solution to this serious problem, therefore, must consider all of these phases. Plans have been completed to address errors at the dispensing, ordering and transcribing phases through computerized pharmacy and CPOE applications, but these approaches do nothing to correct the 34 percent of errors that occur at the end of the medication chain, namely its administration by nursing staff. A bar coding system that we propose to install will fill this lapse and provide an important safeguard for hospitalized patients. It will ensure that the right medication in the right dose is given to the right patient at the right time by an administrator who is qualified and authorized to give it. It will offer alerts regarding potential drug interactions and allergic reactions. It will provide a permanent record of the patient's medication history accessible by health care providers at any site within the partnership. It will track "near misses," so that more errors can be avoided in the future. It will save many of the thousands of dollars that are spent in repairing the damage done by each medication error, lead to better health outcomes for patients, and improve the health of our communities. The bar coding application, offered by the vendor Cerner, will be installed in all six hospitals sequentially over a period of 2-1/2 years. At the end of this period, the hospitals will be willing to share system design and lessons learned.

**Estimated Total Funding:** $1,254,250 (Year one Funding: $500,000)
**Principal Investigator:** Randi Oehlers
**A lli t Institution:** Munson M lical Center (Tr erse City, MI)
**C r i** Rural
**Technology:** Pharmacy Information System, Cl OE, Bar ding, sonal Dig s i d Wide Area Network, Wireless, Electronic Medication Administration ords dical Informati Systems
**C: Setting:** Inpatient
**G N t** UC1 H 487 (9/20/04 – 9/29/07

**C. HIT Support for Safe Nursing Care**

**Description:** Examines the use of the HANDS software system, an HIT supported care planning process for nursing care, and its ability to be transferable between nurses, units, and health care settings.

**Abstract:** To enhance safety culture and reduce errors in hospital units, lessons from high-risk industries can increase effectiveness of HIT-supported nurse care-planning and record-keeping. This *three-year* project supports the care planning process by standardizing and structuring the activities surrounding it, and making it transferable between nurses on one unit, between units, and among health care settings. The central hypothesis is that the reengineered HIT-supported care planning process leads to a safety culture through the development of greater "collective mind, "mindfulness", and "heedful interrelating" among nurses across time and settings to facilitate information flow. The specific aims of this project are: 1) to demonstrate that HIT can be successfully implemented to support nurses in a dynamic care planning process encompassing both the planning and provision of care within units and across health care settings; and 2) to demonstrate that a HIT-supported care planning process leads to a stronger safety culture. A convenience sample of eight nursing units (four units in year one, four units in year two) in five health care organizations will complete the care planning training and implement the Hands-on Automated Nursing Data System (HANDS) care planning process under real-time conditions to test standardization and improvement in communication and enhancement of a safety culture. Data analysis and interpretation will inform the long-range goal of a future real-time implementation in settings across the country leading to interdisciplinary integration and informing execution of an EHR.

**Estimated Total Funding:** $1,486,634 (Year one Funding: $490,658)
**Principal Investigator:** Gail Keenan
**Applicant Institution:** Regents of the University of Michigan (Ann Arbor, Mi)
**Community:** Urban
**Technology:** Internet, Clinical Decision Support
**Care Setting:** Inpatient
**Grant Number:** RO1 HS15054 (9/01/04 – 8/31/07)

**D.** Implementation **of** a Regional HIT Network **by 10** Critical Access Hospitals

Description: Establishes a Web-based EMR system for 10 small rural hospitals to connect them to the area's regional medical center (Marquette General Hospital). The project's ultimate goal is to quickly give all providers access to patient data, eliminate duplicate tests and exams, deliver high-quality care, reduce medical errors, and track health outcomes.

Abstract: During the past year, ten independently owned and operated Critical Access Hospitals (CAH) located in Michigan's Upper Peninsula joined with the region's only medical center to form the Michigan Upper Peninsula Health Information Technology Network to improve patient safety and quality of care through the regional planning, development, and implementation of HIT.

The Network is creating a web-based, portal / repository application that allows selected clinical information to be accessed by authorized physicians and other health care providers for patient care delivery and quality reporting. The IT infrastructure connecting the participants **is** already in place and used for video teleconferencing and patient education. Network HIT applications will include: (a) HIT systems at each partner hospital that capture and send patient demographic and clinical data to the regional data repository; (b) a regional HIT master patient index /unique patient identifier; (c) a regional HIT interface engine to accept and reformat incoming data from the Partner HIT systems; (d) a regional HIT clinical data repository that contains a consolidated summary of patient information; and (e) a web-based portal viewer allowing clinical information to be accessed by providers.

Project goals include: (1) Establish data vocabulary and exchange requirements to ensure comparability and interoperability; (2) Install local network HIT systems in a phased manner; (3) Implement the regional HIT systems and associated support services; (4) Implement the local HIT to regional data sharing components; (5) Analyze &verify the data and technology-related aspects of the project; (6) Evaluate the impact of the HIT Network on patient care delivery and (7) Evaluate the success of the implementation.

During the planning & implementation phases, the Partners will contribute $5,746,091 of in-kind staff support and HIT systems to the project. The project results will be shared with other Critical Access Hospitals, and other state CAH programs.

Estimated Total Funding: $1,484,167 (Year one Funding: $498,506)
Principal Investigator: Donald Wheeler
Applicant Institution: Upper Peninsula Health Care Network (Marquette, MI)
Community: Rural
Technology: Telehealth, HIE, HER, CPOE, Clinical Decision Support
Care Setting: Ambulatory
Grant Number: UC1 HS16152 (9/30/05 – 9/29/08)

## II. BCBSM AND THE PARTNERSHIP FOR MICHIGAN'S HEALTH- REPORT ON EHR IMPLEMENTATION IN THE STATE OF MICHIGAN

On March 22, 2006, Blue Cross Blue Shield of Michigan and the Partnership for Michigan's Health (comprised of the Michigan Health & Hospital Association, the Michigan State Medical Society, and the Michigan Osteopathic Association) released the findings of a state-wide inventory (conducted by KLAS Research) on the use of HIT as it relates to capturing patient health records electronically in the state of Michigan. The goal of this research initiative was to conduct a state-wide inventory of successful EHR implementations within Michigan to: (1) reveal the current level of EHR adoption in Michigan; (2) discover the top initiatives that have been successfully implemented; (3) find and describe top provider organizations with solutions designed for deep clinician use, interoperability, and scalability. The report reveals:

