HL7Clinical Document Architecture:
Introduction to HL7 RIM and Data Types

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Outline

- Inside a CDA document
- Implementation Guide
- Reference Information Model (RIM)
  - RIM Classes
  - Backbone (6 cores)
- HL7 Data Types Overview
- FHIR

Basic Structure

Clinical Document

Header

Body

Non-XML Body

Clinical Document

Header

Non XML Body

Text

Non-XML data

Structure Body with Narrative

Clinical Document
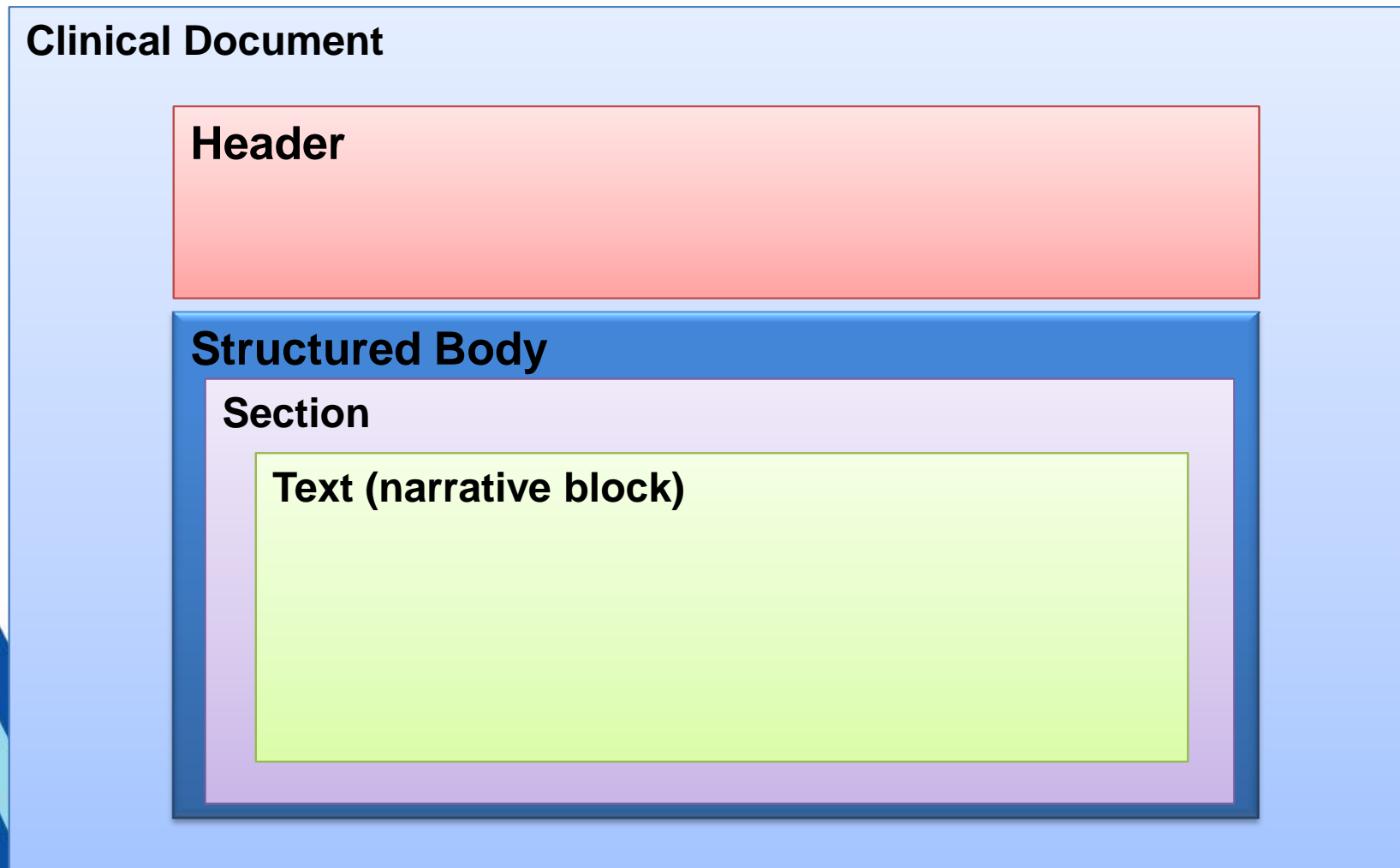
> **Header**
>
> **Structured Body**
>> **Section**
>>> **Text (narrative block)**

Structure Body Add coded entries

Clinical Document

Header

Structured Body

Section

Text (narrative)

Entries (coded data)

