



# Introduction to: HL7 Reference Information Model (RIM)

ANSI/HL7 RIM R2-2009 and ISO 21731

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Presented by:

George W. Beeler, Jr.

*Health Level Seven, Inc*

# RIM Milestones

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- 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
- Ballot of RIM Release 2 completed September, 2009



# HL7 – Version 3

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- 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

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- 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
- Continuous balloting – begun in 2009 – produces a new release each year. R2 finished ballot in September. R3 balloting begins May 2010



# The “essence” of Version 3

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- 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.





# Action – the focus of health care communication and documentation

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- 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.



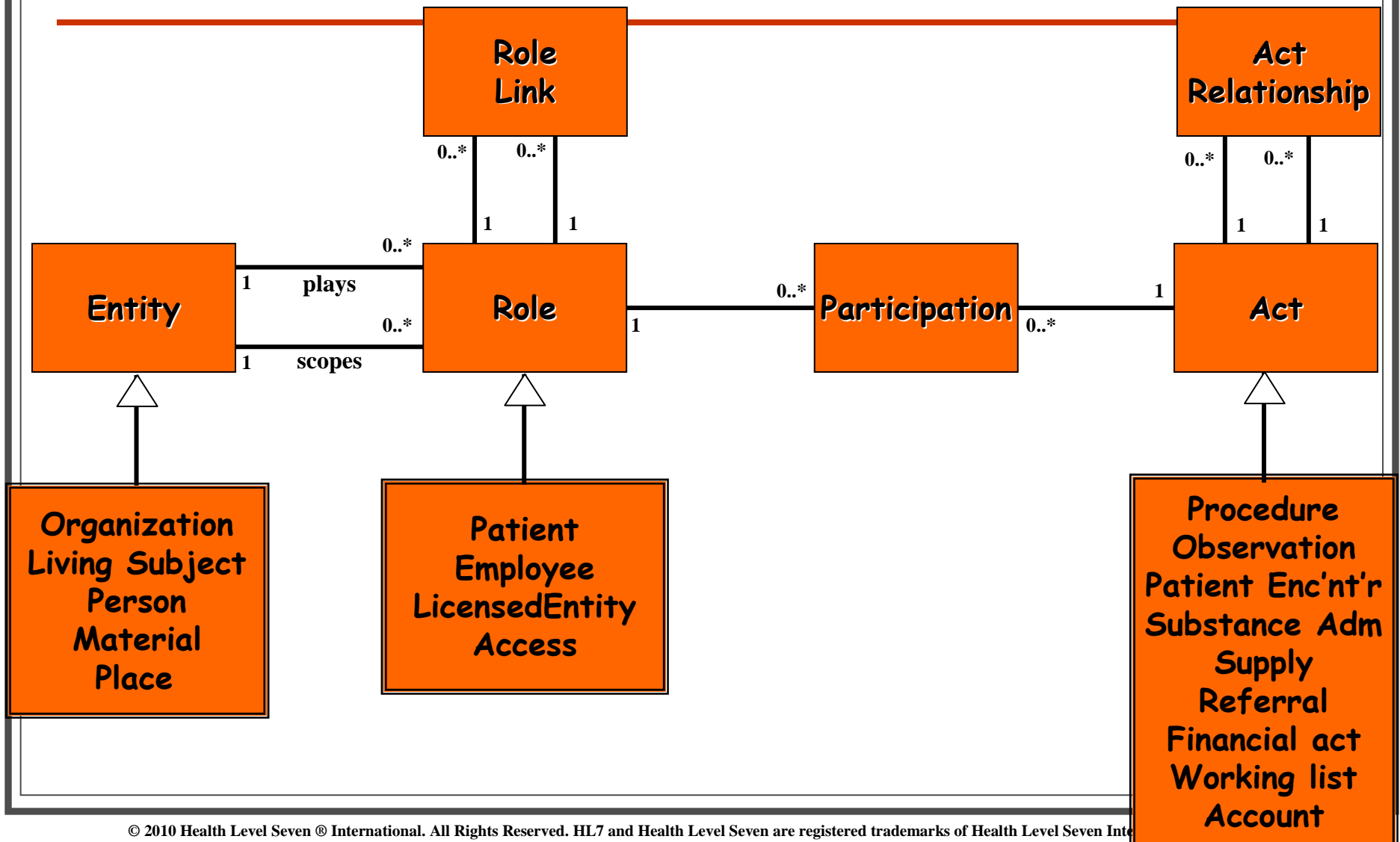
# Five core concepts of the RIM

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- 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



