

Week 9
Health Information Standards

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ACS-3801-050 Principles in Information Systems

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Week 9 Outline

- Reading: Chapter 11, HIS Standards, p357– p392
- Learning Objectives:
 - Give examples of the methods by which standards are developed
 - Discuss the role of organisation that have a significant impact on the adoption of HIS standards
 - Identify examples of HIS standards and the organisations that develop them
 - Understand the terms interoperability and system integration
- Summary

Introduction

- In this section we focus on Data Standards related to HIS
- Typically these are based on protocols, terminologies, procedures
- Objective is to store, share (exchange) and retrieve HIS Data

Standards

- Are a measuring stick to how the HIS/organisation compares
- Standards provide a common set of rules by which HIS can communicate
- HIS that use different standards will not be able to work together or share (communicate) data
- Often Standards are very technically biased and can be difficult to learn/understand, needs experts

Why do I need a Standard?

- Excessive diversity creates inefficiencies or impedes effectiveness as information has to be converted for one structure to another
- Pressures to reuse data collected in a multitude of ways
- We want to make things work more easily together and economically

Standards

- A Standard is essentially a prescribed set of rules
- Generally functional/service based, e.g. Security, EHR, data interchange
- Often require multiple Standards to achieve a single HIS service,
 - e.g. RIS/PACS: DICOM, Access Control, TCP/IP, SQL

Challenges

- No one Standard can fulfill all HIS Data requirements
- There are many governing bodies who own competing standards – which one to choose?
- Similar standards from different governing bodies do not always align
- Often the governing bodies are independent (private) agencies who are in business to control standards
- Generally there is a license fee involved
- The Standard owner may have a set of rules about how to use the Standard in a given use case causing variability in applying Standard

Standards Development Process

Formal and informal methods have evolved that support the establishing of Standards

- Ad-Hoc
- De-Facto
- Government Mandate
- Consensus

1: Ad-Hoc

- Where a group of interested people or organisations come together and agree on a formal specification with any formal adoption process.
- Digital Imaging and Communications in Medicine (DICOM) was developed in this way, vendors of equipment and technical development teams need to be able to capture and store digital images

2: De-Facto

- Arises where a vendor of a particular product controls such a large part of the market (whether paid for or not) that the product becomes the recognised norm
- SQL query language used in dbms
- MS Word as a basic office collaboration tool
- XMLS for data sharing becoming the new de-facto for HIS

3: Government Mandate

- Governments can mandate standards be created to manage specific aspects of the HIS industry
- PIPEDA, HIPPA, are standards created by governments to standardise practices, policies, regulations etc.

4: Consensus

- Various interested parties come together to agree a formal standards specification. A very formal and rigorous procedure of definition, peer review, feedback, updates and formal release
- Changes to the Standard as it evolves over time go through the same process
- HL7 (data interchange) is a typical standard that has undergone this process

Important Standards Organisations

- International Standards Organisation (ISO)
- ASTM International (ASTM)
- Accredited Standards Committee (ASC)
- Health Level Seven International (HL7)
- Digital Imaging and Communication in Medicine (DICOM)
- National Council for Prescription Drug Programs (NCPDP)
- Regenstrief (LOINC) Laboratory Vocabulary
- International Health Terminology SDO (IHTSDO)
- American National Standards Institute (ANSI)

Standards Organisations Role

- Each organisation may have a different philosophy around how they create, manage and release standards they are there to act as the governing body
- It is important that they manage the strategy and growth, expansion of a standards and recognise when change is needed
- Communication and participation, involved experts in the process, bring together committees and team to plan and implement change

Vocabulary and Terminology Standards

- Just as in life we use language and vocabulary to exchange (HIS) information
- Diversity in the range of data and information collected request a formalised vocab in order to capture and exchange this information
- Coding standards help to encode HIS information and are critical to a complete integrated HIS
- We call these Classification Systems (Standards)

Vocabulary and Terminology Standards

- No single vocabulary can fulfil the complex task
- Governing bodies have identified a core set
 - Systematized Nomenclature of Medicine – Clinical Terms (SNOMED)
 - Logical Observation Identifiers Names and Codes (LOINC)
Labs subset

Coded Terminologies & Nomenclatures – Specific Terminologies: SNOMED-CT

- Systemized Nomenclature of Medicine – Clinical Terms (SNOMED-CT)
- It supports multi-axial coding patient information by post-coordination of terms
- It supports a logic-based structure called Reference Terminology
- It is considered to be the most comprehensive clinical healthcare terminology

Coded Terminologies & Nomenclatures – Specific Terminologies: SNOMED-CT

SNOMED-CT Reference Terminology Example

Concept: Bacterial pneumonia

Concept Status Current

Fully defined by ...