Building blocks for more structure

Clinical Document

Header

Structured Body

Section

Text (narrative)

Entries (coded data)

Section

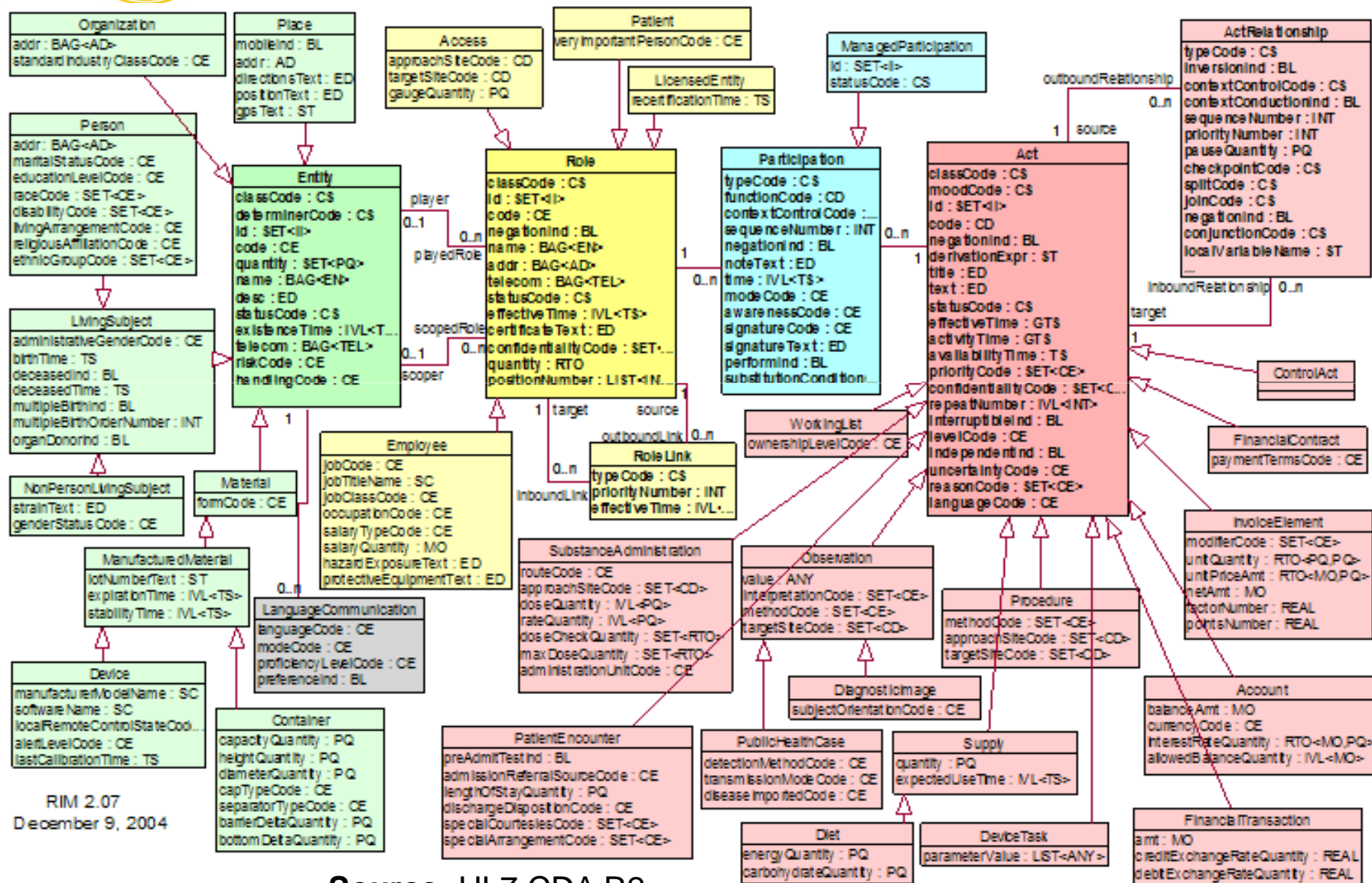Text (narrative)

Entries (coded data)

