
HLZ

HL7 Version 3 – Gateway to Electronic Patient Records

-- Tokyo,Japan -- November 6, 2001 --

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Agenda

- Requirements for data exchange standards for EPR
  - Formal Specification of Semantic Content
  - Format for Interchange
- Standards developers &Available standards
- HL7 in 2001 – role in EPR standards
- HL7 Version 3 – going beyond Version 2
- HL7 RIM – model of clinical information content
- Creating model based message standards with RIM
- First Version 3 Ballot
- Future Version 3 Schedule

Interoperability

- Main Entry: **in·ter·op·er·a·bil·i·ty**
  Function: *noun*
  Date: 1977
  : ability of a system ... to use the parts or equipment of another system
  Source: Merriam-Webster web site
- **interoperability**
  : ability of two or more systems or components to exchange information and to use the information that has been exchanged.
  Source: IEEE Standard Computer Dictionary: A Compilation of IEEE Standard Computer Glossaries, IEEE, 1990]

Functional interoperability

Semantic interoperability

Semantic interoperability

To understand the data being received you must know **both**:

1. The definition of each element of data, and its relationship with each of the other elements – you must have a semantic model of the data

and

2. The terminology to be used to represent coded elements, including the definitions, and relationships within the terminology.

Semantic interoperability (2)

Phrased another way -

Complete semantic understanding of a data exchange can only be achieved if the sender and receiver ***share a common model*** of the data that represents the domain of communication **and** if the sender and receiver ***use common sets of terms*** (codes) drawn from a terminology that is fully defined and comprehensively represents the concepts in the domain of communication.

Functional interoperability

- Functional interoperability requires a robust scheme for formatting the data so that they can be assembled into messages and disassembled (parsed) reliably and efficiently,

  and

- Systems that will reliably and rapidly transport the data from one computing application to another

Functional interoperability (2)

- Increasingly in recent years, the tools for formatting and transporting data have become powerful, readily available and inexpensive. Thus the functional interoperability components are available “off-the-shelf”
- XML and the suite of tools and services that support XML communications are a case in point.

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Who develops standards?

- Consortia
  - OMG – Object Management Group
  - W3C – World-wide-web Consortium
- Ad-hoc groups
- Government mandates
- Standards developing organizations
  - Nationally sanctioned
  - Internationally sanctioned
    - ISO
    - UN EDIFACT

Critical attributes for a standards developer

- Open consensus process
- Diverse participation – users, vendors, academics
- Clear focus and coordination – know where they're headed and why
- Independent mind-set – technology- and vendor-neutral
- International focus and participation
- Formal process with semantic models

Health care data standards

- Ad hoc groups

Danger: XML Barbarians

"It is also our goal to deliver real-world implementations for the exchange of specific types of clinical information. This has already been done successfully for the bidirectional exchange of data between Medical Health Record Systems and ECG, Spirometer and Blood Pressure Measurement devices. Other projects have been started for the exchange of laboratory order-entry messages and for medical correspondence (specialist reports, hospital discharge letters, admission and transfer notifications)."

e-mail received by Dr. Stan Huff, HL7 Chair

Danger: XML Barbarians

- No open consensus process for creating and maintaining the standard
- No formal model
- Lack of consistency across vertical domains
- No connection to standard terminologies
- No migration path when technology changes (Life after XML)

Health care data standards

- Ad hoc groups
- American Society for Testing & Materials (ASTM)
- CEN (European) Technical Committee- 251
- CORBA-Med
- DICOM
- **Health Level Seven**
- ISO Technical Committee 215
- UN-EDIFACT

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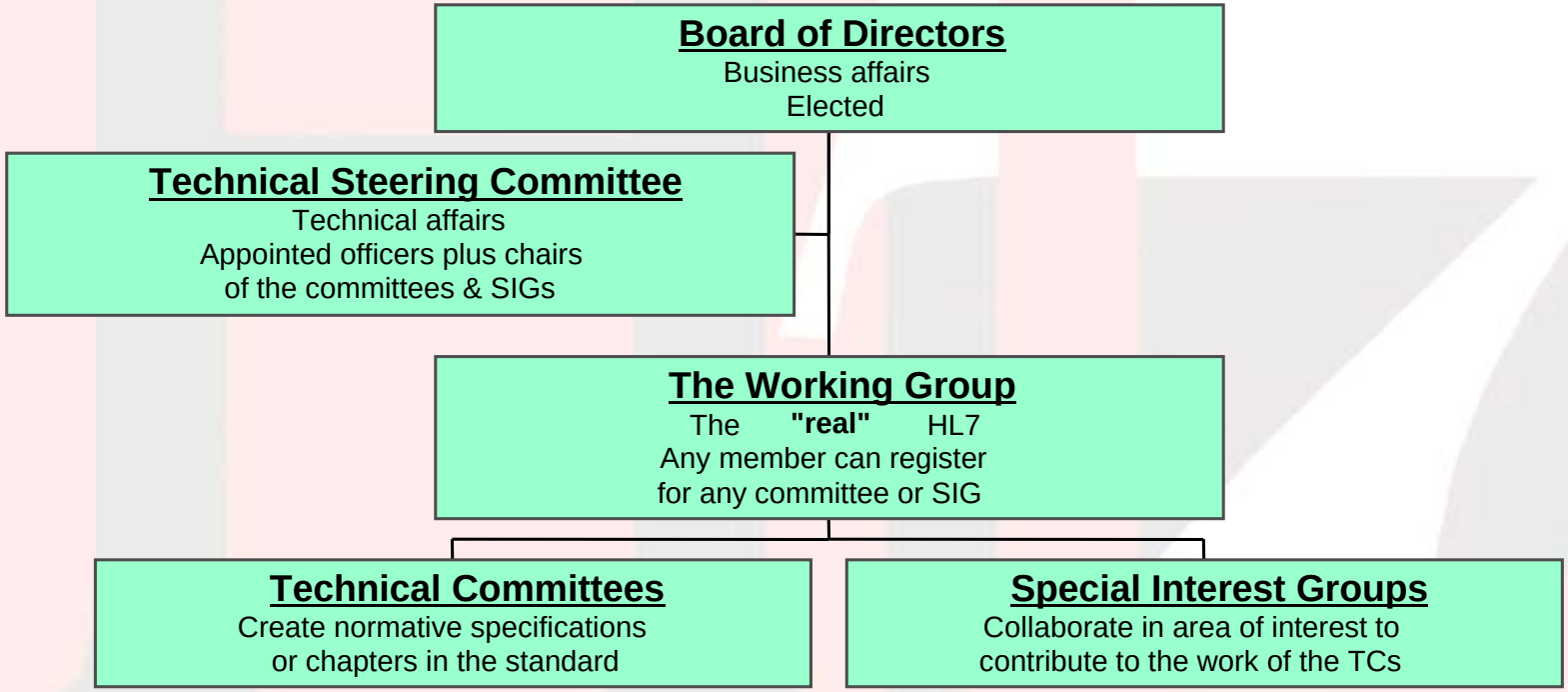
HL7 organization

- Collaborative volunteer organization
- Paid staff limited to the secretariat
- Primary funding is membership dues



The Working Group

- Draws equally from providers, software vendors, and consultants
- Group sets aside their individual interests, rolls up their sleeves and collaborate to get the tough work done
- HARD WORK - five, 12-hour days, three times a year plus active electronic collaboration in between

International Affiliate Members

- 19 International HL7 Affiliates:
  - Argentina
  - Canada
  - Czech Republic
  - German
  - Japan
  - Lithuania
  - Southern Africa
  - Taiwan
  - The Netherlands
  - Australi
  - China
  - Finland
  - India
  - Korea
  - New Zealand
  - Switzerland
  - Turkey
  - United Kingdom

USA

What has HL7 produced?

- Founded in 1987
- Produced Version 1.0 and 2.0 in ‘87 and ‘88
- Approved HL7 message standards -
  - –2.1, 2.2, 2.3, 2.3.1 and 2.4 in ‘90, ‘94, ‘97, ‘99 and ‘00
- Approved CCOW standards
  - –1.0, 1.1, 1.2, 1.3 in ’99, ’00 and ‘01
- Approved Arden Syntax standard in ‘99
- Approved XML-based Clinical Document Architecture standard in ‘00
- Accredited as an SDO by ANSI in 1994
  - –All HL7 approvals since ‘94 are “American National Standards”
- Published implementation recommendations for:
  - –Object broker interfacing ‘98
  - –Secure messaging via e-mail ‘99
  - –HIPAA Claims attachments ‘99
  - –XML encoding of Version 2 ’00

Electronic Health Record (EHR)

- Discussion at the HL7 Board of Directors Meeting (Planning Retreat)
  - Old policy: HL7 concerned with messages for EHR only
  - There is a clear need for EHR related standards
  - HL7 has the right people to address EHR issues
  - Existing HL7 standards form the basis for EHR standards
- Conclusion: Board will draft a revision of HL7 mission statement to include this new direction

HL7's mission - clinical interoperability

"To provide a comprehensive framework and related standards for the exchange, integration, sharing, and retrieval of electronic health information that supports clinical practice and the management, delivery and evaluation of health services. Specifically, to create flexible, cost effective standards, guidelines, and methodologies to enable healthcare information system interoperability and sharing of electronic health records." (Source: HL7 Mission statement, revised 2001)

Mission/charter for new EHR SIG

- Provide a Forum for discussion of different Electronic Health Record (EHR) solutions.
- Create use cases to meet the requirements of an EHR, such as:
  - Transfer of EHR extracts or pointers to EHR components
  - Coordinated/shared care of patients
  - Search and requests for portions of an EHR
  - Support integration of legacy Computerized Patient Records
- Create a high level framework that supports EHR requirements and the development of:
  - An EHR interaction model
  - A set of Refined Message Information Models (R-MIMs) and corresponding Hierarchical Message Definitions (HMDs)
  - Approaches to address security and privacy issues relating to EHRs

EHR ideas and issues

- Use the RIM as a basis for modeling EHR
- Consider standards for:
  - interfaces between a longitudinal record systems and other healthcare systems
  - the information model used to address needed interfaces
  - messages to support exchange of a complete EHR
- Accommodate the document view and the structured data view of the HER

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Why Version 3?