- The top 5 large acute care systems with the most active EHR initiatives are: Trinity Health (Novi/Farmington) that includes Saint Mary's Health Care (Grand Rapids), Mercy General Health Partners (Muskegon), Battle Creek Health System, Saint Mary Mercy Hospital (Livonia), Saint Joseph (Macomb), Mercy Hospital (Port Huron) and Saint Joseph Mercy Health System (Ann Arbor); Hurley Medical Center (Flint), Munson Health Care (Traverse City), Spectrum Health (Grand Rapids) and Detroit Medical Center.
- The top 5 small acute care systems with the most active EHR initiatives are: Pine Rest Christian Mental Health Services (Grand Rapids), Schoolcraft Memorial Hospital (Manistique), Central Michigan Community Hospital (Mount Pleasant), Memorial Health Care (Owosso) and Holland Community Hospital.
- The key findings from the top acute care sites:
  - **4** of the top 5 large hospitals are doing CPOE and 1 of the top 5 small hospitals is doing CPOE
  - **4** of the top 5 acute sites are using Cerner as their system vendor
  - Several of the top 5 sites in the acute space are multi-facility IDNs
  - "Physician buy-in" and having "implementation champions" were key to success in the large and small acute sites
  - Providers spoke about successes in improved patient safety and reduced medical errors, fast access to patient records and ROI from reduced costs for paper, filing, FTEs, etc
  - Providers spoke about challenges in barcodes on medication, physicians dragging their feet, cost of implementing HER, and alert fatigue.
- The top five ambulatory sites with over 25 physicians identified with the most active EHR initiatives were: Trinity Health (Novi/Farmington), Michigan State University (Kalamazoo), Michigan Heart (Ann Arbor), Spectrum Health (Grand Rapids) and Michigan State University (East Lansing).
- The top five ambulatory sites with 6 to 25 physicians identified with the most active EHR initiatives were: Lakewood Family Medicine (Holland), Orthopedic Associates of Grand Rapids, Michigan Heart and Rhythm Group (Troy), Silver Pine Family Medicine Child Health (Sterling Heights), and Michigan Multi-specialty Physicians (Ypsilanti).
- The top five ambulatory sites with 1 to 5 physicians identified with the most active EHR initiatives were: the Center for Women's Health Care (Carson City), Holt Family Practice (Holt), Grand Valley Internal Medicine (Grand Rapids), PrimeCare of Novi, and Associates of Family Medicine (Rochester Hills).
- Physicians cited the Top 3 Essential EMR Implementation Elements as: (1) Physician Buy-In; (2) Experienced and knowledgeable trainers; (3) Implementation Champions (Outsource training **is** last overall).
- Michigan is ahead of the national average for adoption of CPOE as 11% of Michigan's hospitals have added CPOE, compared to the 5.7% nationally.

Among the recommendations in the study[6]:

- Identify the information required to support patient care and safety.
- Continue development of infrastructure to support a regional/state-wide EHR in the state.
- Encourage physician buy-in, as it is an essential element to success.
- Involve physicians, payers and hospitals to promote collaboration within the region.
- Target e-prescribing as a fundamental building block to EHR.
- Define guidelines, standards, formats and infrastructure model and approach.
- Conduct a financial assessment and identify potential funding alternatives.
- Develop incentives to adopt and **use** technology.

The study also identified barriers to EHR development, including varying computer systems, a mix of nonstandard data elements, inconsistent code **sets** and medical vocabularies, the need to promote more e-prescribing and pharmacy integration, and the need for development of unique patient identification solutions.

[6] http //www **bcbsm** com/pr/pr_03-22-2006_14409 shtml

## APPENDIX E: REGIONAL INTERVIEW SUMMARY

In July 2006 the Regional workgroup conducted interviews of self-identified regional initiatives. The process used to conduct these interviews was, two or more representatives from the workgroup met with a representative from the self identified regional effort either via conference call or in-person. The interview template listed below was used for each interview. Not all questions were applicable to all initiatives, depending on their stage of development. During the interviews. previously unknown initiatives were discovered and these initiatives were contacted as well.

Interview Template

1. Is your organization currently exchanging health care information electronically with other providers?
2. If yes:
    a. How is this occurring (ask them to elaborate):
        i. Single, enterprise-wide EMR (which one?)
        ii. Centralized clinical data repository (what's the infrastructure platform?)
        iii. Clinical messaging service (how does it work and what kinds of data are messaged?)
        iv. Other
    b. What providers are included in the exchange?
    c. What's the current scope of your exchange efforts (measured in transaction volume, type of data, etc.)?
    d. Is there a governance structure for overseeing the initiative – who comprises that, is it a formal legal entity, does it set policy?
    e. Do you have certain requirements (technological, financial, patient based) that the entity must meet to participate (in your geographic market)?
    f. What level of investment has your organization made to the effort?
    g. Do the participating entities fund or pay a fee for the use of the data – if yes, ask them to elaborate on the model (transaction based, etc.) and what's paid, etc.
    h. Are you currently receiving state and/or federal funding in support of the initiative (AHRQ, RTI, Markle Foundation, etc)?
    i. Do you possess an inventory of the technology being deployed in support of the initiative that you would be willing to share (hardware, software, vendors, interfacing, network configuration, etc.)?
    j. Do you employ metrics to judge the success of your data exchange efforts?
    k. Would you be willing to share your business and strategic plans with MiHIN?
3. If no, are you planning to initiate data exchange within the next 12 months and if so, would you be willing to share your business and strategic plans with MiHIN? If a formal business plan does not yet exist, can we assist with providing you a template?
4. What other ways can MiHIN support your data exchange efforts – would you value a 'tool kit' which delineates the tasks and resources needed to begin a health information exchange effort? What else would be helpful to you at this time?

5. Do you agree that in the future it will be important for Regional efforts around the state to exchange patient data between themselves?
6. If yes, would you support the development of standards/guidelines which provide minimal requirements for interoperability between Regional efforts?
7. What role do you believe MiHIN should have as it relates to your data exchange initiative?
8. What key points would you like me to convey to those involved in the MiHIN effort?
9. Would you be willing to complete a more comprehensive survey regarding your initiative (leave-behind copy and provide link to complete on-line)
10. What is/was the principal driving force behind the formation of the RHIO/Regional HIE?
11. Who can we contact about legal issues? Technical issues? Clinical issues?

The following information is a catalog of interview summaries conducted in July 2006. The information was current as of that date and is not meant to be an up to date representation of these initiatives.

Interview Summaries

**Capital Area RHIO Development Process managed by the Capital Area Health Alliance**
In January 2005 Board of Directors of the Capital Area Health Alliance (CAHA) passed a resolution to create a digital health information strategy and system for the tri-county community of Clinton, Eaton, and Ingham Counties that would promote the secure exchange of clinical patient information across organizational boundaries. CAHA was a perfect vehicle for RHIO development because its member's organizations were the stakeholders who would be needed to participate in the development project and contribute the time, personnel and finances to support the initiative.

