HL7 Basic Overview

HIMSS
February 24, 2014

George W. Beeler, Jr.
Beeler Consulting LLC, HL7 Technical Steering Committee
and Past Chair, HL7 Board of Directors
Topics

- Need for Electronic Healthcare Information Exchange
- Healthcare Trends, Challenges, which argue for Standards and their Benefits
- The HL7 Organization
- High-Level Review of Core Standards
- New HL7 Initiatives
Need For Integrated Systems

Doctors need to be connected with each other – especially during transfer of care.
Global Healthcare Trends

- **Rising cost of healthcare**
  - Insufficient reimbursement
  - Aging population
  - High cost of chronic care
  - System and organizational inefficiencies
  - Demand on public health hospitals

- **Paper to Electronic Records**
  - Better clinical outcomes
  - Shared data between healthcare providers
  - Meaningful Use program in the United States
  - Enables automated evaluation of clinical pathways and risk assessment

- **Consumer Empowered**
  - Patients and providers seeking greater access and control over information
  - Personal Health Records empower a consumer to manage their own health
Many Types of Healthcare Information Need to be Exchanged

- Pharmacy Medication Lists
- Lab Test Results
- Hospitalization Summaries
- Doctors Orders and Clinicians Notes
- Medical Imaging Results
- Home Health Monitoring Devices
- Payers / Financial Systems
- Government Agencies, Public Health, Research
- Patient
Healthcare IT Stakeholders

- Patients
- Consumers
- General Practitioners
- Specialists
- Outpatient Healthcare Providers
- Residential Care Providers
- Hospitals
- Healthcare Administration
- Laboratories
- Research
- Pharmaceutical
- Payers, Insurance
- Employers
- Medical Equipment
- Review Boards
- Practice Guidelines
- Government Agencies
- Standards Enforcement Agencies
HL7 Standards support a variety of healthcare activities

- Patient Administration and Demographics
- Orders and Results for Clinical Lab/Pathology, Imaging (radiology, ultrasound, etc.)
- Signs and Symptoms, Diagnosis and Treatments
- Clinical Research (e.g. Genomics) and Public Health/Disease Surveillance
- Pharmacy prescriptions, dispensing and administration
- Scheduling and managing healthcare resources
- Claims and Reimbursements
- Patient Care messages, Clinical Documents (referrals, H&P, Summary record, etc.)

Sharing and re-use of information from many healthcare domains
The HL7 Organization

- Founded in 1987, Health Level Seven International (HL7), with members in over 55 countries, is a not-for-profit, ANSI-accredited standards developing organization, with affiliate HL7 standards organizations in over 30 countries.

- HL7 is dedicated to providing a comprehensive framework and related standards for the exchange, integration, sharing, and retrieval of electronic health information that supports clinical practice and management, delivery and evaluation of health services.

- HL7's 2,300+ members include approximately 500 corporate members who represent more than 90% of the information systems vendors serving healthcare.

- Over 45 healthcare standards from anatomic pathology to vocabulary.

Take a Flash tour at
http://www.hl7.org/documentcenter/public/training/IntroToHL7/player.html
HL7 Mission - Business Value

- HL7's mission is to provide standards for interoperability that:
  - improve care delivery
  - optimize workflow
  - reduce ambiguity
  - enhance knowledge transfer

- Wide range of healthcare standards: clinical, administrative, clinical research, electronic claims, public health, personal health, clinical genomics, etc
HL7 Interoperability Goals

- Develop coherent, extendible standards that permit structured, coded healthcare information of the type required to support patient care, to be exchanged between computer applications, while preserving the meaning.

- Promote the use of HL7 standards worldwide through the creation of HL7 International Affiliate organizations.
An International Organization with Over 30+ HL7 Affiliates

Argentina  Czech Republic  Japan  New Zealand  Taiwan
Australia  Denmark  South Korea  The Netherlands  Turkey
Austria  Finland  Russia  Romania  United Kingdom
Brazil  France  Germany  Singapore  United States
Canada  Greece  Hong Kong  Spain  Uruguay
Chile  India  Luxembourg  Sweden  Switzerland
China  Columbia  Italy  Mexico

And growing
Stimulate, encourage and facilitate domain experts from healthcare industry stakeholder organizations to participate in HL7 to develop healthcare information standards in their area of expertise.