Is a

Infectious disease of lung
Inflammatory disorder of lower respiratory tract
Infective pneumonia
Inflammation of specific body organs
Inflammation of specific body systems
Bacterial infectious disease

Causative agent:

Bacterium

Pathological process:

Infectious disease

Associated morphology:

Inflammation

Finding site:

Lung structure

Onset:

Subacute onset
Acute onset
Insidious onset
Sudden onset

Severity:

Severities

Episodicity:

Episodicities

Course:

Courses

Descriptions:

Bacterial pneumonia (disorder)
Bacterial pneumonia

Legacy codes:

SNOMED: DE-10100
CTV3ID: X100H



Multiple
Hierarchy



Definition info



Ways to
Post-coordinate



Names



Backward
compatibility

Coded Terminologies & Nomenclatures – Specific Terminologies: LOINC

- Laboratory Observations, Identifiers, Names and Codes (LOINC)
- Identifies medical laboratory observations and other observations like vital signs & ECG
- Used by data interchange standards
 - Health Level 7 (HL7)
 - Integrating the Healthcare Enterprise (IHE)

Coded Terminologies & Nomenclatures – Specific Terminologies: LOINC

Blood glucose	GLUCOSE:MCNC:PT:BLD:QN:
Plasma glucose	GLUCOSE:MCNC:PT:PLAS:QN:
Serum glucose	GLUCOSE:MCNC:PT:SER:QN:
Urine glucose concentration	GLUCOSE:MCNC:PT:UR:QN:
Urine glucose by dip stick	GLUCOSE:MCNC:PT:UR:SQ:TEST STRIP

 Example

LOINC example acronyms:

components of the fully specified name are separated here by “:” and consist of the substance measured, the property (e.g., MCNC = mass concentration; SCNC = substance concentration; NFR = numeric fraction; and NCNC = number concentration), the time (PT = point in time), the specimen, and the method (SQ = semiquantitative; QN = quantitative; QL = qualitative).

Interoperability

- “the ability of a system to exchange electronic health information with and use electronic health information from other systems without special effort on the part of the user...” Healthcare Information Systems, Wagner, Lee, Glaser, p83.
- Seamlessly integrated health system in which information flows from one application to another
- Enables the creation of a complete longitudinal electronic patient record
- The problem is that the data is not always meaningful, complete and standardized
- Applications also need to fit seamlessly into the workflow

Interoperability - Challenges

- So many systems, so many standards, too few compatibilities
- No one single patient identifier to link HIS together
- No incentives for vendors, why should they integrate, “why not buy our other products and services?”
- Information Blocking, the willful neglect of allowing integration to take place, vendors or system owners won't allow data exchange to take place
- How does this reflect policy that systems should share data?
 - Change service, implement new strategies, communicate issue
 - Certifications, accreditations, strategy roadmaps

Data Exchange and Messaging Standards

- The success of a complete EHR is dependent on the ability to share data
- Can happen at the regional, site, federal level
- Messaging standards are needed to translate vocabularies from one standard with another
 - Health Level 7 Messaging (HL7)
 - Digital Imaging and Communications in Medicine (DICOM)
 - National Council for Prescription Drug Programs

Data-Interchange Standards – General Concepts and Requirements

- Sender – transmits data to another system
- Receiver – gets data required to carry out task
- Transaction set – well defined task steps
- Need to agree
 - Format & content
 - Terminology
 - Delivery mode

Data-Interchange Standards – General Concepts and Requirements

- Goal is to allow data to be sent from the sending system to the receiving system
- Standards must accommodate all data elements required
- Application (on top) free to use the data
- Application independence, i.e. data can be used for many purposes

