Introduction To HL7 Version 3

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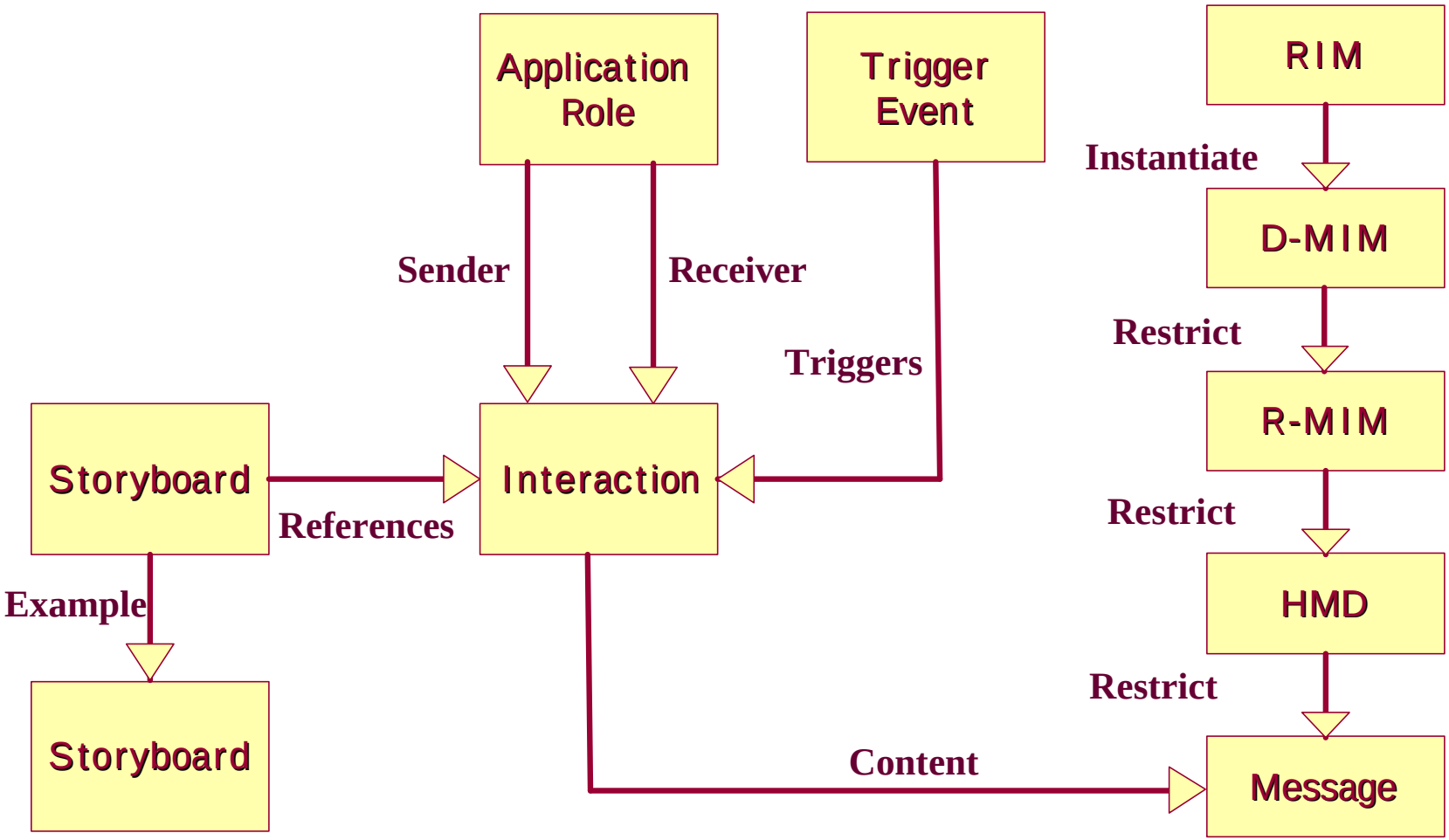
With special thanks to Helen Stevens

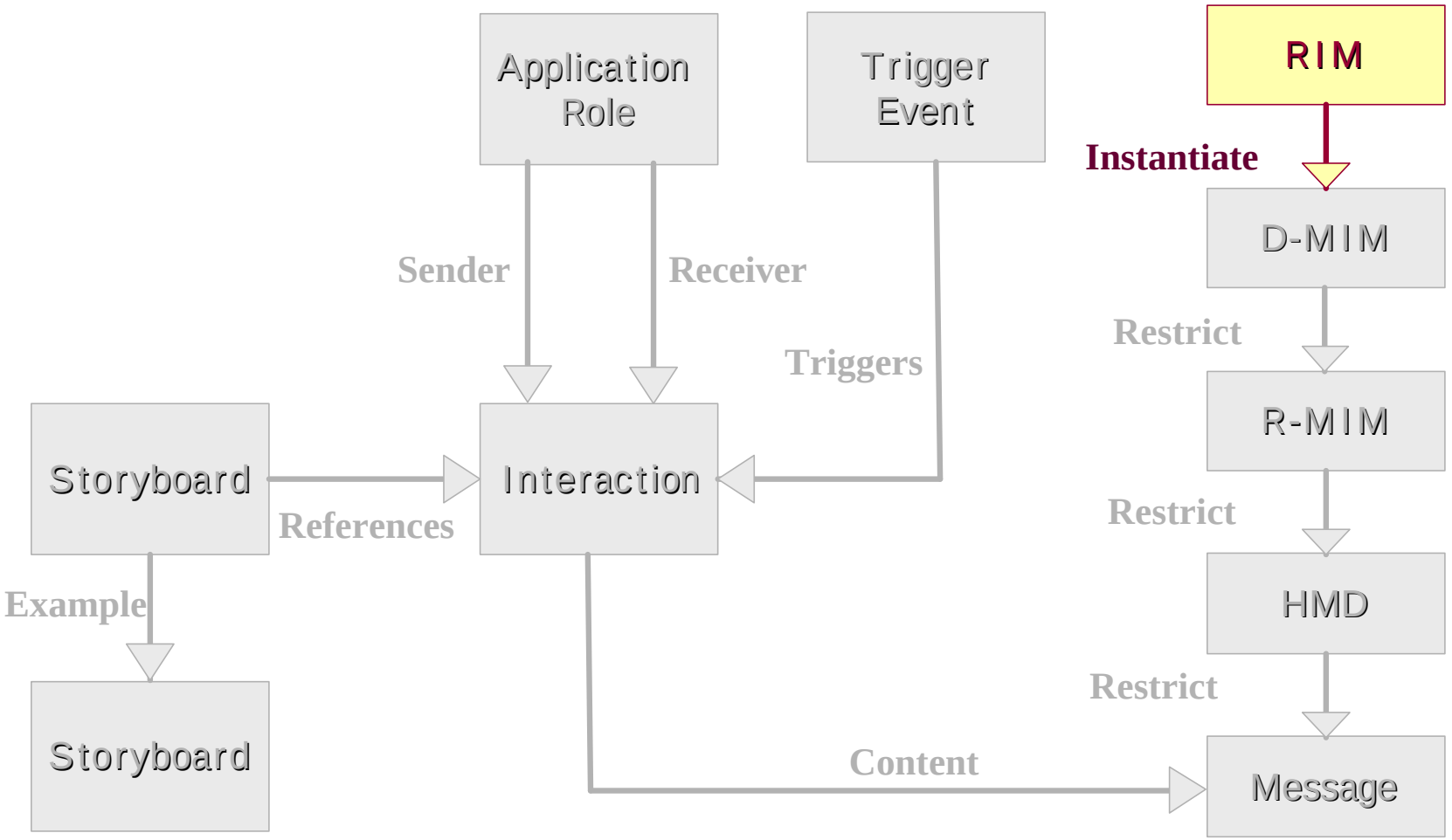
Methodology Introduced

1. Define a consensus Reference Information Model (RIM)
2. Assemble the terminology/vocabulary and data types necessary to express the attributes of the RIM
3. Design the technology to implement the interactions (XML)
4. Develop supporting structures (Storyboards, Trigger events, application roles) that reflect the business model in healthcare
5. Apply the RIM, Vocabulary and Data Types and supporting information to define interactions
6. Publish, Verify, Localize and Implement