- Even as the first Version 2 standards were being accepted and implemented, HL7 began to seek a ***better*** way to develop standards
- Initial strategy was a quick-design approach to meet immediate needs in the health care IT community
- But it is an *ad hoc* method that is difficult to coordinate and control
- Hence, Version 3

How is Version 3 “better”?

- **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 technology de jour
- **Maintain a repository** (database) of the semantic content to assure a single source, and enable development of support tooling

The “essence” of Version 3

- Apply the ‘best practices’ of software development to developing standards – a model-based methodology
- Predicate all designs on two semantic foundations – a reference information model and a complete, carefully-selected set of terminology domains
- Require all Version 3 standards to draw from these two common resources
- Use software-engineering style tools to support the process.

Version 3 Messaging Timetable

- 1996 – Introduced concepts to Technical Leadership
- 1997 – Presented first methodology and draft RIM to Working Group
- 1997 – Created Vocabulary Technical Committee
- 1998 – Introduced complete methodology
- 1999 – Unified Service Action Model (USAM) became part of RIM (11/99)
- 2000 – Initiated Acceleration Project (5/00)
- 2001 – First “non-draft” RIM, version 1.0 (1/01)
- 2001– First committee submissions of storyboards, interactions and message designs (7/01)
- 2001 – Published 1st comprehensive ballot (8/09)

Lessons from the time-table

- Formal processes have a long gestation period for learning and adapting
- Development of common model is not a “free” process
- Reaching agreement on a single model is both exciting and – **very** difficult
- Once the pieces are in place, actual standards design is amazingly quick

Version 3 is a **Family** of standards

- Clinical Context Object Workgroup (CCOW)
  - Binds “desk-top” components together
- Clinical Document Architecture (CDA)
  - Common structure for **persistent** documents
- Arden Syntax for Medical Logic
  - Formalism for expressing medical logic rules
- Version 3 Messaging
  - Focus on data interchange for data bases
  - Enhanced for compound structures such as EHR elements
- **ALL** based on shared information model and terminology

Version 3 is a change to the HL7 Architecture

- **The HL7 2.x specifications have:**
  - Segments that imply information entities
  - Events that indicate implied behaviors
  - Descriptive content that suggests use cases
  - but never formally documents these

- **Version 3 seeks to formalize this by applying object analytic methods and style**
  - to improve the internal consistency of HL7
  - to provide sound semantic definitions
  - to enable future architectures
  - to produce an evolution not a revolution
  - Done by applying MODELING to the HL7 process

Contrasting Versions 2 & 3

- Version 2 messages have no explicit model and thus contains ambiguous references between segments (concepts)
- Version 2 messages are designed for use within a medical center where the context of care is established by policy and need not be communicated.
- Version 2 does not support semantic grouping of messages to create more comprehensive packets of information
- Terminologies are commonly unspecified in Version 2 specifications
- Version 2 is increasingly constrained by its legacy design and the need to maintain backward compatibility.
- Version 2 does not readily take advantage of newer representation and communication technologies
- Version 2 is yesterday and today; Version 3 is today and tomorrow

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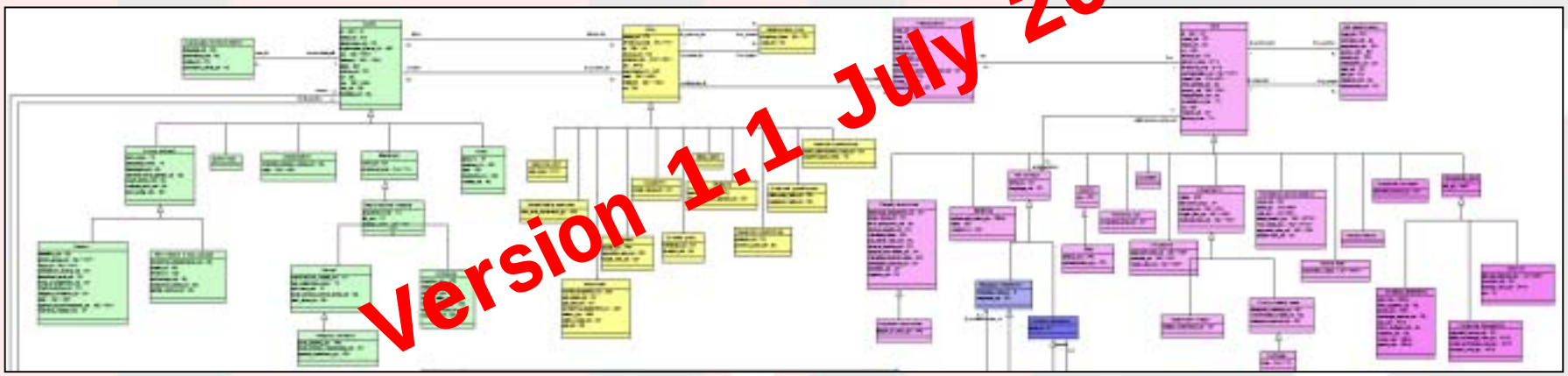
Introduction - Reference Information Model



Core concepts of RIM

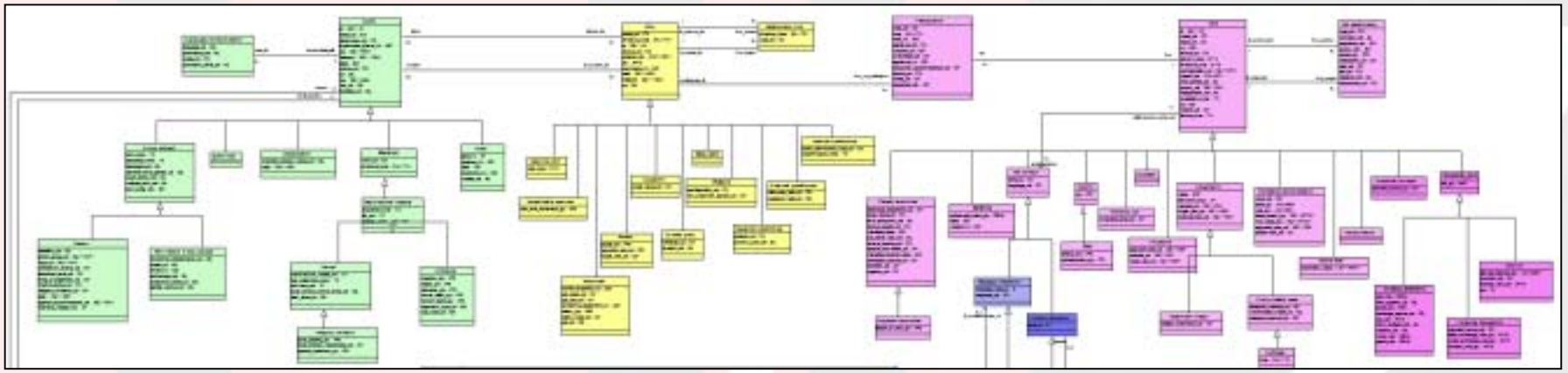
- The “Act” class and its specializations represent every action of interest in health care.
- Specifically –
  “**an intentional action in the business domain of HL7**. Healthcare (and any profession or business) is constituted of intentional actions. An instance is a record of an act. Acts definitions (master files), orders, plans, and performance records (events) are all represented by an instance of Act.”

Core concepts of RIM

- Every happening is an Act
  - Procedures, observations, medications, supply, registration, etc.
- Acts are related through an Act_relationship
  - 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, specimen, etc.
- Roles are played by Entities
  - persons, organizations, material, places, devices, etc.

