner Agreements with users of the data it houses. |

APPENDIX J: State of Michigan Systems Technical Environment Analysis
<table>
<thead>
<tr>
<th>B.</th>
<th>Describe user access provisioning/de-provisioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.</td>
<td>Describe encryption in use</td>
</tr>
<tr>
<td>D.</td>
<td>Describe Authorization Models</td>
</tr>
<tr>
<td>E.</td>
<td>Describe transmission security</td>
</tr>
<tr>
<td>F.</td>
<td>Describe Auditing and audit trails:</td>
</tr>
<tr>
<td>1.</td>
<td>What is being audited</td>
</tr>
<tr>
<td>2.</td>
<td>How is it being audited</td>
</tr>
<tr>
<td>3.</td>
<td>Is viewing of data being audited</td>
</tr>
</tbody>
</table>

**IV. Health Information Exchange**

A. **Description of data records being exchanged**
  Too many to enumerate. See source systems for details.

B. **Is a copy of the data being stored, if so, then:**

1. **Is it a permanent copy?** Yes
2. **Where is it stored?** Teradata database.
3. **What are the security controls on the data that is being stored?** HIPAA compliance is required.

C. **Interfaces utilized for the data exchange**

1. **Are standard protocols being used directly, e.g. HL7, CDA, etc? List and provide version.** No
2. **If standard protocols are not used directly, list and describe the integration or interface engine:**
   a) **Describe the capabilities of the engine.** ETL Tools; Flat Files
   b) **Describe certification status and standards in use.**
3. **Is content being translated and normalized? If so, then:**
   a) **List and describe the type of content.** Normalization of multiple systems’ similar data.
   b) **List and describe homegrown or third party software being used.**
   c) **Describe certification status of these products.**

D. **Exchange partners**

- Births
- Michigan Care Improvement Registry (MCIR)
- Women Infants Children (WIC)
- PRAMS
- MIHAS
- Newborn Metabolic and Hearing Screening
**E. Data flow diagram(s)**

**F. Significant workflow and Use Cases**

Health Care Analysis and Outreach
Through contractual agreements, MDCH works with external entities to improve the quality of care for Michigan Medicaid beneficiaries. This analytical/evaluation capacity provides MDCH with program analysis and policy reports on topics specified by MDCH, and collaboration for joint grant development on longer range, more complex processes. For example, MDCH worked with Michigan State University’s Institute for Health Care Studies (IHCS) to analyze Newborn Metabolic and Hearing Screening. Analysis was performed to determine if beneficiaries are receiving their immunizations, by matching beneficiaries with positive metabolic screens to MCIR data.

Fraud Control
Michigan’s Office of Attorney General, Health Care Fraud Control Unit uses the Medicaid Fee-for-Service Standard Reports Model to complete criminal investigations in conjunction with MDCH Medical Services Administration, Program Investigation Section as mandated by federal regulations and state statutes.

Medicare Part D
Over 217,000 Michigan low-income beneficiaries are enrolled in Medicaid and Medicare (known as dual eligibles). Prescription drug coverage for these individuals was transitioned from Medicaid to Medicare Part D. It was critical for MDCH to ensure that no gaps in coverage occurred for this very vulnerable population. The data warehouse was a key factor in Michigan’s successful implementation of Medicare Part D.

Managed Care
The Managed Care Plan Division uses the HIPAA Health Care Model daily to gather information regarding paid claims, capitations, and maternity case rates as well as to check the encounter data submitted by the Medicaid Health Plans (MHPs) and County Health Plans (CHPs). The data warehouse is a critical tool in resolving payment, eligibility, and enrollment issues.
**utilized by SOM Systems**

| A. Vendor and version both in use at the State and the latest |
| B. Mode of use at the State |
| C. Certification status, if any, of the State version and the latest version of the product |

**VI. Additional Pertinent Information**

| A. Roadmap | Currently creating an RFP to either upgrade existing system or by a new one |
| B. How do you see the system utilizing/aiding/interacting with/coexisting with MiHIN? | Could offer analytic services and historical data. Could aid in startup of MIHIN. |
| C. Other information | |

APPENDIX J: State of Michigan Systems Technical Environment Analysis
# Appendix G – Warehouse ID Matching Criteria by Source System

Data provided by DCH

Unique Client Identifier statistics

53,526,126 Total Records

104 GB Current warehouse storage space used

Teradata Relational Database Management System

The following table shows the columns that are used for matching by the UCI process, and a count of records by system. A “Y” in a comparison column indicates that the column is maintained by the source system; however, the field may not always be populated. Quality of data varies from source system to source system. The count of records may appear high when compared to a count of unique identifiers in the source system. This is due to the fact that UCI keeps all historical names for comparison purposes. Many source systems also have addresses available but addresses are not used in the UCI process.

