

Terminology Services

TEPR 2002 TT3d Medical Terminologies: Language Process as Solution: II May 14, 2002

Presented by Joan R. Duke
Health Care Information Consultants (HCIC), LLC
<http://www.hcicl.com>

Terminology Services

Contributing Authors:

- Joan R. Duke, BS, MA
- John Crawford, PhD
- Caroline Samuels, MD
- Cindy Gillum, RN, MHA
- Sara Adams, BS, MA

Topics

- Problem and Current State
- Terminology Concepts
- Terminology Services Functions
- Relevant Standard
- HL7 Version 3
- Recommendations

Terminology Services

“not just coded clinical data ”

- New product
- New information framework
- New system architecture
- Precursor of standard user interfaces

The Problem

- Clinical documents that are not coded cannot be transmitted to other systems for retrieval and analysis except as text
- To meaningfully share patient medical information the following is needed:
 - Capture coded data at the point of care
 - Reference standard terminologies and data models integrated within the record system
 - Services to process patient information into coded data & phrases within particular terminology domains (subject areas)

Current State

- Multiple standard and proprietary terminologies
- Some standard coding and classification terminologies
- No single design for individual documents or structure of patient medical record
- Multiple computer systems; each with their proprietary record architecture
- There is data sharing among healthcare enterprises using HL7, limited to the definitions needed for interchange of messages among computer systems

Impact of Current State

- Most clinical data cannot be reused for aggregate analysis, building medical knowledge or developing clinical guidelines
- Only basic coded clinical data can be compared among sites or systems (**e.g., ICD, DRG, CPT**)
- Clinical data cannot be linked to standard decision support resources for real-time feedback to clinicians. (**e.g., Example is de facto standard First Data Bank for drug checking**)

Recent News

- NCVHS was studying and has...now recommended HL7 2.2 messaging standard and also recognition of HL7 version 3 as emerging standards
- HL7 Version 3 committee are:
 - Defining data model (RIM, DMIN, RMINS), message meta model (MDF), hierarchical message description (HMD)
 - XML messaging
 - Defining architecture of clinical document (CDA)
 - Defining vocabulary & good vocabulary practices
 - Defining Templates for CDA documents

Medical Terminology Concepts

- Type of terminology depends on its purpose
 - Process by machine - coding
 - Retrieval & analysis - classification & aggregation
 - Documentation of clinical event – vocabulary & nomenclature
- Meaning also requires context and content
 - Model expresses data, semantics and state
 - Terminology defines subject matter (domain) and concepts

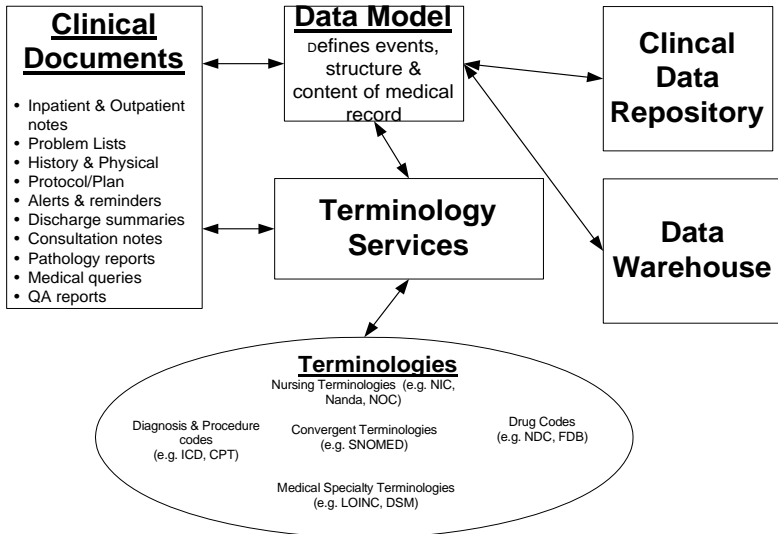
Information Sharing

- Requires consistency across sites and computer applications. This is enabled by:
 - **Functional interoperability - Standards for the exchange of information among systems (e.g., HL7 2.4).**
 - **Semantic interoperability – Standards for sharing meaning among systems (e.g. in SNOMED-RT 'aortic stenosis' has associated topology and 'aortic stenosis' ISA disease of the aorta)**