Partner with healthcare information technology users to ensure that HL7 standards meet real-world requirements, and that appropriate standards development efforts are initiated by HL7 to meet emergent requirements.
Standards Drive Increased Business for Healthcare IT Vendors and Service Providers

- Speed of development, faster time to market
- Lower development and installation costs over customized interfaces
- Clients prefer the flexibility and scalability of products with standardized interfaces
- Enhanced interoperability of product
- Standards create best practices for the international community
- Bigger market beyond that for proprietary products
Healthcare Standards Improve Patient Care

**Benefits of Standards:**
- Increase efficiency,
- Improve quality,
- Lower cost,
- And reduce risk

- Improve quality of care
- Electronic documents provide value to clinicians
- Ensure clinicians have latest knowledge
- Improve patient safety/Minimize preventable errors
- Improve clinical workflow
- Lower cost of healthcare delivery
- Eliminate duplicate medical tests
- Supports lifetime electronic health record
- Empower patient to manage their own health
- Improve public health reporting

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Additional HL7 Programs and Activities

- Education Summits
- Product and Services Guides
- Working group meetings with an annual international conference
- Speakers and booth at conferences
- E-learning courses
- University Educational Program
- Networking among members
- Ambassador Program
- Best Practices
- Government Standards Project
- Country Affiliates with workshops, education
- IT professional Certification
- E-Newsletter
Still to Come

- HL7 Family of Standards
  - Version 2 messaging
  - Version 3 messaging
  - The Reference Information Model (RIM)
  - Clinical Document Architecture
  - EHR specifications
  - Clinical Genetics

- Other products, activities, and benefits HL7 has to offer
HL7 Version 2

DESCRIPTION

- HL7’s Version 2.x (V2) messaging standard is the workhorse of electronic data exchange in the clinical domain and arguably the most widely implemented standard for healthcare in the world. This messaging standard allows the exchange of clinical data between systems. It is designed to support a central patient care system as well as a more distributed environment where data resides in departmental systems.

BENEFITS

- Supports the majority of the common interfaces used in the healthcare industry globally
- Provides a framework for negotiations of what is not in the standard
- Reduces implementation costs
- Generally backward compatible
- 95% of US healthcare organizations use HL7 V2.x
- More than 35 countries have HL7 V2.x implementations
V2.x Messaging

- HL7 version 2 defines a series of electronic messages. Since 1987 the standard has been updated regularly, resulting in versions 2.1, 2.2, 2.3, 2.3.1, 2.4, 2.5, 2.5.1, 2.6, and 2.7. The V2.x standards are backward compatible. V2.x messages use one-character delimiters.

- The following is an example of an admission record:

```
MSH|^~\&|MegaReg|XYZHospC|SuperOE|XYZImgCtr|20060529090131-0500||ADT^A01^ADT_A01|01052901|P|2.5
E VN||20060529090900
PID||56782445^^^UAR^Reg^PI||KLEINSAMPLE^BARRY^Q^JR||19620910|M||2028-9^HL70005^RA99113^XYZ|260 GOODWIN CREST DRIVE^^BIRMINGHAM^AL^35
209^M~NICKELL’S PICKLES^10000 W 100TH AVE^BIRMINGHAM^AL^35200^O

PV1||W^389^1^UBABH^^^^3||12345^MORGAN^REX^J^^^^MD^0010^UAMC^L|678
90^GRAINGER^LUCY^X^^^^MD^0010^UAMC^L|MED|||A0||13579^POTTER|SHER
MAN^T^^^^MD^0010^UAMC^L|||0105I30001^99DEF^AN

OBX|1|NM|^Body Height||1.80|m^Meter|ISO+|||F
OBX|2|NM|^Body Weight||79|kg^Kilogram^ISO+|||F
AL1|1|AP^ASPIRIN
DG1|1||786.50^CHEST PAIN, UNSPECIFIED^I9||A
```
V3 Messaging

The Reference Information Model (RIM) is the cornerstone of the HL7 Version 3 development process and an essential part of the HL7 V3 development methodology. HL7 v3 messages are based on an XML encoding syntax.