Methodology Key Concepts



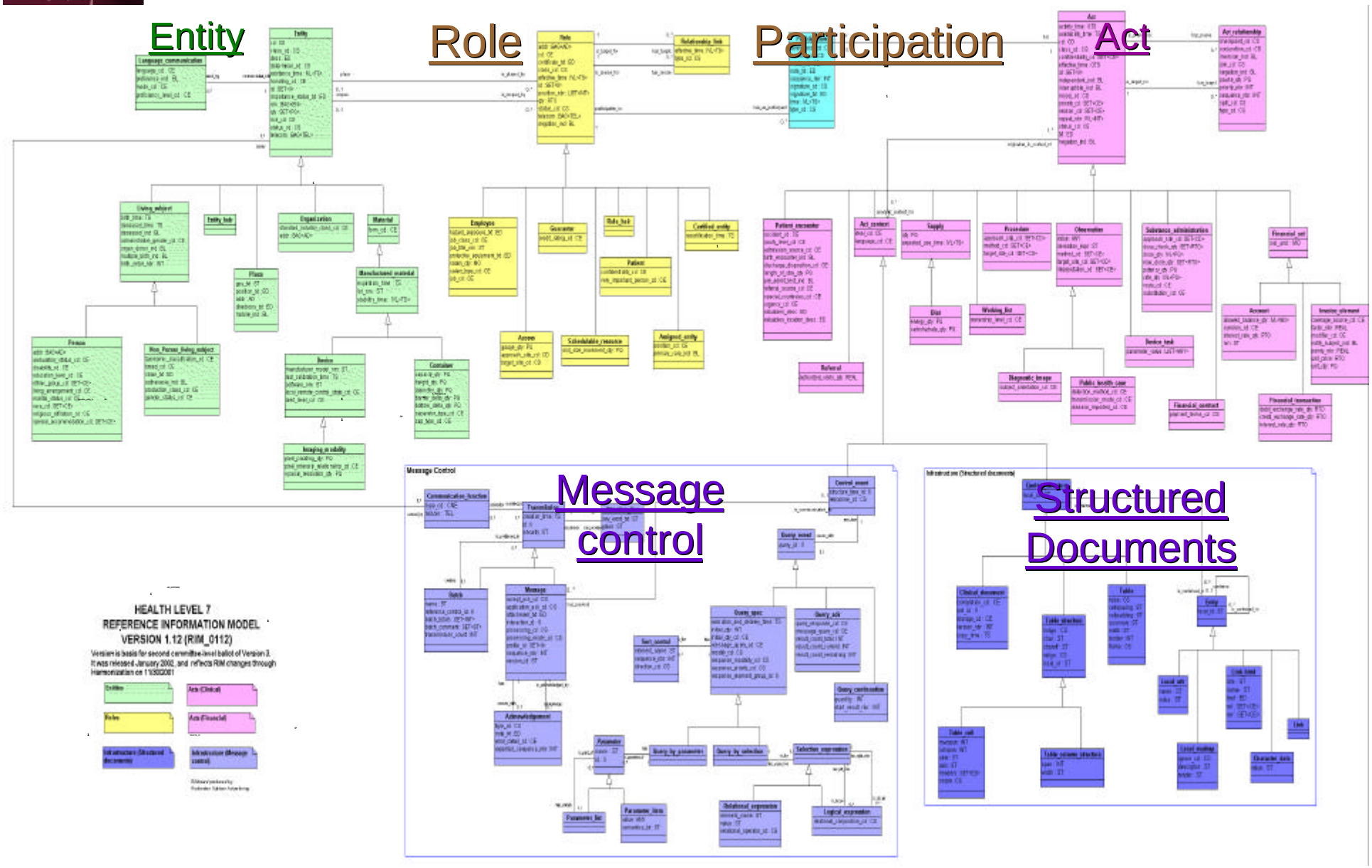
Methodology Key Concepts



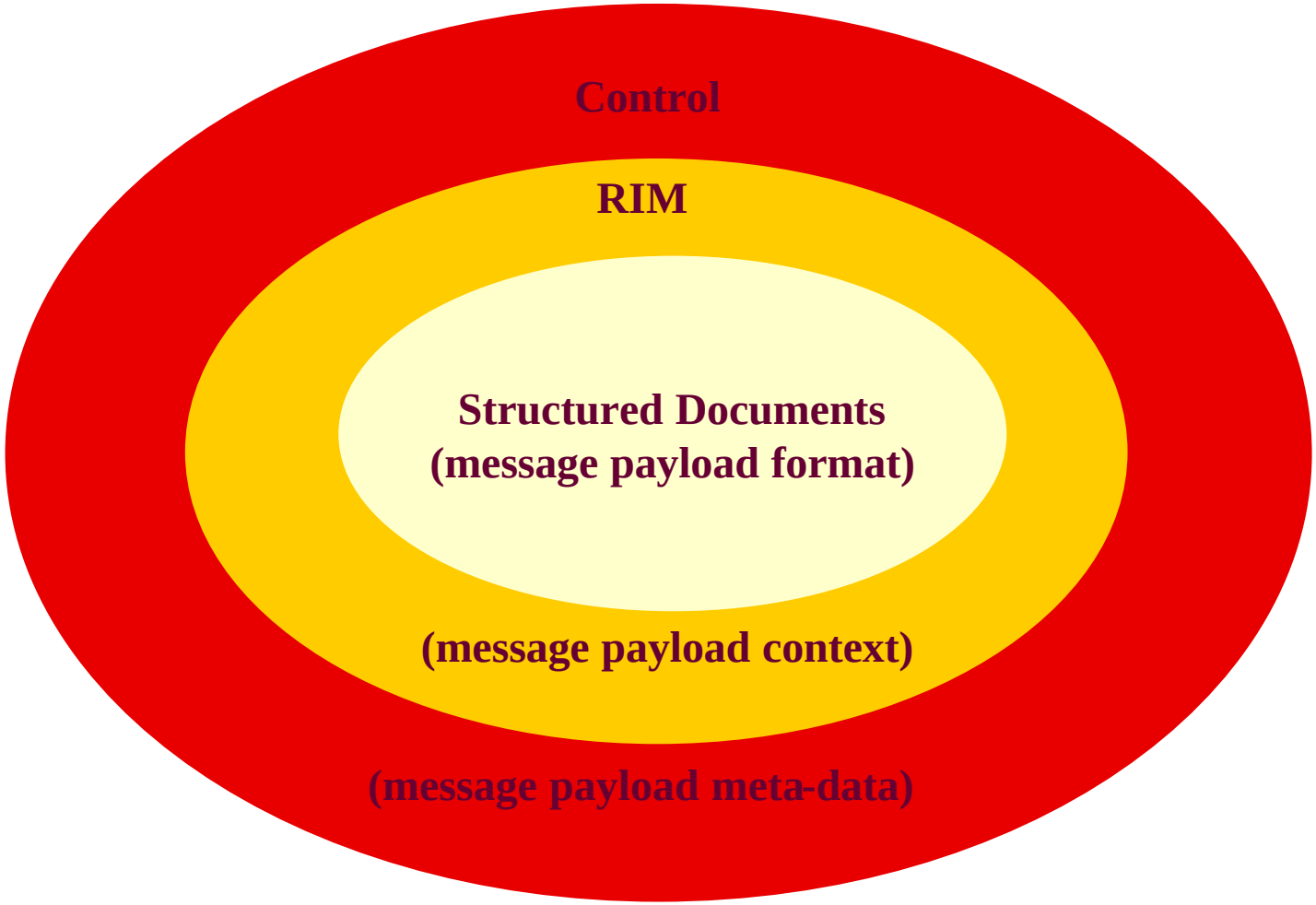
Reference Information Model (RIM)

- Defines all the information from which the data content of HL7 messages are drawn
- Follows object-oriented modeling techniques, where the information is organized into classes that have attributes and that maintain associations with other classes
- Forms a shared view of the information domain used across all HL7 messages independent of message structure
- Provides a means for discovering and reconciling differences in data definition

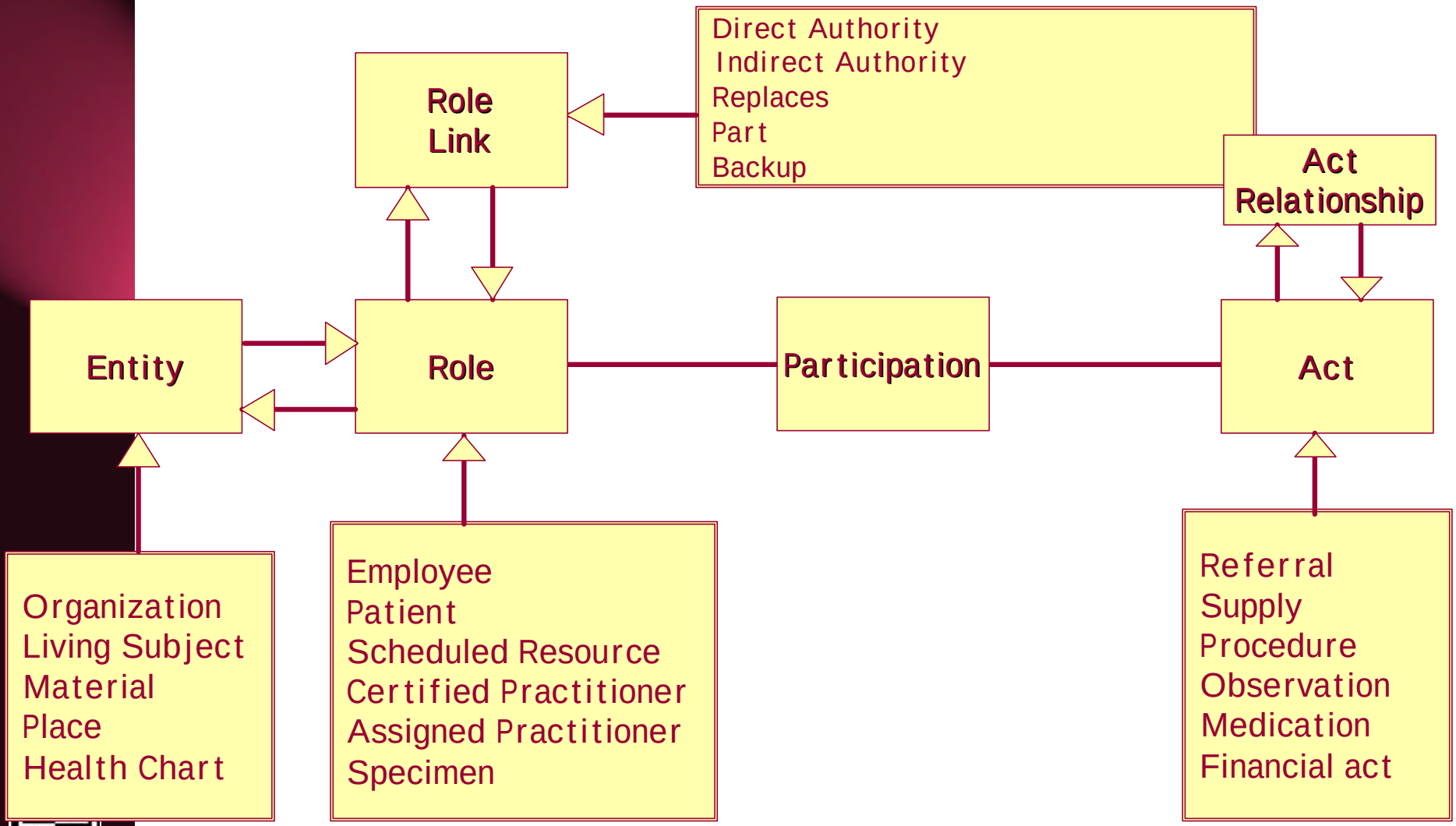
HL7 RIM 1.12


Entity
Role
Participation
Act
Message control
Structured Documents
HEALTH LEVEL 7
REFERENCE INFORMATION MODEL
VERSION 1.12 (RIM_0112)

Format/Context/Meta-data



RIM Core Classes



RIM Core Class Definitions

Act

Act Relationship

Entity

Role

Role Link

Participation

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.

Act Relationship - Ability to relate 2 acts. Examples relationships are compositional, reference and succeeds.

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.

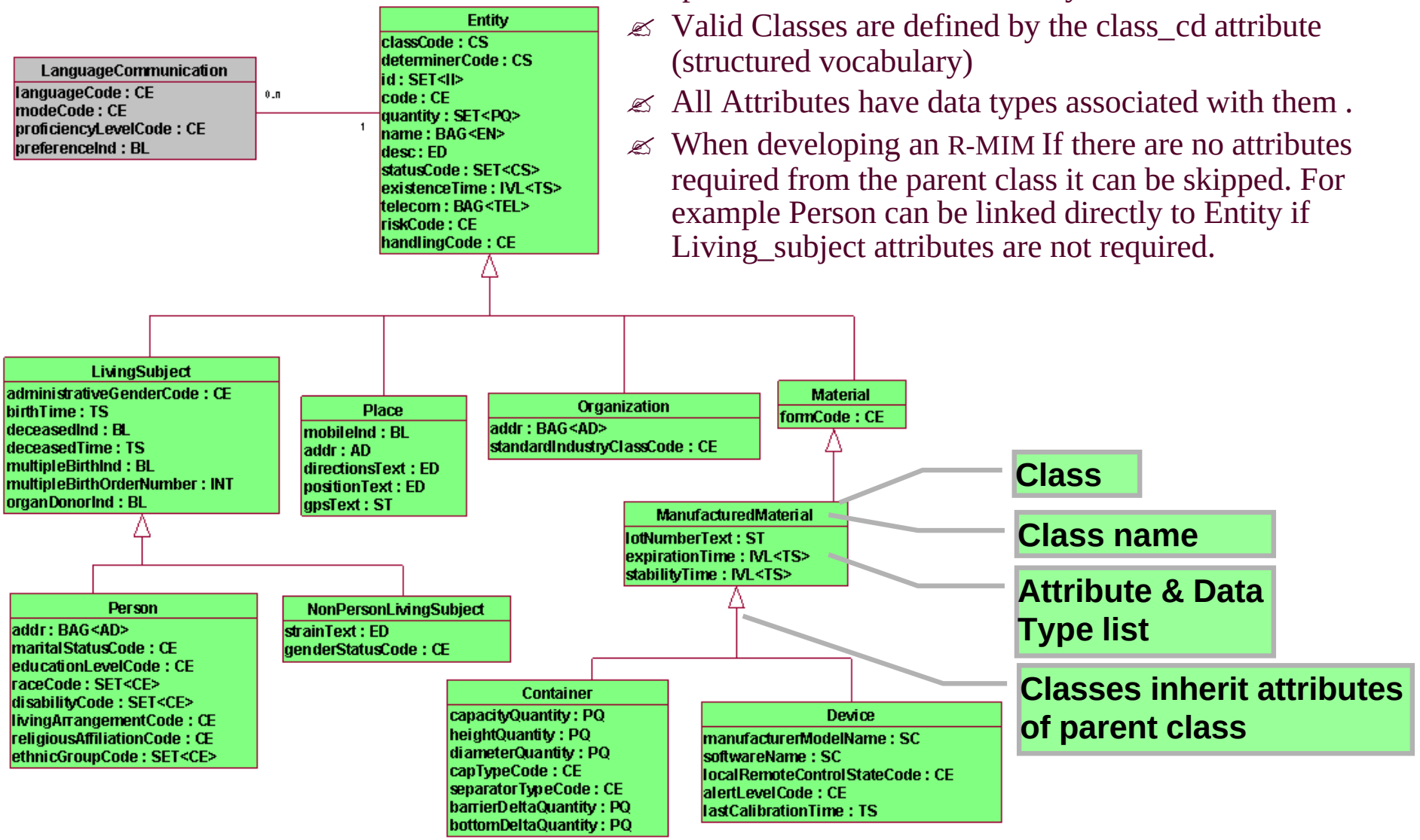
Role - "a socially expected behavior pattern usually determined by an individual's status in a particular society". For people, role is usually positions, jobs, or 'hats' and "a function or part performed especially in a particular operation or process" (ibid) Thus, the roles of places and things are what these places or things are normally *used for.*

Role Link - A relationship between two entity roles. For example linking the Physician's relationship with an organization and a patient's relationship with the organization to express the patient/physician relationship.

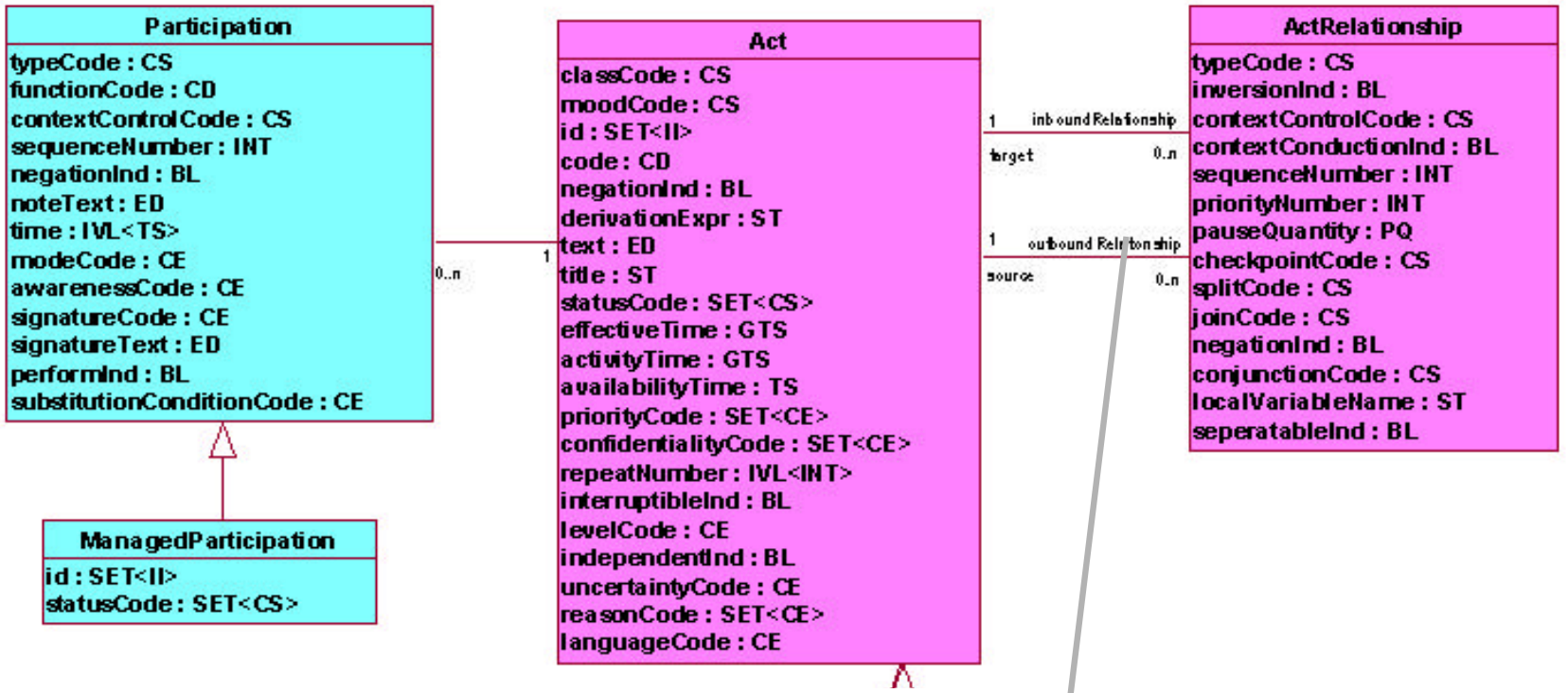
Participation - exists only in the scope of one act. Acts have multiple participants, each of which is an entity in a role. Role signifies competence while participation signifies performance.