<table>
<thead>
<tr>
<th>System</th>
<th>Last Name</th>
<th>First Name</th>
<th>Middle Initial</th>
<th>Name Suffix</th>
<th>DOB</th>
<th>SSN</th>
<th>Gender</th>
<th>Medicaid Beneficiary ID</th>
<th>WIC</th>
<th>Birth C ID</th>
<th>Record Counts in UCI</th>
<th>Source System Identifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bureau of Workman’s Comp</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>3,597,859 SSN</td>
<td>Bureau of Workman’s Comp</td>
</tr>
<tr>
<td>CEPI</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>21,254 UC</td>
<td>CEPI</td>
</tr>
<tr>
<td>Child Support Enfc Srvc</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>5,010,818 MI, MI Recip ID</td>
<td>Child Support Enfc Srvc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FIA</td>
<td>Y*</td>
<td>Y*</td>
<td>Y*</td>
<td>Y*</td>
<td>Y*</td>
<td>Y*</td>
<td>Y*</td>
<td>Y*</td>
<td>Y*</td>
<td>Y*</td>
<td>8,417,469 Recipient ID</td>
<td>FIA</td>
</tr>
<tr>
<td>IA Registry</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>25,712 State Number</td>
<td>IA Registry</td>
</tr>
<tr>
<td>Lead Screening</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>1,680,884 Last Name, First Name, MI, DOB, Specimen date</td>
<td>Lead Screening</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long Term Home Care</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>110,911 SSN</td>
<td>Long Term Home Care</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long Term Nursing Home</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>4,283,034 Assessment Internal ID</td>
<td>Long Term Nursing Home</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long Term OASIS</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>4,434,997 IIHA Assessment Internal ID</td>
<td>Long Term OASIS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCIR</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>7,023,710 Child ID</td>
<td>MCIR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
<td>Y*</td>
<td>Y*</td>
<td>Y*</td>
<td>Y*</td>
<td>Y*</td>
<td>Y*</td>
<td>Y*</td>
<td>Y*</td>
<td>6,687,035 Beneficiary ID</td>
<td>Medicaid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metabolic Screening Child</td>
<td>Y*</td>
<td>Y*</td>
<td>Y*</td>
<td>Y*</td>
<td>Y*</td>
<td>Y*</td>
<td>Y*</td>
<td>Y*</td>
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*Y* = Indicates that data element is extracted from another data element

YD = Yes by default

APPENDIX J: State of Michigan Systems Technical Environment Analysis
Appendix K: Vendor Technical Collaboration Team

The consulting team S2A is now accepting nominations to the MiHIN Vendor Technical Collaboration Team. Nominations will be accepted for both vendor and stakeholder members to the MiHIN Vendor Technical Collaboration Team. While the work of this team will be presented to the MiHIN Technical Workgroup for approval to be included in the MiHIN Architecture Design this is not a State of Michigan sponsored activity. The work of this team will be facilitated by the S2A consultants.

We will hold open nominations for 10 working days from the date of posting on the MiHIN web site. Once the 10 days are up we will select the team and begin work. However we will accept additional nominations after the initial period.

Background: Any project with the scope of the MiHIN requires collaboration and involvement from numerous parties. To provide guidance to the project, the current MiHIN leadership is forming workgroups for Governance, Business Operations and Technical Specifications. There will also be sub-workgroups for Privacy and Security, Finance and Performance Measurement. One of the goals of the Technical Workgroup is to develop the system architecture and standards that can be implemented into highly interoperable infrastructure. While following national standards are very important they are not sufficient to implement the necessary infrastructure. Because most national standards are architecture agnostic they fall short of being true implementation specifications.

A successful approach used in other Health Information Exchange (HIE) projects is to engage both stakeholder IT resources and a broad base of Health Information Technology (HIT) and HIE vendors in the design and standards setting process. We are calling this team the Vendor Technical Collaboration Team. In some HIE projects this team might be merged with the Technical Workgroup. However to mitigate any conflict of interest we have decided that we should keep this team separate from the MiHIN Technical Workgroup which will be creating requirements that would eventually become part of an RFP that some of these vendors might bid on. The work of this team will ensure that any design work done by the Technical Workgroup can be implemented by a large majority of the HIT and HIE vendors.

