Models for Regional Health Information Organization (RHIO) Systems

National Association for Public Health Information Technology
Webinar: March 15, 2006

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Agenda

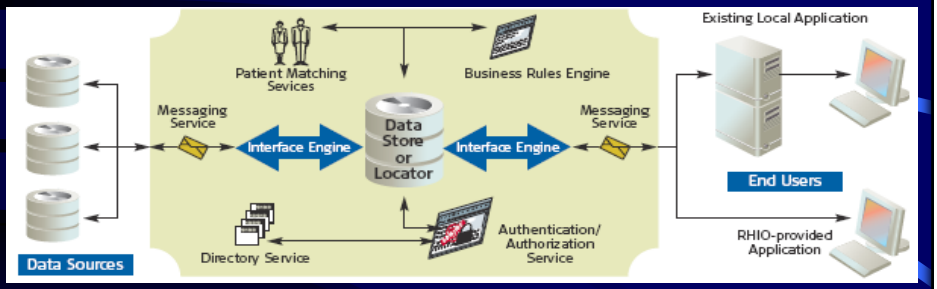
- RHIO Definition
- Integration Framework
- Data Integration Models
- Application Integration Models
- RHIO-Public Health Issues

RHIO Definition

What is a RHIO?

- No single definition – in the eye of the beholder
- A collaborative organization focused on health data exchange
- Participants: Physicians, labs, hospitals, pharmacies, patients, public health, payers
- Primarily driven by the private sector, but often has public health involvement (and may be driven by the public sector)
- Usually focused on clinical data exchange, but may focus on health services data in addition or instead (Health Information Exchange Networks - HIEN)
- Can span a metropolitan area, region, or a state

Health Information Exchange Network (HIEN)



Enablers of RHIO Development

- Interest and Momentum – Is it enough?
- Standards – March continues on
- Public Health Expertise – Leverage possible
- The Internet – Pervasive and ubiquitous

Barriers to RHIO Development

- Financial – Need strong business case
- Standards – Not fully developed
- Identification – No national patient identifier
- Authentication – Of participants
- Organizational – Public-private boundaries
- Vocabulary and Terminology – Language
- Technology – Limited interoperability

The RHIO Conundrum:

Should you develop a discreet technical architecture first, then solicit proposals to build it?

Or should you leave the architecture up to the vendors who propose solutions to meet your needs?

The RHIO Conundrum

Favor pre-determination:

- Concerned about ability to weigh alternatives
- Less confident about funders' commitment
- Unique opportunity to leverage technology
- More certain about COTS
- Participants less flexible for data sharing

Favor more open-ended:

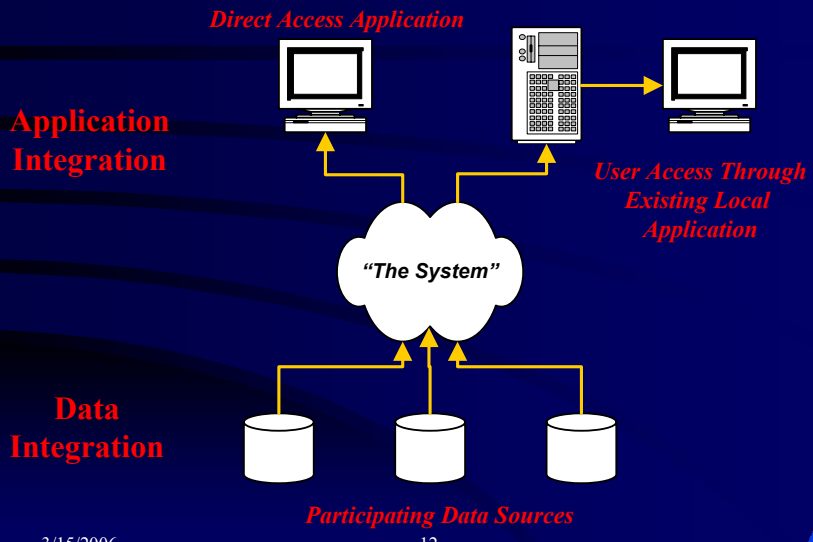
- Concerned about perceptions of bias
- Consensus around clearly-articulated requirements
- More interested in innovation than mitigating technical risk
- Less certain about existing solutions
- Participants more capable for data sharing