RIM Closer Look

- Notes:
  - Only classes that contain attributes will display in the 'poster-board' – there are many others
  - Valid Classes are defined by the class_cd attribute (structured vocabulary)
  - All Attributes have data types associated with them .
  - When developing an R-MIM If there are no attributes required from the parent class it can be skipped. For example Person can be linked directly to Entity if Living_subject attributes are not required.

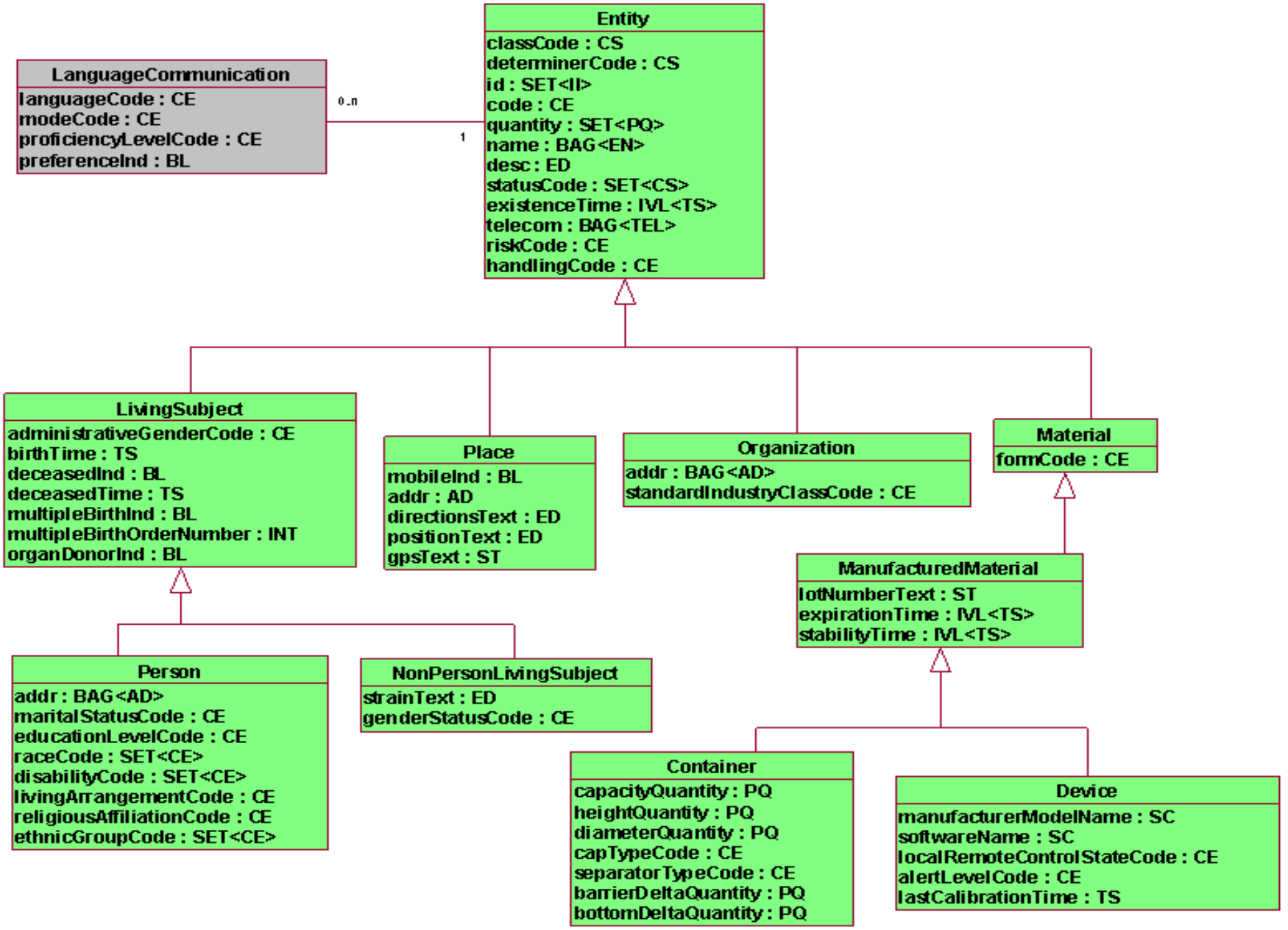


RIM Extract

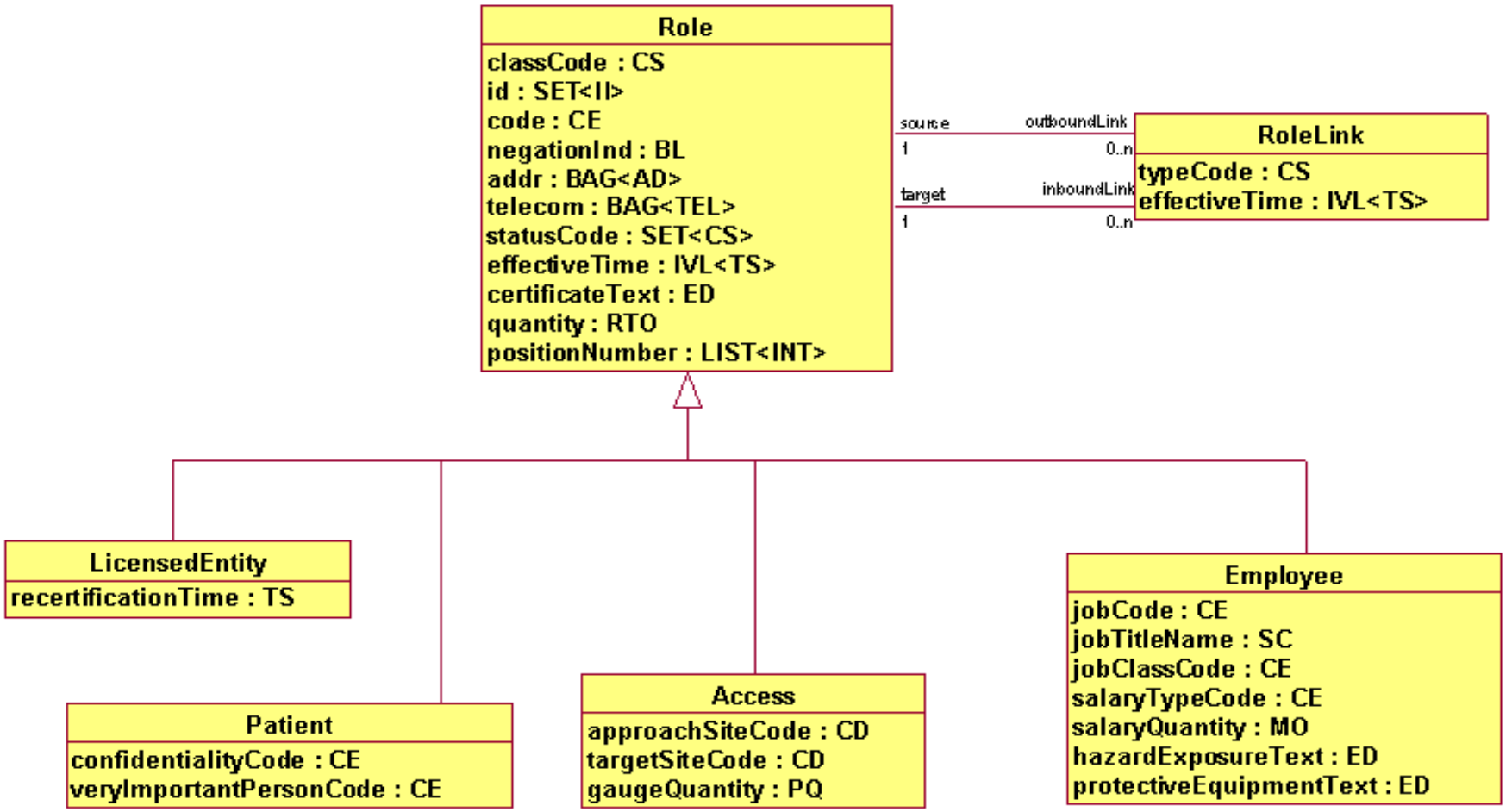


Cardinality & Relationship between classes

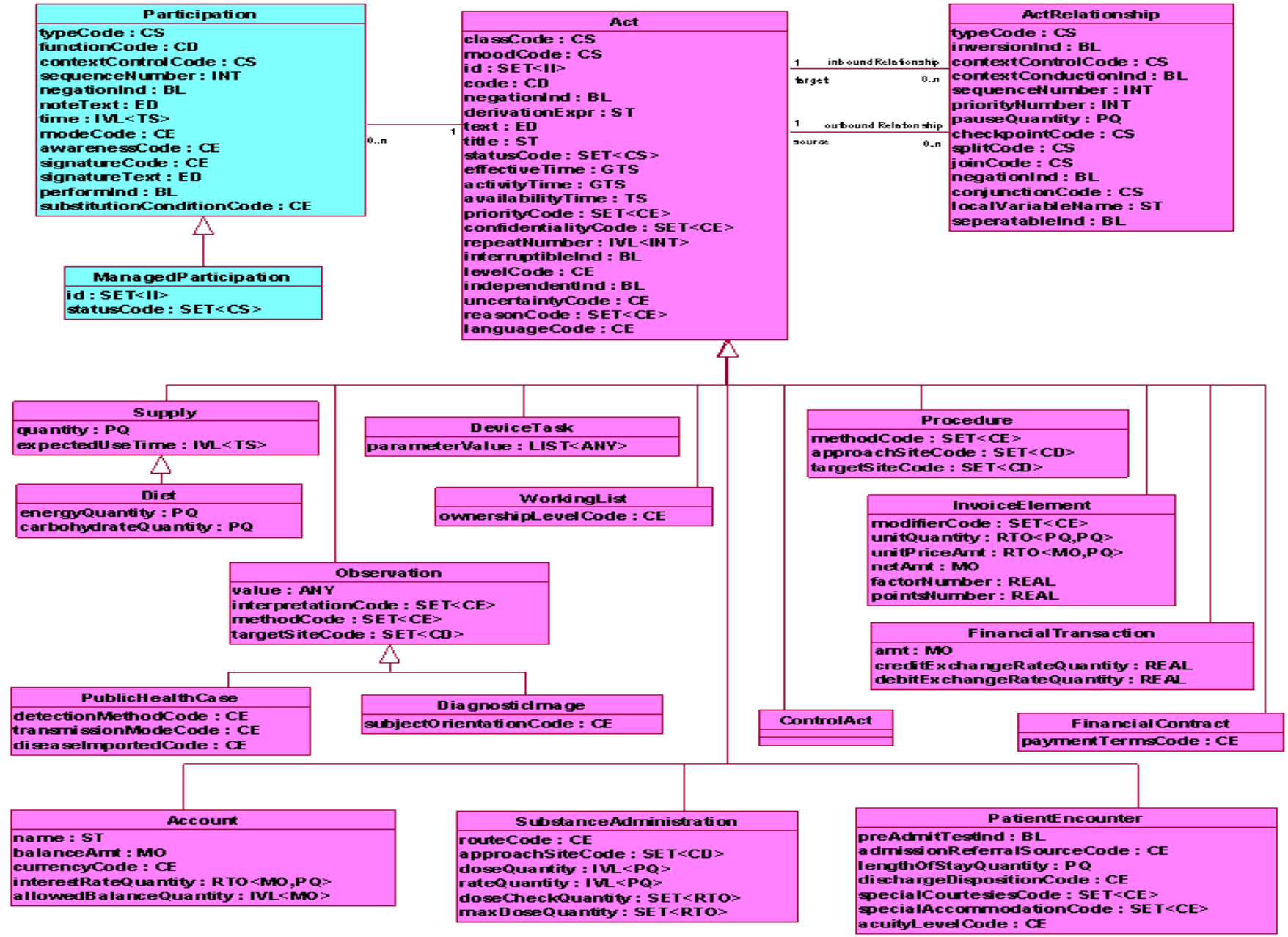
Entity Diagram



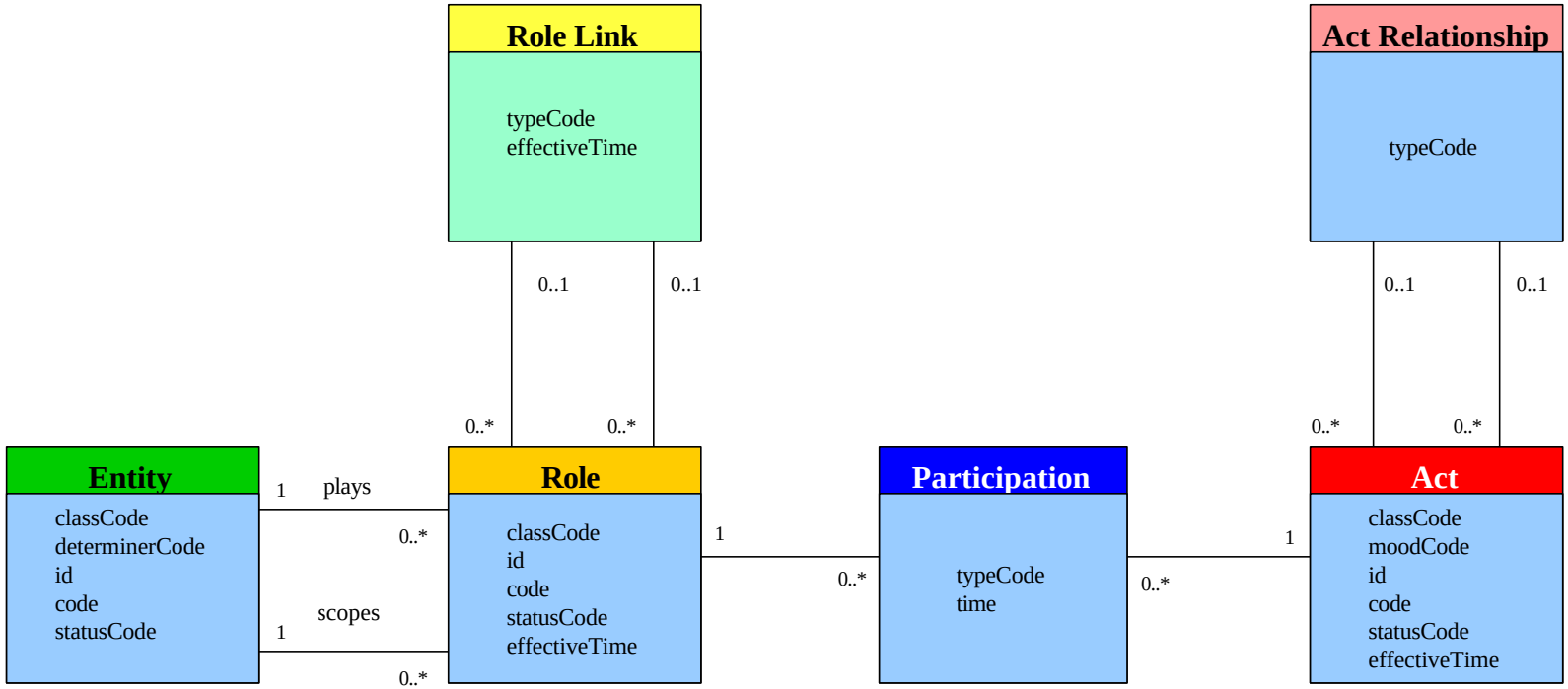
Role Diagram



Participation & Act Diagram



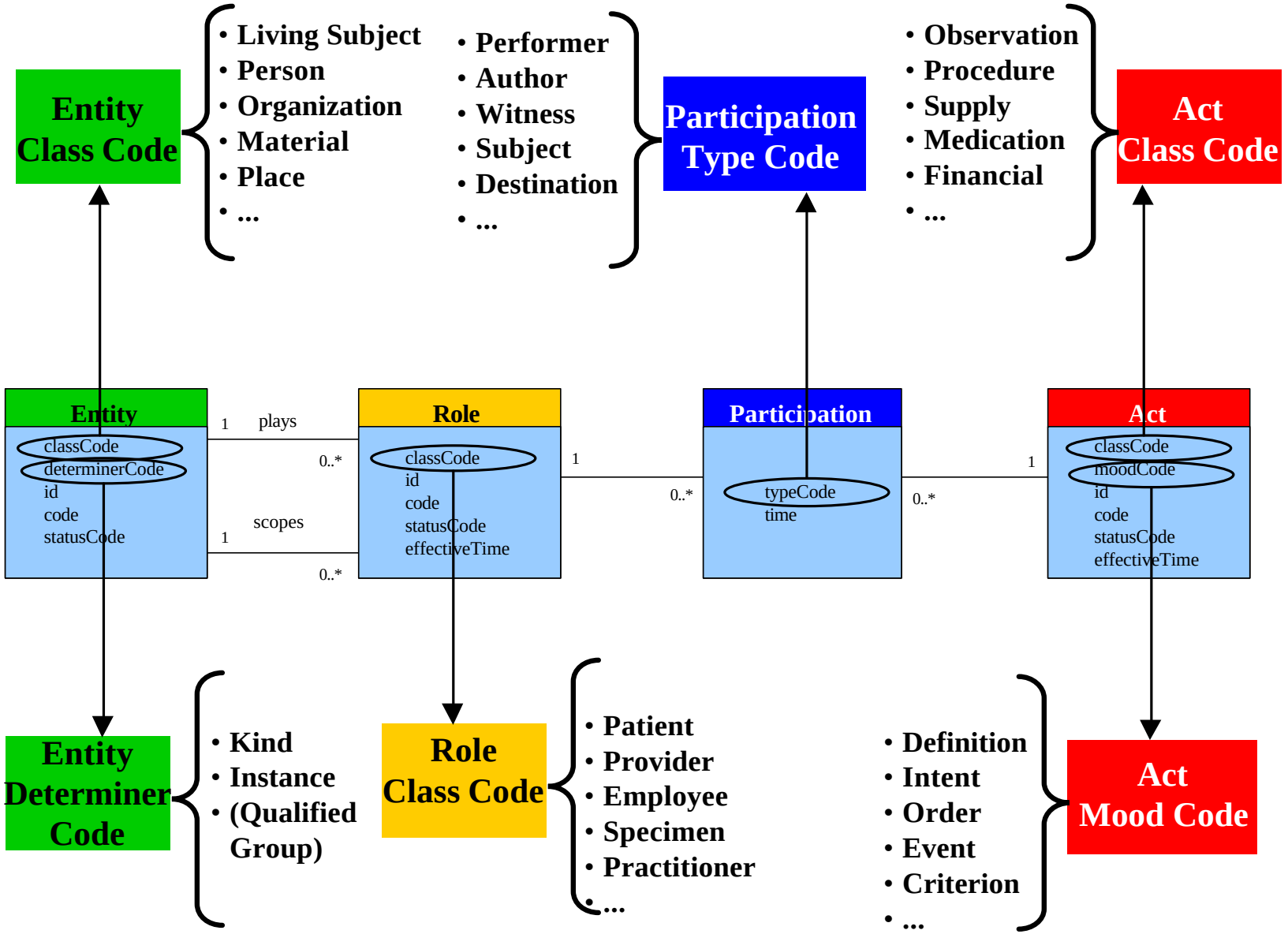
RIM Core Classes



- 4 structural attributes:
  - classCode, typeCode, moodCode, determinerCode

Credit: HL7, Woody Beeler

RIM Core Structural Attributes



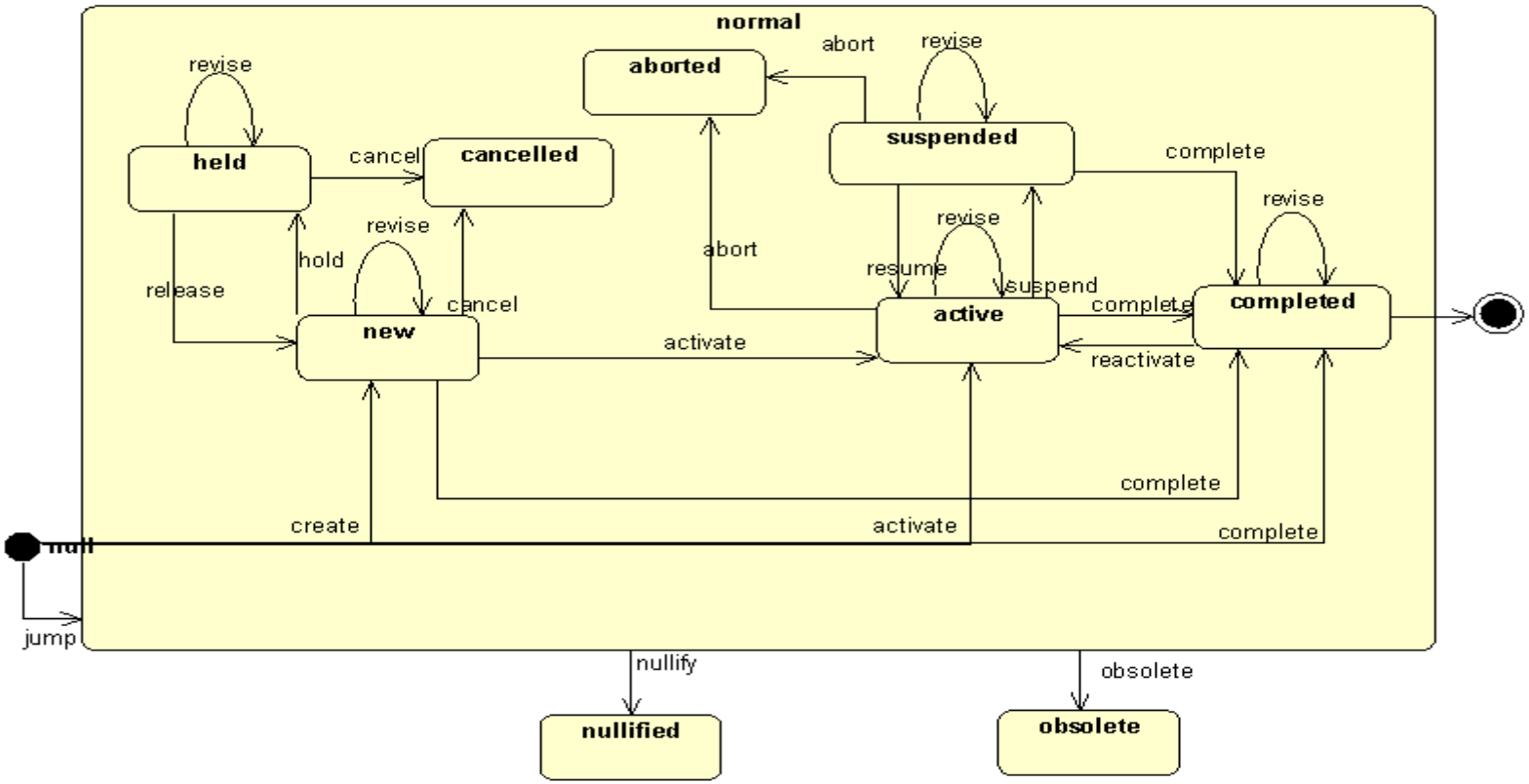
Credit: HL7, Woody Beeler

RMIM Acts and Moods

- Proposal (PRP)
  - Why don’t you clean your room today?
- Order (ORD)
  - Clean your room!
- Intent (INT)
  - I promise to clean my room
- Event (EVN)
  - The room is cleaned
- Definition (DEF)
  - “Cleaning your room” means make the bed, put toys away…
- Event Criterion (EVN.CRT)
  - If you want ice cream you must clean your room

State Transition Diagrams

- A state transition is a change in the state of a class by virtue of a change in its attributes or associations.
- Example: state-transition model representing the life-cycle of an activity.



Artifact Naming Conventions

Why a naming convention?

- Artifacts are uniquely identified
  - Avoids conflicts/duplicates between committees or working groups
- Artifact types and responsibilities are clearly defined and understood from the name
  - Increases accuracy and efficiency in ensuring that correct artifacts are published properly
- High volume of artifacts and submissions being received from many committees to be coordinated centrally by publications

Artifact Naming

All artifacts delivered for V3 must be named using the following convention:

UUDD_AAnnnnnnRRvv

UU = Sub-Section code

DD = Domain code

AA = Artifact or Document code

nnnnnn = Six digit zero-filled number

RR = Realm Code (Currently only UV is supported)

vv = Version Code

Example:

PORX_AR000001UV01

Operations Sub-Section, Pharmacy Domain, Application Role Artifact number 000001, Universal Realm, Version 01.