Reference Information Model

Participation

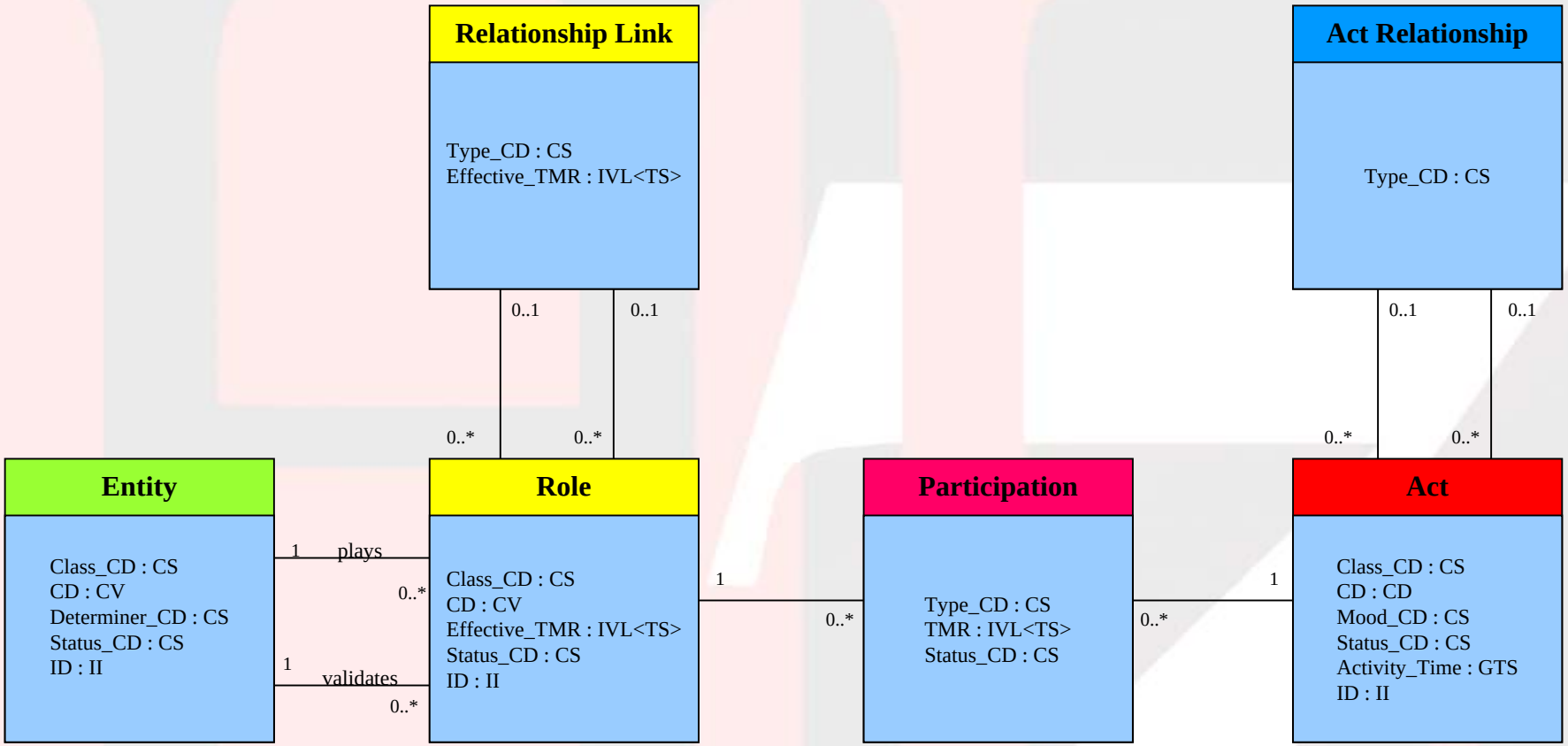


Entities

Roles

Acts

RIM Core Classes & Attributes



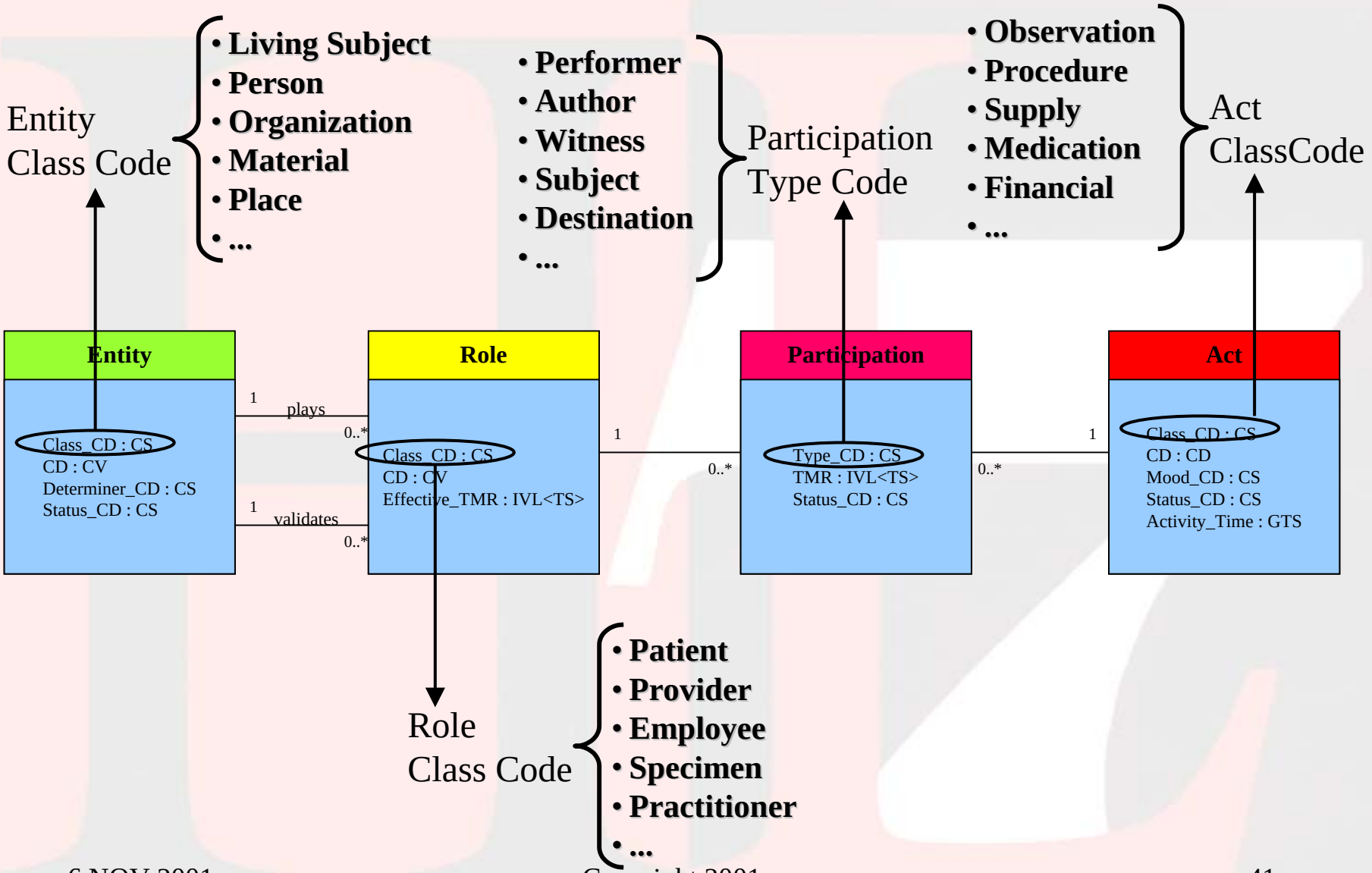
Six kinds of attributes:

type_cd(class_cd), cd, time, mood(determiner), status, id

How does HL7 manage this abstraction?

- In older HL7 models, each concept had a visible (physical) class or association to represent it
- In current RIM:
  - only include a class when it adds new attributes and associations
  - for the rest, use coded “structural” attributes – ‘class’ or ‘type’ codes
- Why are these named structural attributes?
  - because they use codes to represent concepts that would previously have been part of the model structure.

RIM Core Attribute Value Sets



Is “Act” sufficient?

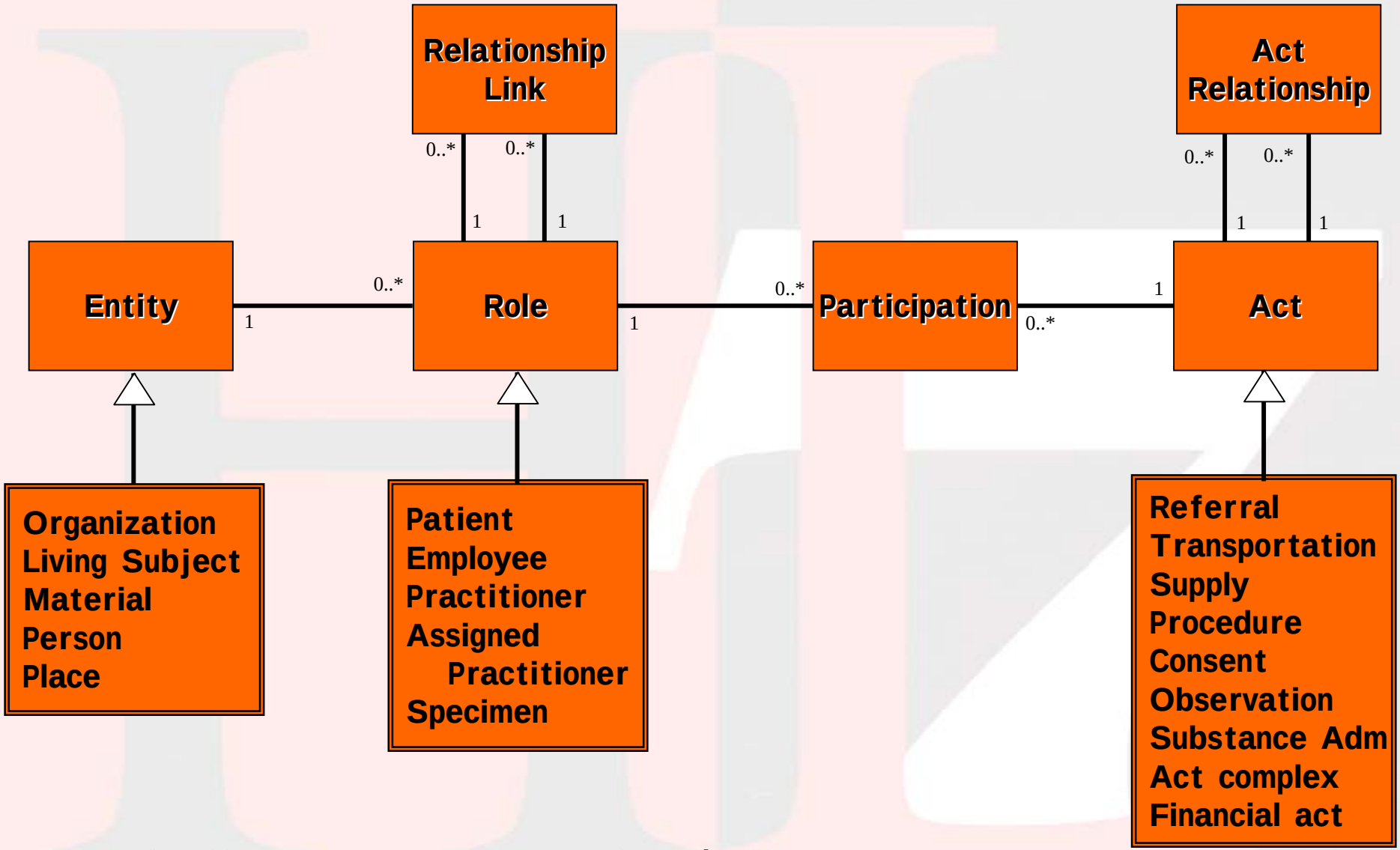
- How can a single act class represent all of the elements of clinical action – their definition, request, order, report?
- Answer: the Act “**mood**” code –