Charter: The focus of this Vendor Technical Collaboration Team will be to assist the MiHIN Technical Workgroup and the Project Control Office (PCO) in the development of the MiHIN Backbone architecture, interoperability standards, system security, shared services definition and implementation.

Why do we need a Vendor Technical Collaboration Team?

- The nature of this project is to create a backbone and state-wide Health Information Exchange infrastructure that is capable of allowing any vendor to interoperate as long as they follow national and state-wide standards
- The success of this backbone hinges on its ability to interoperate with broad array of stakeholder and vendor systems.
- While there are some national standards most of them are developed to be vendor and architecture agnostic. Applying these standards to a particular architecture takes significant work.
• By getting a number of vendor organizations to develop a consensus on how to implement specific functions and services of the backbone we ensure higher interoperability and encourage more competition for specific services going forward
• There is strong precedence for this at the national and at state levels
• The ONC is looking for states and regions to develop standards and submit them for national review and acceptance

Goals of the MiHIN Vendor Technical Collaboration Team

To assist the MiHIN Consultants in:

• the design of the MiHIN Backbone technical architecture
• recommending approaches for the implementation of the backbone
• defining the interoperability standards that should be implemented for the backbone and the integration with all community HIE organizations and EHR vendors
• the definition of the terminology (nomenclature) standards that should be implemented for the backbone
• the development of security standards and processes for the backbone
• the development of shared services definitions and technology deployment
• assisting in the backbone implementation and testing during implementation

Participants

• Co-chairs and Voting Members of the MiHIN Technology Workgroup
• MiHIN Project Control Office Consulting Team (Team Leadership)
• Key State of Michigan Department Staff
• Backbone or HIE Vendors Technical Staff
• EHR Vendors Technical Staff
• Select technical resources from stakeholder organizations

Process for Forming the Vendor Technical Collaboration Team

The Vendor Collaboration Team will be assembled and facilitated by the MiHIN Dewpoint/S2A consulting team. The selection process will encourage broad vendor participation to meet the goals described above. Each of the 30 RFI respondent organizations will be contacted and encouraged to nominate a member of their organization to participate. Other organizations that we know of who can add to the process will also be invited. We will also post this on the MiHIN and Dewpoint web sites and ask for open nominations.

Nominations will be done online via Survey Monkey. Vendors will have 10 working days to respond before we begin meetings but others members can be added later. Please see the Criteria for Selecting Vendors and Guidelines for Membership below.

Criteria for Selecting Vendors

1. Vendors are defined as those organizations that currently have HIT or HIE products, implement open source HIE products, or develop software for interoperable healthcare services and market and sell these products or services
2. Vendors may have full service HIE products or individual products such as security services, master patient indices, messaging gateways or other products
3. Vendors who re-sell other vendors' products generally will not be allowed unless they provide significant value-added services such as software enhancements that promote interoperability.

4. Vendors must be CCHIT certified or for those products not yet covered by CCHIT certification they must demonstrate commitment to national standards for Health Information Technology interoperability.

5. Vendors who have been actively involved in national and regional HIE standards efforts are encouraged to participate.

6. Vendors with operating HIE systems being used by Regional Health Information Organizations (RHIOs) or backbone products used by national, state or regional consortiums are encouraged to participate.

7. Consultant organizations (other than the PCO consultant team) will not be allowed unless they meet one of the other vendor criteria above.

8. Vendors will not be able to develop system requirements and will not be voting members of any MiHIN Workgroup.

9. Michigan stakeholder organizations that have existing technology which may be leveraged for the MiHIN are not considered Vendors for the purposes of this process, thus they may be voting members of the MiHIN workgroups.

10. In some cases more than one representative from an organization may be allowed to participate if they bring additional skills to the team.

**Guidelines for Membership**

1. This is not a sales activity and no vendor sales staff will be allowed.

2. While broad participation from Technical Workgroup and vendors is highly desirable, membership will be limited to individuals who bring strong technical skills and specific knowledge to the team.

3. Each member must be impartial in their work on this Collaboration Team in much the same manner as working on development of national standards.

4. Members will be asked to complete a Conflict of Interest and Intellectual Property form with Dewpoint/S2a which will describe their affiliations and protect any intellectual property that they may expose during the course of these sessions.

5. Members will be expected to contribute to the work by performing some limited work assignments such as reviewing and commenting on documents, collecting data to be shared with the team and other tasks. In general, the requirement for participation will be limited to about 8 hours per month. Some members may be asked to volunteer to complete more extensive work assignments, but this will be voluntary.