Infrastructure Management

IM	Section: Infrastructure Management	
MC	Sub-Section: Message Control	
	CI	Transmission Infrastructure
	AI	Control Act Infrastructure
MF	Sub-Section: Master File Management	
	MI	Master File Infrastructure
QU	Sub-Section: Query	
	QI	Query Infrastructure
CO	Sub-Section: Common Message Elements	
	CT	Common Message Elements
	MT	Common Message Content

Section Identifier

Sub-Section Identifier

Domain Identifier

Health & Clinical and Administrative

HM	**Section: Health & Clinical Management**
PO	**Sub-Section: Operations**
LB	**Laboratory**
RX	**Pharmacy**
II	**Imaging Integration**
CG	**Clinical Genomics**
RR	**Public Health Reporting**
RI	**Public Health Reporting Informative**
RT	**Regulated Studies**
RE	**Sub-Section: Reasoning**
PC	**Patient Care**
RC	**Sub-Section: Records**
MR	**Medical Records**

AM	**Section: Administrative Management**
PR	**Sub-Section: Practice**
PA	**Patient Administration**
SC	**Scheduling**
PM	**Personnel Management**
FI	**Sub-Section: Financial**
CR	**Claims & Reimbursement**
AB	**Accounting & Billing**

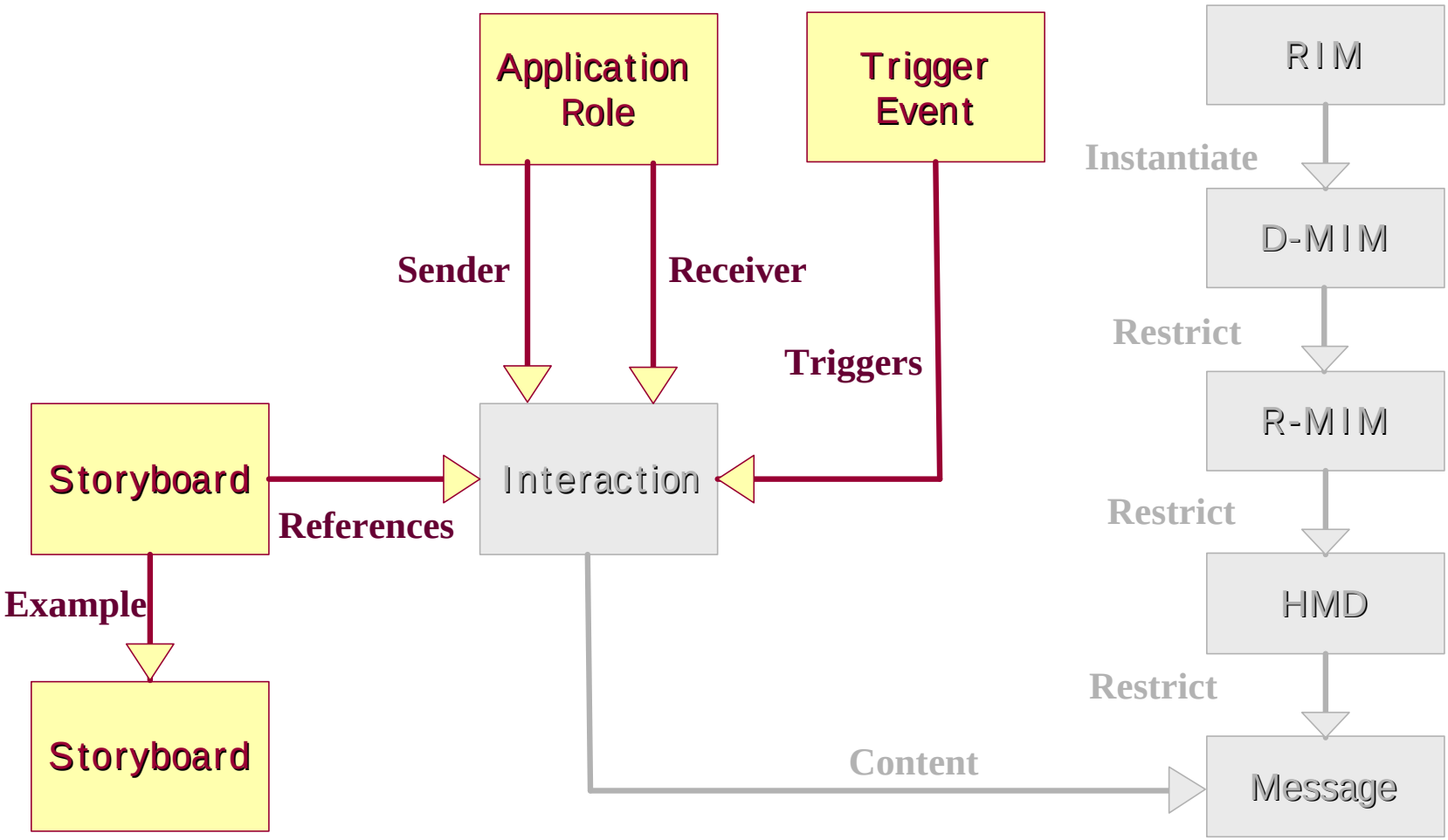
Artifact & Document Codes

Code	Artifact
AR	Application Role
DM	D-MIM (Domain Information Model)
DO	Domain
EX	Example
HD	HMD (Hierarchial Message Descriptor)
IN	Interaction
MT	Message Type
NC	Narrative Content
RM	R-MIM (Refined Information Model)
ST	Storyboard
SN	Storyboard Narrative
TE	Trigger Event

Code	Document
BB	Backbone
CF	Conformance
DT	Data Types
GL	Glossary
IT	ITS
NC	Narrative Content
PB	Publication/Domain Database
RI	RIM
RP	Repository Database
VG	V3 Guide
VO	Vocabulary

Code	Realm
UV	Universal

Methodology Key Concepts



Storyboards

✍ A Storyboard is a real-world example of a sequence of events.

2.1.4 Add New Patient (PRPA_ST201001)

Purpose

These storyboards demonstrate adding a new patient to a patient registry. The first narrative describes this taking place in a setting with separate person and patient registries where the patient information is linked to the person information. The second narrative describes this taking palce in a setting where there is only a patient registry that includes both person and patient information.

Interaction List

Patient Activate Notification	PRPA_IN201001
PatientLivingSubject Activate Notification	PRPA_IN201101

2.1.4.1 Patient Activate (PRPA_SN201001)

Mr. Adam Everyman's physician, Dr. Patricia Primary, called the Good Health Hospital to schedule an inpatient visit for Mr. Everyman for lung surgery. The clerk located the existing entry for Mr. Everyman in the GHH Person Registry and added added Mr. Everyman to the GHH Patient Registry along with the mailing address and telephone number to use for communicating patient information to him [Trigger Event Patient Activate Notification] and scheduled the admission for two weeks from that day.

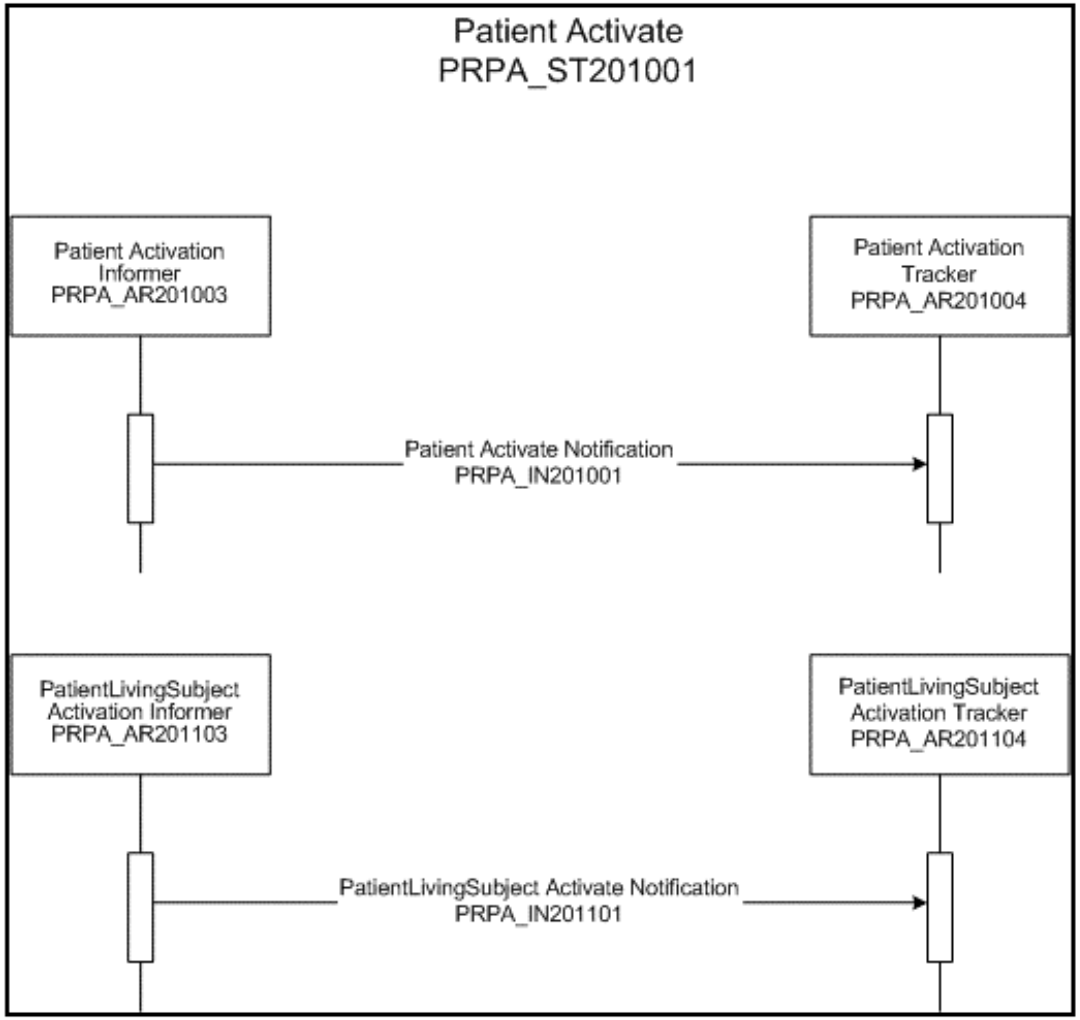
2.1.4.2 PatientLivingSubject Activate (PRPA_SN201101)

Mr. Adam Everyman's physician, Dr. Patricia Primary, called the Good Health Hospital to schedule an inpatient visit for Mr. Everyman for lung surgery. The clerk added Mr. Everyman's name, demographics, address and telephone number to the GHH Patient Registry along with the mailing address and telephone number to use for communicating patient information to him [Trigger Event PatientLivingSubject Activate Notification] and scheduled the admission for two weeks from that day.

Storyboard Interaction Diagram

- Storyboard interaction diagrams support each storyboard

Diagram



Application Roles

- Abstractions that standardize the roles played by healthcare information system components when they send or receive HL7 messages.
  - Foundation for conformance claims
  - Used to define interoperable messages
  - Tool to analyze the relationship between messages and key classes in the RIM

2.2.5 Person Comprehensive Informer (PRPA_AR101001)

Description

Structured Name: Person Comprehensive Informer

A Person Comprehensive Informer sends all notification messages for person registries.

2.2.6 Person Comprehensive Tracker (PRPA_AR101002)

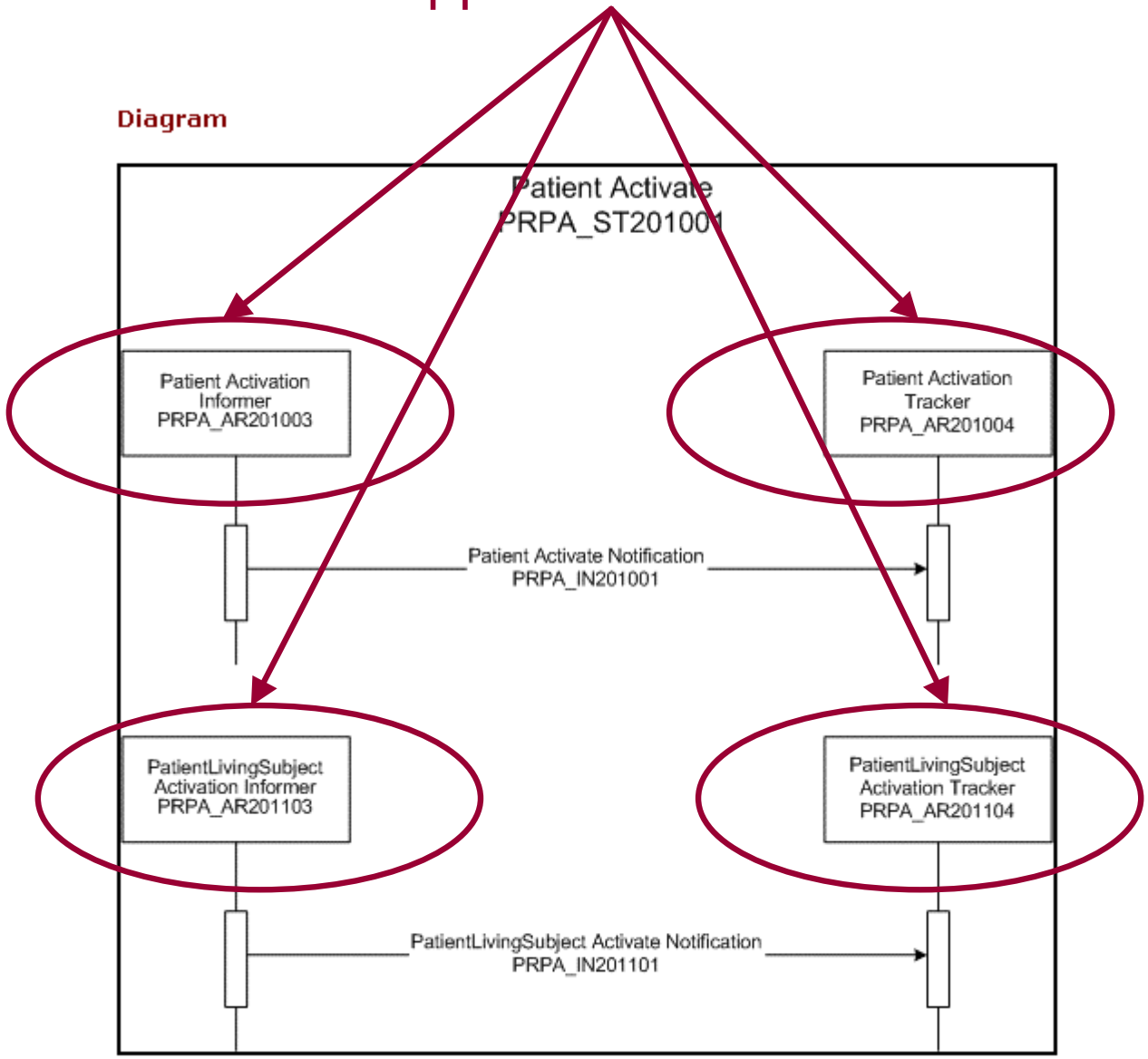
Description

Structured Name: Person Comprehensive Tracker

A Person Comprehensive Tracker receives all notification messages from person registries.