The CAHA project named *Capital* Area *RHIO Development* ***Process*** is made up of representatives of physicians, and other health care professionals and leaders from:

- Blue Cross Blue Shield of Michigan,
- Community Mental Health,
- Hayes Green Beach Hospital,
- Ingharn County Health Department,
- Ingham County Medical Society
- Ingham Regional Medical Center,
- Lansing Regional Chamber of Commerce,
- Michigan Department of Community Health,
- Michigan State University,
- Physicians Health Plan of Mid-Michigan,
- Sparrow Health System

Work was done in early 2005, by the Steering Committee to develop a shared vision, goals and objectives and transfer those into tactics and a business plan defining needs and requirements for funding and sponsorship. The project was also designated as a Demonstration Project, working with the Institute for Health Care Studies at MSU to share project evaluation, health economic metrics, activities, findings and conclusions with other Michigan communities. Direct financial contributions for the project were made by Ingham Regional Medical Center, Michigan State University and Sparrow Health System

A matching grant was received as Medicaid Matching funds through the Michigan Department of Community Health and in kind contributions were received from the Ingham County Health Department and the Lansing Regional Chamber of Commerce. In addition, because the vision for CA RHIO always included using the RHIO to promote Public Health objectives for the Capital Area community, the project entered a competitive process and was awarded a significant grant from the Robert Wood Johnson Foundation to support plans to integrate Public Health capacity into RHIO development.

With oversight from the CAHA Board of Directors, work for the project was divided among 5 standing committees:

- Steering Committee
- Business Planning and Governance Committee
- Community Information Technology Assets and Source System Assessment
- Products and Services for Physicians and Providers
- Public Health Information Development

Those committees have been used to guide an assessment process which is currently underway and involves four surveys relating to: Clinical Service Provider Capacity, Physician Office Work Flow, Public Health Integration and HIE Readiness. Along with over 80 project participants, that assessment process includes expert consultants in RHIO Development, Organization Management, Strategic and Legal Planning, Health Information Technology and Finance. Several of the project participants are already exchanging some Health Information data electronically. Pilots and other demonstration options will be explored. It is expected that the project will finish a plan for implementation, incorporating findings and recommendations from the assessment process in 2007, at which time additional funding will be sought for implementation.

State-wide resources will be needed to engage large nationwide laboratories to participate in the exchange of information with regional HIEs. Additionally, consolidated legal resources should be made available to assist regional HIEs with their efforts. CA RHIO is actively involved in the MiHIN process and is willing to explore opportunities to participate in inter community information exchange and data standardization.

**Greater Flint Health Coalition**

The Greater Flint Health Coalition just recently identified that a Health Information Exchange could be beneficial. They are currently doing more research to understand what an HIE is and how they could benefit by developing an HIE.

**Holland Regional Effort**

The Holland Hospital is exchanging health care information today by making lab and x-ray information available to physicians in the community (there are approximately 170 physicians participating). Currently 40% of all the physicians in the community have implemented EMRs and another 40% are in the process of implementation. They have created an RFP for interconnectivity software. Holland will be soliciting funds from insurance companies and members of the local businesses throughout the community for initial costs of establishing the Regional effort. A charter has been developed for the task force to operate under. The business plan for Holland is to be completed by the end of summer 2006. The subcommittee of the Hospital Board provides the main governance structure right now, but by next fall plan to become a formal legal entity. The Holland Regional effort stated that a state-wide effort could help by (1) providing pool of subject matter experts that could be tapped into; (2) standards/guidelines for exchange of information between regional initiatives; (3) act as an umbrella *to* connect regional initiatives.

**Michigan Health Infrastructure (MHI) – Grand Rapids area**

The business plan for MHI was to be completed by early to mid July (2006). They will begin testing project pilots this fall. The leader in this initiative was Spectrum Health (which is not a formalized entity yet, but will proceed with forming a non-profit corporation after the pilot). The MHI currently has 12 private practice clinics (which include 100 physicians) that are using some component of health information exchange. A few examples are: labs, x-rays, allergy alerts, e-prescribing and Utilizing Cerner. They believed that a state-wide effort could help by: (1) providing standarddguidelinesfor exchange of information between regional initiatives; (2) act as an umbrella to connect regional initiatives; (3) MiHIN could help by having the experts as resources already available; **(4)** give a regional initiative a "stamp" of legitimacy – recognition at a state level

**Michigan Health Information Alliance (MHIA) – Central Michigan**

The Michigan Health Information Alliance is reported to be in the Planning stage. They stated that they are about two years away from exchanging information electronically. The geography of MHIA is not yet defined, but planning on covering most of Central and Northern Michigan. Central Michigan University has offered to be an organizing neutral third party. They believe a state-wide effort could help by: (1) producing a toolkit and a business plan; (2) endorse National Standards that regional initiatives should **use;** (3) provide recommendations on key legal issues relevant to data sharing; **(4)** consulting services for legal, technical and governance issues; (5) provide access to funding for rural and impoverished areas so they can actively participate; (6) decentralize regional initiative network.

**Michiaan Upper Peninsula Health Information Technolonv Network (Michigan UP HIT Network)**

The Michigan Upper Peninsula Health Information Technology Network was formed in 2005 to "Improve patient safety and quality of care through the regional planning, development, and implementation of Health Information Technologies." This HIT network includes Marquette General Hospital (MGH) and ten Critical Access Hospitals located across Michigan's Upper Peninsula. The Network was organized within the existing Upper Peninsula Health Care Network, which has coordinated shared services among its members for the past 10 years,

The Network is using an existing web-based, portal / repository application (UPCare) that allows selected clinical information to be accessed by authorized physicians and other health care providers for patient care delivery and quality reporting. UPCare was created by MGH in 2001 to provide health professionals web-access to their patient's clinical information. The system currently provides approximately 4,000 health professionals with web-access to the clinical records of nearly 400,000 patients across the Upper Peninsula. The Network is using a 3-year AHRQ grant to connect the ten Critical Access Hospitals to the existing Network over the next 2 years.

Network HIT applications include: (a) HIT systems at each partner hospital that capture and send patient demographic and clinical data to the regional data repository; (b) a regional HIT master patient index /unique patient identifier; (c) a regional HIT interface engine to accept & reformat incoming data from the Partner HIT systems; (d) a regional HIT clinical data repository that contains a consolidated summary of patient information; and (e) a web-based portal viewer allowing clinical information to be accessed by providers.

**SE Michigan HIE**

Southeast Michigan Health Information Exchange (SE MI-HIE) project was initiated in March 2006 with participation by health care stakeholders (health systems, physician groups, medical societies, insurance plans, employers, and others) in the seven-country Metro Detroit area. The counties were determined by the location of employees living in certain counties and the location of key health systems/hospitals in area.

The initiative is in the planning stage and the scope of exchange efforts and governance structures were to be defined by the end of July 2006. Compuware/Covisint is funding the first two years of build out and is bringing the core technology to the SE Michigan effort.