  “Webster's dictionary defines mood as a "distinction of form [.] of a verb to express whether the action or state it denotes is conceived as fact or in some other manner (as command, possibility, or wish)". This definition of mood can be directly applied to the USAM model, where the action (in natural language) may be conceived as an event that happened (fact), an ordered service (command), a possible service (master), and a goal (wish) of health care.”

Principle Act ‘moods’

- definition (DEF) – Definition of an act, formerly a “master file”
- intent (INT) – an intention to plan or perform an act
- order (ORD) – an order for a service from an order “placer” to an order “filler”
- event (EVN) – an act that actually happens, includes the documentation (report) of the event
- **Critical concept –** “Mood” is not a status code. Each instance of the Act class may have one and only one value for ‘mood’
- Thus, an act in “order” mood that orders an act in definition mood and results in an Act in ‘event’ mood are three different acts, related through the act relationship.

RIM Core Classes



Definitions

Act - an intentional action in the business domain of HL7. Healthcare (and any profession or business) is constituted of intentional actions. An instance is a record of an act. Acts definitions (master files), orders, plans, and performance records (events) are all represented by an instance of Act.

Entity - physical thing or organization and grouping of physical things. A physical thing is anything that has extent in space, mass. **Excludes information structures**, electronic medical records, messages, data structures, etc.

Role – defines the competency of an Entity. An Entity, in a particular Role, can participate in an Act or can be related to another Entity in a particular Role. The Role defines the competency of an Entity irrespective of any Act, as opposed to Participation which is limited to the scope of an Act.

Each role is “played by” one Entity and is usually “scoped” by another. Thus the Role of “patient” is played by (usually) a person and scoped by the provider from whom the patient will receive services. Similarly, an Employee role is scoped by the employer.

Definitions (continued)

Participation -- Participation defines how an Entity, in a particular Role, functions during the scope of an Act. Participation is limited to the scope of the Act, as opposed to Role, which defines the competency of an Entity irrespective of any Act. **Role signifies competence while participation signifies performance**.

Relationship Link – Is similar to an Act relationship in that it binds together two entities in roles and their relationship with their respective scoping entities. The primary forms of this link connote a chain of authority (the source role provides direct or indirect authority to the target) and composition (the target is part of the source) .

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From abstraction to ‘concrete’ concepts

- How can this “skinny” RIM and its codes represent the large, sophisticated sets of concepts that must be communicated to support modern health care?
- Answer: The RIM is the starting point, the source or pattern, from which specific models are constructed to define a particular set of messages.
- The messages are based on a RIM-derivative known in HL7-ese as the Refined Message Information Model, or RMIM,
- The RMIM is constructed using the RIM pattern and definitions, but is specific as to which type of act, participation and role is intended.

RMIM construction

- Construction of an RMIM is the most critical, step in the message design process
- The RMIM is built from “constrained clones” of the base classes that are in the RIM
- These clones
  - contain only attributes found in the RIM
  - have specific, usually singular values for the class or type codes
  - constrain other coded attribute domains as appropriate to the type being defined
  - limit repeatability and optionality of the associations and attributes
- Multiple clones of a single RIM class are commonly found in RMIM designs

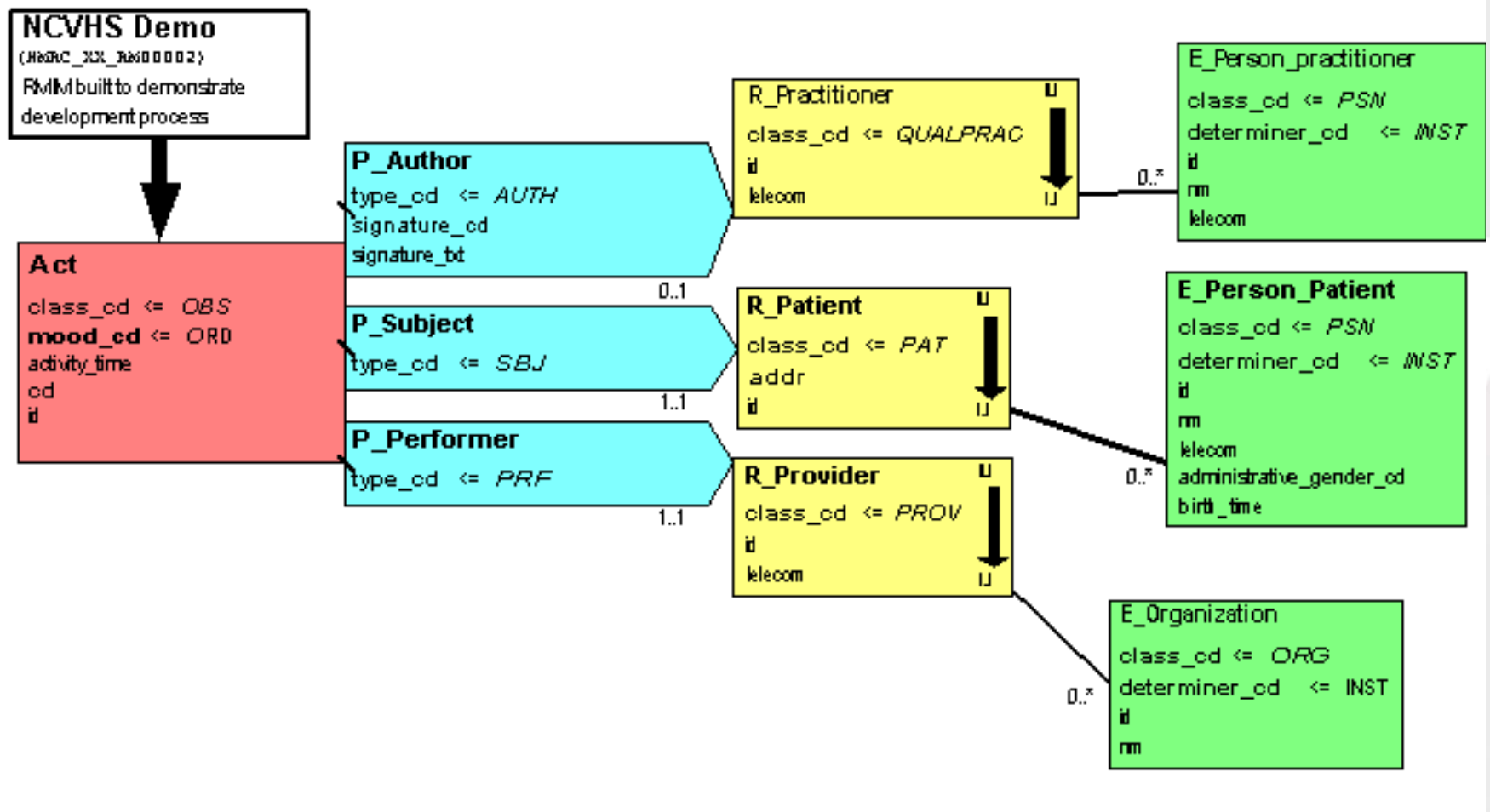
VERY Simple example

- Create a message for a simple observation order. It has an identifier and order time. It also is characterized by three participations –
  - an Author, who is the practitioner who created the order
  - a Subject, who is the patient upon whom the observation is to be made
  - a Performer, which is the health care provider (organization) that will make the observation