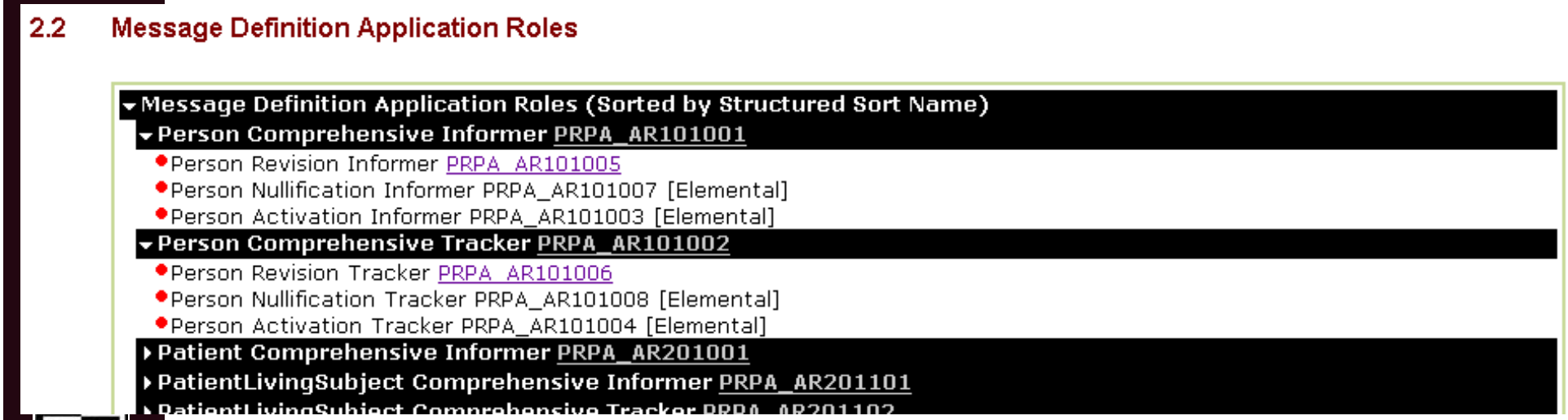
Application Roles & Storyboards

Application Roles



Application Role Hierarchies

- An application role can be both
  - Container:
    - Contains other AR
  - Contained
    - Is contained by other AR



Trigger Event

- An occurrence in the health care domain, or within the systems that support this domain, that causes information to be exchanged in the domain or between systems.
- There are three types of Trigger Event:
  - Interaction based
    - Occurs when a specific interaction is received
  - State-transition based
    - Based on the state transition of a particular focal class. Some trigger events may be based on more than one state transition. If a trigger is associated with more than one state transition, it is assumed that both transitions occur at the same time.
  - User request
    - Occurs at the request of a human user

2.3.1 Add New Person (PRPA_TE101001)

Description

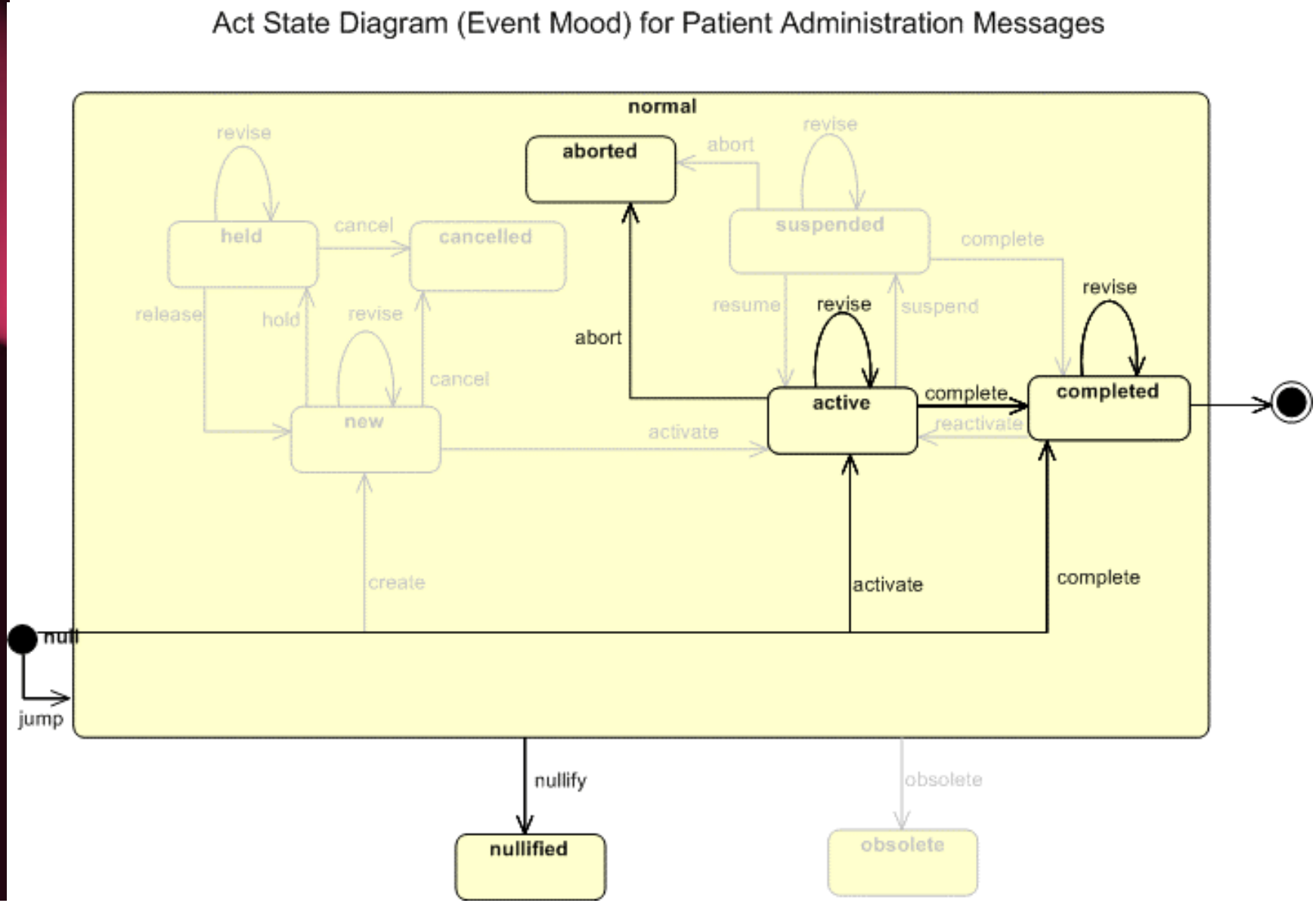
Structured Name: *Person Activate Notification*
Type: *State-transition based*
State Transition: *IdentifiedPerson (PRPA_RM101001)*

The Add New Person trigger event signals that a new person was added to a person registry.

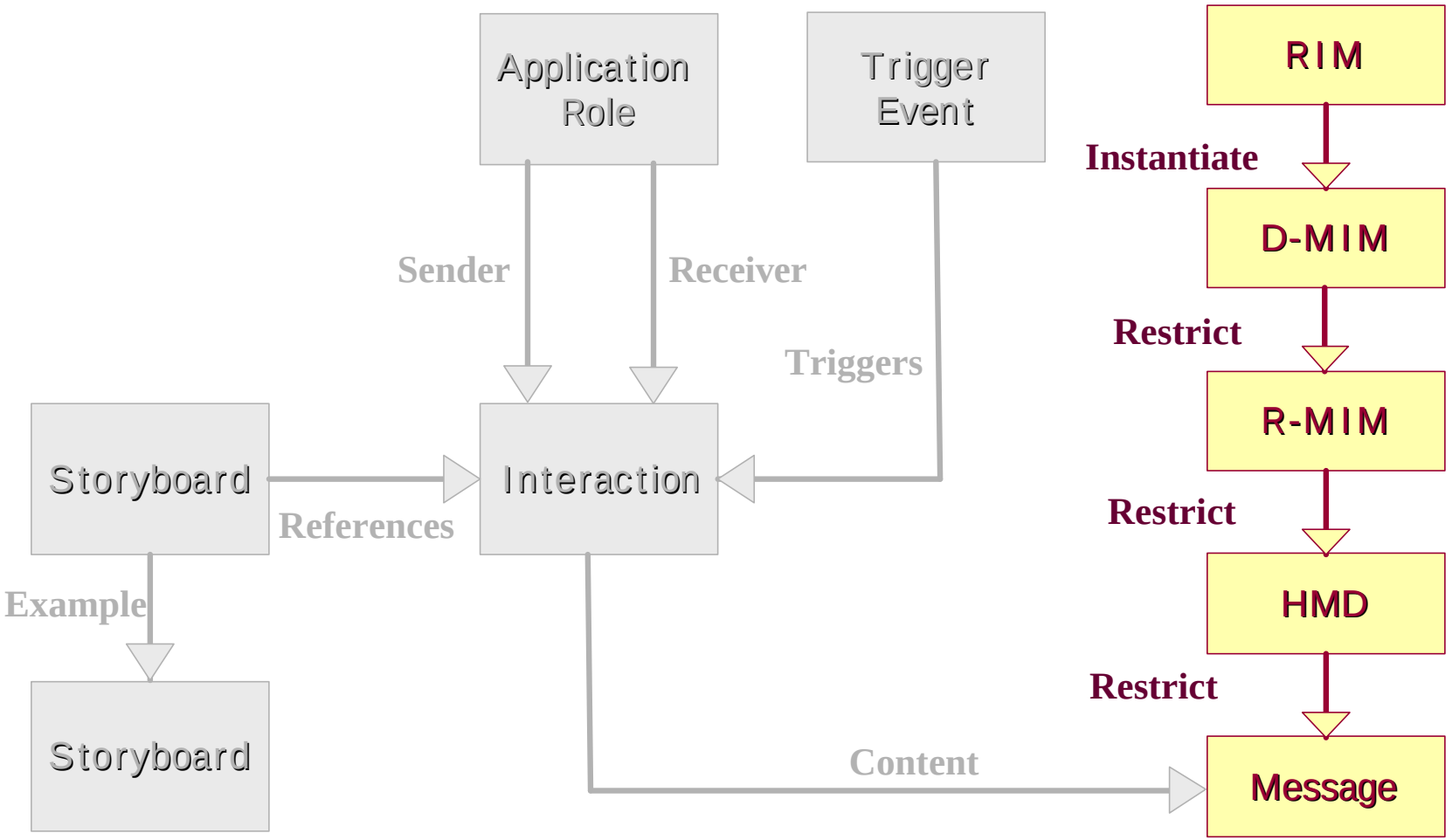
V2 Reference

The Add New Person trigger event is most closely aligned with the HL7 2.4 ADT^A28 - add person or patient information. However, in v3 person level providers with an ongoing relationship are reported in patient rather than person messages.