Types of Integration

Two Types of Integration

- Data Integration: forming valid relationships between data sources
- Application Integration: presenting a unified view of data to a user through a computer application

Data versus Application Integration



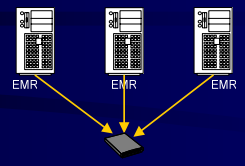
Data and Application Integration

The message:

- These are two parts of the same puzzle
- Perceptions about "ease of access" and "ease of use" have to be viewed based on assumptions about these two types of integration
- Issue of timely access to/submission of data is critical to all strategies

Data Integration Models

Model 1: Smart Card



Features:

- Extreme in distributed databases: no central database at all!
- Providers of data store information directly onto a patient's smart card which is carried from site to site
- Authorized users have smart card readers which permit access to records
- Patient controls access to data through possession of the card
- Patients do *not* typically have card readers of their own

Model 1: Smart Card *(continued)*

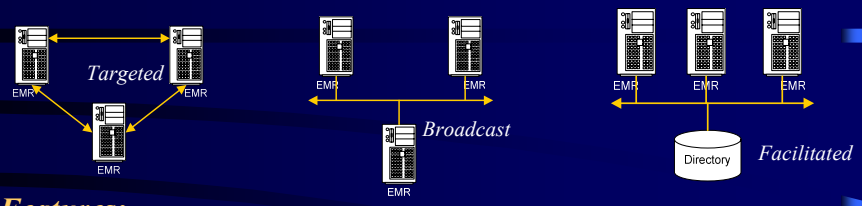
Strengths:

- Allows incremental deployment as participants are ready
- Relatively inexpensive technology
- No burden of central coordination
- No dependence on a central database
- No difficult requirements for data consolidation
- May be less expensive to deploy

Limitations:

- Patient must be physically present (or the card must be present) to access data
- Data is replicated from provider system to smart card and can become unsynchronized
- Provider system must be able to accommodate smart card; high integration cost
- Does not facilitate system-wide data analysis

Model 2: Peer to Peer



Features:

- No central data server required, but directory server (of providers, not patients) can be used to facilitate communications
- Each system communicates as needed with neighboring systems
- Data is displayed within each users "local" system, or stored locally
- Queries between systems could be targeted or "broadcast"
- Standard for communications (e.g., HL7) both for data formats, message types, and communications techniques
- Can support real-time messaging or batch communications depending on the capabilities of the participating systems

Model 2: Peer to Peer *(continued)*

Strengths:

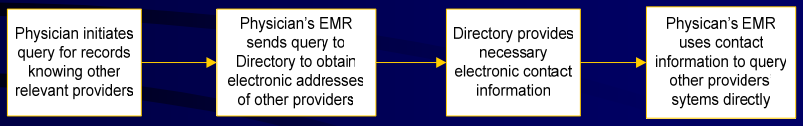
- Allows incremental deployment as systems are ready
- No replication of data required (though it is possible)
- Any system can participate (even geographically peripheral) if they adopt the standards
- Lower burden of central coordination
- No dependence on a central database (except for Facilitated)
- May work well when number of participants is small
- May be less expensive to deploy

Limitations:

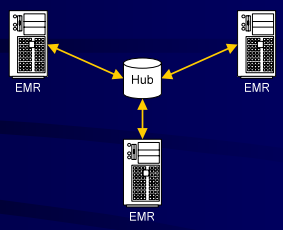
- In some implementations, need to know the destination system for your information request, or be patient while "the network" is searched
- Might allow some systems to fall behind and not support inter-system communication
- Will not scale well to many, many systems
- Does not facilitate system-wide data analysis
- Performance may be slow