- Conceptual foundation – a single, common reference information model to be used across HL7

- Semantic foundation – in explicitly defined concept domains drawn from the best terminologies

- Abstract design methodology that is technology-neutral – able to be used with whatever is the preferred technology: information resources, documents, messages, services, applications
Five core concepts of the RIM

- Every happening is an **Act**
  - Procedures, observations, medications, supply, registration, etc.
- Acts are related through an **ActRelationship**
  - composition, preconditions, revisions, support, etc.
- **Participation** defines the context for an Act
  - author, performer, subject, location, etc.
- The participants are **Roles**
  - patient, provider, practitioner, specimen, employee etc.
- Roles are played by **Entities**
  - persons, organizations, material, places, devices, etc.
Normative RIM Release 6

RIM 2.44
Normative RIM R6
November 22, 2013
Domains in the Normative HL7 V3 standard

- Accounting & Billing
- Claims & Reimbursement
- Materials Management
- Patient Administration
- Personnel Management
- Scheduling
- Blood bank
- Care Provision
- Clinical Decision Support
- Clinical Document Architecture
- Clinical Genomics
- Diagnostic Imaging
- Immunization
- Laboratory
- Medical Records
- Medication
- Orders and Observation
- Pharmacy
- Public Health
- Regulated Products
- Regulated Studies
- Specimen
- Therapeutic Devices
Need a Standard Coding, Terminology, and Vocabulary System for Common Understanding

A and B differ syntactically and cannot interoperate without translation.

A and C differ semantically. A cannot represent the concept "Unknown".

<table>
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<th>Patient's gender</th>
<th>“0”</th>
<th>Male</th>
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<tbody>
<tr>
<td></td>
<td>“1”</td>
<td>Female</td>
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<table>
<thead>
<tr>
<th>Patient's gender</th>
<th>“M”</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>“F”</td>
<td>Female</td>
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<tr>
<td></td>
<td>“U”</td>
<td>Unknown</td>
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HL7 Messages and Documents

**Messages**
- A message is event driven and includes a specific workflow.
- It could include bi-directional flow of data

**Documents**
- The Clinical Document Architecture (CDA) can facilitate clinical document exchange within and between medical institutions.
- CDA can be used to bring patient’s clinical documents into a patient-centric EHR.
- A collection of information about an encounter
- Can be digitally signed
Clinical Document Architecture (CDA)

- **Interoperability**
  - An approved standard way to exchange dictated, scanned, or electronic reports on a patient between various health information technology systems and platforms
  - Human readable
    - The “paper world” of clinical documents, forms, etc.
  - Computer readable
    - XML representation of document data
    - EHR discrete data storage
    - Clinical decision support
CDA is the Basis For …

- Continuity of Care Document
- Consult Note
- Diagnostic Imaging Report
- Discharge Summary
- Healthcare-associated Infections, Public Health Case Reports
- History and Physical
- Operative Note
- Personal Health Monitoring
- Plan-2-Plan Personal Health Record
- Quality Reporting Document
- Genetic Test Results

- Emergency Care Summary
- Patient Summary
- Patient Level Quality Data Document Using IHE Medical Summary (XDS-MS)
- Encounter Document constructs
- Clinical Oncology Treatment Plan
- Immunization Document
- Scanned document
- … and many more …
What is a Continuity of Care Document?

- A medical summary representing the continuity of care record core data set covering one or more healthcare encounters.