State Transition Trigger Events

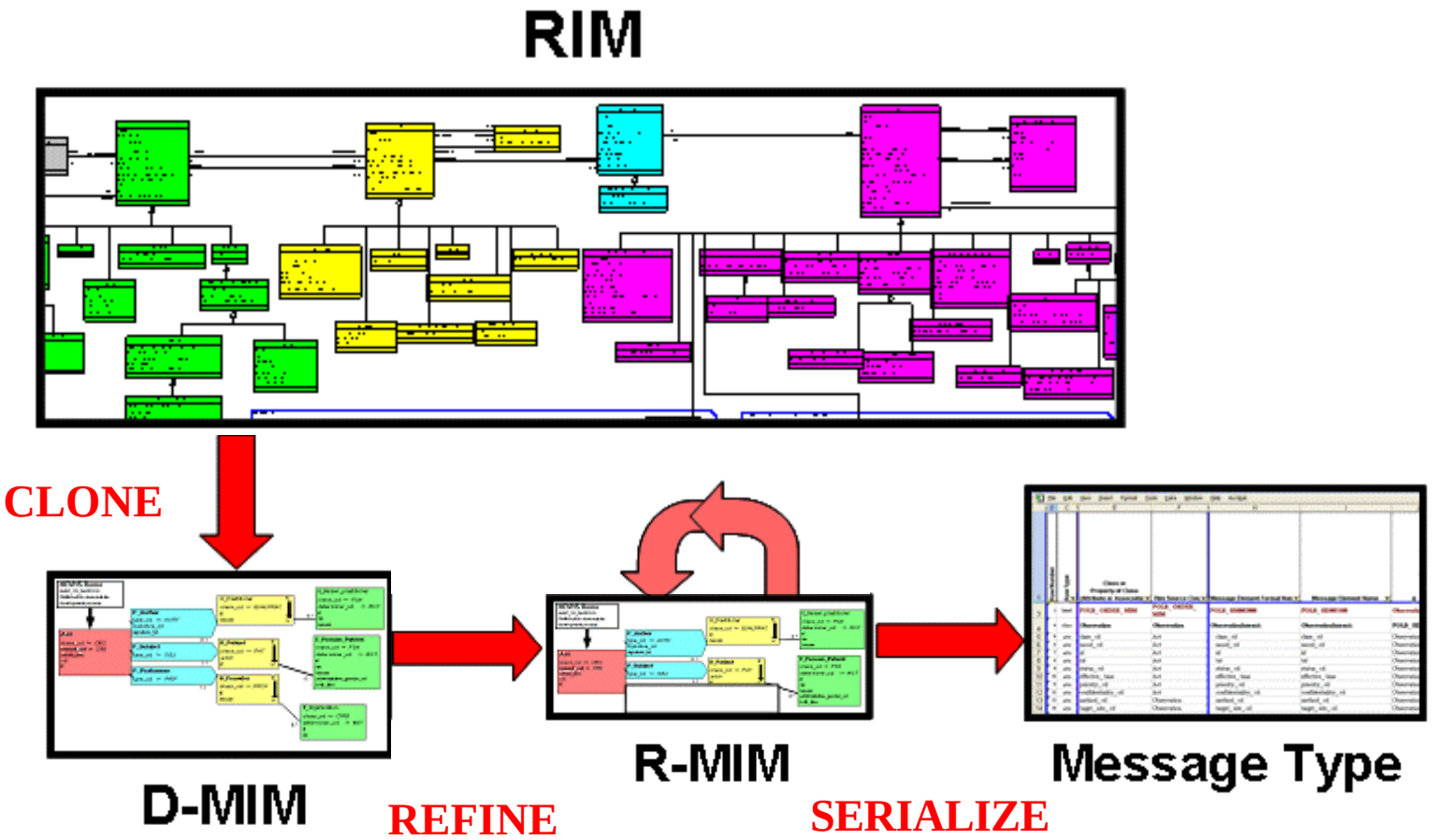


Methodology Key Concepts



RIM to Message Type

HL7 v3 Methodology - Models



Credit: HL7, Woody Beeler

Domain Information Models

Diagrammatical representation of the domain's information requirements.

1.3 Domain Message Information Models

Domain Table of Contents

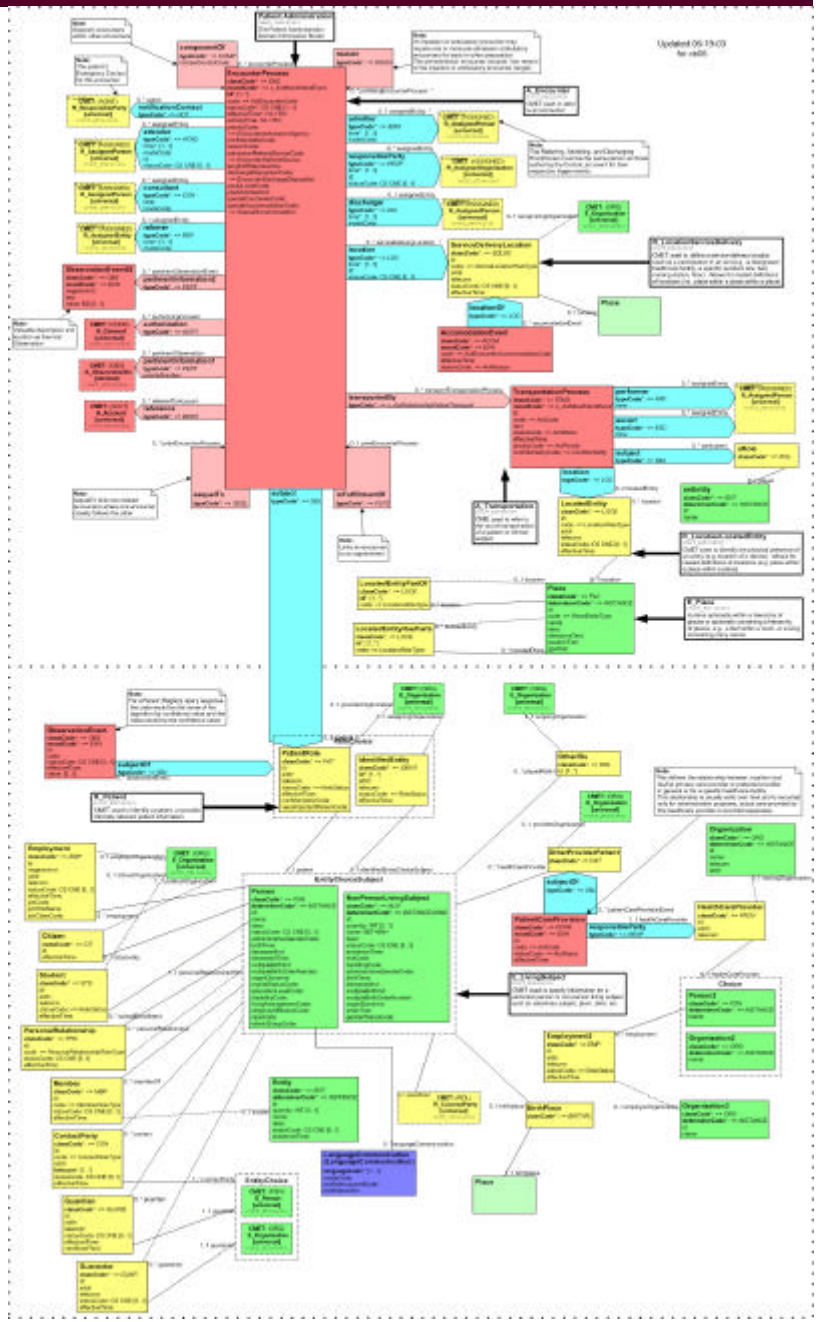
Patient Administration (PRPA_DM000000)

Description

Domain Message Information Model (D-MIM)

The Patient Administration D-MIM is a refined subset of the HL7 Reference Information Model (RIM) that includes the set of class clones, attributes and relationships used to create messages for the Patient Administration domain.

The D-MIM is further refined into a collection of Refined Message Information Models (R-MIM) that define the information content for sets of messages.

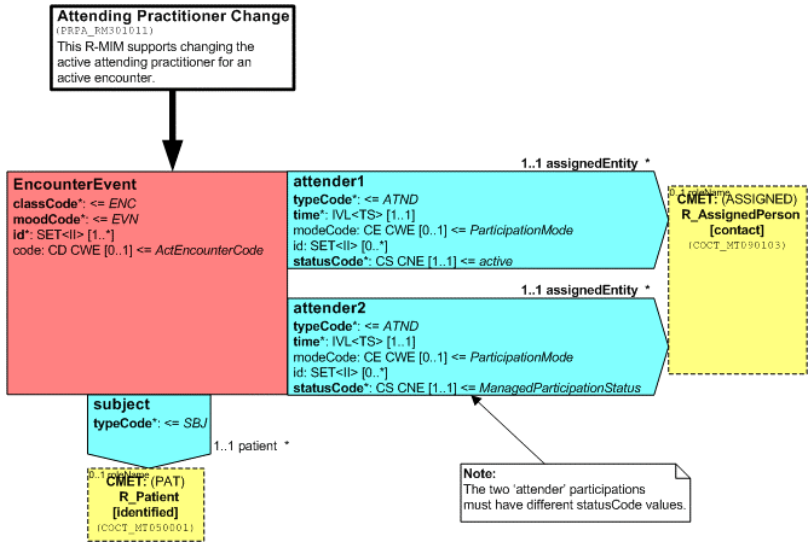


Message Type Development

- The steps from the RIM to the MT introduce:
  - Cloning
    - The copying of core classes from the RIM to represent each concept. For example, an Entity for the patient, another for the physician.
  - Constraining
    - Restricting the vocabulary, cardinality and relationships. Each step towards the MT constrains further the artifact above.

Reference Information Models

- Diagrammatical representation of the message information.
- A sub-set of the DMIM



2.4.6 Attending Practitioner (PRPA_RM301001)

Description

Parent: *Patient Administration (PRPA_DM000000)*

PRPA_RM301001 - Attending Practitioner R-MIM

This R-MIM defines content for state transition notification messages from systems that do not include attending practitioner participation in patient encounter messages.

EncounterEvent

The entry point to the Attending Practitioner R-MIM is the focal encounter, *EncounterEvent*. The R-MIM assumes attending practitioner messages would be exchanged between closely coupled systems so only *EncounterEvent.id* and the *subject* association to *R_Patient [identified]* CMET are sent about the encounter.

attender

The *attender* class describes the attending practitioner participation of a practitioner who is sent in an *R_AssignedPerson* CMET. The *statusCode* and *time* attributes are mandatory. The *time* attribute requires a starting time for an "active" participation and both starting and ending times for a "completed" participation. For a "nullify" message the *time* would be the time reported in the record that was nullified.

VISIO Diagrams Purpose

- Allows visual representation of data structures that makes content clearer
- Visual representation of R-MIM attribute and association properties (cardinality, mandatory, etc.)
- Simplify the design and development process for R-MIMs and D-MIMs
- Allow checking of the designed model against the RIM
- Allow saving of R-MIMs into the RoseTree repository
- Allow validation of Visio R-MIMs against repository R-MIMs
- Allow creation of HTML output

Hierarchical Message Descriptors

- HMD specifies the order and constraints of particular set of attributes and relationships drawn from the RIM classes of interest with each unique pattern of attributes and relationships made explicit as "cloned" classes.
- Includes a “common message” that has least strict constraints.

2.5.2 Patient (PRPA_HD201001)

Description

The Patient HMD defines content for state transition notification messages for patient registries that link to separate person registries.

Common Message Element Types Used In This Domain

E_OrganizationContact	COCT_MT150003
E_OrganizationIdentified/confirmable	COCT_MT150002
E_PersonIdentified/confirmable	COCT_MT030202
E_PlaceUniversal	COCT_MT710000
R_CoveredPartyUniversal	COCT_MT500000