# Associations between Roles and Entities: "Played and Scoped"

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Downtown  
Hospital

Uptown  
Hospital

Scoped  
By

Scoped  
By

Doctor

Patient

Plays

Plays

Joe Smith



# Is “Act” sufficient?

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- 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'

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**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

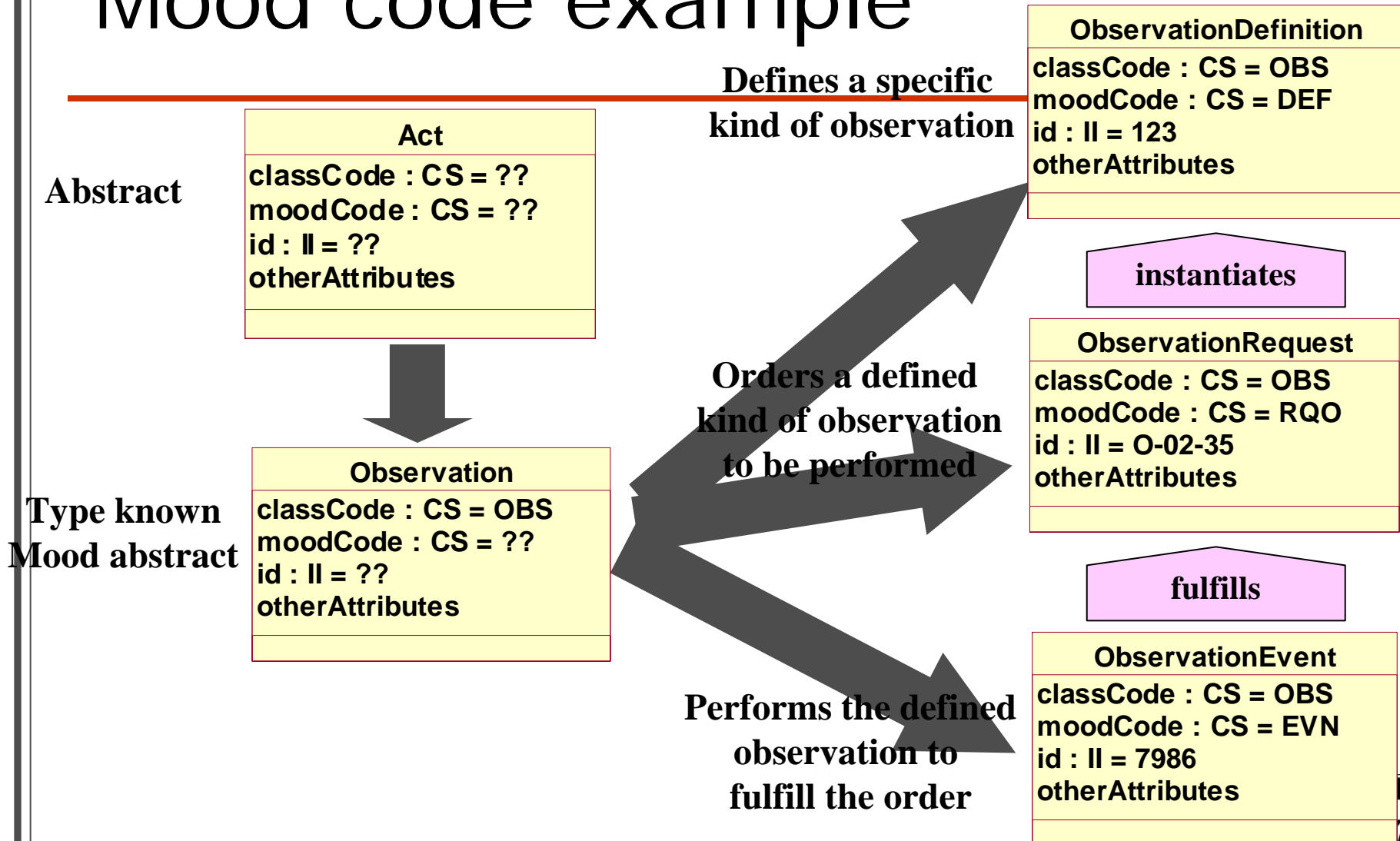
**confirmation** (CNF) – promise that has been solicited via an order