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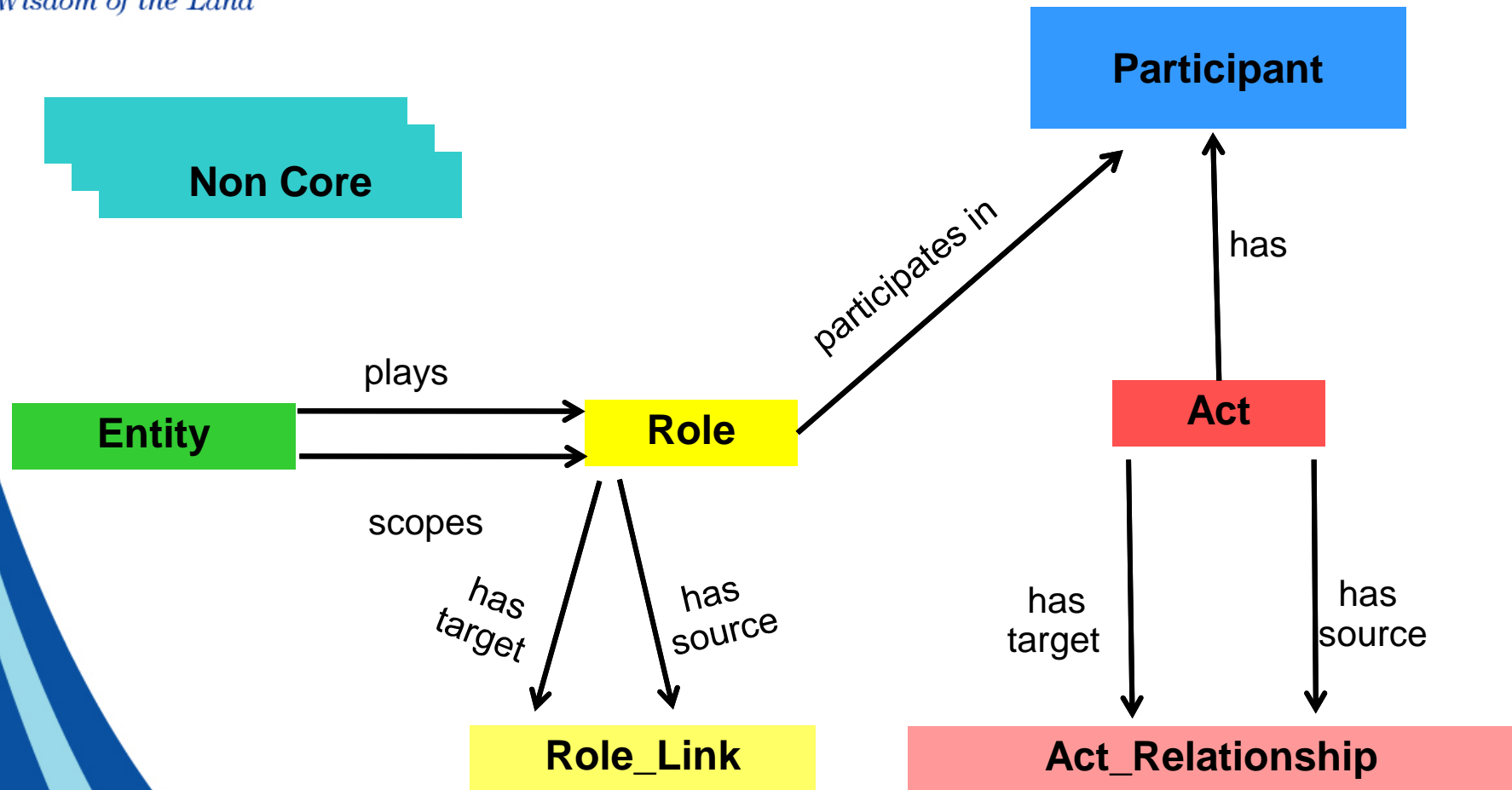
Source: HL7 CDA R2

Class	Description
Entity	which represents the physical things and beings that are of interest to, and take part in health care
Role	which establishes the roles that entities play as they participate in health care acts
Participation	which expresses the context for an act in terms such as who performed it, for whom it was done, where it was done
Act	which represents the *actions* that are executed and *must be* documented as health care is managed and provided
RoleLink	which represents relationships between individual roles
ActRelationship	which represents the binding of one act to another, such as the relationship between an order for an observation and the observation event as it occurs