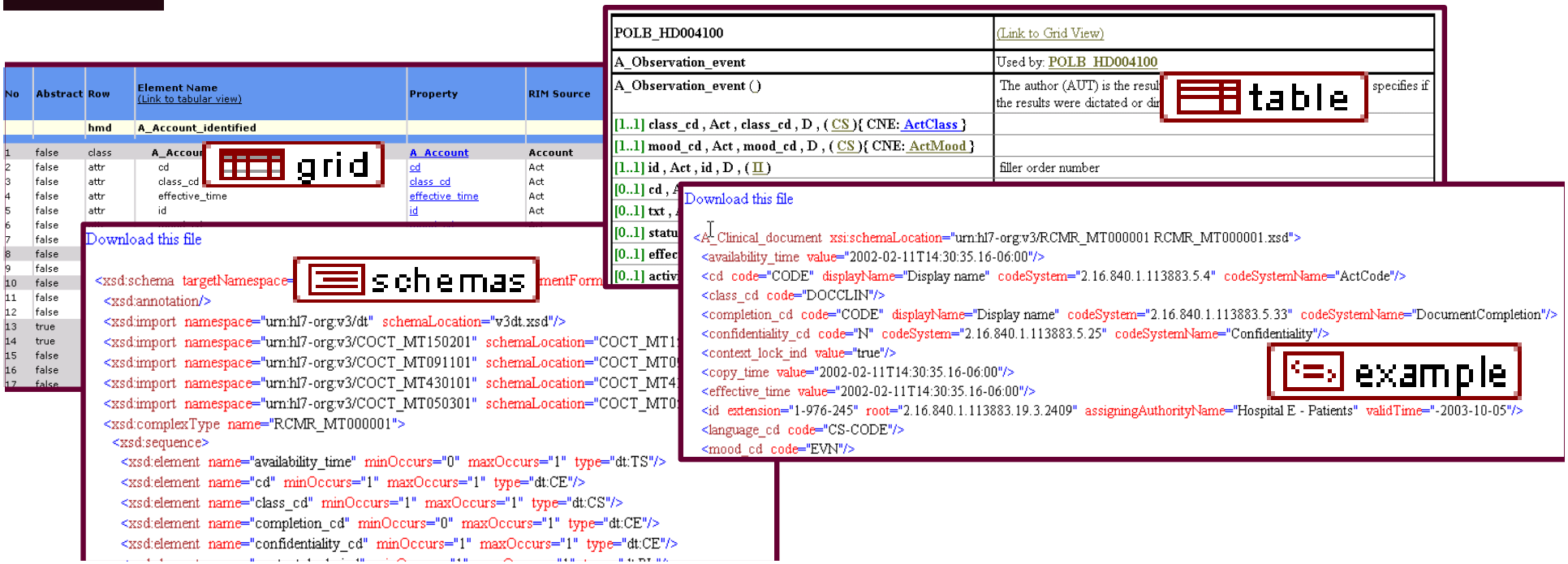
Base Hierarchical Message Description

Message Type List

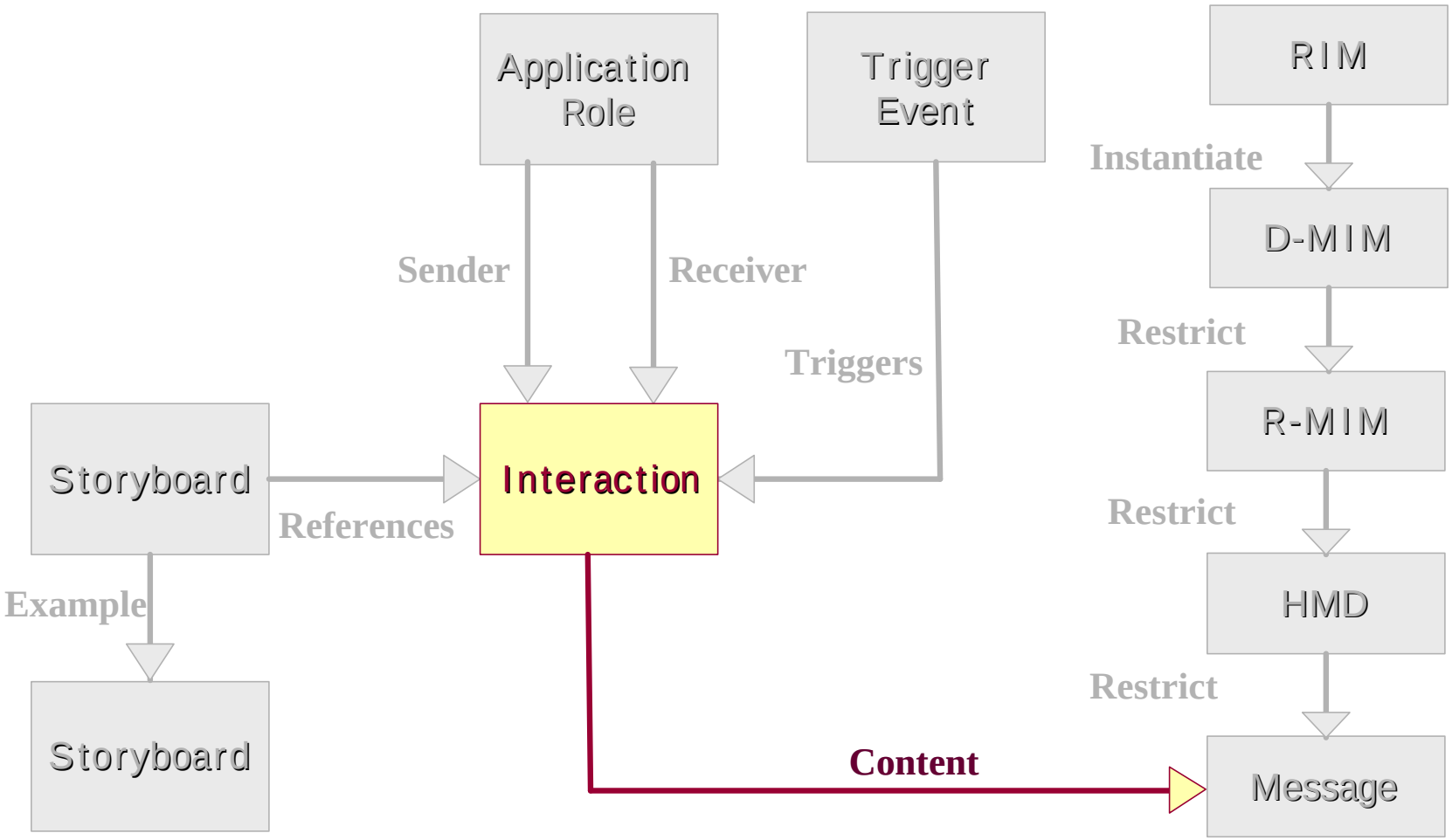
Patient Activate	PRPA_MT201001	
Patient Nullify	PRPA_MT201003	
Patient Revise	PRPA_MT201002	

Message Types

- Each Message Type can specify different patterns of constraints for the same set of attributes as long as the constraints are at least as strict as those prescribed in the common message for the HMD.
- Constraints may be stricter (or "tighter") than the common message. This allows a single HMD to satisfy the needs of a number of related interactions.



Methodology Key Concepts



Interactions

- An interaction is a single, one-way transfer of information.
- An association between a specific information transfer, a trigger event that initiates or triggers the interaction, and the roles that send and receive the interaction.

2.6.1 New Person Added (PRPA_IN101001)

Description

Structured Name: Person Activate Notification

The PRPA_IN101001 *Person Activate Notification* occurs when a new person is added to a person registry. The *Person Activation Informer* sends a complete person record to all *Person Activation Trackers*.

Sending Role	Person Activation Informer	PRPA_AR101003
Receiving Role	Person Activation Tracker	PRPA_AR101004
Trigger Event	Person Activate Notification	PRPA_TE101001
Transmission Wrapper	Send Message Payload	MCCI_MT000100
Control Act Wrapper	Registry - role target	MFMI_MT700701
Message Type	Person Activate	PRPA_MT101001

Interaction Support Information

- Interaction Type
  - Query
  - Query Response
  - Event Notification
  - Request for Action
  - Request Response – Accept
  - Request Response – Refuse
  - Un-triggered notification
- Wrapper Type Class
  - Acknowledgment
  - Initial message
  - Query
  - Query response

Receiver Responsibilities

- An interaction may have many receiver responsibilities associated with it.
- Receiver responsibility may be:
  - New interaction(s)
  - New trigger event(s)
- Each Responsibility is mutually exclusive and is described with a narrative ‘Reason’.

Receiver Responsibilities

Reason	Trigger Event	Interaction
Fulfiller confirms the occurrence order using this general confirmation.	POLB_TE003131	POLB_IN003131
Fulfiller rejects the occurrence order.	POLB_TE002141	POLB_IN002143

Interaction Indexes

5.3 Interaction Indexes

Domain Table of Contents

5.3.1 Interaction Index by Application Role

Person Revision Informer (PRPA_AR101005)

Interactions in which this application role is the sender:

Person Revise Notification	PRPA_IN101002

5.3.2 Interaction Index by Trigger Event

Person Activate Notification (PRPA_TE101001)

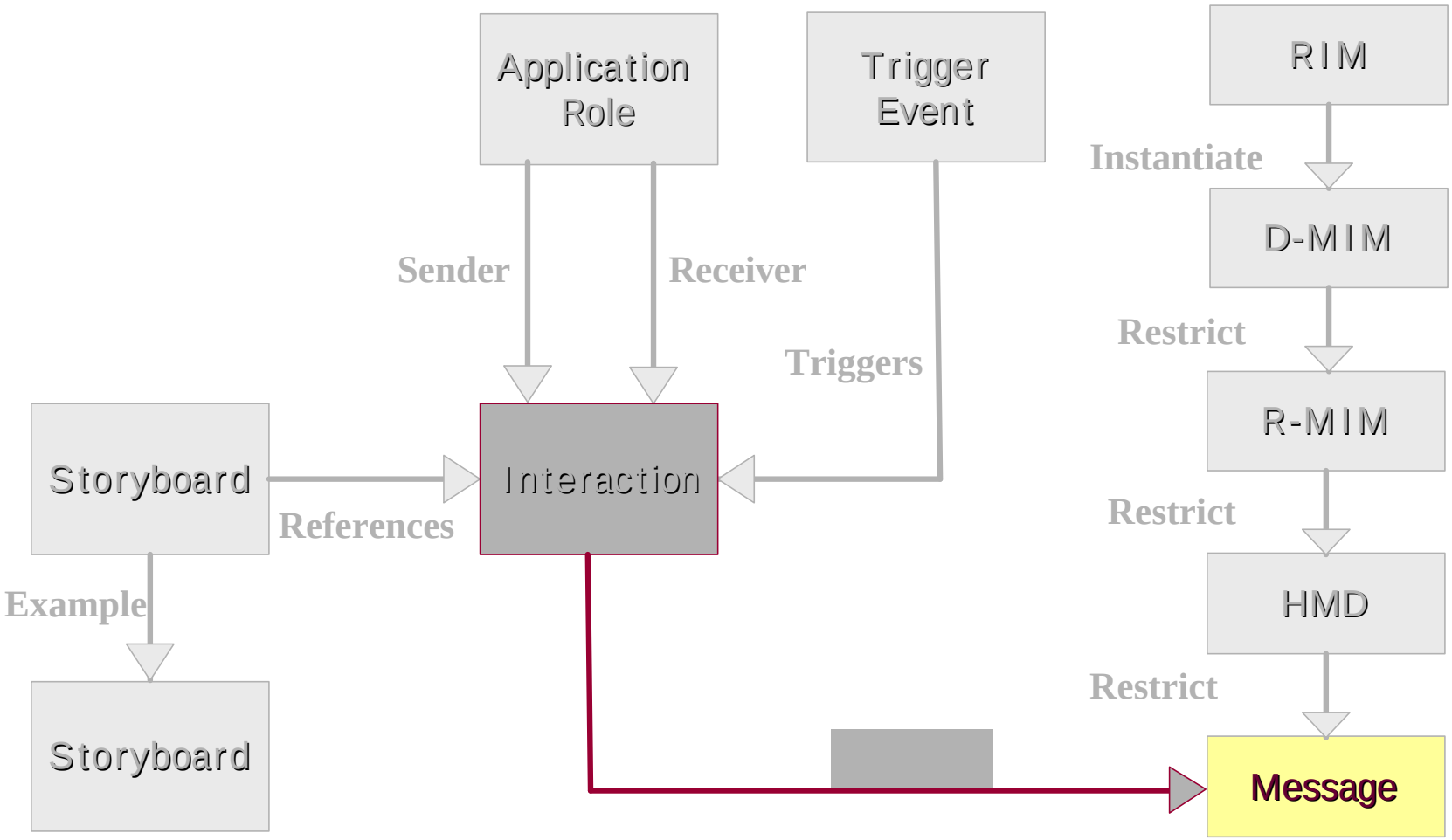
Person Activate Notification	PRPA_IN101001

5.3.3 Interaction Index by Message Type

Person Activate (PRPA_MT101001)

Person Activate Notification	PRPA_IN101001

Methodology Key Concepts



Localization

- Optionality
  - Barrier to interoperability in V2
  - Methods for dealing with it in V3
  - But haven’t done away with the need for it!
- Localization
  - Realms (e.g. Canada) are to approve ‘realm specific’ needs for code sets, vocabularies and other constraints or refinements of HL7 V3 artifacts
- Process
  - Members propose items for localization
  - HL7 Canada Technical Committees review the proposal and recommend it for approval
  - HL7 Canada Secretariat holds an open ballot
  - If approved, it is localized for Canada
- Key point:
  - If an implementer skips this step or doesn’t use the HL7 Canada localized artifact, they are not V3 conformant!

Example XML Message Instance

- XML Message Instance for a lab order

Downloads and Known Issues

Dear Member,

Welcome to the Version 3 Ballot Package Download Page. Here you can download various parts, or even all, of the ballot package web site.

What is in a Download?

The ballot package includes several documents. To facilitate faster downloading, the ballot package has been broken into several smaller downloads. To ensure that most of the hyperlinks work, all download packages include the reference and help documents:

Need Help?

Advice on Downloads
Advice on Installation

HL7 Version 3.0 Known Issues

1. **PDF:** Although the documentation states that the V3.0 ballot will be available in PDF format for printing resource limitations during the development of the publication resulted in this not being achieved. It is still the intent of HL7 to produce the ballot in PDF format; however, this will not be included in this ballot cycle. To aleviate the problem the HTML representation has been split into smaller documents so that each can be individually printed using the browser print functionality. The publishing committee is actively seeking volunteers to assist in the development of a PDF rendition; please contact Karen VanHentenryck if you are available to help.

2. **XML ITS:** The XML ITS Documentation is not complete and includes only the Data Types specification portion. This document is still under development within the Control/Query Techical Committee and XML Special Interest Group. Please contact the co-chairs of these committees for further information on the

Reporting Issues or Comments

When reporting on an issue that is not listed on the web page, here please email the Publishing Committee Support.

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CANADA

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