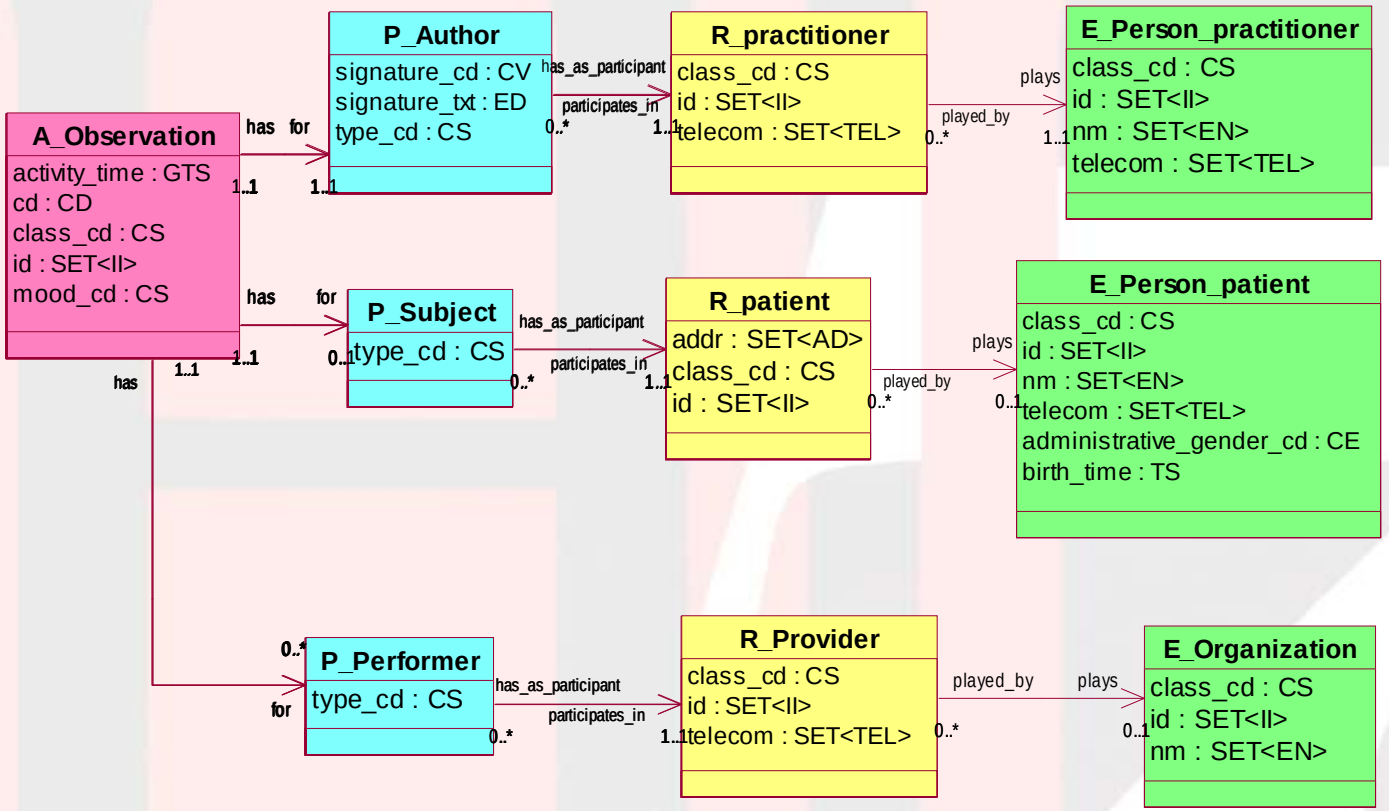
The RMIM for the example contains

- A Clone of Act, in “order” mood, with “observation” class code, and a specific domain of observation types codes (code attribute) drawn from LOINC.
- Clones of the Participation class identify the “author”, “subject” and “performer” through the type code
- Clones of Role are created as the participants that are “practitioner”, “patient” and “provider”, respectively
- Clones of Entity – two as “person”, one as “organization” are created to play these roles.
- In all ten different clones are created from just four RIM “backbone” classes.