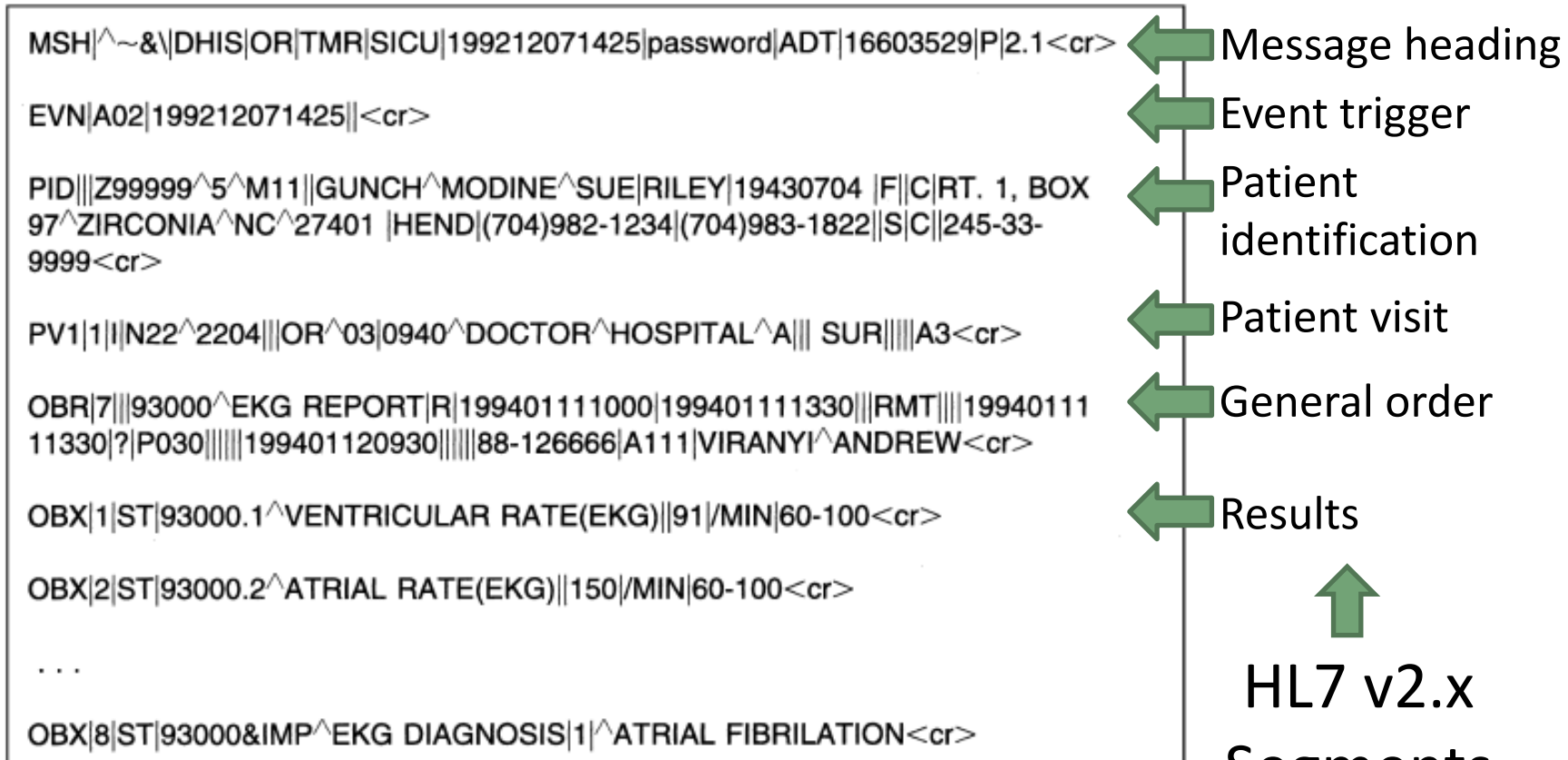
Data-Interchange Standards – Specific Standards: Health Level 7 (HL7)

- Original goal was to enable data exchange among hospital systems
- Most widely implemented data-messaging standard
- It is message based and uses an event trigger model with transmit request-response messages

Data-Interchange Standards – Specific Standards: Health Level 7 (HL7)