**Thumb Rural Health Network**

The Thumb Rural Health Network (TRHN) is a 15 member organization located in the rural counties of Huron, Sanilac and Tuscola, typically referred to as Michigan's "Thumb". TRHN's membership consists of all hospitals located in the three counties, and includes seven Critical Access Hospitals and one sole-provider; all three County Health Departments; three tertiary hospitals serving the region; and one Multipurpose Collaborating Council. In 2006, the organization identified the need to develop a Health Network Exchange (HNE) and has initiated a formal planning process. The Network is currently developing its HNE vision and priorities, and is conducting an inventory of HNE resources, capabilities and member HNE priorities. The Network's HNE Development plan is scheduled for completion by the fall of 2006.

## APPENDIX F: PLEASE SEE FCC PROPOSAL APPENDIX X FOR OVERVIEW OF MICHIGAN'S LEGAL FRAMEWORK FOR HEALTH DATA RELEASE/ SHARING

## APPENDIX G: SECURITY STANDARDS MATRIX

This matrix was included as an appendix to the federal security regulations and can be found at *68* Federal Register 8380 (February 20, 2003).

Standards Sections Implementation Specifications (R)=Required, (A)=Addressable

Administrative Safeguards

| | | |
|---|---|---|
| Security Management Process..... | 164.308(a)(1) | Risk Analysis (R) |
| | | Risk Management (R) |
| | | Sanction Policy (R) |
| | | Information System Activity Review (R) |
| Assigned Security Responsibility..... | 164.308(a)(2) | (R) |
| Workforce Security..... | 164.308(a)(3) | Authorization and/or Supervision (A) |
| | | Workforce Clearance Procedure |
| | | Termination Procedures (A) |
| Information Access Management ..... | 164.308(a)(4) | Isolating Health care Clearinghouse Function (R) |
| | | Access Authorization (A) |
| | | Access Establishment and Modification (A) |
| Security Awareness and Training..... | 164.308(a)(5) | Security Reminders (A) |
| | | Protection from Malicious Software (A) |
| | | Log-in Monitoring (A) |
| | | Password Management (A) |
| Security Incident Procedures..... | 164.308(a)(6) | Response and Reporting (R) |
| Contingency Plan..... | 164.308(a)(7) | Data Backup Plan (R) |
| | | Disaster Recovery Plan (R) |
| | | Emergency Mode Operation Plan (R) |
| | | Testing and Revision Procedure (A) |
| | | Applications and Data Criticality Analysis (A) |
| Evaluation ..... | 164.308(a)(8) | (R) |
| Business Associate Contracts and... Other Arrangement | 164.308(b)(1) | Written Contract or Other Arrangement (R) |

Physical Safeguards

| | | |
|---|---|---|
| Facility Access Controls..... | 164.310(a)(1) | Contingency Operations (A) |
| | | Facility Security Plan (A) |

| | | |
|---|---|---|
| | | Access Control and Validation Procedures (A) |
| | | Maintenance Records (A) |
| Workstation Use..... | 164.310(b) | (R) |
| Workstation Security..... | 164.310(c) | (R) |
| Device and Media Controls ..... | 164.310(d)(1) | Disposal (R) |
| | | Media Re-use (R) |
| | | Accountability (A) |
| | | Data Backup and Storage (A) |

**Technical Safeguards** (see §164.312)

| | | |
|---|---|---|
| Access Control ..... | 164.312(a)(1) | Unique User Identification (R) |
| | | Emergency Access Procedure (R) |
| | | Automatic Logoff (A) |
| | | Encryption and Decryption (A) |
| Audit Controls ..... | 164.312(b) | (R) |
| Integrity ..... | 164.312(c)(1) | Mechanism to Authenticate Electronic Protected Health Information (A) |
| Person or Entity Authentication..... | 164.312(d) | (R) |
| Transmission Security..... | 164.312(e)(1) | Integrity Controls (A) |
| | | Encryption (A) |

Added notes:
If an implementation specification is "required", the covered entity must implement policies and/or procedures that meet what the implementation specification requires.

If an implementation specification is "addressable", the covered entity must assess whether it is a reasonable and appropriate safeguard in the entity's environment. This involves analyzing the specification in reference to the likelihood of protecting the entity's electronic protected health information from reasonably anticipated threats and hazards. If the covered entity chooses not to implement an addressable specification based on its assessment, it must document the reason and, if reasonable and appropriate, implement an alternative measure.

## APPENDIX H: TECHNOLOGY OVERVIEW

This appendix provides the highlights of technology activities, conclusions and recommendations. The anticipated processes for both implementing individual HIE's and moving toward a network of HIE's and a National Health Information Network (NHIN) are expected to be incremental and iterative. This in part derives from two aspects of the role of technology in HIE's and HIT, (1) the closely intertwined relationship between policy and technical decisions, and (2) the emerging and changing nature of many HIT solutions. Thus, technology issues need to be revisited in tandem with policy decisions and direction as HIE activity develops and expands and as its associated, supportive technologies become more widespread and increase in sophistication.

**Policy / Technology Symbiosis:** *As* stated in the *eHealth* Initiative's Connecting Communities *Toolkit*: "Although actual technical implementation of the HIE system is one of the last stages to be undertaken – the one where the 'rubber meets the road – the decisions about which standards to use and which technologies to implement should be made early, as there are significant interactions between policy decisions (about privacy protection, for example) and the technical decisions (use of a record locator service to index distributed databases, for example). Experience has shown that this feedback into the policy process is critical and may, in fact, require re-examination of previously decided policy or technical **issues."**

**HIE and HIT Technology Maturity Levels:** Many business process, design and technology issues still need to be resolved, and much of the technology is still emerging and maturing. For example, Gartner views RHIOS and HIE's to be an emerging business and technology solution model, some 5 – 10 years away from providing fully mature benefits. The user advice in "Hype Cycle for Health Care Provider Technologies, 2006 , July 3, 2006, is to "think long term of a networking infrastructure and business models that support many different needs for information exchange; act short term to begin with a few kinds of information exchange that motivate physician participation and generate cost savings that lead stakeholders to accept long-term financial participation in the networks."

The *Conduit to* Care, including the materials in this appendix, resources on the MiHIN website and the foundation laid by efforts such as the Connecting for Health Common Framework (http://www.connectingforhealth.org/commonframework), and the eHealth Initiative's (eHI) Connecting Communities Toolkit (http://toolkit.ehealthinitiative.org) can assist in taking the next steps crucial to establishing functioning HIEs. The Common Framework is a methodology and implementation guide supporting the technical aspects of HIE and addressing issues such as patient and provider authentication, a record locator service, and effective technical architectures to support responsible implementation and access. It also includes policy guides and model contractual language. The Connecting Communities Toolkit supports learning across and among diverse stakeholders including state, regional, and community-based organizations. The Toolkit is a distillation of the knowledge that eHI has accumulated through its work with multiple stakeholders and various communities.

