


# Immunization Information System Interoperability

AIRA Pre-conference Workshop  
42<sup>nd</sup> National Immunization Conference

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March 16, 2008

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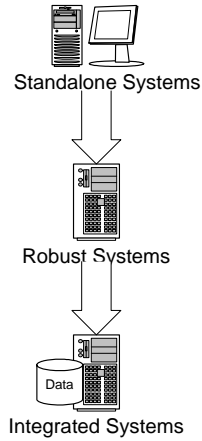
- Evolution of IIS & Systems Integration
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# IIS Evolution



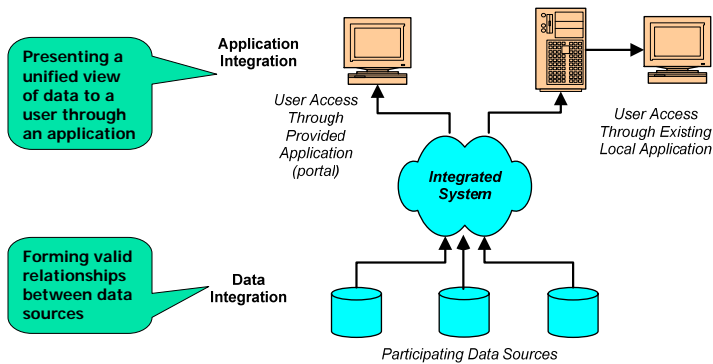
- Began as standalone systems, often PC-or mainframe-based
- Evolved into more robust systems as technology improved
- In some cases became integrated systems, usually patient-centric or incorporating related functions

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# Two Types of Integration



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## From Integration to Interoperability


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“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

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## HL7 EHR WG Definition

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- “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

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## HL7 Definition Key Aspects

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

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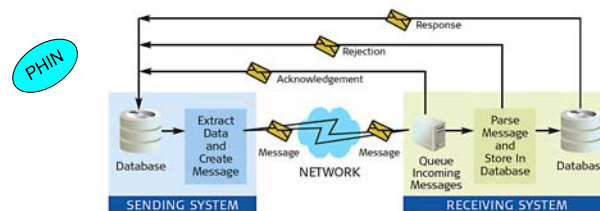
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## Technical Interoperability: System-to-system Messaging

- 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



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# Semantic Interoperability: VT Health Info Tech Plan

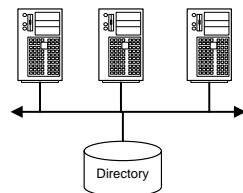
Standard	Description
CMS' Healthcare Common Procedure Code System (HCPCS)/American Medical Association (AMA) Current Procedural Terminology (CPT®) Fourth Edition (CPT-4)	This is the standard coding for procedures widely used in the healthcare community: Level I: Hospital Outpatient Procedures (CPT4) Level II: Products, supplies and other services
Centers for Disease Control and Prevention (CDC) Race and Ethnicity Code Sets	These code sets are based on current federal standards.
College of American Pathologists Systematized Nomenclature of Medicine Clinical Terms (SNOMED CT®)	This is the standard coding used for a wide variety of medical and health care terms.
International Classification of Diseases, Ninth Edition, Clinical Modifications (ICD-9-CM)	This is the standard coding used for diagnoses and procedures by hospitals: Volume 1 & 2: Hospital diagnoses Volume 3: Inpatient hospital procedures
International Classification of Diseases, 10 <sup>th</sup> revision, Related Health Problems (ICD-10 CM)	This revision to ICD-9-CM contains a number of important improvements. This standard is not yet widely implemented.
Logical Observation Identifiers Names and Codes (LOINC®)	This is the standard coding for laboratory and clinical observations used by health care systems and messaging (like HL7).
National Library of Medicine (NLM) Unified Medical Language System (UMLS) RxNorm	This is the standard for coding the names of drugs and dose forms.
National Drug Code (NDC)	This is a universal product identifier for human drugs.

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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



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# Why is all this so important?