- Version 2.3 expanded scope
 - Patient administration (e.g. admission, discharge, etc)
 - Patient accounting
 - Order entry
 - Clinical-observation data
 - Patient and resource scheduling
 - Patient-referral messages
 - ... and several more

Data-Interchange Standards – Specific Standards:HL7 ADT Transaction Message

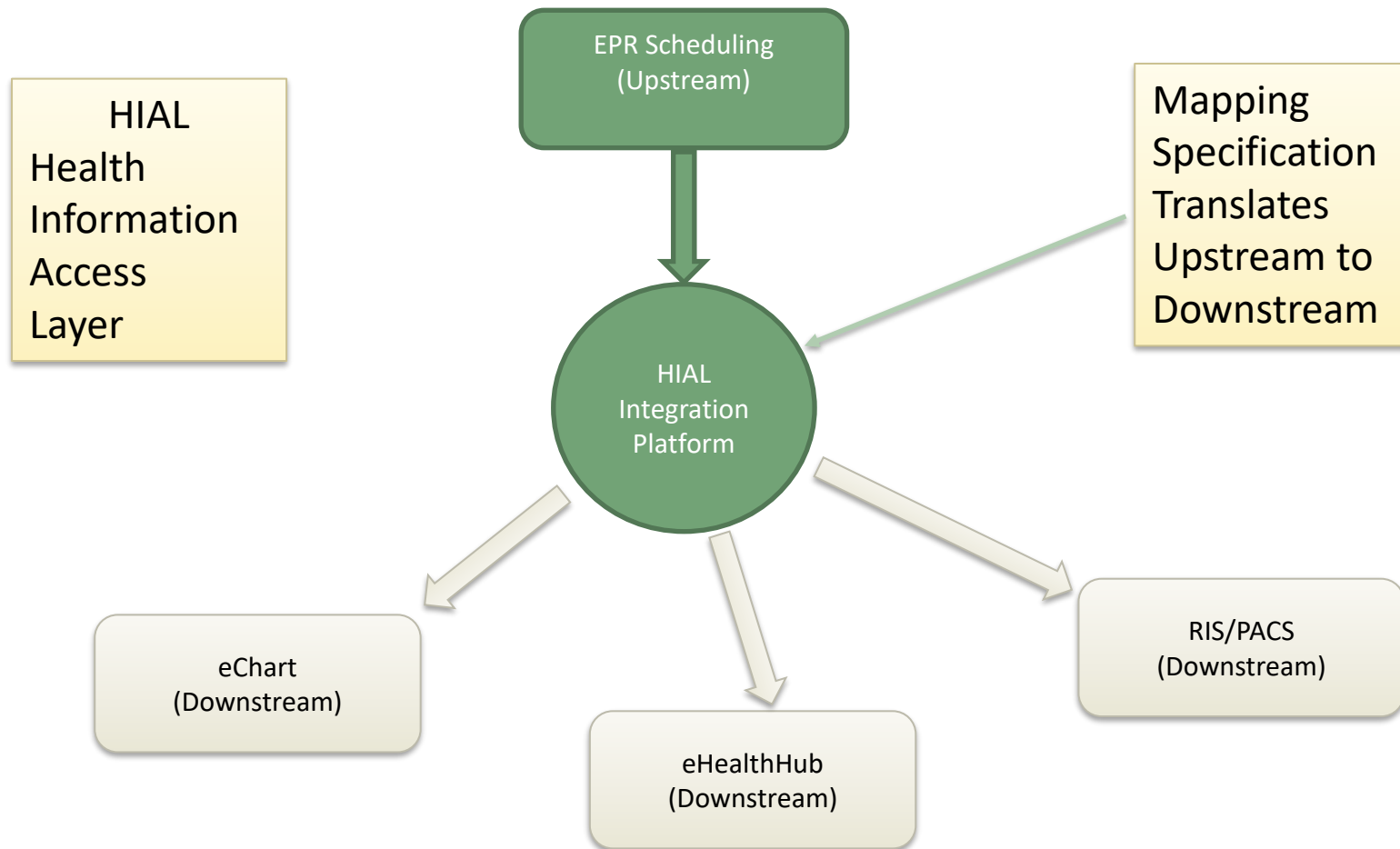


Event: Patient is transferred from OR to the ICU.
There are two independent HIS.