Greater detail is available on the MiHIN work site http://workspace.ehealthinitiative.org/mediqent/collaborate/cateqory/default.aspx?CID=27 under Technology Workgroup at http://workspace.ehealthinitiative,org/mediqenffcollaborate/cateqory/default.aspx?CID=38 and reference materials at http://workspace.ehealthinitiative.org/medigent/collaborate/category/default.aspx?CID=288 .

## A. Technical Overview

# 1. Issue and Challenge Highlights

Technology issues and pending tasks were identified by a number of workgroups. These are described in greater detail in both this appendix and the *Conduit to* Care report.

- Developing and assuring adherence to a common set of principles and standards both for the technical and policy aspects of information sharing, addressing the needs of every stakeholder
- Achieving a viable, equitable, trust based balance between centralized / federated HIE models.
- Establishing standards and architecture, compatible with other HIE's and national standards in order to facilitate interoperability.
- Ensuring privacy, security and disaster recovery capabilities.
- Creating a shared methodology and standards for identity authentication and authority (Including encryption, certificate exchange, auditing and logging).
- Select or develop shared provider and patient indexes, and controlled medical vocabulary terminology and coding standards.
- Achieving a workable balance between computer-process-able and computer manageable data standards.
- Developing consistent frameworks for presenting information related to the technical aspects of HIEs.
- Ensuring sufficiently robust infrastructure to support migration to an interoperable, scalable health information network.

### Health Information Exchange Characteristics

- Includes multiple senders and receivers of data ("many to many relationships")
- Multiple beneficiaries and value propositions
- Shared infrastructure
- Public-private partnership
- Typically no participant can meet needs independently

HIE's typically focus on improving cross organizational communications and access to patient information, including:

- Delivery of results and reports.
- Ambulatory orders from physician practices (including ePrescribing).
- Referrals and consults.
- Secure messaging.
- Historical patient record access.

### Health Information Technology Characteristics

- Typically defined, designed and implemented to serve the needs of an entity or organization
- Usually serves the organization and its customers
- Benefit, decision and funding relates to one specific organization

Example s of HIT Products and Services include:

- Physician practice EMR system.
- Practice management system.
- Laboratory system.
- Hospital CPOE.
- Medical Records system.

## 2. Review Selected Clinical Data Sharing HIE Architecture Options

### Health information Exchange (HIE) Architectures

The Technology Workgroup reviewed basic HIE architecture options and their implications. A detailed presentation to the workgroup by Shaun Grannis (MD, MS) from the Regenstrief Institute is available at the MiHIN site - see
http //workspace ehealthinitiative org/medigent/collaborate/view aspx?CID=426&AID=609&AT=documents

The review illustrates the issues surrounding the centralization, decentralization debate, and the need to address issues such as trust, ownership and control. According to Gartner's "U.S RHIO's" A Hype Roller Coaster", April 27, 2006, the federated or confederated model is an important compromise. The Indiana Health Information Exchange is currently the best example of the federated model.

### Primary Models Reviewed

- **Fully integrated, monolithic data base:** All data reside in a single data base structure, and users interact with centrally located, standardized content. An example is the planned UK PHS.
- **Federated, inconsistent databases** Data is gathered from physically separate repositories with different patient identifiers, different data models and different identifiers for observations (e.g. hemoglobin, Hgb or WB Hemoglobin). An example is the CareSciences / Santa Barbara County Care Data Exchange.
- **Federated, consistent database** Data is gathered centrally in separate physical files, "mirrors" of remote sites. Data is standardized at the time it comes in. An example is the Regenstrief/Indiana Network for Patient Care.
- Patient carried / owned **patient centric** - smart cards / PING. A standardized data set is carried by each individual. Infrastructure at clinical sites interacts with the data.
- **Switch:** No data storage. Data is gathered centrally in separate physical files, "mirrors" of remote sites. Data is standardized at the time it comes in.

## Advantages and Disadvantages

- **Centralized Database**
  - ***o*** **Advantages**
    - Simplicity
    - Benefits of scale
    - Data are consistent
    - Efficient
    - No patient linkage issues – everyone has to accept the same identifier
  - ***o*** **Disadvantages**
    - Doesn't scale well
    - Single point of control – must trust the custodian
    - Requires exceptional leadership
    - Everyone has to accept the same identifier
    - Needs robust communication infrastructure (e.g. internet / fixed lines)
- **Federated Data Base**
  - o **Advantages**
    - Data ownership can be managed by defining business policies and access rules
    - Individual organizations are able to control their own data
    - Benefits of scale
    - Builds on existing infrastructure – doesn't necessarily require new computers, easier transition
    - More opportunities for creativity (Within the specified architecture)
    - Experience: The only examples of working interoperable healthcare systems **use** the federated model
  - o **Disadvantages**
    - Requires more coordination
    - May be slower than monolithic database
    - Have to solve the patient identifier problem
    - Also needs robust communication infrastructure in place
  - ***o*** **Otherissues**
    - Consistent federated databases are a cross between inconsistent federated databases and centralized databases
    - If inconsistentfederated databases are adopted, speed becomes a bigger issue
    - Patient linkage is a problem unless there is a uniform identifier but "incorrect" linkages are more easily undone than with centralized databases

## 3. Assess Regional HIE Core Requirements and Use Cases

**Core HIE Requirements:** Core requirements consist of a master patient index, vocabulary standardization and a provider index. The data repository contains clinical data that may be standardized or non-standardized. Repositories may represent hospitals, regional labs, or other data submitters.

- **Master Patient Index:** Used to identify where patient data resides within the HIE and to link specific data to specific patients. This is needed to aggregate patient data. Term is often used interchangeably with "Record Locator Service".
- **Vocabulary Standardization:** Functionality needed to create a common vocabulary (for diseases, diagnoses, lab findings, etc.) by translating differing proprietary vocabularies into a single common vocabulary. This is necessary for decision support and aggregating patient-level data by data type (a very useful clinical function)
- **Provider Index:** Used to identify Doctors and other health care providers and their physical locations. Necessary for clinical results delivery.

