Immunization Information System Interoperability

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IIS Evolution

- Began as standalone systems, often PC-or mainframe-based
- Evolved into more robust systems as technology improved
- In some cases became integrated systems, usually patient-centric or incorporating related functions

Two Types of Integration

- Presenting a unified view of data to a user through an application
- Forming valid relationships between data sources
From Integration to Interoperability

“Interoperability is the ability of two or more systems or components to exchange information and to use the information that has been exchanged.”

HL7 EHR Interoperability Working Group

HL7 EHR WG Definition

- “Coming to Terms” Working paper developed in 2006
- Compilation and Analysis
  - 100+ Definitions
  - Many sources, including HL7, ISO, IEEE, NAHIT, US Executive Order...
  - Approximately 50% - 50% (US/Int’l)

Source: HL7 EHR Interoperability Working Group
HL7 Definition Key Aspects

- Technical Interoperability
  - Structure, syntax, reliable communication
- Semantic Interoperability
  - Full meaning preserved
- Process Interoperability
  - Integration of systems into work flow

Technical Interoperability: System-to-system Messaging

- Public health systems have been engaged in data exchange for years (mostly to them)
- Though flat file formats still dominate, HL7 messaging is beginning to gain steam
Semantic Interoperability: VT Health Info Tech Plan

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMS Healthcare Common Procedure Code System (HCPCS)/American Medical Association (AMA)</td>
<td>This is the standard coding for procedures widely used in the healthcare community: Level I: Hospital Outpatient Procedures (CPT4) Level II: Products, supplies and other services.</td>
</tr>
<tr>
<td>Centers for Disease Control and Prevention (CDC) Race and Ethnicity Code Sets</td>
<td>These code sets are based on current federal standards.</td>
</tr>
<tr>
<td>College of American Pathologists Systematized Nomenclature of Medicine Clinical Terms (SNOMED CT®)</td>
<td>This is the standard coding used for diagnoses and procedures by hospitals: Volume 1 &amp; 2: Hospital diagnoses Volume 3: Inpatient hospital procedures</td>
</tr>
<tr>
<td>International Classification of Diseases, Ninth Edition, Clinical Modifications (ICD-9-CM)</td>
<td>This revision to ICD-9-CM contains a number of important improvements. This standard is not yet widely implemented.</td>
</tr>
<tr>
<td>International Classification of Diseases, Tenth revision, Related Health Problems (ICD-10-CM)</td>
<td>This is the standard coding for diagnoses and procedures by hospitals:</td>
</tr>
<tr>
<td>Logical Observation Identifiers Names and Codes (LOINC®)</td>
<td>This is the standard coding used for a wide variety of medical and health care terms.</td>
</tr>
<tr>
<td>National Drug Code (NDC)</td>
<td>This is a universal product identifier for human drugs.</td>
</tr>
<tr>
<td>National Library of Medicine (NLM) Unified Medical Language System (UMLS) RxNorm</td>
<td>This is the standard coding for laboratory and clinical observations used by health care systems and messaging (like HL7).</td>
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Process Interoperability: Peer-to-Peer EHR Exchange

- 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
Why is all this so important?

The Health Information Exchange Network (HIEN)
operated by
The Regional Health Information Organization (RHIO)

**HIENs will be the forum in which public health and provider systems will interoperate.**

What is a Health Information Exchange Network (HIEN)?

- HIENs come in different sizes and shapes, but usually share these core components
- Together they will form Nationwide Health Information Network (NHIN)
What is a Regional Health Information Organization (RHIO)?

- 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
- Can span a metropolitan area, region, or a state

Standards Initiatives to Follow

- Health Information Exchange
  - American Health Information Community (AHIC)
  - Health Information Technology Standards Panel (HITSP)
  - Health Information Security and Privacy Collaboration (HISPC)
- Federal/State/Local Systems
  - Consolidated Health Initiative (CHI)
  - Medicaid Information Technology Architecture (MITA)
  - Public Health Information Network (PHIN)
More Initiatives to Follow

- Certification Commission for Health Information Technology (CCHIT)
- Industry Interoperability
  - Health Level 7 (HL7)
  - Integrating the Healthcare Enterprise (IHE)
- Agency/Jurisdiction Standards and Policies

Hierarchy of Alphabet Soup

- HHS Secretary
- AHIC
- HITSP
- HL7
- IHE
- ONC
- CCHIT

3/17/2008
IIS Alignment with the National Standards Agenda

- PHIN
- HL7
- AIRA
- CCHIT
- IHE
- HITSP
- Standards Development and Harmonization

HITSP Standards for IZ Data Exchange

- No HITSP constructs in this area yet
- Being developed this year
  - AHIC Immunization Use Case
  - Interoperability specifications
  - Lack of IHE Profile - Gap
  - HL7 version 3 (PHER)
- PHDSC/IHE Task Force
Key Issues in IIS Interoperability