**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



# Consider the Act of "Room Cleaning"

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- Mood: Proposal

- PRP

**Why don't you clean your room today honey?**

- Mood: Order/Request

- RQO

**Clean your room!**

- Mood: Promise

- PRMS

**I will already!**

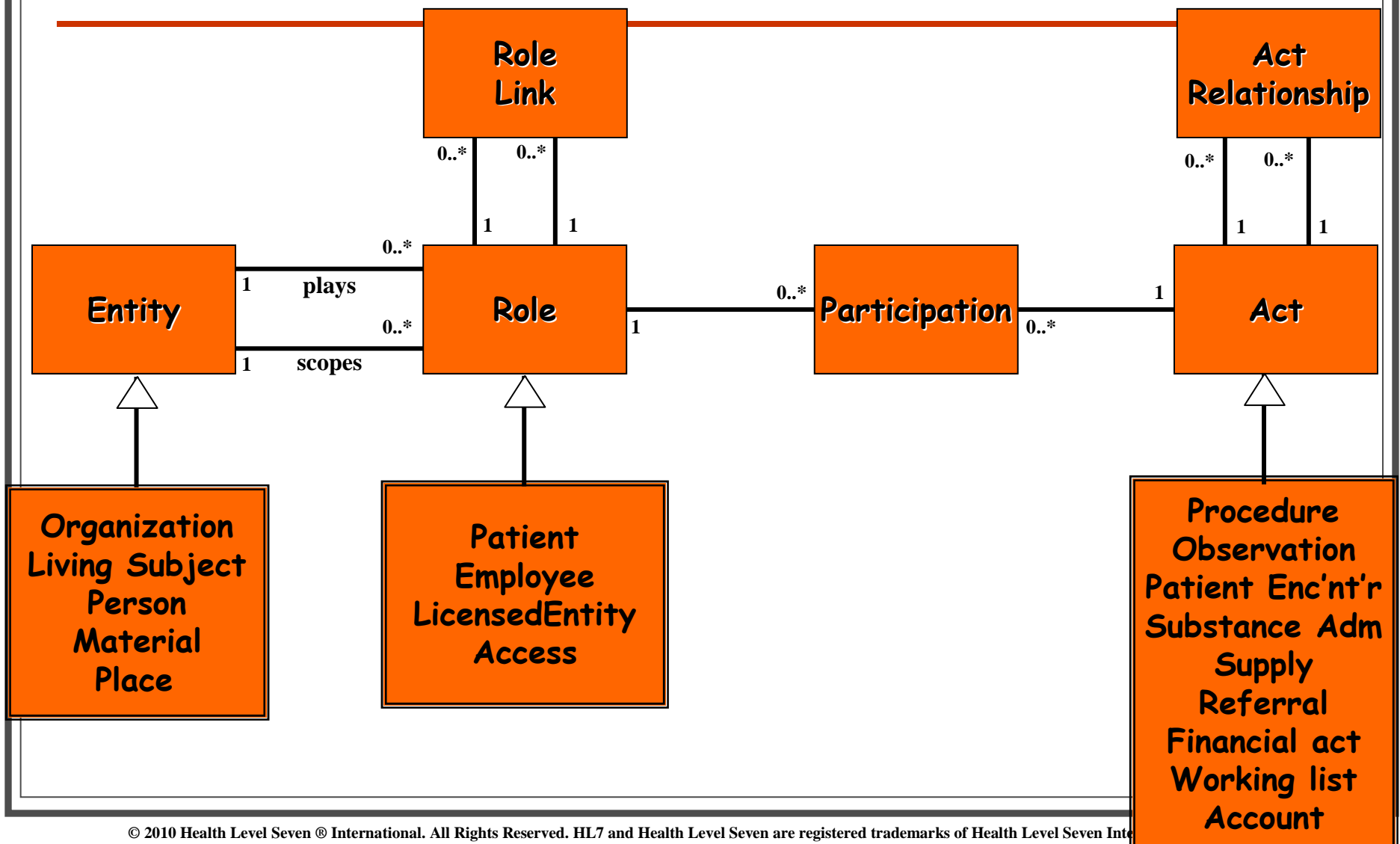
- Mood: Event

- EVN

**Room is cleaned.**



# RIM Core Classes



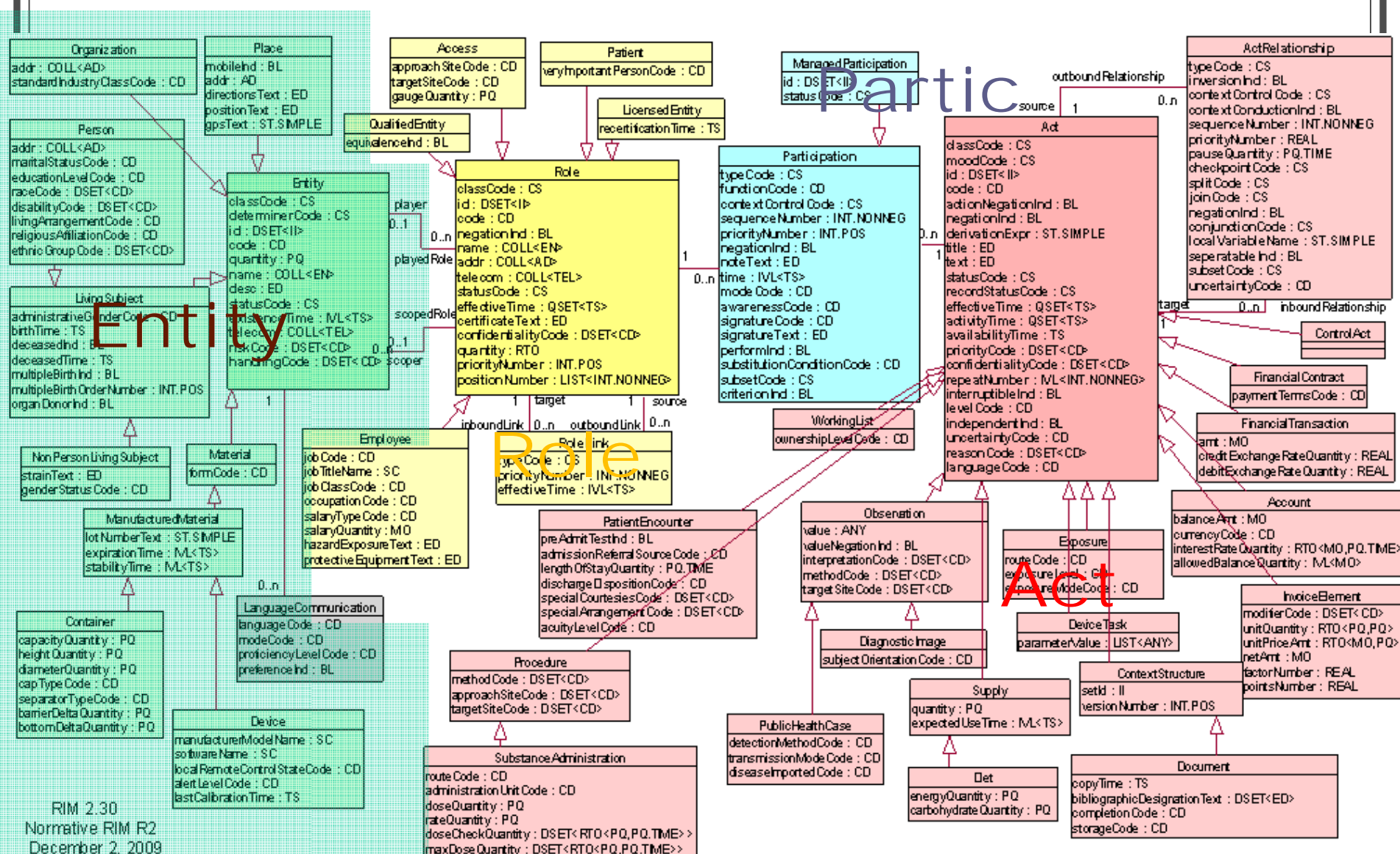
# Brief Survey of RIM

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- 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