RIM Classes

RIM UML Instance Scenario
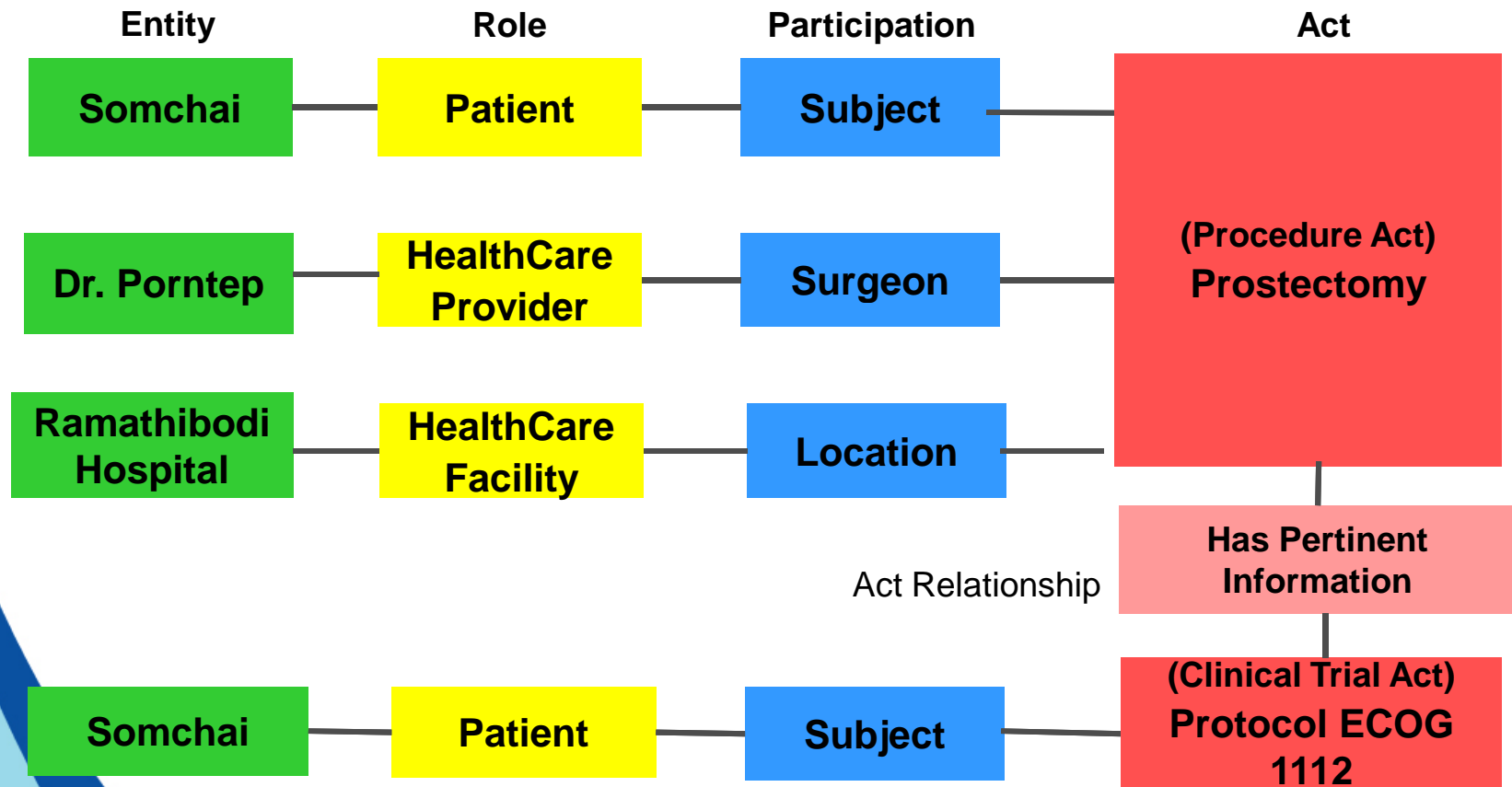
Entity	Role	Participation	Act
Somchai	Patient	Subject	(Procedure Act) Prostectomy
Dr. Porntep	HealthCare Provider	Surgeon	
Ramathibodi Hospital	HealthCare Facility	Location	

Act Relationship — Has Pertinent Information

Entity	Role	Participation	Act
Somchai	Patient	Subject	(Clinical Trial Act) Protocol ECOG 1112

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Associations between Roles and Entities: "Played and Scoped"

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Siriraj Hospital
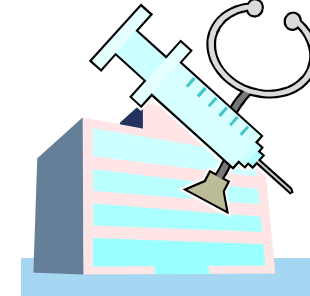
Mr. Somchai

Scoped By

Scoped By

Doctor

Plays

Plays

Patient

RIM Backbone Class: Entity

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Entity
classCode : CS
determinerCode : CS
id : SET<II>
code : CE
quantity : SET<PQ>
name : BAG<EN>
desc : ED
statusCode : SET<CS>
existenceTime : IVL<TS>
telecom : BAG<TEL>
riskCode : CE
handlingCode : CE

- **Entity:**
  - A person, animal, organization or thing
  - A collection of classes related to the Entity class, its specializations and related qualifying classes. The classes represent health care stakeholders and other things of interest to health care.