6. Vendor organizations may nominate one or more individuals for participation on the Collaboration Team; however, the Collaboration Team leadership will decide on individual participation.

7. Participation is limited to individuals not organizations. Organizations may not substitute at will for individual members but rather can nominate others for membership.

8. Participation by individuals from vendor organizations will not enhance nor hinder a vendor's opportunity to be selected for any State of Michigan or other MiHIN contracts.

9. Any member, as determined by the Collaboration Team leadership, who is not following these guidelines, may be asked to leave the team.
Appendix G: MCEITA Other Underserved Settings
Michigan Center for Effective IT Adoption (M-CEITA)

Michigan has been in a recession for six years running due to permanent changes in the auto industry and recently held the highest unemployment rate in the nation for four years in a row. These conditions have put incredible demand on all levels and settings of the health care system and most settings have dramatically increased the numbers of uninsured, underinsured and other medically underserved populations while their incomes have held steady or decreased. To adequately address the need for primary care HIT services in Michigan, M-CEITA proposes the following definition of "other settings that predominantly serve uninsured, underinsured, and medically underserved populations" and of "collaborative practices" with the understanding that M-CEITA is limited to no more than 20% of the REC’s total providers falling into these categories.

Definition of Other Underserved Settings

1. State and County correctional settings, where the REC can claim up to 10 PPCPs per practice (i.e. physical location/geographic) site.

2. School-Based and School-Linked Health Centers as identified by the School-Community Health Alliance of Michigan, where the REC can claim up to 10 PPCPs per practice (i.e. physical location/geographic) site.

3. Public health clinics defined as any health care clinic environment operated by a local public health agency (Michigan Public Health Code, MCL 368-1978-2-24) that provides primary patient care, or a sub-section of primary patient care, in the State of Michigan, where the REC can claim up to 10 PPCPs per practice (i.e. physical location/geographic) site.

4. Pediatrician offices seeing at least 10% combined Medicaid, MICHild, and uncompensated care where the REC can claim up to 10 PPCPs per practice (i.e. physical location/geographic) site.

5. Visiting and home help providers providing primary care services in alternative settings. Such provider’s home office would be considered the site location; additional office locations would be considered additional geographic sites. The REC can claim up to 10 PPCPs per practice (i.e. physical location/geographic) site.

6. Primary care settings in which at least 15% of care consists of any combination of Medicaid and uninsured (i.e. 10% Medicaid plus 5% uninsured would equal a total of 20% underserved and qualify the clinic for M-CEITA services), where the REC can claim up to 10 PPCPs per practice (i.e. physical location/geographic) site. These settings include but are not limited to:
   a. Hospital-owned outpatient clinics which share the same tax ID number as the affiliated hospital (i.e. each clinic is a site for which the REC can claim up to 10 PPCPs)
   b. Private practices with more than 10 primary care providers
7. Rural practices if the practice(s) is located or primarily serves patients residing in a zip code with a U.S. Census Rural-Urban Commuting Area (RUCA) Code of 4 or higher, the REC can claim up to 10 PPCPs per practice (i.e. physical location/geographic) site.

8. Practices located in and serving an area that has been identified as a Health Professional Shortage Area (HPSA) as defined at 42 USC 254e and 42 CFR § 5.2, then the REC can claim up to 10 PPCPs per practice (i.e. physical location/geographic) site.

9. Practices located in and serving in an “economically depressed” county, defined as where the county poverty level is higher than the national average poverty level based on data from the most recently available from the US Census Bureau, where the REC can claim up to 10 PPCPs per practice (i.e. physical location/geographic) site.

10. Practices that predominantly serve an ethnic, religious, cultural or refugee population(s) that face barriers to and disparities in health care (e.g. metropolitan Detroit has more than 300,000 Arab Americans including sizable numbers of recently arrived Iraqi refugees who have settled near the Middle Eastern communities in Southeast Michigan), where the REC can claim up to 10 PPCPs per practice (i.e. physical location/geographic) site. disparity

11. M-CEITA believes there may be other practices that predominantly serve uninsured, underinsured and medically underserved populations that fall outside of the existing underserved definitions. M-CEITA’s policy is to consider those practices on a case-by-case basis and, if required, to present such cases to ONC for approval.

Practice Consortium Definition

1. The REC can claim up to 10 PPCPs per practice (i.e. physical location/geographic) site in collaborative practices where either:
   a. Individual practice sites were historically independent
   b. Individual practice sites bill commonly but function independently
END OF DOCUMENT