Terminology Services Facilitate

- Processing of relationships & attributes (events & data elements) defined in data model (e.g., patient care includes orders which have actions that have attributes such as type of action, time, priority, etc.)
- Processing of terminology – Data includes terms & their concepts (e.g., eczema is a disease; skin is part of the anatomy; warm is a modifier)
- Collecting data entered into standard templates (e.g., user interfaces provide fields to capture assessment “skin improved slightly w/topical treatment”)

Terminology Processing



Terminology Functions

- Can be provided by external server or internal module
- Retrieve terminology information from servers
- Retrieve details of the properties of concepts & terms
- Retrieve the contents based on specified criteria and relationships
- Validate terms within a particular domain
- Map and transform codes and phrases

Terminology Uses

- Coding and controlling code sets
- Enabling pick lists
- Enabling standard orders and order sets
- Supporting standard alerts and warnings
- Coding protocols and guidelines
- Capturing structured text such as histories, assessments and treatment plans
- Accessing medical knowledge-bases
- Back-end functions for code translation, indexing & retrieval

Relevant Standards Efforts

- Numerous terminologies & message formats (e.g., ICD, CPT, LOINC, SNOMED & HL7, X12N, DICOM, NDPCP, etc.)
- HIPAA has created legal framework and established "code set" standards for use in certain administrative and financial healthcare transactions
- National Library of Medicine (NLM) – UMLS is comprehensive thesaurus of electronic biomedical information from many sources
- HL7 – Develops and publishes protocol specifications for sharing and processing of health care data



HL7 Approach

Terminologies & Documents

- Was, and still is, focused on interface standards for health care data sharing, e.g., messages
- Version 3, currently in process, uses object methodology to address healthcare events, information model and vocabularies
- Addresses not only messages, but data model and document architecture (hierarchy of document specifications) of patient healthcare record

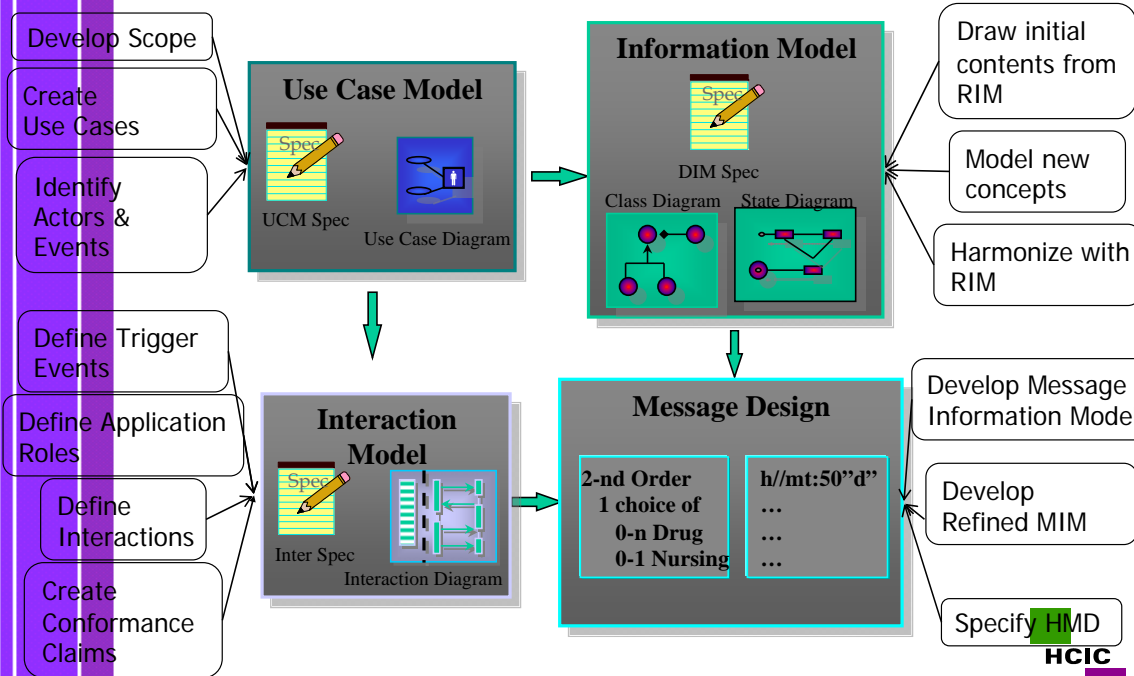
Clinical Documents vs. Messages

- HL7 Clinical Document Architecture (CDA)
 - A defined and complete information object that can include text, images, sounds, and other multimedia content
 - In contrast with a message, the document is a whole clinical document maintained for a period of time by person or organization that is human readable and can be authenticated
- Clinical documents derive their meaning from the Reference Information Model (RIM)