- **Entity has the following sub-classes:**
  - Container
  - Device
  - LanguageCommunication
  - LivingSubject
  - ManufacturedMaterial
  - Material
  - NonPersonLivingSubject
  - Organization
  - Person
  - Place

RIM Backbone Class: Role

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Participation
classCode : CS
id : SET<II>
code : CE
negationInd : BL
addr : BAG<AD>
telecom : BAG<TEL>
statusCode : SET<CS>
effectiveTime : IVL<TS>
certificateText : ED
quantity : RTO
positionNumber : LIST<INT>

- **Roles:**
  - A responsibility or part played by an entity (e.g. Person in a role of patient, employee, etc.) –different faces of an Entity
  - A collection of classes related to the Role class and its specializations. These classes focus on the roles participants may play in health care.

- **Role has the following sub-classes:**
  - Access
  - Employee
  - LicensedEntity
  - Patient
  - Health Care Provider
  - Member

RIM Backbone Class: Participation

Participation

---

typeCode : CS
functionCode : CD
contextControlCode : CS
sequenceNumber : INT
negationInd : BL
noteText : ED
time : IVL<TS>
modeCode : CE
awarenessCode : CE
signatureCode : CE

signatureText : ED
performInd : BL
substitutionConditionCode : CE

- **Participation:**
  - An association between an Act and a Role with an Entity playing that Role.

- **Participation has the following sub-class:**
  - ManagedParticipation

RIM Backbone Class: Act

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Act
classCode : CS
moodCode : CS
id : SET<II>
code : CD
negationInd : BL
derivationExpr : ST
text : ED
title : ST
statusCode : SET<CS>
effectiveTime : GTS
activityTime : GTS
availabilityTime : TS
priorityCode : SET<CE>
confidentialityCode : SET<CE>
repeatNumber : IVL<INT>
interruptibleInd : BL
levelCode : CE
independentInd : BL
uncertaintyCode : CE
reasonCode : SET<CE>
languageCode : CE

- **Act:** A collection of classes including the Act class and its specializations. These relate to the actions and events that constitute health care services. A record of something that is being done, has been done, can be done, or is intended or requested to be done.

- **Act has the following sub-classes:**
  - Account
  - ControlAct
  - DeviceTask
  - DiagnosticImage
  - Diet
  - FinancialContract
  - *FinancialTransaction*
  - InvoiceElement
  - Observation
  - Participation
  - PatientEncounter
  - Procedure
  - PublicHealthCase
  - SubstanceAdministration
  - Supply
  - WorkingList

☐ Note: Sub-classes also include Core Infrastructure, Message Communications Control and Structured Documents classes not shown here.

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HL7 Data Types Overview

- Symbols:
  - BL
  - ST
  - INT
  - II
  - TEL
  - CS
  - CE
  - ED
  - EN
  - PQ
  - TS
  - SET
  - BAG
  - IVL

Example
HL7 v3 Data Types

Symbol	II
Name	Instance Identifier
Description	An identifier that uniquely identifies a thing or object. Examples are object identifier for HL7 RIM objects, medical record number, order id, service catalog item id, Vehicle Identification Number (VIN), etc. Instance identifiers are defined based on ISO object identifiers.

Example
HL7 v3 Data Types

Symbol	TEL
Name	Telecommunication Address
Description	A telephone number (voice or fax), e-mail address, or other locator for a resource mediated by telecommunication equipment. The address is specified as a Universal Resource Locator (URL) qualified by time specification and use codes that help deciding which address to use for a given time and purpose.

Example
HL7 v3 Data Types

Symbol	CS
Name	Coded Simple Value
Description	Coded data in its simplest form, where only the code and display name is not predetermined. The code system and code system version is fixed by the context in which the CS value occurs. CS is used for coded attributes that have a single HL7-defined value set.

Example
HL7 v3 Data Types

Symbol	CE
Name	Coded With Equivalents
Description	Coded data that consists of a coded value (CV) and, optionally, coded value(s) from other coding systems that identify the same concept. Used when alternative codes may exist.

Example
HL7 v3 Data Types

Symbol	ED
Name	Encapsulated Data
Description	Data that is primarily intended for human interpretation or for further machine processing outside the scope of HL7. This includes unformatted or formatted written language, multimedia data, or structured information in as defined by a different standard (e.g., XML-signatures.) Instead of the data itself, an ED may contain only a reference. Note that the ST data type is a specialization of the ED data type when the ED media type is text/plain.