RIM 2.30  
Normative RIM R2  
December 2, 2009



# V3: All About Acts

## Act

**classCode: CS**

**moodCode: CS**

**id: DSET<II>**

**code: CD**

**statusCode: CS**

**effectiveTime: QSET<TS>**

# 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.

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

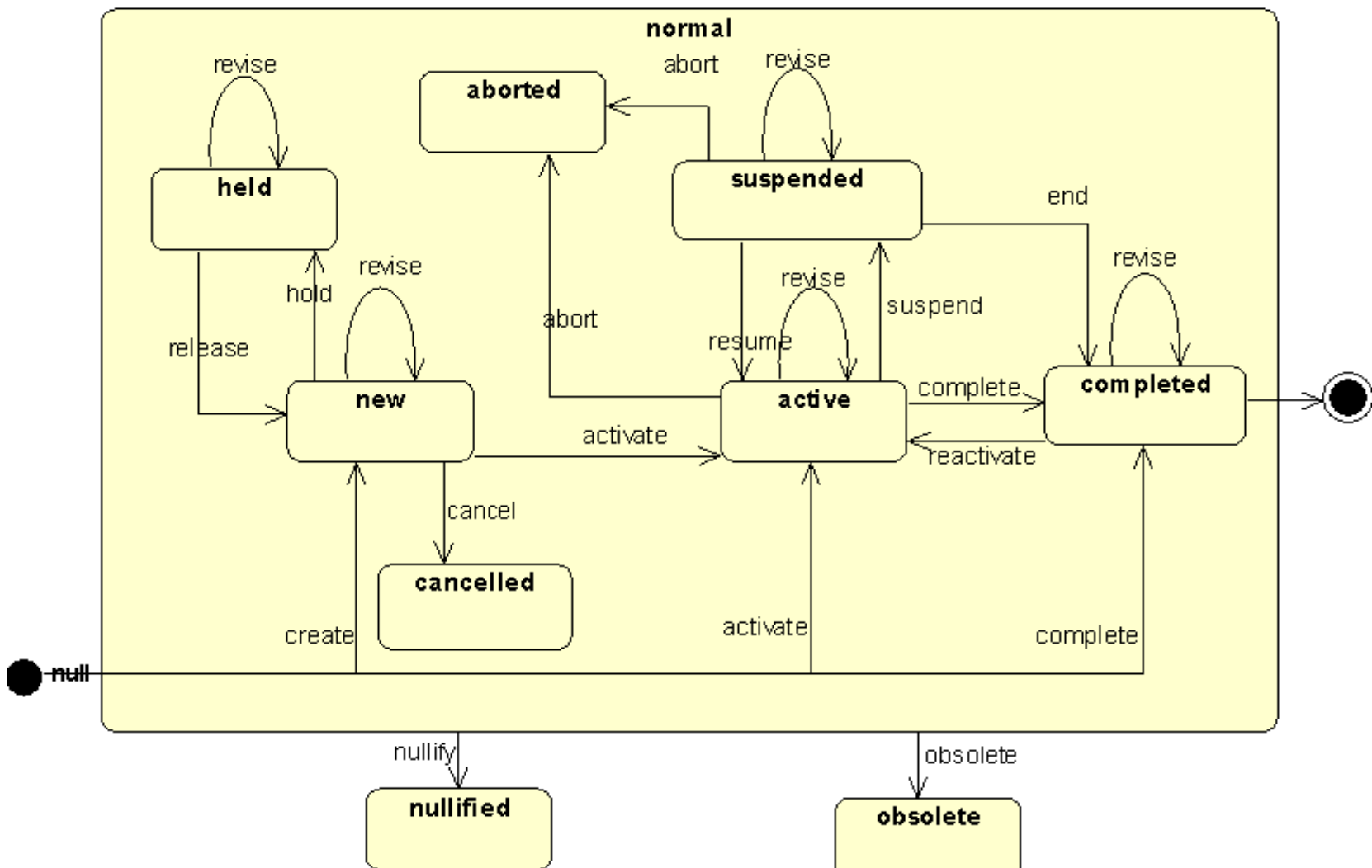
## ■ HL7 defined:

- Encounter Type are Act Codes.