CDA Names

Name as requested by R.Dolin	LOINC_NUM	Document ty	Type of Service	Subject
Advanced directive report		Legal	Advanced directive	Patient
Procedure report	28570-0	Report	Procedure	Patient
Operative report	11504-8	Report	Surgical operation	Patient
Pathology report	11526-1	Report	Pathology	Patient
Radiology report	18782-3	Report	Radiology	Patient
Conference report		Report	Conference	Patient
Consent report		Report	Consent	Patient
Postmortem report (Autopsy report)	18743-5	Report	Autopsy	Patient
Provider comment report		Comment (note)		Patient
Report of clinical encounter	11516-2 (phys)	Note	Visit	Patient
Clinical consultation report	11488-4	Report	Consultation	Patient
Confirmatory consultation report	24611-6	Report	Consultation, confirmatory	Patient
Educational visit report		Report	Education	Patient
History and physical report	11492-6 (hospital)	Report	History & Physical	Patient
Admission history and physical report	28636-9	Report	History & Physical^Admis	Patient
Comprehensive history and physical report	28626-0	Report	History & Physical, Comp	Patient
Targeted history and physical report	18763-3 (phys)	Report	History & Physical, Target	Patient
Progress report	11506-3	Report	Subsequent visit (follow-u	Patient
Summary report		Report	Summary of Episode	Patient
Discharge summary	28574-2	Report	Summary^Discharge	Patient
Flow sheet report		Flow sheet		Patient
Transfer summary report	18761-7	Report	Summary^Transfer	Patient
Supervising physician report		Report	Supervisory Direction	Patient
Cardiology Clinic Note		Note	Visit	
Cardiology Note		Note	Cardiovascular Evaluation	
Cardiology Consult		Note	Consult	
		Kind of Docu	Kind of Service	
		Letter	Visit (synonym for evaluation and	
		Report (know	Supervisory Direction	
		Note (ad hoc,	Therapy	
		Legal Docume	Procedure	
		Flow sheet	Physical Exam	

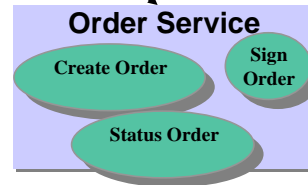
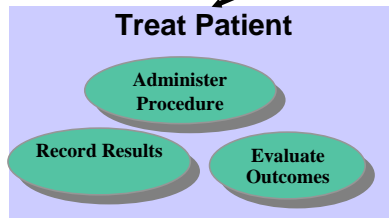
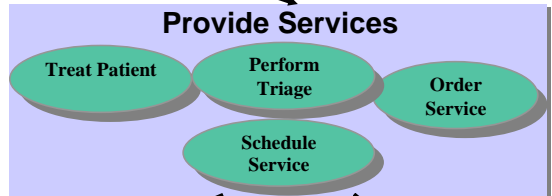
Version 3 Development Model



Use Case Model

- Defines situations in which the communication is needed
- Defines who initiates and participates in the use case
- Develops graphic of the business process
- See sample model on next slide

SAMPLE MODEL



Reference Information Model (RIM)

- Model for data content of HL7 messages and documents
- RIM defines classes such as people, places and events.
- Defines attributes, type of data and constraints (vocabulary or other domains)
- Defines transition states for those events that can change such as patient encounters, based on use cases, e.g., scheduled, active, discharged, etc.

Domain Information Model (DIM)

- Attributes in the RIM must be associated with a Domain to have meaning
 - (e.g., observations have observation values)
- Domains are associated with Vocabularies
 - Held in the *Domain Specification Database* (e.g., observation results in an diagnosis of cancer M-80003 in SNOMED-RT)
- The vocabulary and domain define the values that may be taken on by an attribute in a defined message
 - Set of coded values or defined words/phrases
 - Statements in a constraint language

Interaction Model

- Specifies standard trigger events and information
 - (same as in HL7 Version 2)
- Does not define standard applications, functions or roles
- In HL7 version 3, becomes the basis for contractual commitments and performance testing

Message Information Model (MIM)

- Subset of Reference Information Model
- Contains structure and semantics of message
- Documents message specification