The Health Information Exchange Network (HIEN)

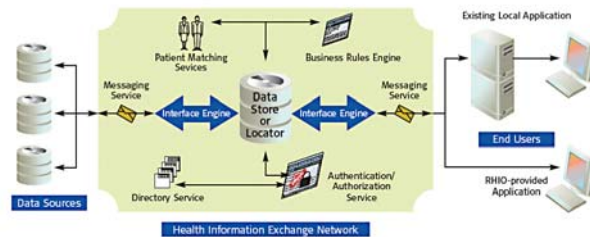
operated by

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

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## 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)

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## 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

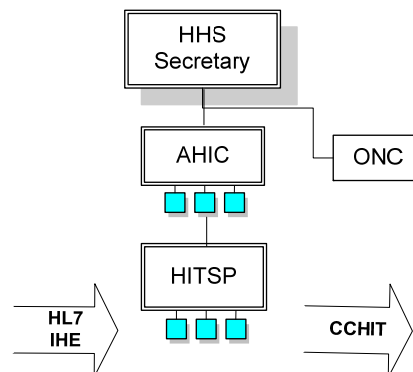
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## Hierarchy of Alphabet Soup



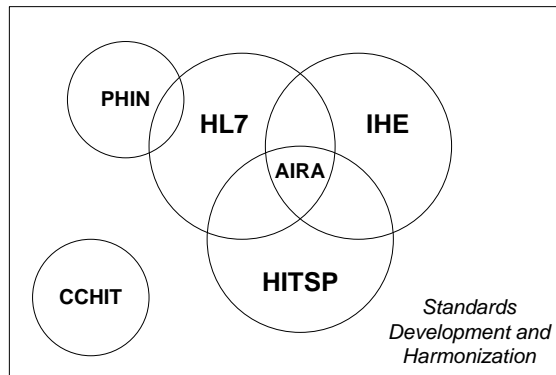
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## IIS Alignment with the National Standards Agenda



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## 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

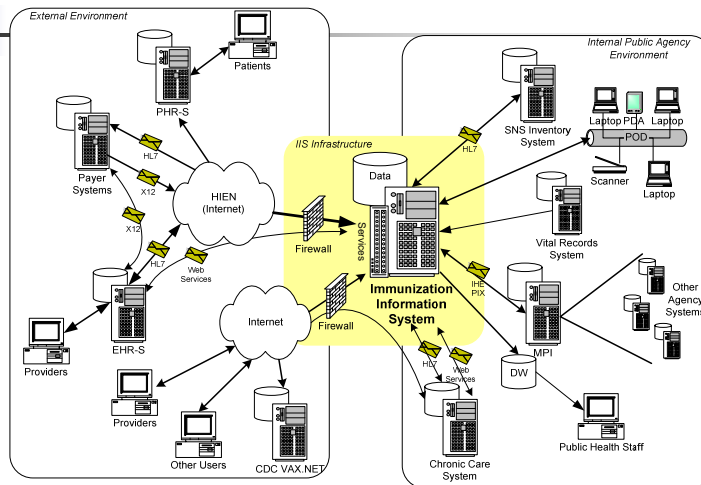
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## IIS Interoperability Model



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## Key Issues in IIS Interoperability

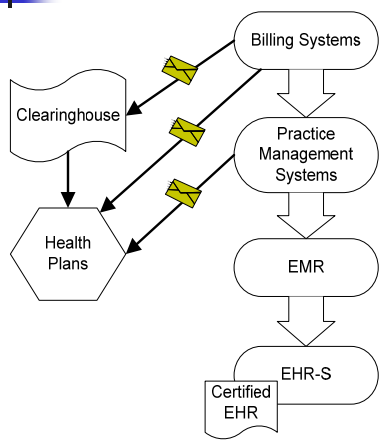
- HL7 is here to stay, but its implementation is neither easy nor uniform
- More than just moving around *data* (SOA)
- National standards development effort is catching up (AHIC IZ Use Case, IHE)
- Many moving parts – pick somewhere to start
- Will take years to evolve and develop

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## 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

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## Risks and Realities for IIS