- A snapshot in time for a patient, in CDA form, containing the pertinent:
  - clinical,
  - demographic, and
  - administrative data
The EHR-S Functional Model

Is…
- A system specification
- An EHR system specification
- A reference list of functions that may be present in an EHR-S (the “what”)
  - Enables consistent expression of functionality
  - Provides flexibility for innovation and product differentiation
  - Gold standard, sensitive to what can practically be done by a system, future system development

Is Not…
- A messaging specification
- An EHR specification
- An implementation specification (not the “how”)
  - Does not prescribe technology
  - Does not dictate how functions must be implemented (e.g., via the user interface, database design)
EHR-S Functional Model at a Glance

<table>
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<tr>
<th>Direct Care</th>
<th>Supportive</th>
<th>Information Infrastructure</th>
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<tbody>
<tr>
<td>C1.0 Care Management</td>
<td>S1.0 Clinical Support</td>
<td>11.0 EHR Security</td>
</tr>
<tr>
<td>C2.0 Clinical Decision Support</td>
<td>S2.0 Measurement, Analysis, Research, Reporting</td>
<td>12.0 EHR Information and Records Management</td>
</tr>
<tr>
<td>C3.0 Operations Management and Communication</td>
<td>S3.0 Administrative and Financial</td>
<td>13.0 Unique identity, registry, and directory services</td>
</tr>
</tbody>
</table>

Functions describe the behavior of a system in user-oriented language so as to be recognizable to the key stakeholders of an EHR System.
EHR-S Profiles Developed or Under Development

- Emergency Department
- Child Health
- Long Term Care
- Behavioral Health
- Records Management & Evidentiary Support
- Regulated Clinical Research (Clinical Trials)
- Vital Statistics Reporting

For more information:

HL7 Electronic Health Record
http://www.hl7.org/ehr/index.asp

HL7 Functional Profile Registry
http://xreg2.nist.gov:8080/ehrsRegistry/index.jsp
Welcome to the HL7 Education Portal

The Education Portal aims to provide a gateway to training and education opportunities for the HL7 community. This dedicated space provides access to information about Professional Development and Certification Opportunities beneficial to Project/Product Managers, Implementers, Software Engineers, Clinicians and Business Analysts working in the HL7 space.

In addition, the portal links you to exam preparation materials and access to registration for any certification exam at locations around the world.

NEW - HL7 Webinars

HL7 webinars are a leading source of education and training for HL7 stakeholders and the wider HL7 global community. Attend the live event or view the recording on-demand, when it's convenient for you. Or do both because registering for a live HL7 webinar includes unlimited access to the recording for one full year...

Read More...
### wiki.hl7.org

This is the Main Page of the HL7 Wiki, hosted by HL7 Inc, whose main web page is at [http://www.hl7.org](http://www.hl7.org). The HL7 Wiki is a collaborative technology used to support the HL7 organization. The contents of this Wiki are non-binding, see the HL7 website for persistent documents (minutes, standards, etc.). The Wiki currently has 5,705 pages with substantive content. See Basic Editing and Help Resources for information about editing the Wiki, subject to the HL7 Wiki Acceptable Use Policy. To access information, either use the search option or the main page of a HL7 work group or project as shown below.

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<td>Health &amp; Clinical Topic Groups (cont.)</td>
<td>WGMs</td>
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<td>Conformance and Guidance for Implementation/Testing WG</td>
<td>Orders &amp; Observations WG</td>
<td>Upcoming WGM Information and detailed agendas</td>
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<td>Infrastructure and Messaging WG</td>
<td>Patient Care WG</td>
<td>Co-Chair Election Schedule</td>
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<td>ITS WG</td>
<td>Patient Safety WG</td>
<td>Unofficial HL7 Significant others &amp; spouses Auxiliary</td>
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<td>Pharmacy WG</td>
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<td>Public Health and Emergency Response WG</td>
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<td>RIMBAA WG (v3 implementers)</td>
<td>Regulated Clinical Research Info Mgmt WG (RCRIM)</td>
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<td>Security WG</td>
<td>Administrative Topic Groups</td>
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<td>Community-Based Collaborative Care (CBCC)WG</td>
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See also:
- [Find or Be a Volunteer for an HL7 Work Group](http://www.hl7.org/)
- [WG information](http://www.hl7.org/)
- [PBS Metrics](http://www.hl7.org/)
- [Projects, Ballots, and Standards](http://www.hl7.org/)
- [GForge](http://www.hl7.org/)
- [TSC Projects > Files > PBS Metrics](http://www.hl7.org/)
- [Search for HL7 Projects](http://www.hl7.org/)

