Introduction to HL7 RIM

HL7 Reference Information Model (the “RIM”) – formally:

ANSI/HL7 RIM R1-2003
ISO 21731

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RIM Milestones

• Concept proposed in 1992 by ANSI/HISPP Joint Working Group for a Common Data Model (in which HL7 was a key participant)
• HL7 undertook development formally in 1997, building on models contributed by members
• Process of Harmonization established to advance the state of the model
• RIM 1.0 (first non-draft RIM) – Published Jan 2001
• ANSI/HL7 RIM Release 1 – Approved July 2003
• ISO 21731 (RIM Release 1) approved 2006
• RIM changed to ANSI “Continuous Maintenance Process” January 2009
• First Ballot on RIM Release 2 opened March 30, 2009
HL7 – Version 3

• Initial HL7 standards (Version 2) were based on a pragmatic ‘just do it’ approach to standards
• HL7 saw the need to revise and formalize the process
  – to assure consistency of the standards
  – to meet plug’n’play demands
  – to be able to adopt and leverage new technologies for both HL7 and its users
• Adopted the new methodology in 1997
  – based on best development & design practices
  – supports ‘distributed’ development across committees
  – is technology neutral
HL7 Version 3

• Methodology based on shared models
  – Reference Information Model (RIM)
    • of the health care information domain
  – Defined vocabulary domains
    • Drawn from the best available terminologies
    • Directly linked to the RIM
    • Supported by robust communication techniques

• Harmonization process that
  – Assures each member and committee a voice in the process, yet
  – Produces a **single** model as the foundation for HL7 standards
The “essence” of Version 3

- Apply the ‘best practices’ of software development to developing standards – a model-based methodology
- Predicate all designs on three semantic foundations – a reference information model, a robust set of data types, and a complete, carefully-selected set of terminology domains
- Require all Version 3 standards to draw from these three common resources
- Use software-engineering style tools to support the process.
Class Diagram – Normative RIM Release 1

- 4 Primary Subject Areas
- 35 Classes
- 181 Attributes
- 9 Associations
- 28 Generalizations
Action – the focus of health care messaging

• The reason we want to automate health care data is to be able to document the actions taken to treat a patient:
  – A request or order for a test is an action
  – The report of the test result is an action
  – Creating a diagnosis based on test results is an action
  – Prescribing treatment based on the diagnosis is an action

• In simple terms, a medical record is a record of each of the individual actions that make up the diagnosis, treatment and care of a patient.
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.
RIM Core Classes

- **Entity**: Organization, Living Subject, Person, Material, Place
- **Role**: Patient, Employee, LicensedEntity, Access
- **Participation**: Procedure, Observation, Patient Enc’nt’r, Substance Adm, Supply, Referral, Financial act, Working list, Account
Associations between Roles and Entities: “Played and Scoped”

- Doctor
- Patient
- Downtown Hospital
- Uptown Hospital

Joe Smith
Scoped By
Plays
Scoped By
Plays
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 – “A code specifying whether the Act is an activity that has happened, can happen, is happening, is intended to happen, or is requested/demanded to happen.
**Principle Act ‘moods’**

**definition** (DEF) – Definition of an act, formerly a “master file”

**intent** (INT) – an intention to plan or perform an act

**request** (RQO) – a request or order for a service from a request “placer” to a request “fulfiller”

**promise** (PRMS) – intent to perform that has the strength of a commitment

**confirmation** (CNF) – promise that has been solicited via an order

**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.
Mood code example

Abstract

Act
classCode : CS = ?
moodCode : CS = ?
id : II = ??
otherAttributes

Mood abstract

Type known

Observation
classCode : CS = OBS
moodCode : CS = ?
id : II = ??
otherAttributes

ObservationDefinition
classCode : CS = OBS
moodCode : CS = DEF
id : II = 123
otherAttributes

Orders a defined kind of observation to be performed

ObservationRequest
classCode : CS = OBS
moodCode : CS = RQO
id : II = O-02-35
otherAttributes

instantiates

Performs the defined observation to fulfill the order

ObservationEvent
classCode : CS = OBS
moodCode : CS = EVN
id : II = 7986
otherAttributes

fulfills
Consider the Act of “Room Cleaning”

- Mood: Proposal
  - PRP
  
- Mood: Order/Request
  - RQO

- Mood: Promise
  - PRMS

- Mood: Event
  - EVN

Why don’t you clean your room today honey?

Clean your room!

I will already!

Room is cleaned.
• Basis of HL7 V3 is single model with only six back-bone classes and a couple of swedozen specializations.
• Abstracted by type hierarchies and “mood”
• Displayed on a single 8-1/2 x 11 sheet ---
RIM Core Classes
<table>
<thead>
<tr>
<th>Act</th>
</tr>
</thead>
<tbody>
<tr>
<td>classCode: CS</td>
</tr>
<tr>
<td>moodCode: CS</td>
</tr>
<tr>
<td>id: SET&lt;II&gt;</td>
</tr>
<tr>
<td>code: CD</td>
</tr>
<tr>
<td>statusCode: SET &lt;CS&gt;</td>
</tr>
<tr>
<td>effectiveTime: GTS</td>
</tr>
</tbody>
</table>
Acts Have Class

- ENC - Encounter
- OBS - Observation (lab)
- SBADM - Substance Administration (pharmacy - admin)
- SPLY - Supply (pharmacy - dispense)
- CLINDOC - Document

Act.classCode :: CS (1..1) Mandatory

Concept domain: ActClass
Acts Can Have Codes

External coding systems:
- Lab Observation Act Codes could be LOINC codes.