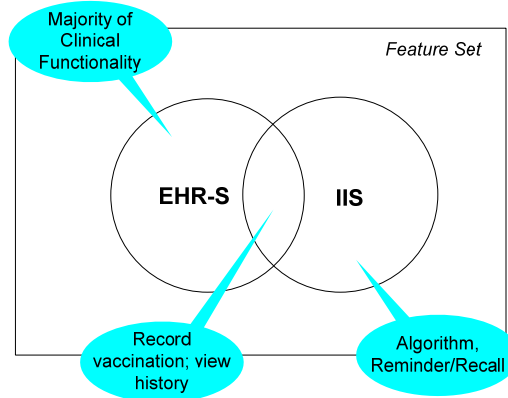
- IIS front-end applications targeted at these users may have slower uptake as organizations encourage (or require) users to stay within institutionally-supported applications
- Pressure will build for providers to interoperate solely through HIENS
- Users run the risk of losing access over time to the 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

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## IIS – EHR-S Tension



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## What does interoperability actually look like?

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

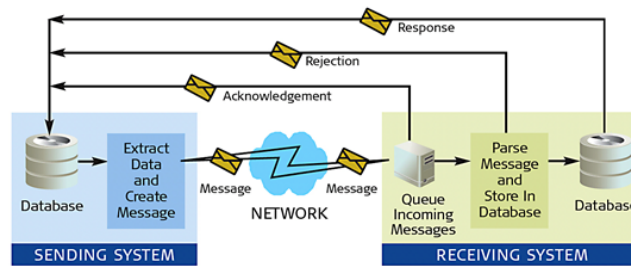
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## HL7-IIS Roadmap Primer



- Update and/or Query?
- History and/or Recommendations?
- Real-time and/or Batch?
- HIEN or Point-to-Point Connection?

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## 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

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## Data-centered or Document-centered? *(continued)*

### ■ Interoperability Strategy:

e.g., X12  
or HL7  
messages

■ **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)

e.g., CCR,  
CCD

■ **Document-centered:** data is pre-arranged in a document format which is structured

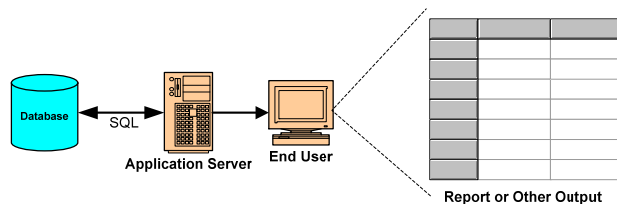
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## Data-center Approach



```
MSH|^~\&|||||VXU^V04|19970522MA53|P|2.3.1|
PID||22134567|^SS||KENNEDY^JOHN^FITZGERALD^JR|BOUVIER^^^^^M|1990060
7|M||~^^^^MA^^^BDL|
NK1|1|KENNEDY^JACQUELINE^LEE|MTH^MOTHER^HL70063|
RXA|0|1|19900607|19900607|08^HEPB-PEDIATRIC/ADOLESCENT^CVX|.5|ML^^ISO+|||||||
MRK12345||MSD^MERCK^MVX|
```

Sample HL7 v2.n Message

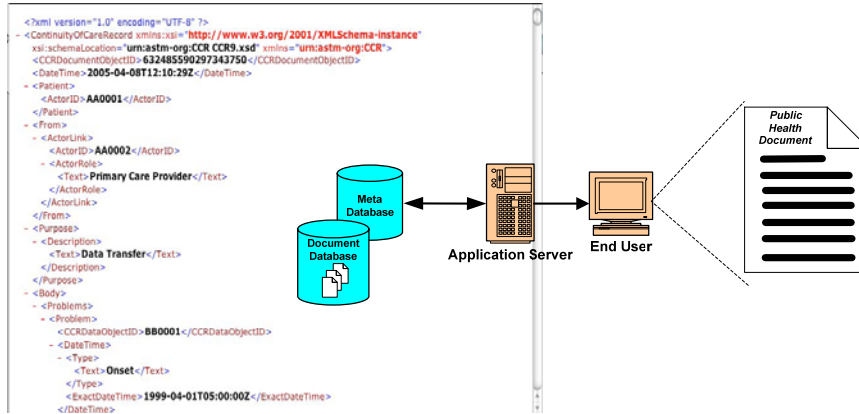
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## Document-centered Approach