- HL7 is here to stay, but its implementation is neither easy nor uniform
- More than just moving around data (SOA)
- National standards development effort is catching up (AHIC IZ Use Case, IHE)
- Many moving parts – pick somewhere to start
- Will take years to evolve and develop
Provider System Evolution

- Provider systems evolved from focus on administration to clinical support
- Now systems will have to be CCHIT certified with compliant EHRs
- Many different solutions available
- Adoption somewhat slow

Risks and Realities for IIS

- IIS front-end applications targeted at these users may have slower uptake as organizations encourage (or require) users to stay within institutionally-supported applications
- Pressure will build for providers to interoperate solely through HIENs
- Users run the risk of losing access over time to the distinctive IIS features (e.g., algorithm, R/R)
- While many specialized features are part of the approved HL7 EHR specification they are not yet required for CCHIT certification
What does interoperability actually look like?

- HL7 Roadmap Primer
- Data-centered vs Document-centered
- Enabling special features through SOA
**Data-centered or Document-centered?**

- **Data Storage Strategy:**
  - **Data-centered:** systems store data in a conventional relational database (RDBMS) with tables and rows; use SQL to access
  - **Document-centered:** data stored in a formatted document for retrieval as a unit; meta-data saved to facilitate search and retrieval
Data-centered or Document-centered? (continued)

- Interoperability Strategy:
  - Data-centered: traditional structures to represent the data set being transported (a row in a file for a record; delimited or fixed length fields within the record)
  - Document-centered: data is pre-arranged in a document format which is structured

Data-center Approach

Sample HL7 v2.n Message

```
MSH\^\-\&\[\[\]\]\[\]VXU^V04\[\]19970522MA53\[\]P\[\]2.3.1
P(D)[\[\]221345671\[\]\[\]SS]\[\]KENNEDY^JOHN^FITZGERALD^JR\[\]BOUVIER\[\]M\[\]19900607\[\]M\[\]\[\]MA\[\]BDL\[\]NK1\[\]1\[\]KENNEDY^ACQUELINE^LEE\[\]MTH^MOTHER^HL70063\[\]RXA(0)[\[\]19900607\[\]19900607\[\]HEPB-PEDIATRIC/ADOLESCENT-CVX\[\]5\[\]ML\[\]ISO+\[\]\[\]12345\[\]MSD^MERCK^MVX
```
Implications for Public Health

- Data-centered approaches still dominate in intra-organization interoperability but this may change
- Public health/PHIN still seems to be message-centric (i.e., data-centric)
- EHR-S/HIEN world seems to be moving to document-centric (IHE, CDA)
Enable Special Features: An Example

- Immunization Information Systems (IIS) serve a jurisdiction by providing a common repository for immunization information.
- IIS provides specialized features not typically found in an EMR, like:
  - Recommendations of next immunizations due
  - Reminder and recall to ensure that patients return
  - Vaccine ordering and order processing
  - Practice-level assessment of up-to-date status

Enable Special Features: One Suggested Solution

**Service-oriented Architecture** (SOA): a building block approach to systems design that allows discreet functions to be accessed by any authorized system.
Enabling Special Features: A Case Study

- KIDSNET, the integrated child health system in RI, did not have a robust immunization predictor algorithm
- Decided to use a version of the algorithm developed in CA (with permission)
- Deployed algorithm as a web service rather than absorbed into KIDSNET
- Other applications could now easily make use of the service

Enabling Special Features: A Case Study (continued)

- Web service is called in real time from KIDSNET application when needed.
- Core KIDSNET system (Linux/Oracle) interoperates with Microsoft-based Web Immunization Service Evaluation and Recommendation (WISER) without issue.
Enabling Special Features: A Possible Future

This future vision can co-exist with the previous model: Web service can interact with IIS and provider EHR systems.

The Future...

- Will HIEN’s persist and grow? What are the implications of that?
- How quickly will EHR-S deployment expand?
- Will IIS *applications* become a thing of the past, replaced by other styles of data access?
Selected Readings


Selected Sources

- CCHIT: http://www.cchit.org/
- Connecting for Health (Markle Foundation): http://www.connectingforhealth.org/
- eHI: http://www.ehealthinitiative.org/
- HITSP: http://www.hitrust.org/
- HLN: http://www.hln.com/resources/
- NCPHI: http://www.cdc.gov/ncphi/
- ONC: http://www.hhs.gov/healthit/
- PDHSC: http://www.phdsc.org/
- PHII: http://www.phii.org/
Selected Technical Sources

- HL7: http://www.hl7.org/
- IHE: http://www.ihe.net/
- PHIN: http://www.cdc.gov/phin/
- SOA: http://www.webservices.org/
- WWW: http://www.w3.org/2002/ws/

Questions and Comments

Thank you!

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