Model 2: Peer to Peer *(continued)*

Typical Information Flow: *Facilitated Model*



Model 3: Information Broker



Features:

- Central hub operated by regional authority, public or private
- Hub contains master index of all patients contained in all participating systems but does *not* contain any actual clinical records
- Each participating system is flagged in the index as possessing data for a particular patient
- A participating system queries the hub to identify where parts of a patient's record exist elsewhere, then either queries those systems directly. Alternatively, a user accesses patient records through a central "hub application."
- Community-wide standard for communications (*e.g.,* HL7) both for data formats, message types, and communications techniques
- Can support real-time messaging or batch communications

Model 3: Information Broker *(continued)*

Strengths:

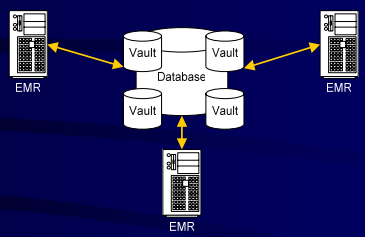
- System can discover where relevant records are housed community-wide
- No replication of clinical data; data remains close to its source
- System as a whole better protected from inappropriate disclosure (systems can refuse a query)
- Scales well
- Facilitates system-wide data analysis
- May be easier to incrementally add participating systems

Example:
New York City MCI
MA-SHARE

Limitations:

- Strong central coordination required
- Dependence on the central hub for inter-system communications
- Harder for individual systems to participate
- Requires two steps (and more time) to get data: query to the hub, then second query to the authoritative system
- Potential for large effort to keep demographic records free from duplication
- Other systems may be unavailable at query time
- More difficult to present a coherent, unified view of the patient

Model 4: Partitioned Warehouse



Features:

- Central database operated by the regional authority which assembles complete, consolidated record of people and their medical data (similar to Model 3), but assembled "on the fly" from separately-maintained "vaults"
- Central database contains master index of all patients contained in all participating systems (similar to Model 2)
- Systems required to periodically supply data to the central database cluster
- Standard for communications (e.g., HL7) both for data formats, message types, and communications techniques
- Can support real-time messaging or batch communications depending on the capabilities of the participating systems

Model 4: Partitioned Warehouse *(continued)*

Strengths:

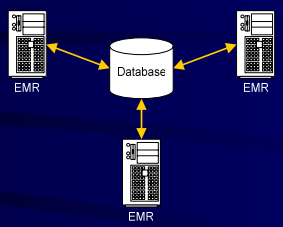
- Less real-time dependence on other participating systems
- Implements a stricter "need to know" policy for data access
- Facilitates system-wide data analysis
- Scales well so long as appropriate investments made in central resources

Example:
Indianapolis Network for Primary Care

Limitations:

- Strong central coordination required
- Dependence on large central database for inter-system queries
- Queries may take longer to fulfill due to "on the fly" data consolidation
- Data timeliness issue: data submission from participating systems to central database may lag
- Potential for large effort to keep people *and* clinical records free from duplication
- Harder to implement incrementally
- Requires timely submission of data to be effective
- Unclear how to implement large number of vaults for small providers
- Likely fairly expensive option

Model 5: Central Warehouse



Features:

- Central database operated by the regional authority which contains complete, consolidated record of all people and their medical data: a "union catalog"
- Systems required to periodically supply data to the central database
- Standard for communications (e.g., HL7) both for data formats, message types, and communications techniques
- Can support real-time messaging or batch communications depending on the capabilities of the participating systems

Five Models

Model 5: Central Warehouse *(continued)*

Strengths:

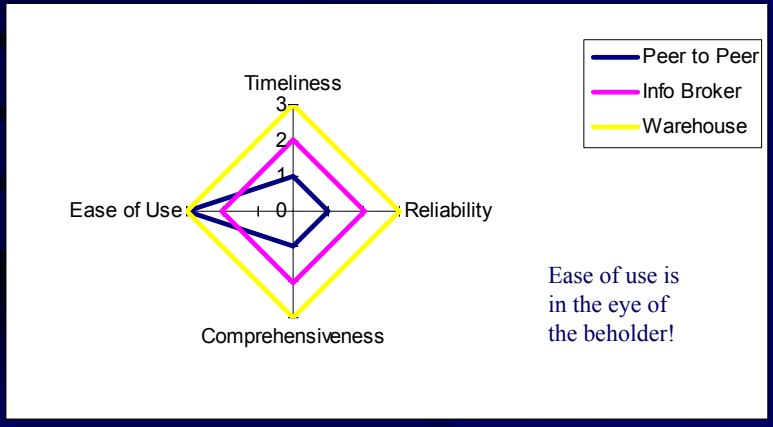
- Querying system's response to a data request is quicker
- Less real-time dependence on other participating systems
- Facilitates system-wide data analysis
- Scales well so long as appropriate investments are made in central resources
- Economies of scale due to use of large-scale central resources
- Likely better expertise in managing central resources
- Supports existing systems well

Example:
Arizona HealthQuery
TN MidSouth eHealth Alliance

Limitations:

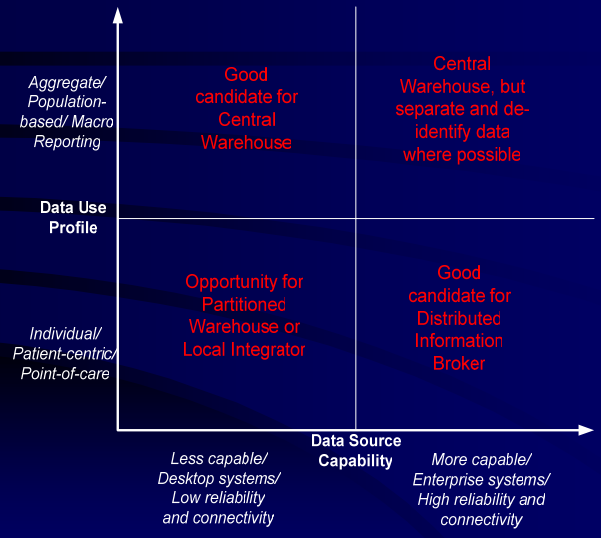
- Strong central coordination required
- Dependence on large central database for inter-system queries
- Data timeliness issue: data submission from participating systems to central database may lag
- Potential for large effort to keep people *and* clinical records free from duplication
- Potential for inappropriate disclosure as medical data from unrelated system joined together in advance of specific query or need
- Harder to implement incrementally and provide complete data
- Requires timely submission of data to be effective
- Likely fairly expensive option

Relative Model Strength

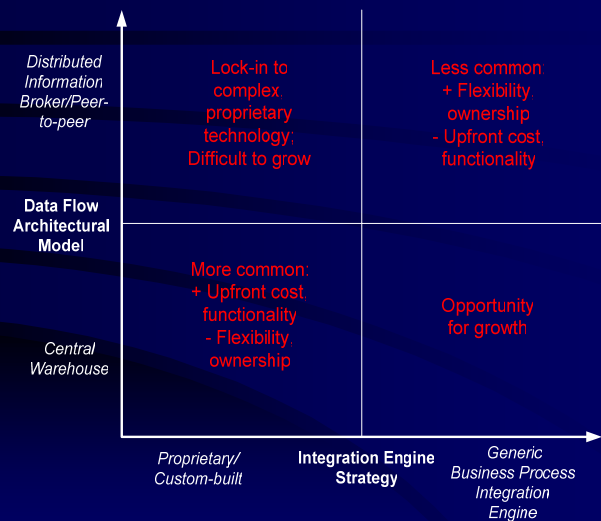


Ease of use is in the eye of the beholder!