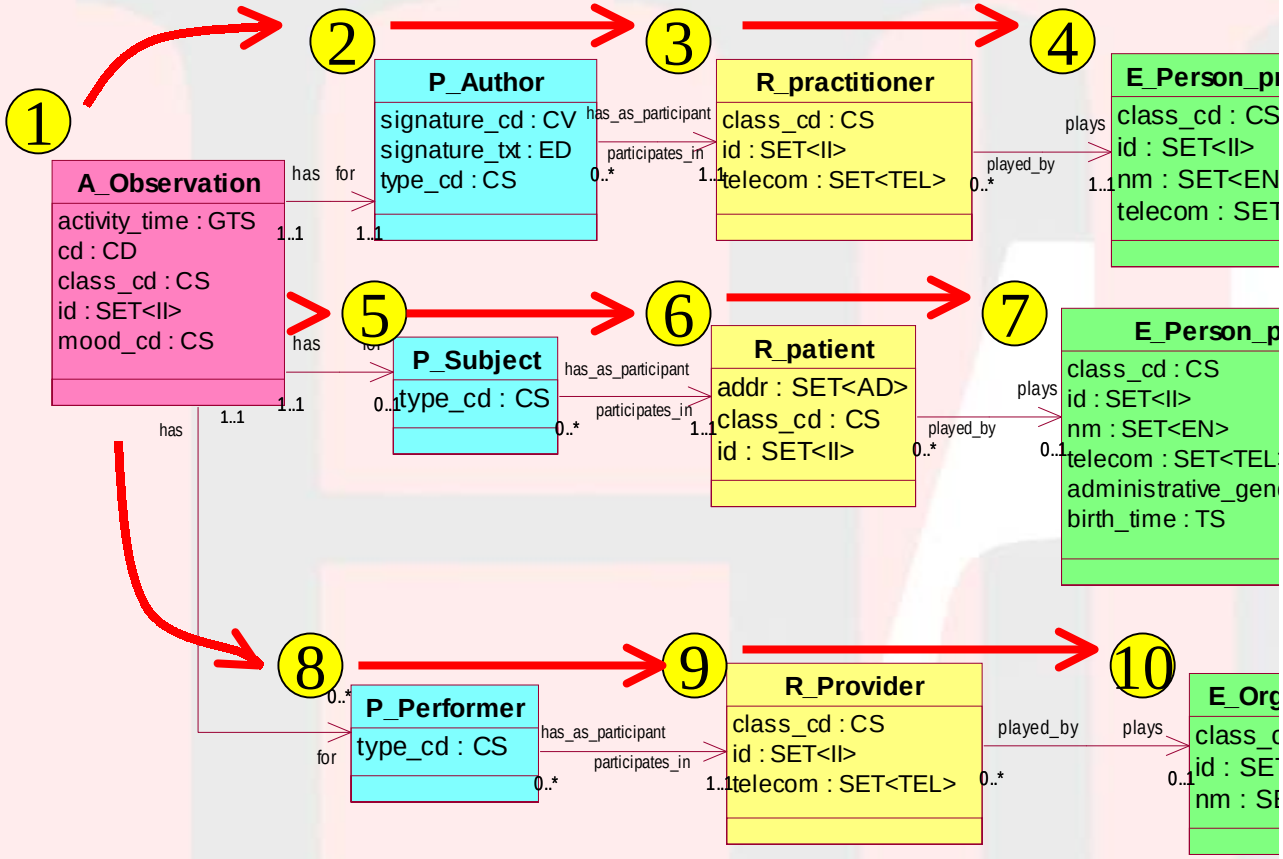
Visio R-MIM of Example

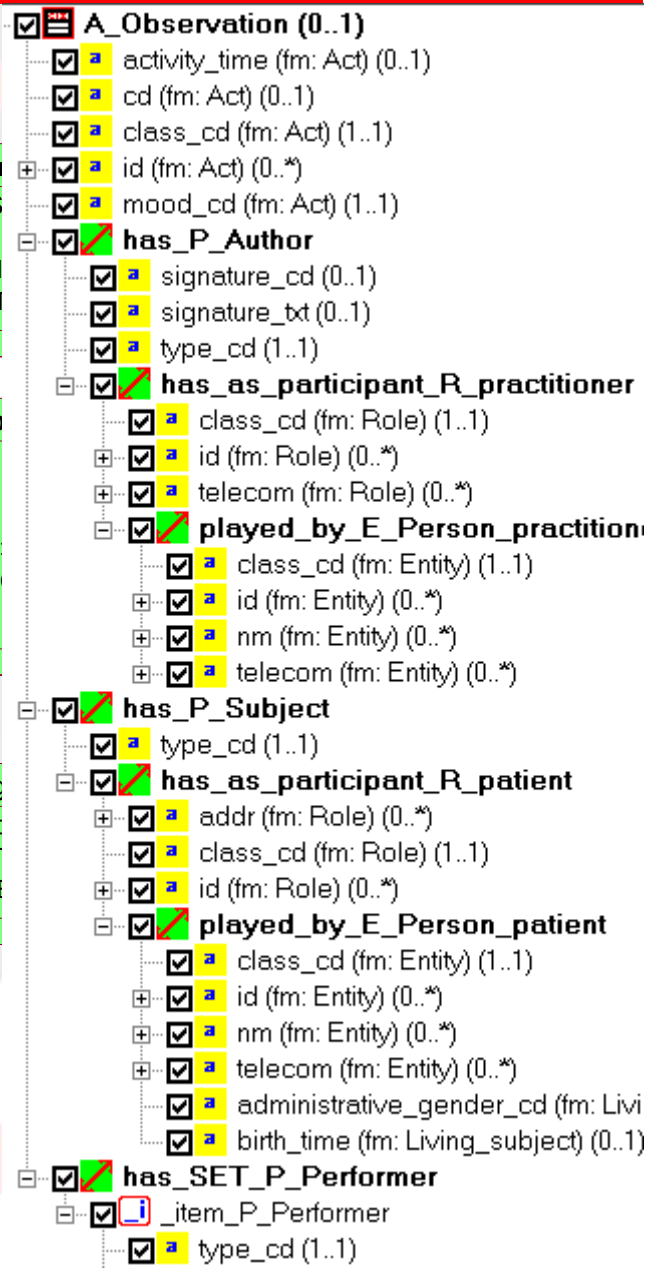


Example as a UML model



Message structure from RMIM





HMD in spreadsheet format

Row Number	Row Type	Class or Property of Class (Attribute or Association)	Rim Source Class	Message Element Name	Message Element Short Name	in Message Element	of Message Element Type	DT definition source	Cardinality	Domain Specification	Coding Strength (default CWE)	Mandatory	Constraint/Note #	Default Value (#) Default Default = "NI"	Default Update Mode Default Default = R	Update mode set	Conformance	Cardinality
3	hmd	C00_ NCΨHS	NCΨHS	NCΨH_ XX_ RM00002	NCΨH_ XX_ HD00002	Example				Common								
4	class	**Observation**	**Observation**	**Act**	**Act**	**NCΨH_ XX_ HD00002**	**Act**	**N**	**0..1**									**0..1**
5	attr	activity_ time	Act	activity_ time	actvtyTime	Act	GTS	D	0..1									0..1
6	attr	cd	Act	cd	cd	Act	CD	D	0..1	ActCode	CWE							0..1
7	attr	class_ cd	Act	class_ cd	class	Act	CS	D	1..1	OBS	CNE	M						1..1
8	attr	id	Act	id	id	Act	SET <II>	D	1..*									0..*
9	item		Act	_ item_ II	_ II	SET <II>	II	D	1				There must be at least two					
10	attr	mood_ cd	Act	mood_ cd	mood	Act	CS	D	1..1	ORD	CNE	M						1..1
11	assoc	**has**	**Observation**	**has_ SetList_ P_ Author**	**has_ P_ Authr**	**Act**	**SET <P_ Authr>**	**N**	**0..***									**0..***
12	item		Observation	_ item_ P_ Author	_ P_ Authr	SET <P_ Authr>	P_ Authr	N	1									
13	attr	signature_ cd	Participation	signature_ cd	signture	P_ Authr	CV	D	0..1	ParticipationSi	CWE			X				0..1
14	attr	signature_ txt	Participation	signature_ txt	signtureTxt	P_ Authr	ED	D	0..1									0..1
15	attr	type_ cd	Participation	type_ cd	type	P_ Authr	CS	D	1..1	AUT	CNE	M						1..1
16	assoc	**has_ as_ participant**	**Participation**	**has_ as_ participant_ R_ Practitioner**	**hasAsPartcpnt _ R_ Practnr**	**P_ Authr**	**R_ Practnr**	**N**	**1..1**									**1..1**
17	attr	class_ cd	Role	class_ cd	class	R_ Practnr	CS	D	1..1	QUALPRAC	CNE	M						1..1
18	attr	id	Role	id	id	R_ Practnr	SET <II>	D	0..*									0..*
19	item		Role	_ item_ II	_ II	SET <II>	II	D	1									
20	attr	telecom	Role	telecom	telcm	R_ Practnr	SET <TEL>	D	0..*									0..*
21	item		Role	_ item_ TEL	_ TEL	SET <TEL>	TEL	D	1									
22	assoc	**plays**	**Qualified_ practitioner**	**played_ by_ E_ Person_ practitioner**	**playdBy_ E_ PrsnPractnr**	**R_ Practnr**	**E_ PrsnPractnr**	**N**	**1..1**									**1..1**
23	attr	class_ cd	Entity	class_ cd	class	E_ PrsnPractnr	CS	D	1..1	PSN	CNE	M						1..1
24	attr	determiner_ cd	Entity	determiner_ cd	detrmnr	E_ PrsnPractnr	CS	D	1..1	INSTANCE	CNE	M						1..1
25	attr	id	Entity	id	id	E_ PrsnPractnr	SET <II>	D	0..*									0..*
26	item		Entity	_ item_ II	_ II	SET <II>	II	D	1									
27	attr	nm	Entity	nm	nm	E_ PrsnPractnr	SET <EN>	D	0..*									0..*
28	item		Entity	_ item_ EN	_ EN	SET <EN>	EN	D	1									
29	attr	telecom	Entity	telecom	telcm	E_ PrsnPractnr	SET <TEL>	D	0..*									0..*
30	item		Entity	_ item_ TEL	_ TEL	SET <TEL>	TEL	D	1									
31	assoc	**has**	**Observation**	**has_ SetList_ P_ Subject**	**has_ P_ Sbjct**	**Act**	**SET <P_ Sbjct>**	**N**	**0..***									**0..***
32	item		Observation	_ item_ P_ Subject	_ P_ Sbjct	SET <P_ Sbjct>	P_ Sbjct	N	1									
33	attr	type_ cd	Participation	type_ cd	type	P_ Sbjct	CS	D	1..1	SBJ	CNE	M						1..1
34	assoc	**has_ as_ participant**	**Participation**	**has_ as_ participant_ R_ Patient**	**hasAsPartcpnt _ R_ Pt**	**P_ Sbjct**	**R_ Pt**	**N**	**1..1**									**1..1**
35	attr	addr	Role	addr	addr	R_ Pt	SET <AD>	D	0..*									0..*
36	item		Role	_ item_ AD	_ AD	SET <AD>	AD	D	1									
37	attr	class_ cd	Role	class_ cd	class	R_ Pt	CS	D	1..1	PAT	CNE	M						1..1
38	attr	id	Role	id	id	R_ Pt	SET <II>	D	0..*									0..*
39	item		Role	_ item_ II	_ II	SET <II>	II	D	1									

Full Screen

Close Full Screen

Adding constraints

- This process defines the message type structure
  - Class and association properties
  - Attributes
- Within HMD, HL7 adds constraints about:
  - Data types used for attributes
  - Vocabulary or code domains for coded attributes
  - Cardinality of associations and attributes
  - Mandatory or inclusion constraints

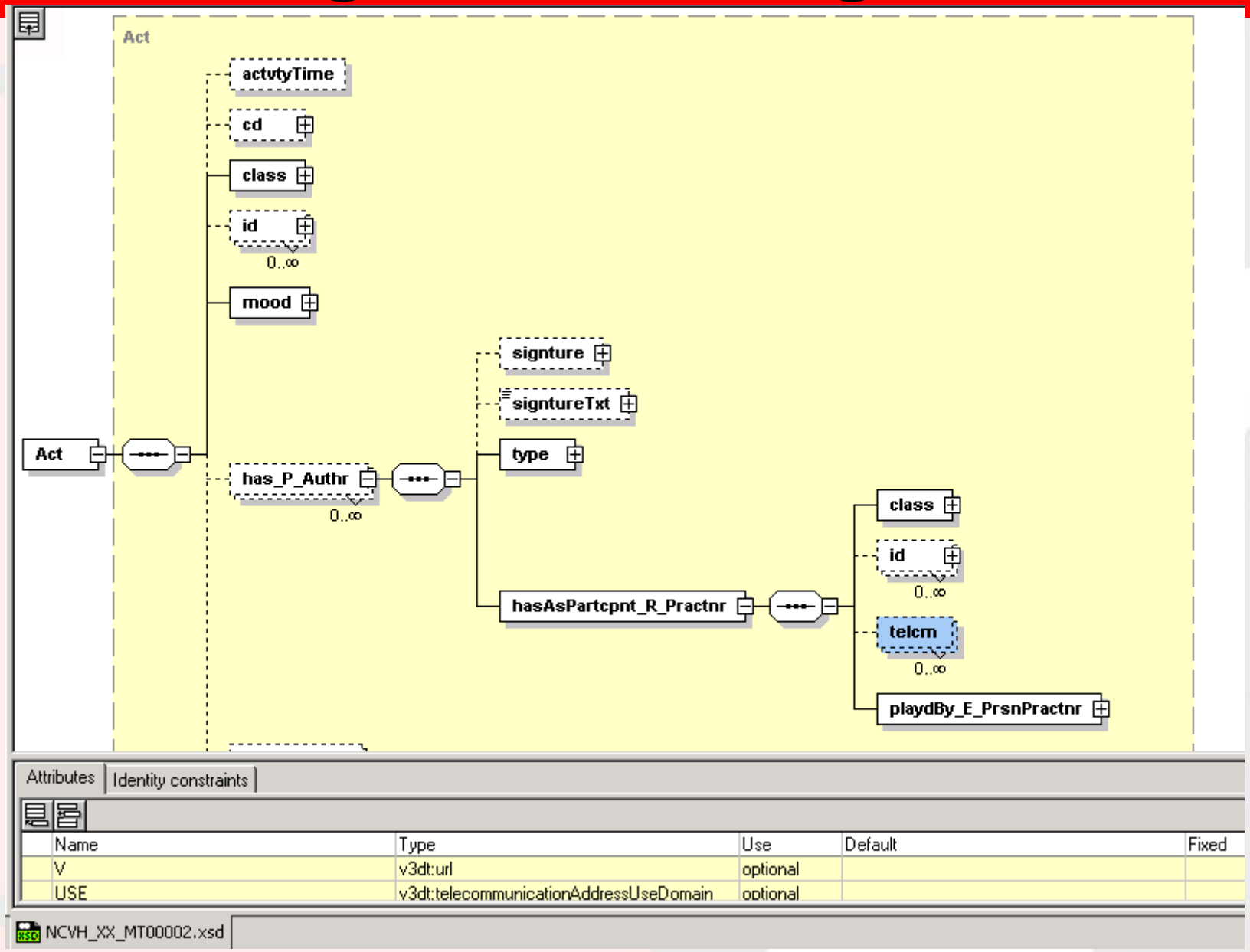
HMD expressed in XML

```
<!DOCTYPE HMD (View Source for full doctype...)>
<!-- <?xml-stylesheet type="text/xsl" href="HL7_HMD.xsl"?> -->
- <HMD ID="NCVH_XX_HD00002-hmd" CommitteeID="NCVH_XX_HD00002" Name="Example">
    <RMIM ID="NCVH_XX_RM00002-rmi" Identifier="NCVH_XX_RM00002" />
    <Message ID="NCVH_XX_HD00002-Common-msg" Identifier="Common" />
    <Message ID="NCVH_XX_HD00002-NCVH_XX_MT00002-msg" Identifier="NCVH_XX_MT00002" />
  - <Class HMDRowID="NCVH_XX_HD00002-NCVH_XX_HD00002-Act-hmd" ClassOrProperty="Act" RimSource="Observation"
      RimSourceID="Observation-cls" ElementName="Act" ElementShortName="Act" InMET="NCVH_XX_HD00002" OfMET="Act"
      METsource="N">
      <MsgConstraints ID="Common-NCVH_XX_HD00002-NCVH_XX_HD00002-Act-hmd" MessageID="NCVH_XX_HD00002-
        Common-msg" HMDrowID="NCVH_XX_HD00002-NCVH_XX_HD00002-Act-hmd" Cardinality="0..1" />
      <MsgConstraints ID="NCVH_XX_MT00002-NCVH_XX_HD00002-NCVH_XX_HD00002-Act-hmd"
        MessageID="NCVH_XX_HD00002-NCVH_XX_MT00002-msg" HMDrowID="NCVH_XX_HD00002-NCVH_XX_HD00002-Ac
        hmd" Cardinality="0..1" />
    + <Attr HMDRowID="NCVH_XX_HD00002-Act-actvtyTime-hmd" ClassOrProperty="activity_time" RimSource="Act"
        RimSourceID="Act-activity_time-att" ElementName="activity_time" ElementShortName="actvtyTime" InMET="Act" OfMET
        OfMETID="GTS" METsource="D">
    + <Attr HMDRowID="NCVH_XX_HD00002-Act-cd-hmd" ClassOrProperty="cd" RimSource="Act" RimSourceID="Act-cd-att"
        ElementName="cd" ElementShortName="cd" InMET="Act" OfMET="CD" OfMETID="CD" METsource="D">
    + <Attr HMDRowID="NCVH_XX_HD00002-Act-class-hmd" ClassOrProperty="class_cd" RimSource="Act" RimSourceID="Act-
        class_cd-att" ElementName="class_cd" ElementShortName="class" InMET="Act" OfMET="CS" OfMETID="CS" METsource="D
    + <Attr HMDRowID="NCVH_XX_HD00002-Act-id-hmd" ClassOrProperty="id" RimSource="Act" RimSourceID="Act-id-att"
        ElementName="id" ElementShortName="id" InMET="Act" OfMET="SET<II>" OfMETID="SET-II-" METsource="D">
    + <Attr HMDRowID="NCVH_XX_HD00002-Act-mood-hmd" ClassOrProperty="mood_cd" RimSource="Act" RimSourceID="Act-
        mood_cd-att" ElementName="mood_cd" ElementShortName="mood" InMET="Act" OfMET="CS" OfMETID="CS" METsource="
    - <Assoc HMDRowID="NCVH_XX_HD00002-Act-has_P_Authr-hmd" ClassOrProperty="has" RimSource="Observation"
        RimSourceID="Participation-for-Act-ass" ElementName="has_SetList_P_Author" ElementShortName="has_P_Authr"
        InMET="Act" OfMET="SET<P_Authr>" METsource="N">
        <MsgConstraints ID="Common-NCVH_XX_HD00002-Act-has_P_Authr-hmd" MessageID="NCVH_XX_HD00002-Commo
          msg" HMDrowID="NCVH_XX_HD00002-Act-has_P_Authr-hmd" Cardinality="0..*" />
        <MsgConstraints ID="NCVH_XX_MT00002-NCVH_XX_HD00002-Act-has_P_Authr-hmd" MessageID="NCVH_XX_HD000
          NCVH_XX_MT00002-msg" HMDrowID="NCVH_XX_HD00002-Act-has_P_Authr-hmd" Cardinality="0..*" />
      - <Item HMDRowID="item-NCVH_XX_HD00002-Act-has_P_Authr-hmd" RimSource="Observation"
          ElementName="_item_P_Author" ElementShortName="_P_Authr" InMET="SET<P_Authr>" OfMET="P_Authr" OfMETID="i
```