HL7 defined:
- Encounter Type are Act Codes.

```xml
<code
  code="1554-5"
  codeSystemName="LN"
  displayName="Serum Glucose"
/>
```

**Encounter Type**
- Inpatient
- Emergency
- Ambulatory
- Home Health

**Act.code :: CD (0..1)**

Concept domain: ActCode
Acts Have States

Act.statusCode :: SET<CS> (0..*)

Concept domain: ActStatus
Acts Have Moods...

• Further clarifies the meaning of the Act (like Class and Code)
• Specifies if this act is an actual fact (event), or an intention to perform an act - such as a command, goal, appointment, or proposal.
• Signifies a major modality or stage for which a permanent record must be obtained.
• Never changes.
• Alternatively, status can change. Status does not define the Act.

Act.moodCode :: CS (1..1) Mandatory

Concept domain: ActMood
Acts happen at specific times: Act.effectiveTime

**Definition:** A time expression specifying the focal or operative time of the Act, the primary time for which the Act holds, the time of interest from the perspective of the Act's intention.

Data Type = General Timing Specification (GTS)
Similar to V2 TQ repeat interval

Act.effectiveTime :: GTS (0..1)
Types of Act Relationships

- COMP - has component
- PERT - has pertinent info
- SEQL - is sequel
- OPTN - has option
- FLFS - fulfills
- RSON - has reason
- INST - instantiates
- PRCN - has precondition
- OUTC - has outcome
- ARR – arrived by
- SUCC - succeeds
- RPLC - replaces
- OCCR - occurrence
- REFV - has reference values
- AUTH - authorized by
- COST - has cost
- GOAL - has goal
- PREV - has previous instance

ActRelationship.typeCode :: CS (1..1) Mandatory

Concept domain: ActRelationshipType
Participation

• Describes the involvement of an entity in an act.
• The entity is playing a role
  (Joe Smith plays doctor).
• The role participates in an act. Examples:
  – Author [of an order]
    (Ordering Doctor)
  – Admitter [of an encounter]
    (Admitting Doctor)
Types of Participations

- AUT - author
- ENT - data entry person
- CBC - call back contact
- PATSBJ - patient subject
- ADM - admitter
- PRF - performer
- ATND - attender
- CNS - consenter
- DIS - discharger
- SPC - specimen
- LOC - location
- CON - consultant
- DST - destination
- DEV - device
- TPA - therapeutic agent
- CSM - consumable
- RESPROV - responsible provider

**Participation**.typeCode :: **CS** (1..1) Mandatory

Concept domain: ParticipationType
Attributes have Data Types

### 33 V3 Data Types

<table>
<thead>
<tr>
<th>ANY</th>
<th>CE</th>
<th>BAG</th>
<th>ON</th>
</tr>
</thead>
<tbody>
<tr>
<td>BL</td>
<td>SC</td>
<td>IVL</td>
<td>INT</td>
</tr>
<tr>
<td>BN</td>
<td>II</td>
<td>HIST</td>
<td>REAL</td>
</tr>
<tr>
<td>ED</td>
<td>TEL</td>
<td>UVP</td>
<td>RTO</td>
</tr>
<tr>
<td>ST</td>
<td>AD</td>
<td>PIVL</td>
<td>PQ</td>
</tr>
<tr>
<td>CD</td>
<td>EN</td>
<td>EIVL</td>
<td>MO</td>
</tr>
<tr>
<td>CS</td>
<td>TN</td>
<td>GTS</td>
<td>TS</td>
</tr>
<tr>
<td>CO</td>
<td>PN</td>
<td>PPD</td>
<td>SET</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LIST</td>
</tr>
</tbody>
</table>

The Grouping: Data Types: SET, BAG, LIST, IVL, GTS

Next Release of V3 Data Types is in FINAL ballot jointly by HL7, ISO TC 215 and CEN TC 251 (April 2009)
Many Attributes also have Vocabulary Constrains

Expressed as Concept Domains or Value Sets

<table>
<thead>
<tr>
<th>AcknowledgementCondition</th>
<th>WorkPlaceAddressUse</th>
</tr>
</thead>
</table>

**Coding Strength:**
(for attributes with Vocabularies)

- **CNE** = Coded No Exceptions
- **CWE** = Coded With Exceptions

**Act.classCode :: CS (1..1) Mandatory**

- Concept Domain: **ActClass (CNE)**

bind HL7 attributes to value sets from external or internal terminologies
• V3 Messages and Documents are derived from the RIM
• Other objects could also be created from the RIM.
• Do you have an application for the RIM?
• Some vendors are making their internal data models consistent or mappable with the RIM. They are prepared for V3 communication. Are you?
Thank You!

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