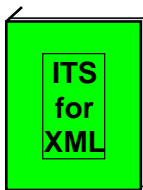
Putting the pieces together

Implementation
Technology
Specification

"Send as ASCII
string in XML
format"

Hierarchical
Message
Definition

"Discontinue
pharmacy order"

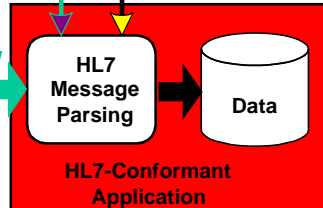
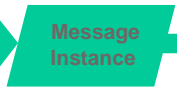
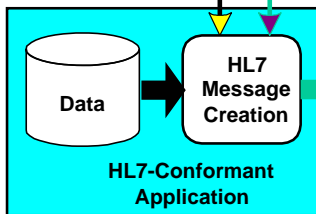


Information Model Mapping										Message Elements				Message Structures			
Object View	Object Views and Attributes	Relationship	Role	Multiplicity	Data Type	Element	Segment	Segment or Data Field	Segment	Segment or Data Field	Structure	Structure	Structure	Structure			
1	is associated with	Encounter	participation	1..*	ED	ENC	ENC	ENC	ENC	ENC	ENC	ENC	ENC	ENC			
2	is participant for	Individual	participation	1	ED	IND	IND	IND	IND	IND	IND	IND	IND	IND			
3	is participant for	Individual	participation	1	ED	IND	IND	IND	IND	IND	IND	IND	IND	IND			
4	is participant for	Individual	participation	1	ED	IND	IND	IND	IND	IND	IND	IND	IND	IND			
5	is participant for	Individual	participation	1	ED	IND	IND	IND	IND	IND	IND	IND	IND	IND			
6	is participant for	Individual	participation	1	ED	IND	IND	IND	IND	IND	IND	IND	IND	IND			
7	is participant for	Individual	participation	1	ED	IND	IND	IND	IND	IND	IND	IND	IND	IND			
8	is participant for	Individual	participation	1	ED	IND	IND	IND	IND	IND	IND	IND	IND	IND			
9	is participant for	Individual	participation	1	ED	IND	IND	IND	IND	IND	IND	IND	IND	IND			
10	is participant for	Individual	participation	1	ED	IND	IND	IND	IND	IND	IND	IND	IND	IND			

Required Values
1. Required value ATT for attending physician.

Conditional Presence
2. Multiple_attn_val may only be present if reason_status_val is True.
3. End-attn must not be present if Status_val indicates the encounter is active.

Notes
4. patient_admission_admission_order must not be prior to patient_encounter_start_date.



Key HL7 Points

- Object orientation is what is important
- RIM model needs further work for clinical content
- XML development is needed to support structured information
- CDA will need much effort to define the general format of clinical documents
- Templates still need to be defined, for example:
 - Progress note
 - Primary care note
 - Chief complaint
 - Subjective
 - Physical exam
 - Assessment & plan

Recommendations

- Terminology Services
- Documentation Capture
- Structure and Integration

Terminology Services

- Must:
 - Be integrated with documentation module
 - Reside on a separate server and/or application
 - Reference and cross reference (map & transform) terminologies
 - Provide metadata and content services
 - Refer to a standard data model

Documentation Capture

- **Must:**
 - Be integrated in a user friendly fashion into the clinicians' documentation process
 - Support the building and use of templates for creating clinical documents
 - Focus on most critical document :
 - Protocols, consults, diagnostic and operative reports
 - For outpatients – encounter summaries
 - For inpatients – assessments, charting and progress notes

Structure and Integration

- **Must:**
 - Support XML, according to HL7 CDA
 - Be able to utilize naming standards of HL7 RIM
 - Allow integration with existing interfaces
 - Index existing documents and documents received from external systems.
 - Support query and retrieval using concept mapping

So how does this apply...

- Terminology services are provided, to a greater or lesser extent, within clinical information systems; they are called templates, look-up tables, master files, etc.
- Separating terminology services from vendor products using object-oriented approach will facilitate standard development.
- The information from this presentation and paper can be used to build requirements for how terminology should be managed.
- Requirement exists for vendors to build and support industry standards for terminology.

Terminology Services

“map to buried data”



Terminology Services Overview

TEPR 2002

Presented by

Joan Duke, BS, MA

Health Care Information Consultants, LLC

Baltimore, Maryland, USA

jduke@hcicllc.com