Example
HL7 v3 Data Types

Symbol	EN
Name	Entity Name
Description	A name for a person, organization, place or thing. A sequence of name parts, such as first name or family name, prefix, suffix, etc. Examples for entity name values are "Jim Bob Walton, Jr.", "Health Level Seven, Inc.", "Lake Tahoe", etc. An entity name may be as simple as a character string or may consist of several entity name parts, such as, "Jim", "Bob", "Walton", and "Jr.", "Health Level Seven" and "Inc.", "Lake" and "Tahoe".

Example
HL7 v3 Data Types

Symbol	PQ
Name	Physical Quantity
Description	A dimensioned quantity expressing the result of measuring.

Example
HL7 v3 Data Types

Symbol	TS
Name	Point in Time
Description	A quantity specifying a point on the axis of natural time. A point in time is most often represented as a calendar expression.

Example
HL7 v3 Data Types

Symbol	SET
Name	Set
Description	A value that contains other distinct values in no particular order.

Example
HL7 v3 Data Types

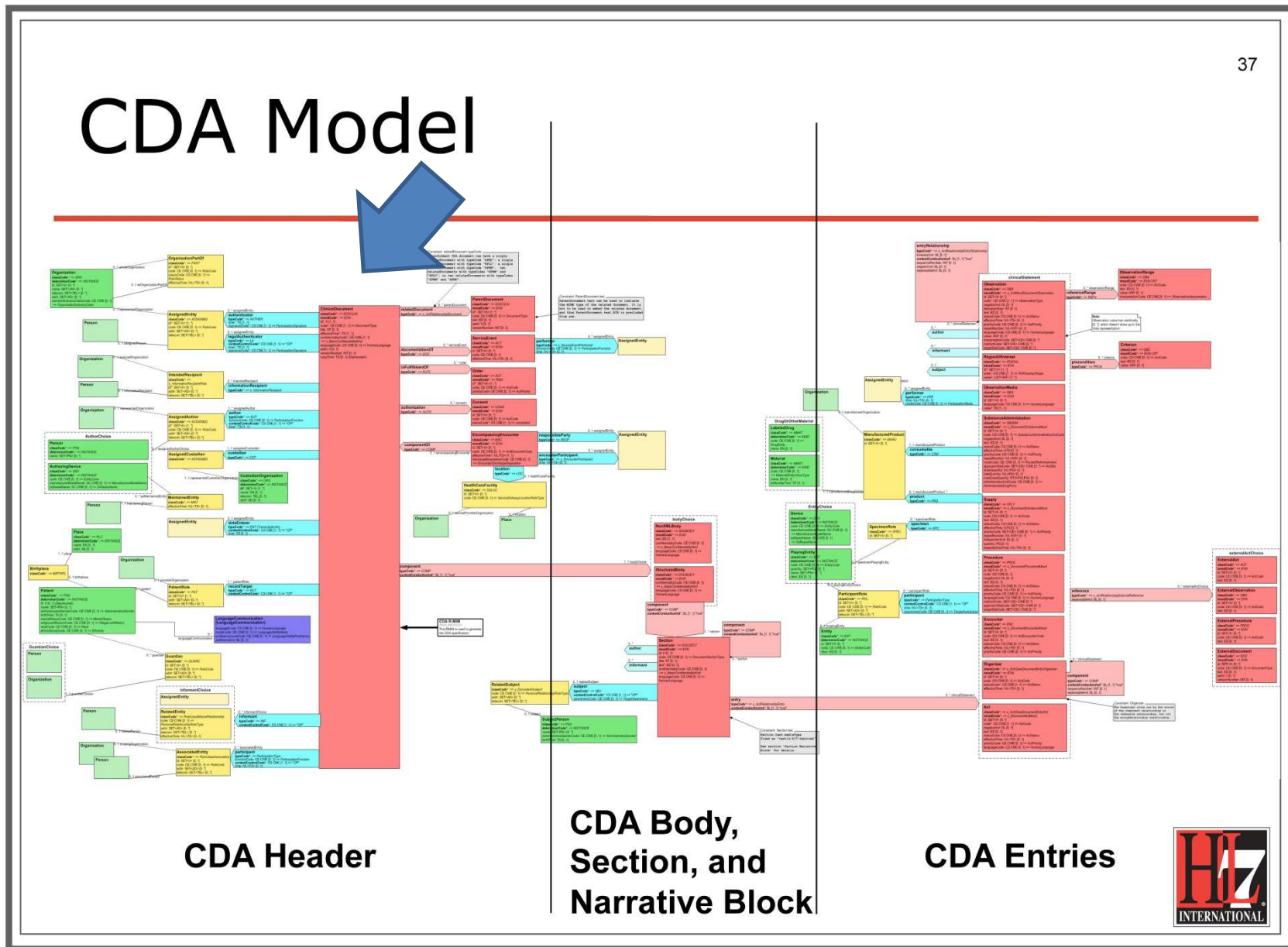| Symbol	BAG
Name	Bag
Description	An unordered collection of values, where each value can be contained more than once in the bag, i.e., {a,a,b,c}

