Lecture Notes

Big Data in Medical Informatics

Week 7: Semantic Interoperability

HL7 v3

Reference Information Model (RIM)

Clinical Document Architecture

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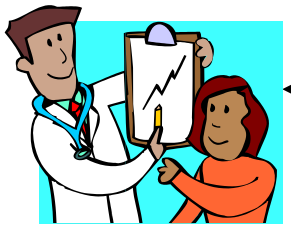
HL7 v3 and RIM Model

Electronic Health Information Exchange



Physicians

Referral Process

Eligibility

Claim/Status

Claims/Prescriptions

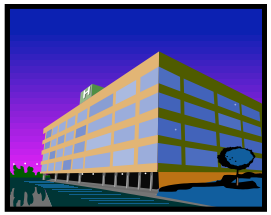
Pharmacies

Eligibility

Claim Status

Referral Process

Payors



Hospitals

Medical Records

Patient Data

Lab results

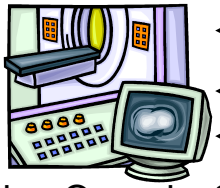
Public Health

Medical Society

Family Planning

Mental Health

County/Community Entities



Testing Organizations Lab/Images

Orders

Results

Images

Government Medicare/Medicaid

Insurance Updates

Health Information

Patients/Consumers

Enrollment

Employers

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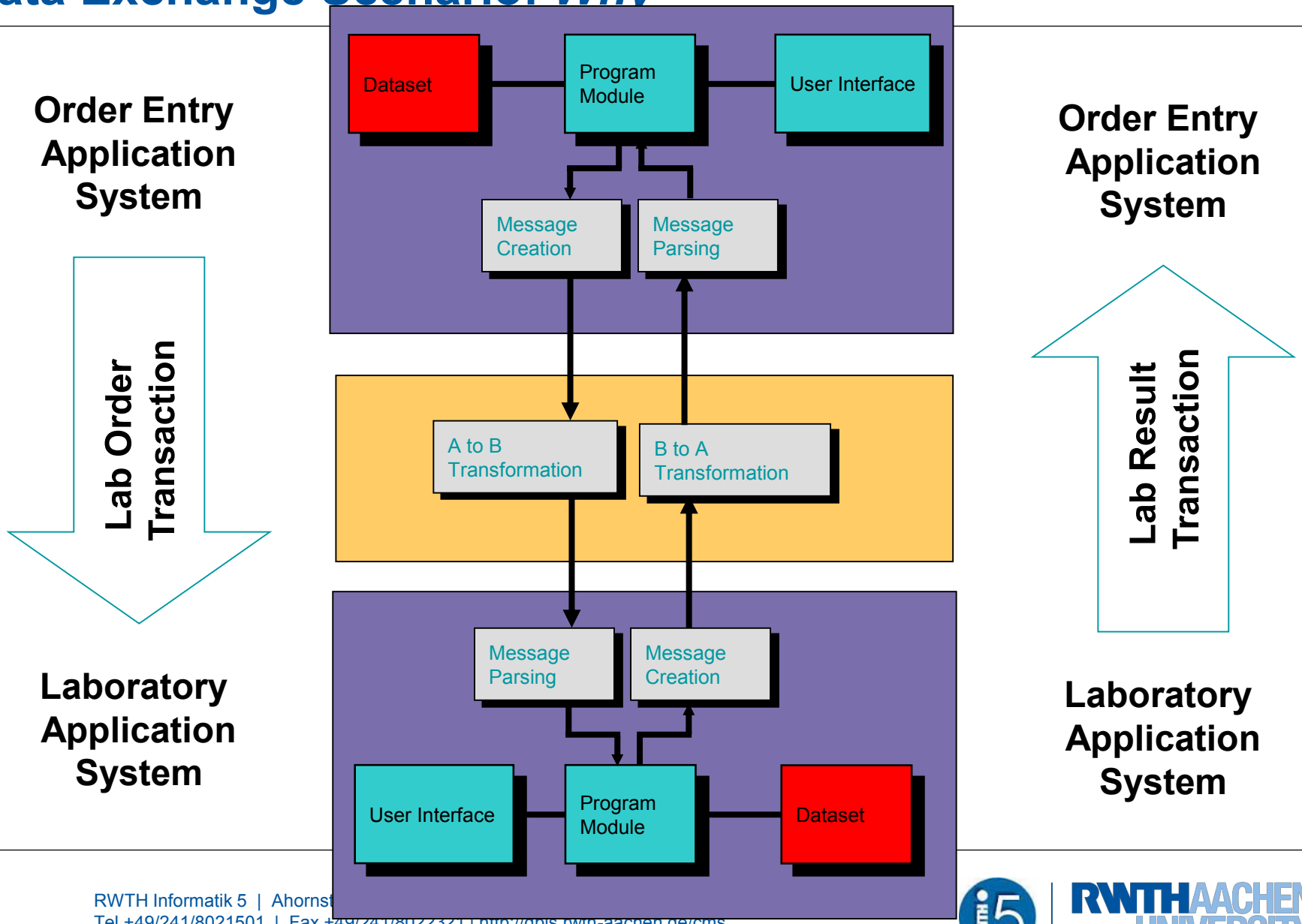
Data Exchange Scenario: *Why*