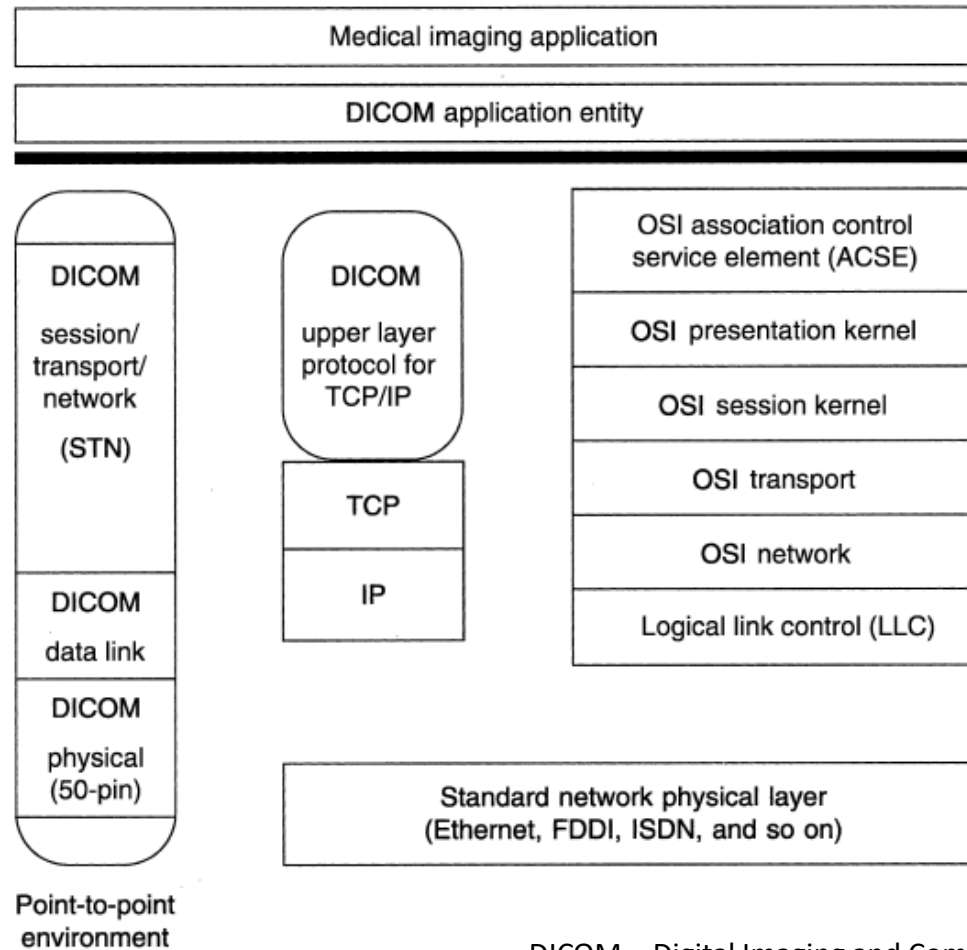
Data-Interchange Standards – Specific Standards: Health Level 7 (HL7)

- Version 3.x (aka CDA)
 - Object oriented
 - Based on a Reference Information Model (RIM)
 - It includes terminology, data representation and data exchange
 - Market is migrating to v3.x, but v2.x heavily utilized
 - Very difficult to implement!

How HL7 Integration Works



Data-Interchange Standards – Specific Standards: DICOM



DICOM – Digital Imaging and Communications in Medicine

Data-Interchange Standards – Specific Standards: NCPDP

- NCPDP – National Council for Prescription Drug Programs
- Data-interchange standards for the pharmacy service sector
 - <http://www.ncpdp.org/Standards/Standards-Info>
- Goal is to improve communication within the pharmacy industry

Summary

- With the diverse of applications and data we need standards to help control data structure and simply integration
- Governing bodies and vendor lead organisations manage a diverse (and growing) range of standards
- No one standard can do the job alone, it takes multiple standards to achieve interoperability
- Vocabulary based standards ensure a common language
- Integration capability is a key function of HIS