**Selected Use Cases:** The work group delineated the data repository, master patient index, vocabulary standardization and provider index requirements for various scenarios or user cases. Use cases included:

- Delivering regional laboratory results to a HIE
- Transfer of clinical patient summaries between regional HIE's (Two scenario's, different assumptions about architecture and HIT)
- Transfer of medication history from payor and pharmacy benefits manager (PBM) sources to an Emergency Department (ED)
- Transfer of Medicaid data to an ED

Depending on the type of information exchange desired, the technology needed to transfer or "switch" data among the HIE's varied as did the assumptions or requirements for the architecture. The "Regional Health Information Exchange (HIE) Schematic with Core Components "is available at http://workspace.ehealthinitiative.org/medigent/collaborate/view.aspx?CID=478&AID=766&AT=documents

**Research and Advisory Service Perspective and Validation:** Gartner's "Hype Cycle for Healthcare Provider Technologies , 2006, July 3, 2006, characterizes the core technologies as either being in or entering the mature mainstream. "Any Care Delivery Organization (CDO) that does not have a monolithic computing environment should use the capabilities of an enterprise master person index to ensure that it is able to accurately aggregate all patient information across all of its internal information systems. This capability will also be critical as CDO's begin to participate in information sharing outside the organization, such as regional health information organizations (RHIO's). Access to adequately controlled medical vocabulary (CMV) capabilities is becoming essential to healthcare providers to offer automated support for advanced healthcare activities such as clinical decision support, outcomes analysis, care management protocols and evidence-based medicine."

## APPENDIX I: MiHIN RESOURCE CENTER WORKGROUPS

The structure for the MiHIN Resource Center Workgroups is similar to the *Conduit to* Care structure, however, additional objectives have been added to each workgroup. The objectives and type of participants of each workgroup are as follows:

### Clinical Workgroup

- Aid in the prioritization of key process flows under consideration by the MiHIN Resource Center for implementation.
- Define and prioritize use cases that are appropriate
- Provide guidance on appropriate and most effective use of HIE in clinical activities

Recommended participants should include at a minimum:

- Physician representing physicians association(s)
- Nursing representative
- Physician representing medical schools
- Representative from patient safety organization
- Representative of employer community
- Physician representing hospital/health system
- Other healthcare providers (e.g. EMT. home health, etc.)
- Representative from public health

### Legal and Governance Workgroup

- Provide advocacy when needed and build trust, buy-in, and participation of major stakeholders state-wide including public health.
- Serve as a resource for best practices for data security, data use agreements, privacy, and confidentiality that can be applied in Michigan.
- Establish standards for audit trails and data verification/data integrity checks. Fund costs of monitoring and auditing and investigating complaints.
- Establish a means for developing consensus on legal interpretations of applicable laws, consider limits on liability for those who meet or exceed the standards identified.
- Provide input on federal and state laws that govern maintenance and transmission of electronic health information, engage technical experts on design of system to address and facilitate legal compliance. (E.g. HIPAA privacy, HIPAA security, other federal and state laws governing confidentiality).
- Convene stakeholder focus groups (providers, regulators, consumers) to provide input on proposed changes to Michigan law and facilitate discussion to avoid unintended consequences.
- Develop model documents or templates for inclusion in the Reference Guide (e.g. model clause regarding HIE for Notice of Privacy Practices, authorization forms, participant agreements, vendor agreements regarding software). Develop answers to FAQs for Reference Guide (written in general terms) to address legal questions about starting an HIE.
- Assist with the development of a master provider index, which identifies all licensed personnel in the state who are qualified to access health information through the HIE. Additionally, assist with the development of a master patient index. Facilitate maintenance and record-keeping to ensure that the index remains accurate and updated.
- Establish requirements for creating, administering and terminating access rights to the HIE. Permit the HIE governing body to suspend access as necessary or appropriate, and insulate the governing body from liability for such decisions made in good faith.

- Establish stringent measures for enforcement against individuals who engage in behaviors intended to, or likely to without valid reason, bypass or overcome security measures.
- Prioritize recommendations in *Conduit to Care* that need further study, set goals and timelines according to priorities.

Recommended participants should include at a minimum:

- Board chair or equal representative from at least one of the more advanced exchange initiatives
- Hospital/health system executive or board member
- Representative of a physician group
- Representative of one of the major payers
- Representative of employer community
- Representative from MDCH/MDIT
- Representative of the American Civil Liberties Union (ACLU).
- Privacy Officer or equal representative with expertise in HIPAA Privacy Regulations and other federal privacy laws, and state confidentiality laws
- Security Officer or equal representative with expertise regarding compliance with HIPAA Security Regulations and other laws governing electronic health information.
- Representative of MDCH or local health department with expertise regarding health information collected or maintained by the State and/or local health departments for public health or other purposes, public health reporting requirements and surveillance initiatives, and applicable state laws.
- Attorney or equal representative with expertise regarding regulation of health professionals and health facilities and agencies (e.g. licensing laws, federal and state Stark, antitrust)
- Attorney or equal representative with expertise regarding business law aspects of HIE, such as laws governing nonprofits, corporations and other business entities, contracts, intellectual property, tax law.

**Financial Workgroup**

- Provide guidance for distribution of funding through the HIT Commission
- Analyze benefits of potential HIT investments as requested by the HIT Commission and MiHIN Resource Center.
- Provide recommendations of financial strategies to increase adoption and funding of health data exchanges
- Assist in the development of business cases for various investments in health information exchange on a state-wide basis.
- Provide guidance on grants available from public and private sources

Recommended participants should include at a minimum:

- Board chair or equal representative from at least one of the more advanced exchange initiatives
- Hospitallhealth system executive or board member
- Representative of a physician group
- Representative of one of the major payers
- Representative of employer community
- Representative from MDCH/MDIT
- Representative from private foundation
- Representative from public accounting (specifically someone with healthcare expertise)

Regional **Workgroup**

- Obtain Michigan Department of Community Health agreement with criteria to be used in designating regional health information exchanges
- Meet with key leaders of the governing entities of existing and start-up regional HIE efforts to learn "best practices", communicate criteria, educate on Reference Guide, etc..
- Develop and participate in delivering an education plan for large employers, business coalitions, Chambers of Commerce, etc. regarding the importance of HIE
- Directly approach major employers regarding HIE and the need for them to be involved as stakeholders for regional HIEs

Recommended participants should include at a minimum:

- Board chair or equal representative from at least one of the more advanced exchange initiatives
- Hospital/health system executive or board member
- Representative of a physician group
- Representative of one of the major payers
- Representative of employer community
- Representative of healthcare law firm familiar with not for-profit and HIT
- Representatives from each Michigan HIE

Technical **Workgroup**

- Provide recommendations regarding possible technical architectures that can be used to facilitate health information exchange (including Master Patient and Provider Indexes, security protocols and options, network robustness, disaster recovery, etc.).
- Provide guidance/guidelines on national and developing standards.
- Consulting with established HIEs or those wishing to begin HIE effort
- Education (within broader efforts of MiHIN and HIT Commission)
- Brokerage with other HIEs

Recommended participants should include at a minimum:

- Representative from at least one of the more advanced exchange initiatives
- Hospital/health system representative
- Representative of a physician group
- Medical school representative
- Representative of employer community
- Representative of a major payer
- Representative from MDCH/MDIT
- Individual representing health information technology field
- Representative of a major physician group (should be clinician using IT in daily practice)
- Representative from non-physician clinical specialty (who uses IT in daily practice) (e.g., nursing, physical therapy, etc.)
- Representative from group supporting primary care in MI (e.g., MPCA)

## APPENDIX J: MEDICAL TRADING AREA ANALYSIS

### Introduction to Medical Trading Area Analysis

This analysis can be started with simple charts, graphs and maps. Those from discharge analysis and other tools should be used, such as the information in the Dartmouth Atlas for Michigan: http://www.bcbsm.com/atlas/qeoqraphy.shtml. Many of the areas would resemble the federal government's definition of metropolitan statistical areas but will go beyond those areas where there is an established pattern of health care services provided to patients outside the metro area or where there is a significant non-metro population grouping not yet defined as a metro area

The following items are the recommended building blocks and minimums to help define regions and should be used as criteria when issuing state funding. The quantitative numbers that follow are not absolute, but are meant to be a guide when reviewing applications for funding. The building blocks/minimums listed below were selected based upon many other general assumptions.