Opening of Message Schema

```
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
+ <!--  -->
- <xsd:schema targetNamespace="urn::hl7.org/NCVH_XX_MT00002" xmlns="urn::hl7.org/NCVH_XX_MT00002"
    xmlns:v3dt="urn::hl7.org/v3dt" xmlns:hl7="urn::hl7.org" xmlns:xsd="http://www.w3.org/2001/XMLSchema"
    elementFormDefault="qualified">
  - <xsd:annotation>
    - <xsd:appinfo>
        <hl7:hmdName>Example</hl7:hmdName>
        <hl7:hmdID>NCVH_XX_HD00002</hl7:hmdID>
        <hl7:messageID>NCVH_XX_MT00002</hl7:messageID>
        <hl7:rmimID>NCVH_XX_RM00002</hl7:rmimID>
      </xsd:appinfo>
    </xsd:annotation>
  - <!--
        import the schemas for other namespaces, i.e., V3DT and any
        CMETs needed
    -->
    <xsd:import namespace="urn::hl7.org/v3dt" schemaLocation="v3dt.xsd" />
  - <xsd:element name="Act" type="Act">
    - <xsd:annotation>
      - <xsd:appinfo>
          <hl7:rowType>Class</hl7:rowType>
          <hl7:METsource>N</hl7:METsource>
          <hl7:hmdClass>Observation</hl7:hmdClass>
          <hl7:hmdProperty>Act</hl7:hmdProperty>
          <hl7:hmdRowID>NCVH_XX_HD00002-NCVH_XX_HD00002-Act-hmd</hl7:hmdRowID>
        </xsd:appinfo>
      </xsd:annotation>
    </xsd:element>
  - <xsd:complexType name="Act">
    - <xsd:sequence>
      - <xsd:element name="actvtyTime" type="v3dt:GTS" minOccurs="0">
        - <xsd:annotation>
          - <xsd:appinfo>
```

Message schema diagrammed



Agenda

- Requirements for data exchange standards for EPR
  - Formal Specification of Semantic Content
  - Format for Interchange
- Standards developers &Available standards
- HL7 in 2001 – role in EPR standards
- HL7 Version 3 – going beyond Version 2
- HL7 RIM – model of clinical information content
- Creating model based message standards with RIM
- First Version 3 Ballot
- Future Version 3 Schedule

Initial Version 3 Ballot Package

- Developed between May and July, 2001
- Five domain committees participated
  - Orders/Observations
  - Patient Administration/Finance
  - Medical Records Management
  - Control/Query
  - Scheduling
- Contains
  - over 275 specific message types
  - supporting over 250 trigger events
  - used in over 360 specified interactions
  - involving 190 application roles
  - using over 30 “common” message element types
  - Supported by over 150 story-boards

Tools for the shoemaker's .....