Example
HL7 v3 Data Types

Symbol	IVL
Name	Interval
Description	A set of consecutive values of an ordered base data type

CDA Model

CDA Header

CDA Body, Section, and Narrative Block

CDA Entries

Source: From "What is CDA R2? by Calvin E. Beebe at HL7 Educational Summit in July 2012

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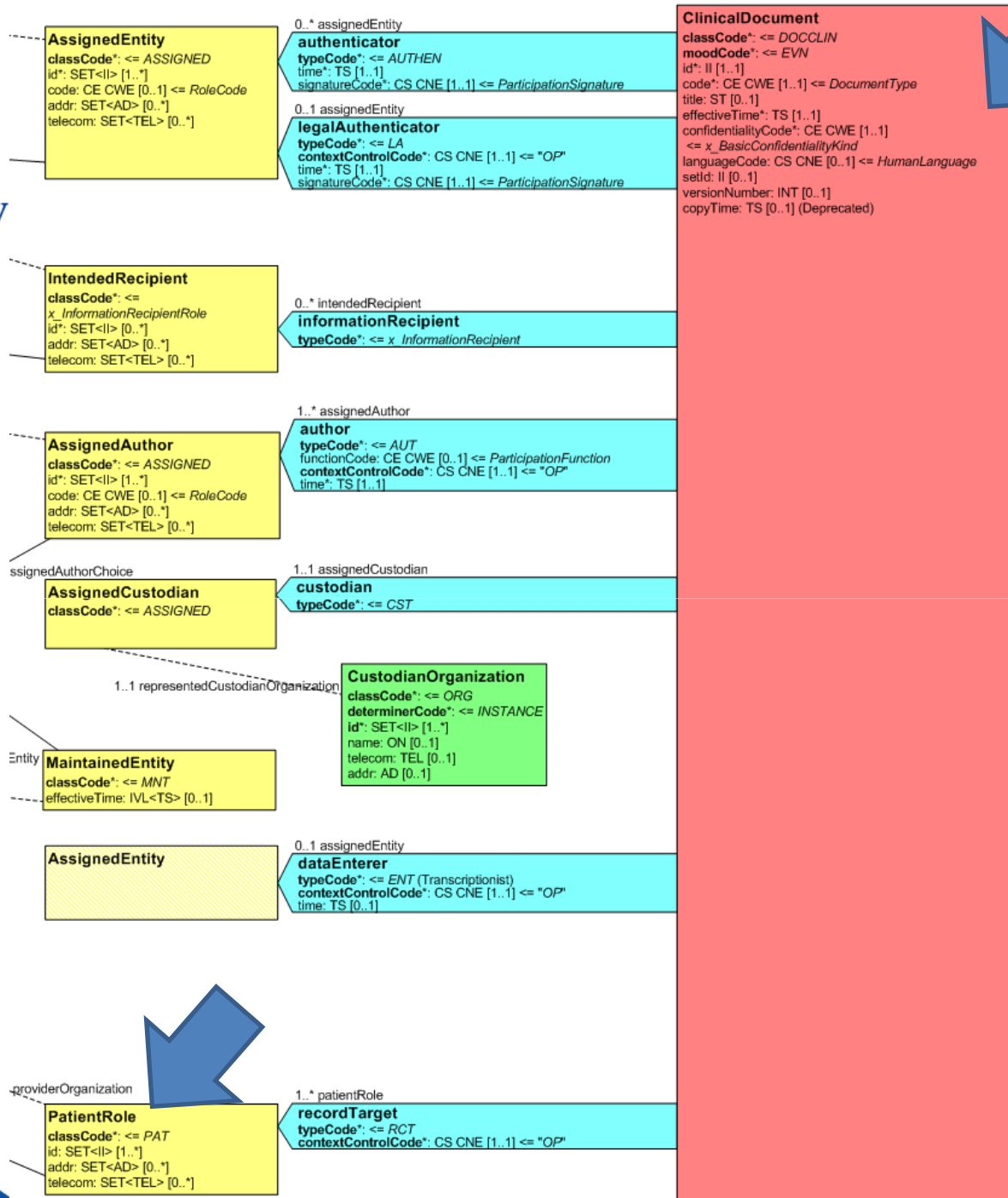
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```xml
1  <?xml version="1.0"?>
2  <?xml-stylesheet type="text/xsl" href="CDA.xsl"?>
3  <!--
4  Readers should be aware of the evolving "Using SNOMED CT in HL7 Version 3" implementation guide, currently in a draft state.
   The guide, co-developed by HL7 and the College of American Pathologists, will be balloted by HL7 as an Informative Document.
   Recommendations in the final published guide should usurp patterns of SNOMED CT usage found in this sample instance.
5  -->
6  <ClinicalDocument xmlns="urn:hl7-org:v3" xmlns:voc="urn:hl7-org:v3/voc" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
   xsi:schemaLocation="urn:hl7-org:v3 CDA.xsd">
7      <!--
8  ********************************************************
9    CDA Header
10 ********************************************************
11 -->
12     <typeId root="2.16.840.1.113883.1.3" extension="POCD_HD000040"/>
13     <templateId root="2.16.840.1.113883.3.27.1776"/>
14     <id extension="c266" root="2.16.840.1.113883.19.4"/>
15     <code code="11488-4" codeSystem="2.16.840.1.113883.6.1" codeSystemName="LOINC" displayName="Consultation note"/>
16     <title>Good Health Clinic Consultation Note</title>
17     <effectiveTime value="20000407"/>
18     <confidentialityCode code="N" codeSystem="2.16.840.1.113883.5.25"/>
19     <languageCode code="en-US"/>
20     <setId extension="BB35" root="2.16.840.1.113883.19.7"/>
21     <versionNumber value="2"/>
22     <recordTarget>
23         <patientRole>
24             <id extension="12345" root="2.16.840.1.113883.19.5"/>
25             <patient>
26                 <name>
27                     <given>Henry</given>
28                     <family>Levin</family>
29                     <suffix>the 7th</suffix>
30                 </name>
31                 <administrativeGenderCode code="M" codeSystem="2.16.840.1.113883.5.1"/>
32                 <birthTime value="19320924"/>
33             </patient>
34             <providerOrganization>