Encounter Type  
Inpatient  
Emergency  
Ambulatory  
Home Health

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

Concept domain: ActCode



**Act.statusCode :: CS (0..1)**

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

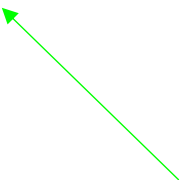
Concept domain: ActMood



# 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 :: QSET<TS> (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

**Release 2 of V3 Data Types was balloted jointly by HL7, ISO TC 215 and CEN TC 251**

- **10 “Foundation: data types** from which the rest are built, includes collection data types, boolean, etc.
- **10 “Basic” data types** including string, encapsulated data, coded data types, name, address, etc.
- **7 “Numerical and quantity” data types**, including numbers, money, and ratios
- **10 “Quantity collection” types** including intervals, discrete sets, unordered sets, etc.
- **2 “Uncertainty” data types**
- **33 “Flavors”** (specific constraints) of other data types, including “email address”, “organization name”,

# Many Attributes also have Vocabulary Constrains

Expressed as Concept  
Domains or Value Sets

AcknowledgementCondition  
..  
WorkPlaceAddressUse

## Coding Strength:

(for attributes with Vocabularies)

CNE = Coded No Exceptions

CWE = Coded With Exceptions

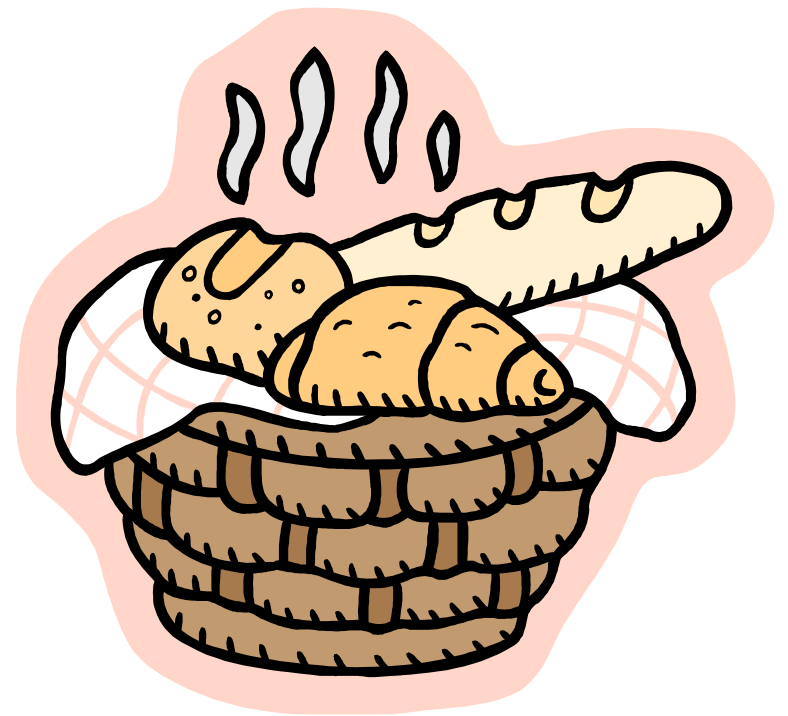
**Act.classCode :: CS (1..1) Mandatory**

Concept Domain: ActClass (CNE)

**bind HL7 attributes to value sets from external or internal terminologies<sup>8</sup>**

# RIM: Food for Thought

- 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!*



**George W. Beeler, Jr., Ph.D.**  
Emeritus Staff, Mayo Foundation  
Principal, Beeler Consulting LLC  
807 Tenth Ave. SW  
Rochester, MN 55902  
(507)254-4810  
woody@beelers.com