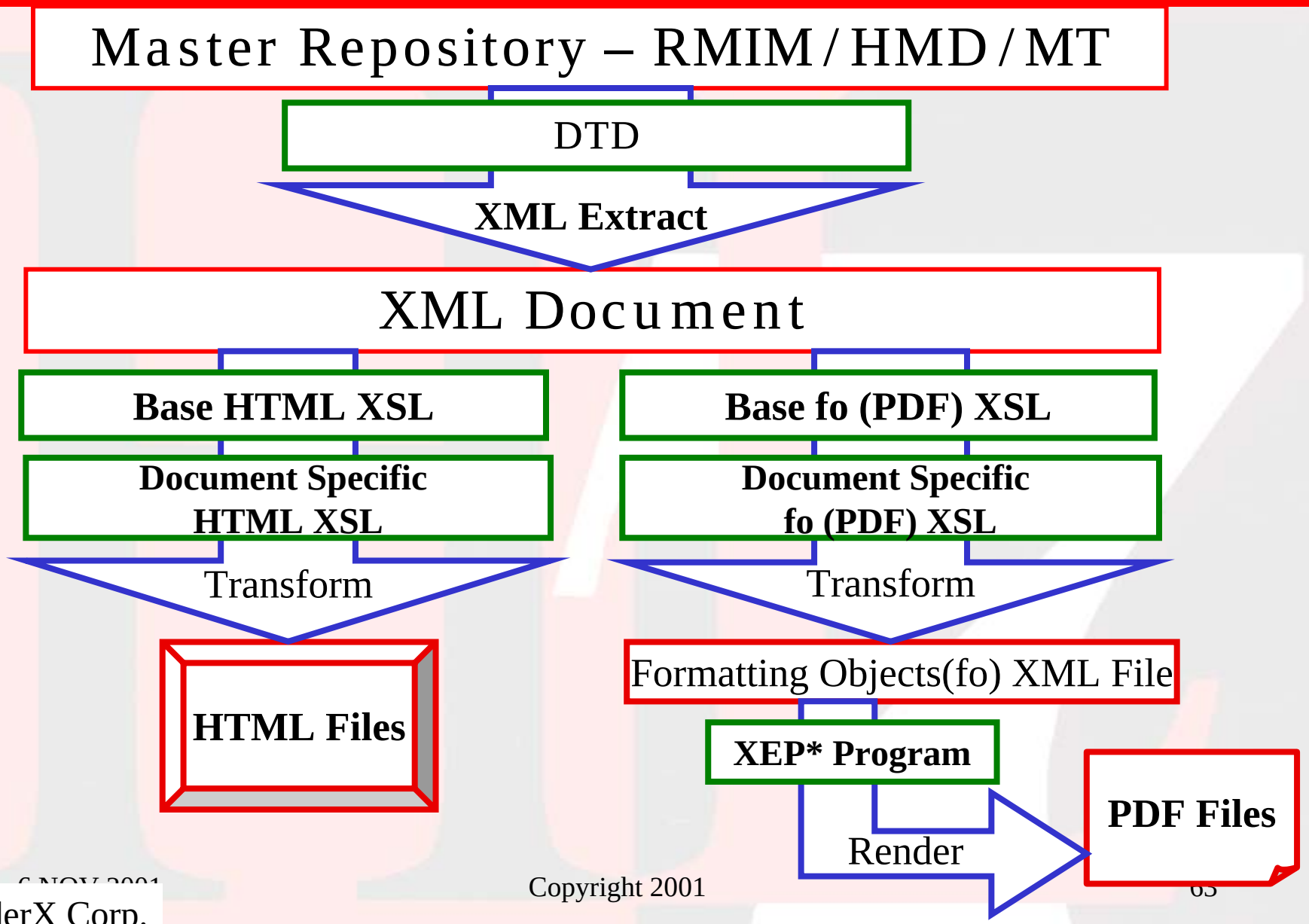
HL7 Repository

Publication Interactive Database

Graphic RMIM Design Tools

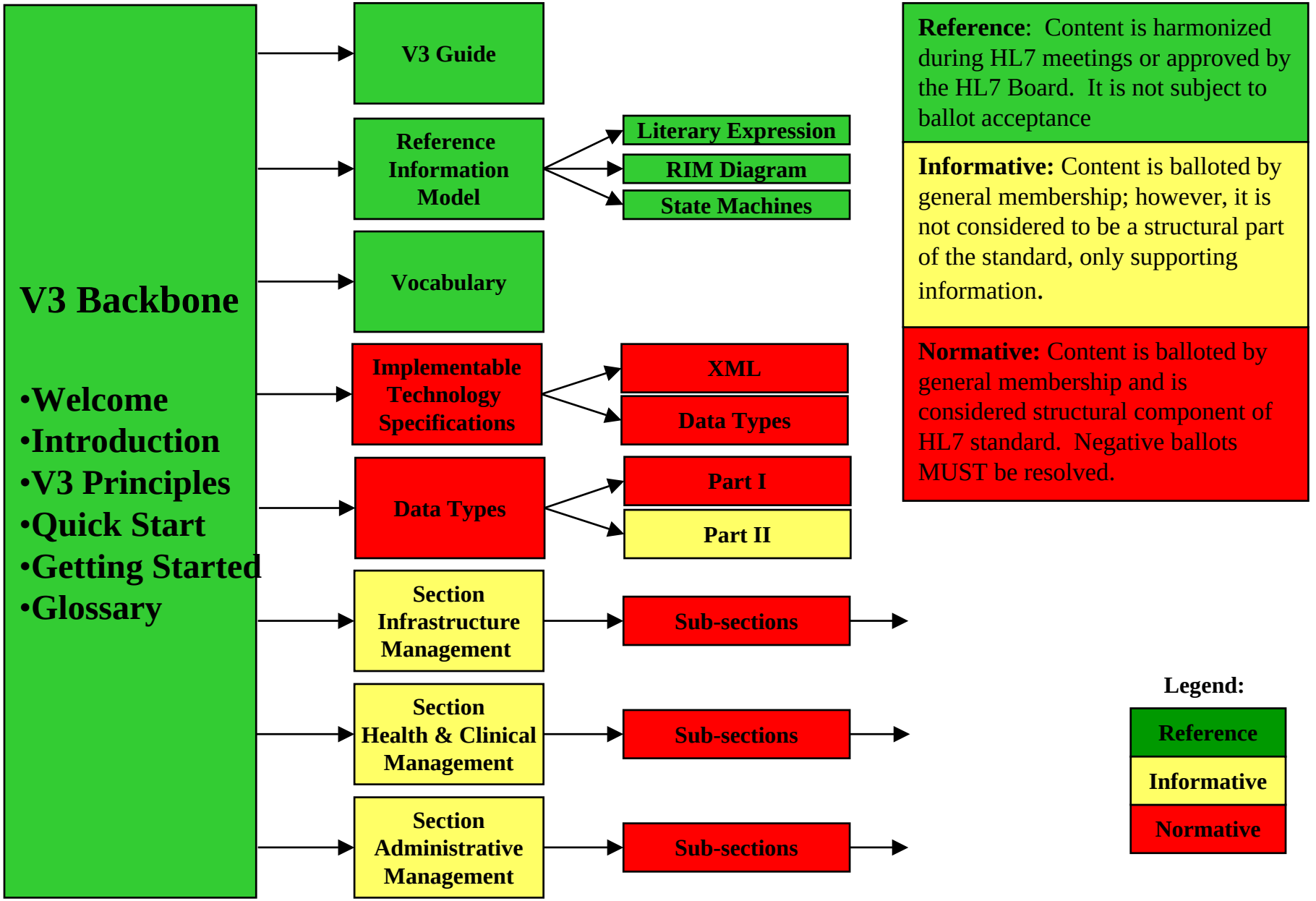
RoseTree – Repository tools

Generating HTML and PDF



*RenderX Corp.

HL7 3.0 Core Publication Structure



Specific domains in V3 Ballot

- Control domain
  - Message control
  - Master files
- Finance
  - Accounting & billing
  - Claims & reimbursement
- Practice
  - Laboratory
  - Pharmacy
- Practice administration
  - Patient administration
  - Scheduling
- Medical records management
- Query
  - MPI query

Ballot content - Finance

- Accounting & Billing
  - Basic definition an management of a patient billing account
- Claims & Reimbursement
  - Detailed R-MIM & HMD to define a health care invoice (claim) for either pre-adjudication or formal submission
  - and Response from payer as to status, action and adjustments on each item of the invoice
  - Definition of Roles and responsibilities attendant to e-claims
  - Designed to handle insurance, government agency coverages, workers compensation programs, accident claims, and so on

Ballot content – Reusable METs

- Common Message Element Types (CMETs) from Practice & Operations:
  - Transport, Supporting clinical info, Detailed diagnoses, Substance route (of administration), Packaged medication, Medicinal product, Specimen, Order options, Reagents
- CMETs from Patient Administration:
  - Identified encounter, Qualified practitioner, Certified practitioner, Transportation, Detailed organization, Organization contact person, Identified organization, Contactable person, Contactable person w/o language, Detailed clinical subject, Identified patient, Detailed practitioner (IHCP), Identified practitioner, Detailed provider, Location role, Identified encounter with account, Assigned practitioner, Responsible entity/person/party/device

Tightly coupled – Loosely coupled

- Tightly coupled presumes that the interacting systems share a set of identifiers for such things as practitioners, patients, etc.
- Loosely coupled assumes that message must include sufficient detail about patients, practitioners, etc. that they can be identified solely from message contents.

Ballot content – Practice & Operations

- Laboratory (both loosely coupled and closely coupled)
  - Order – Activate, revise, supercede, complete (with request & accept/reject for each)
  - Intent – Activate, revise, supercede, complete
  - Event – Activate, Preliminary, Revise, Supercede, Complete
- Pharmacy (Loose & Close coupling)
  - Order, Intent and Event for each of
  - Pharmacy administration & dispensing (combined or alone)

Ballot content – Practice administration

- Administration
  - Patient admission/discharge/transfer/leave-of-absence
  - Encounter create, activate, merge, complete
  - Location and bed status management
- Scheduling
  - Booking
  - Rescheduling/modification
  - Cancellation

Ballot content – Medical Records

- Complete mapping of all Version 2.4 Medical Records management trigger events and interactions
- Additionally, acts as vehicle for establishing and communicating HL7 Version 3 – Clinical Document Architecture Framework-compliant documents

Agenda

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What did the voters tell us?

- The content is “pretty good”, BUT, before we can have a successful committee level ballot, there are problems to solve –
  - Presentation improvements
  - Consistency
  - Understandability (more coherence)
  - Example messages tied to consistent storyboards
  - Clean out cumbersome methodology limitations
  - EDUCATE, EDUCATE, EDUCATE

Version 3 Time-line

- August 10, 2001 – committee-level ballot opened
- September 23, 2001 – ballot closed
- October 1-5, 2001 – Fall Meeting – ballot reconciliation, methodology update, education
- October - December 2001 –
  - Develop additional support and material for revised ballot
  - Do all necessary harmonization
  - Produce a prototype of the next ballot from one section
- January 7-11, 2002 – Finish preparation of 2nd ballot
- February, 2002 – Release second ballot
- April 29-May 3, 2002 – 2nd ballot reconciliation

Changes in next ballot package

- Provide uniform definitions of Common Message Element Types (CMET)
- State how to define CMETs for use in a particular international affiliate region
- Better definition of all concepts
- Improvements in XML implementation specification for schemas
- Provide example message instance for each HMD
- Define how to create a “conformance profile” for a specific user requirement.
- Begin to define implementation “tools”

Version 3 Time-line

- April 29-May 3, 2002 – 2nd ballot reconciliation
- June-July, 2002 – Prepare 3rd ballot (perhaps membership ballot)
- September 2002 Working Group Meeting – Reconcile 3rd ballot
- October-November 2002, earliest possible publication

Version 3 Summation

- Proper communication of clinical concepts and the context in which those concepts are determined and used can only be achieved through careful definition of the context through a reference information model and the content through expressive, coordinated, broadly conceived terminologies.
- HL7 RIM and Vocabulary Domains, coupled with the strong, currently-available terminologies will accomplish this.
- Implementations of the initial set of Version 3 Messages will demonstrate this synergy unequivocally.

Thank you!

Questions?