Related Wikis:
- [HL7 TSC Wiki](http://www.hl7.org/)
- [HDF development wiki](http://www.hl7.org/)
- [IHE Wiki](http://www.hl7.org/)
- [Biomed GT Collaborative Terminology Development Wiki](http://www.hl7.org/)
- [MITA project wiki](http://www.hl7.org/)
- [Wiki: HL7 AU, HL7 DE](http://www.hl7.org/)

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HL7 Overview

NEW INITIATIVES
Consolidated CDA

- The development of a single implementation guide that represents harmonization of Health Story guides, HITSP C32, part of the IHE Patient Care Coordination, and the original CCD by HL7

- 9 different types of commonly used CDA documents
  - Continuity of Care Document
  - Consultation Notes
  - Discharge Summary
  - Imaging Integration, and DICOM Diagnostic Imaging Reports
  - History and Physical
  - Operative Note
  - Progress Note
  - Procedure Note
  - Unstructured Documents
Fast Health Interoperability Resources

This is the 1st DSTU version of FHIR. There's also a developmental version, and a Nightly Build.

Welcome to FHIR®

First time here? Read the high level summary and then the FHIR overview / roadmap. See also the open license.

Major Sections:

- General Documentation
- Implementation & Exchange
- Clinical Resources
- Administrative Resources
- Infrastructural Resources

Quick links:

Documentation
- Resource List
- XML & JSON

Implementation
- Downloads
- FHIR Schemas & Schematrons

External Links
- Support: Stack Overflow (When to use)
- Public Test Servers & Software
HL7 has been addressing these challenges by producing healthcare data exchange and information modeling standards for over 20 years. **FHIR is a new specification based on emerging industry approaches, but informed by years of lessons around requirements, successes and challenges gained through defining and implementing HL7 v2, v3 and the RIM, and CDA.** FHIR can be used as a stand-alone data exchange standard, but can and will also be used in partnership with existing widely used standards. (See [Comparing FHIR to other HL7 standards](#))
Standards and Select IP Freely Available

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HL7 Standards Soon to be Free of Charge
Health IT Standards Leader to Support Widespread Global Adoption by Making Standards and Select IP Freely Available

Ann Arbor, Michigan, USA – Sept. 4, 2012 – Health Level Seven® International (HL7®), the global leader in developing interoperability standards for healthcare IT, announced today its decision to make much of its intellectual property (IP), including standards, freely available under licensing terms. The landmark decision represents HL7’s commitment to the betterment of healthcare worldwide by ensuring that all stakeholders have equal access to its HIT standards. The new policy is expected to take effect in the first quarter of 2013.
New Member Benefits

Join Us!
How to get more info on HL7

- **Web site:**
  - [http://www.hl7.org](http://www.hl7.org)

- **International Affiliates**
  - [http://www.hl7.org/Special/committees/international/intl.htm](http://www.hl7.org/Special/committees/international/intl.htm)

- **Education and Tutorials**
  - [http://www.hl7.org/education/index.cfm](http://www.hl7.org/education/index.cfm)

- **How to request and HL7 Ambassador speaker**
  - [mailto:hq@hl7.org](mailto:hq@hl7.org)

- **Contact info for HL7 HQ**
  - [mailto:hq@hl7.org](mailto:hq@hl7.org)

- **Product and Services Guide**
Thank You

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and Past Chair, HL7 Board of Directors