35                 <id root="2.16.840.1.113883.19.5"/>
36             </providerOrganization>
37         </patientRole>
38     </recordTarget>
```

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OID (Object Identifier)

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No	Element Name	Rim Source	of Message Element Type
	CDA (POCD_HD000040) Hierarchical Description		
	ClinicalDocument	Document	ClinicalDocument
1	typeId	InfrastructureRoot	II
2	classCode	Act	CS
3	moodCode	Act	CS
4	id	Act	II
5	code	Act	CE
6	title	Act	ST
7	effectiveTime	Act	TS
8	confidentialityCode	Act	CE
9	languageCode	Act	CS
10	setId	ContextStructure	II
11	versionNumber	ContextStructure	INT
12	copyTime	Document	TS
13	**recordTarget**	Act	SET<RecordTarget>
14	typeCode	Participation	CS
15	contextControlCode	Participation	CS
16	**patientRole**	Participation	PatientRole
17	classCode	Role	CS
18	id	Role	SET<II>
19	addr	Role	SET<AD>
20	telecom	Role	SET<TEL>
21	**patient**	Role	Patient
22	classCode	Entity	CS
23	determinerCode	Entity	CS
24	id	Entity	II
25	name	Entity	SET<PN>
26	administrativeGenderCode	LivingSubject	CE
27	birthTime	LivingSubject	TS
28	maritalStatusCode	Person	CE
29	religiousAffiliationCode	Person	CE
30	raceCode	Person	CE
31	ethnicGroupCode	Person	CE

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FHIR

FHIR Background

- HL7 v2 around since 1981
- HL7 v3 about 10 years old : poor adoption except CDA
- FHIR grew out of frustration with v3
  - too hard for implementers (More for modellers)
  - too long to develop
  - CDA good, but documents not enough
- Mobile needs simple technology
- Take all good ideas from v2/v3/CDA

FHIR - Overview

- **F**ast **H**ealthcare **I**nteroperability **R**esources
- FHIR can be used as a stand-alone data exchange standard
- FHIR will also be used in partnership with existing widely used

Why FHIR?

- V3 is too hard (But you can't throw away)
  - Couldn't do FHIR if we hadn't done v3 first
- Documents (CDA) aren't enough
- V2 needs a transition path
- There are new markets and HL7 needs
- The world has evolved

Credit: Slideshare > Health Informatic New Zealand, Jun 22, 2012

Scope of FHIR

- ## All aspects of healthcare interoperability
  - Within a facility
  - Between facility
  - Mobile

- ## Different 'modalities'
  - On-line(REST)
  - Messaging
  - Documents
  - Services
  - XDS(Cross-Enterprise Document Sharing)

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Q & A