### Qualitative Building Blocks:

- Recommended Planning Elements:
  - There should be flexibility for inclusion in the Medical Trading Areas. They should be inclusive, not exclusive. Providers may need to be in more than one medical trading area.
  - The Medical Trading Areas must work for the providers to improve efficiency and quality. What is best for the provider will ultimately be best for the patient.
  - The providers should drive the Medical Trading Areas and shape them.
  - Being involved in the Medical Trading Area should give organizations a competitive edge, but not create a competitive edge over another organization also involved.
  - There must be flexibility because different areas will have different approaches to health care based on culture.

- Recommended Implementation Elements of a Regional Exchange:
  - The technical infrastructure for each area should include a central switch to send and receive data. There should be technical hardware, such as Internet access, facilities and infrastructure as well as a standard patient identification system and consistent data.
  - The "what" and "how" of this should be a state role, especially in setting standards, assuring transferability between Medical Trading Areas, and fitting in with federal standards that may emerge
  - Must be treated as a unique entity with a sustainable business model
  - Decisions on services to be offered should be based upon market and pricing/cost in that market

### Quantitative Building Blocks:

- Planning Minimums:
  - Average Minimum Population Size: 250,000 people
  - Minimum Percentage of Services: 3 or more separate organizations representing at least 60% of Hospital Discharges, 50% of lab work, and 50% of the data in at least 3 other categories listed above.

- Implementation of a Regional Exchange Minimums:
  - Average Minimum Population Size: 500,000 people
  - Minimum Percentage of Services: 3 or more separate organizations representing 70% of the hospital discharges, 60% of lab results and 60% of 3 other categories from above.

## Additional Details on Medical Trading Areas

An analysis, we have referred to as "medical trading area analysis," has been developed to analyze the claims of beneficiaries of particular health plans from a designated geographic area such as those outlined in the atlas report or others. This analysis is used to determine what clinical service providers and specialty procedure and testing physicians would be needed as participants in a local or regional HIE to provide the vast majority of the clinical results, reports, and documents necessary to meet the goals of the Health Information Exchange users. It would make sense to do the analysis to determine how many providers and their volumes of services would **be** required to serve the population of an area defined by those who plan to develop an HIE for an area. The area must be big enough to support the expense and resource requirements of an HIE. The types of services one would typically include in such an analysis would include but not be limited to the following services:

- Inpatient discharges
- Emergency service visits
- Outpatient hospital services such as
  - Laboratory
  - Radiology
  - Rehab services
  - Cardiology procedures
  - EEGs, EKGs, pulmonary function
  - Etc
- Hospital outpatient surgeries
- Urgent care center visits,
- Primary care office visits
- Specialty physician office visits
- Imaging center procedures
- Free standing surgery centers
- Birthing centers
- Pharmacies prescriptions
- Commercial laboratories procedures
- Anatomical path analysis
- Mental health visits
- Long term care days
- Home health visits

The vast majority of the reports documents and procedures completed are not addressed in the hospital analysis alone.

The following information is support for the quantitative building blocks recommended by the Regional Workgroup in the Conduit *to* Care.

A. The volume of service in each category and the number of providers in the region required to participate in the HIE in order to reach certain threshold metrics in order to reach 60%, 70%. 80% or 90% of the clinical data, by type, needed to meet the needs of the physicians who ordered the tests, the consulting and referring physicians, the disease management programs, the community summary record users, and the public health programs. In the long run an HIE may want to provide or interface a patients clinical data to their personal health record as well.

B. The identification of the clinical service providers outside the service area, or medical trading area, who provide enough service to warrant inclusion in the scope of the providers who are necessary to meet the threshold levels but are not deemed part of the community by virtue of their distance, a small proportion of their total services provided in this area, or other factors. Many of these may be large national concerns like commercial laboratories or national chains of pharmacies.

C. The identification of geographic areas where large proportions of the services are provided by providers outside their chosen designation of a medical trading area, in one or many different directions and locations

D. The critical mass of beneficiaries necessary to support an HIE may range from 250,000 on the low side to areas of 500,000 to 750,000 covering multiple counties. Areas larger that those mentioned are usually more complex and diverse. They may have complex relationships among and between providers, diverse and complicated referral and service delivery patterns, and more difficult organizational problems. Areas like Chicago, Detroit, Philadelphia, Baltimore/Washington, Oakland/San Francisco Bay area and Los Angeles. The opportunities are great but the challenges seem much greater.

E. The Dartmouth Atlas will aid as one of the tools to help define some beginning points of geographic definition for the initiation of the process but many dynamics will unfold as one accesses and analyses the data. It is important for success that the major insurers, Medicaid, Blue Cross, and the State participate with all of their beneficiary data (de-identified) to broaden the base of the analysis.

F. Much can be learned in the assessment of the real opportunities for the use and value of clinical information exchange if the full range of clinical data sources and potential users, benefits, beneficiaries, and funding sources are explored beginning with the Medical Trading Area analysis suggested.

G. The population of beneficiaries who utilize the health care providers extensively will also yield a number of key findings, which for those really exploring a sustainable business model, will provide a clear path of future developments and data sources with a very strong benefit for those who chose to use clinical data for patient safety, efficiency and quality improvement.

H. The Financial Group recommends this type of analysis when a group files for a planning grant, or for implementation funding.

I. The Governance Group may want to use this type of analysis to determine those who may be potential members of the regional organizational governance and would be desired as signatories on letters of intent or commitments for matching funds.

J. The regional HIE may want to add the guidelines for this type of analysis in the *Resource Guide,* especially since it is available for the time being from state sponsored analysis of Medicaid and state employee data bases.

K. The Technical Workgroup should use this type of analysis, in conjunction with knowledge of the existing state of HIT development and implementation in region, to make recommendations concerning technologies and processes to leverage and those to discontinue.