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## 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)

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## 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

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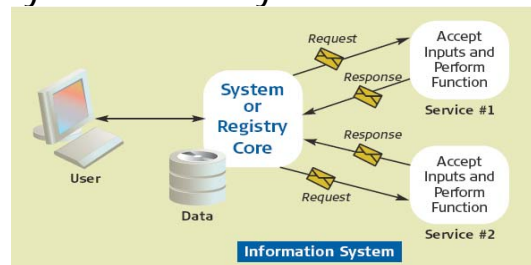
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## Enable Special Features: One Suggested Solution

**Service-oriented Architecture (SOA):** a building block approach to systems design that allows discreet functions to be accessed by any authorized system



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## 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

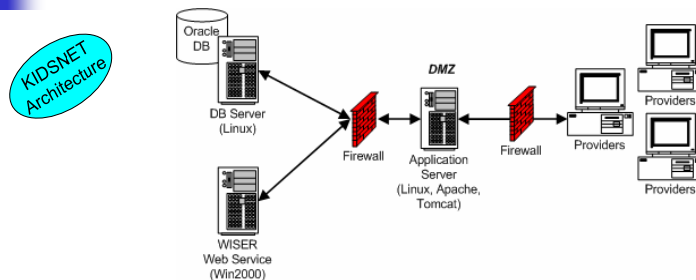
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## Enabling Special Features: A Case Study *(continued)*



- 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.

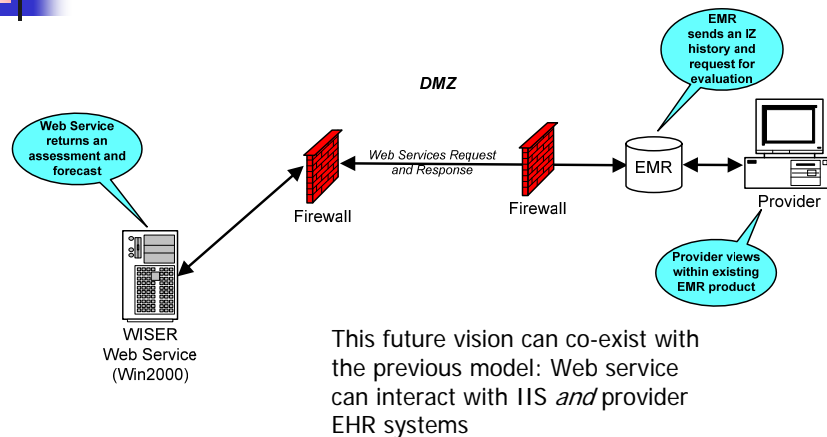
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## Enabling Special Features: A Possible Future



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## 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?

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## Selected Readings

- Noam H. Arzt with contributions by Susan Salkowitz, *Evolution of Public Health Information Systems: Enterprise-wide Approaches*, July 2007.  
<<http://www.hln.com/assets/pdf/UT-White-Paper-Final.pdf>>
- Patricia Gibbons, et al, *Coming to Terms: Scoping Interoperability for Health Care*, Health Level 7 Electronic Health Record Interoperability Work Group, February 2007.  
<<http://www.hln.com/assets/pdf/Coming-to-Terms-February-2007.pdf>>
- Noam H. Arzt, Response to Request for Information, *Development and Adoption of a National Health Information Network*, Department of Health and Human Services, Office of the National Coordinator for Health Information Technology, January 18, 2005.  
<<http://www.hln.com/noam/ONCHIT-RFI-HLNConsulting.pdf>>

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## Selected Sources

- CCHIT: <http://www.cchit.org/>
- Connecting for Health (Markle Foundation):  
<http://www.connectingforhealth.org/>
- eHI: <http://www.ehealthinitiative.org/>
- HITSP: <http://www.hitsp.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/>

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## Selected Technical Sources

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- 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

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# Thank you!

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