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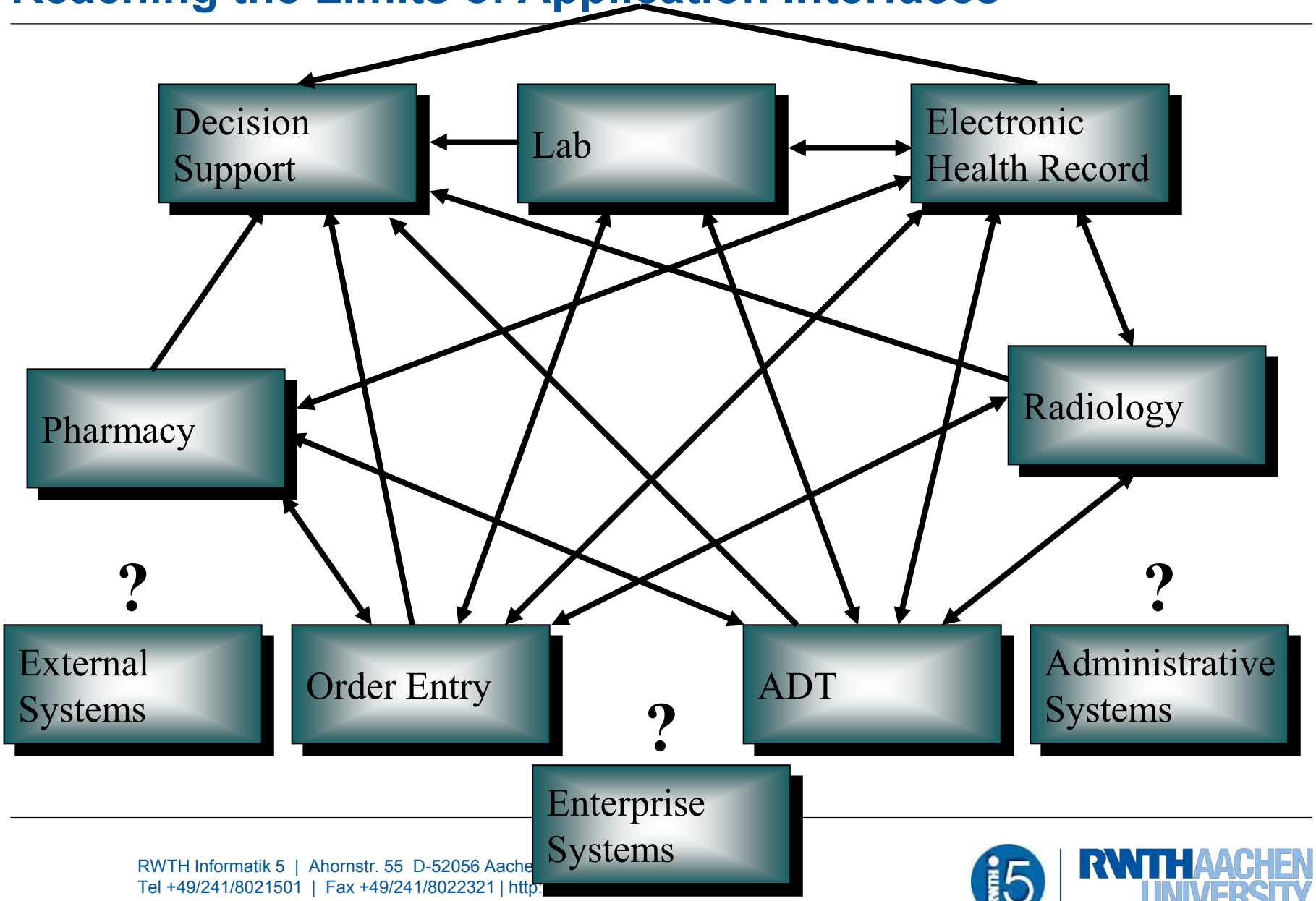
Reaching the Limits of Application Interfaces