L. The MiHIN Resource Center may use the analysis to assist with the identification of those clinical service providers who have service levels in many medical trading areas across the state and to determine the extent of the service to assist them with their priorities for policy and operational issues to encourage their participation in the provision of clinical data to regional HIEs across the state.

**Example of a Medical Trading Area Analysis:**

The Capital Area Regional Health Information Organization, with the help of the Institute for Health Care Studies at Michigan State University, performed a Medical Trading Area Analysis to begin the assessment of the preliminary geography, the concentration of clinical service providers and physician practices which are within the three county area who provide the majority of services to the patents of the area. Further they were interested in estimating the level of service provided in the area of different types and numbers of providers. Of course an important analysis was the identification of clinical service providers whose organizations were located outside the three county area who provided a significant proportion of the area services.

This analysis will help the sponsors to determine the scope and breadth of the number and location of potential customers for the exchange and also to clarify with statistics the extension of the geography outside the three county area.

## APPENDIX K: GLOSSARY

Adapted *from the* Arizona *Health-e* Connection *Roadmap,* April *4,* 2006 and Health Information Technology Glossary http:/%www. *wcit2006.org/Health care/glossary.html*

**ANSI** – American National Standards Institute - The U.S. standards organization that establishes procedures for the development and coordination of voluntary American National Standards,

**ASTM International** – American Society for Testing and Materials – was formed over a century ago, when a forward-thinking group of engineers and scientists got together to address frequent rail breaks in the burgeoning railroad industry. Total, standards developed at ASTM are the work of over 30,000 ASTM members. These technical experts represent producers, users, consumers, government and academia from over 100 countries. Participation in ASTM International is open to all with a material interest, anywhere in the world. www.astm.org

**Application Service Provider (ASP)** – A business that provides access to one or more software applications, typically from a hosted environment over a network to its customers.

**Broadband** – The ability of a user to view content across the Internet to include large files, such as video, audio and three dimensional. A **user's** broadband capability is typically governed by the connection between the internet service provider (ISP) and the user.

**Certification Commission for Health care Information Technology (CCHIT)** – An organization dedicated to accelerating the adoption of interoperable health information technology throughout the US health care system by certifying HIT products.

**Clinical Document Architecture (CDA)** – Provides an exchange model for clinical documents and brings the industry closer to the realization of an electronic medical record. The CDA is expected to be published by the end of 2006 as a nationally accepted standard.

**Computerized Provider Order Entry (CPOE)** – A computer application that allows a physician's orders for diagnostic and treatment services (such as medications, laboratory, and other tests) to be entered electronically instead of being recorded on order sheets or prescription pads. The computer compares the order against standards for dosing, checks for allergies or interactions with other medications, and warns the physician about potential problems.

**Consolidated Health Informatics Initiative (CHI)**- One of the 24 Presidential eGovernment initiatives with the goal of adopting vocabulary and messaging standards to facilitate communication of clinical information across the federal health enterprise. CHI now falls under FHA.

**Continuity of Care Record (CCR)** - A standard specification being developed jointly by ASTM International. the Massachusetts Medical Society (MMS), the Health Information Management and Systems Society (HIMSS), the American Academy of Family Physicians (AAFP), and the American Academy of Pediatrics. It is intended to foster and improve continuity of patient care, to reduce medical errors, and to assure at least a minimum standard of health information transportability when a patient is referred or transferred to, or is otherwise seen by, another provider. The origins of the CCR stem from a Massachusetts Department of Public Health, three-page, NCR paper-based Patient Care Referral Form that has been in widespread use for many years in Massachusetts, and from other minimal data sets both electronic and paper-based. The CCR is being developed and enhanced in response to the need to organize a set of basic patient information consisting of the most relevant and timely facts about a patient's condition. Briefly, these include diagnoses, recent procedures, allergies, medications, recent care provided, as well as recommendations for future care (care plan) and the reason for referral or transfer. The CCR will be created by a health care provider/clinician at the end of an encounter, or at the end of an episode of care, such as a hospital or rehabilitation stay.
http://www.massmed.org/Da4es/ccrfaq.asp

**Decision-Support System (DSS) –** Computer tools or applications to assist physicians in clinical decisions by providing evidence-based knowledge in the context of patient-specific data. Examples include drug interaction alerts at the time medication is prescribed and reminders for specific guideline-based interventions during the care of patients with chronic disease. Information should be presented in a patient-centric view of individual care and also in a population or aggregate view to support population management and quality improvement.

**Document Consumer –** the vendor, who receives information, views the document; imports and stores the document for later viewing; and imports specific patient information, such as test results or medication lists. (Senders are dubbed "Document Sources.")

**Electronic Health Record (EHR) –** A real-time patient health record with decision support capabilities that can be used to aid clinical decision making. The EHR can also support the collection of data for uses other than clinical care, to include billing, quality management, outcome reporting and public health surveillance and reporting.

**Enterprise Architecture –** A strategic resource that aligns business and technology, leverages shared assets, builds internal and external partnerships, and optimizes the value of information technology services

**ePrescribing –** Computer technology in which physicians use handheld or personal computer devices to review drug and formulary coverage and transmit prescriptions to a printer, EMR or pharmacy. ePrescribing software can be integrated with existing clinical information systems to allow access to patient-specific information to screen for drug interactions and allergies.

**Federal Health Architecture (FHA) –** A collaborative body composed of several Federal departments and agencies, including the Department of Health and Human Services (HHS), the Department of Homeland Security (DHS). the Department of Veterans Affairs (VA). the Environmental Protection Agency (EPA), the United States Department of Agriculture (USDA), the Department of Defense (DOD), and the Department of Energy (DOE). FHA provides a framework for linking health business processes to technology solutions and standards, and for demonstrating how these solutions achieve improved health performance outcomes

**Health Information Exchange (HIE) –** The movement of health care information electronically across organizations within a region or community. HIE provides the capability to electronically move clinical information between disparate health care information systems while maintaining the meaning of the information being exchanged. The goal of HIE is to facilitate access to and retrieval of clinical data to provide safe, timely, efficient, effective, equitable, patient-centered care.

**Health Information Technology (HIT) –** The use of computer software and hardware to process health care information electronically, thereby allowing for the storage, retrieval, sharing and use of the information, data and knowledge for communication and decision making related to patient care delivery

**Health Insurance Portability and Accountability Act (HIPAA) –** A law enacted in 1996 to first protect health insurance coverage for workers and their families when they change or lose their jobs and secondly requires the establishment of national standards for electronic health care transactions and national identifiers for providers, health insurance plans and employers.

**Health Level Seven (HL7) –** One of several accredited standards (specifications or protocols) established by ANSI (American National Standards Institute) for clinical and administrative data. Systems which are HL7 'compliant' improve the ability for interoperability and exchange of electronic data.