Date Source vs Data Use Profile



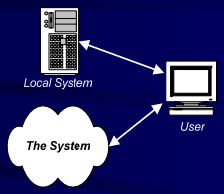
Strategy Comparison



Application Integration Models

Four Models

Model 1: Independent Application



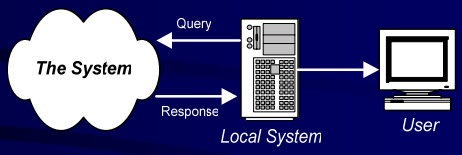
- Users access data through a new computer application provided as part of the system, sometimes referred to as a "portal"
- No concerns about interoperability with other applications

But

- Users may become confused about which application to use
- Some organizations may not want to support this additional, non-institutional application, and may discourage its use or ban it altogether

Four Models

Model 2: Data Exchange/Local Application



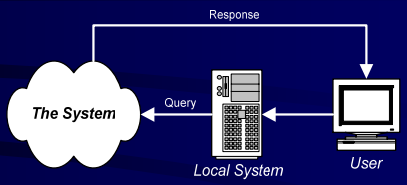
- User's local system queries the central system through a standard protocol (*e.g.,* HL7) and data is displayed within the user's local application
- No concern about user confusion – all data accessed through familiar, supported local applications

But

- Systems must support agreed-upon method for query and response
- Network interruption or latency can interfere or degrade performance

Four Models

Model 3: Direct Access through Local Application

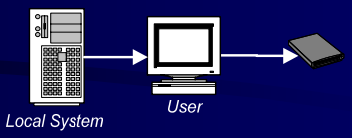


- User's access patients in the local system which initiates a login to the central system through a standard protocol (*e.g.,* CCOW) and logs the user into the central system with existing credentials and query parameters
- User access data both with local system and central system but does not have to re-query or re-authenticate

But

- Network interruption or latency can still interfere or degrade performance

Model 4: Data Access via Smart Card



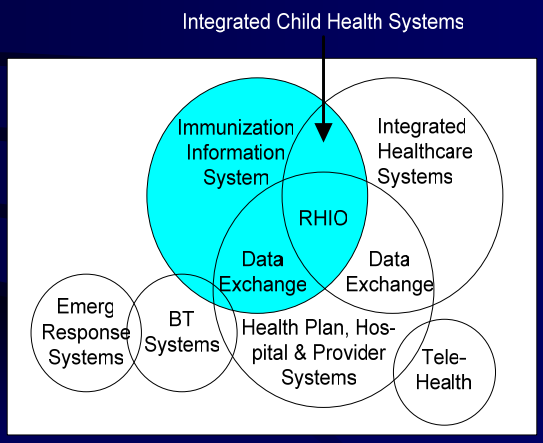
- Data stored directly on smart card which then has consolidated record

But

- Providers may not be able to readily write to the card nor integrate data easily into their other applications

RHIO-Public Health Issues

Integration Roadmap: Public Health Perspective



What Can Public Health Contribute to a RHIO?

- **"Quick start"** by leveraging existing activities
- **Data**, including consolidated data
- **Expertise**: registries, de-duplication, database management, web applications, data exchange including HL7
- **Existing relationships with many relevant stakeholders**: providers, hospitals, payers, professional associations
- **Governance**: experience in negotiating and implementing data sharing agreements
- **Childhood health data** somewhat more contained and manageable than adult health data

National Scene

- American Health Information Community (AHIC)
- Office of the National Coordinator for HIT (ONC)
- Health Information Technology Standards Panel (HITSP)
- Certification Commission for Healthcare Information Technology (CCHIT)

Selected Sources

- CCHIT: http://www.cchit.org/
- Connecting for Health (Markle Foundation): http://www.connectingforhealth.org/
- eHealth Initiative: http://www.ehealthinitiative.org/
- HITSP: http://www.hitsp.org/
- HL7: http://www.hl7.org/
- HLN: http://www.hln.com/resources/rhio.php
- ONC: http://www.hhs.gov/healthit/

Questions?