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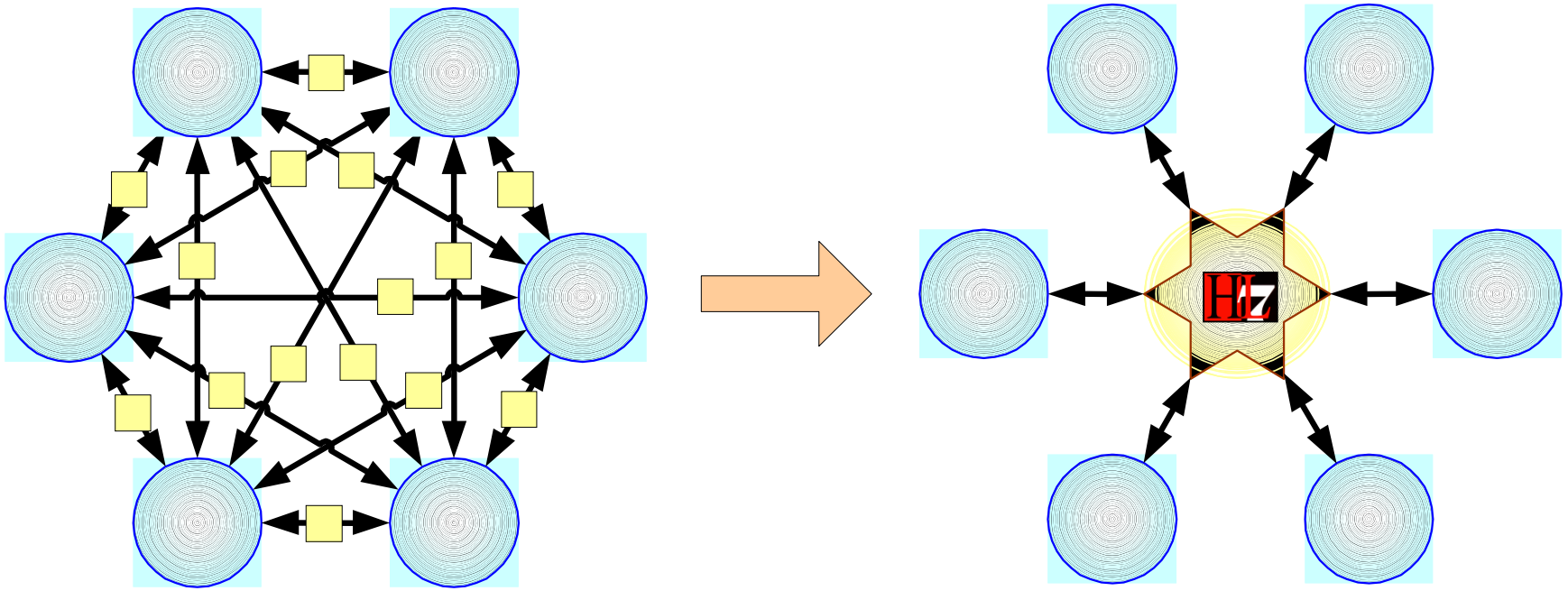
Health Level Seven: *Why*



- The number of interfaces between N systems is given by the formula I = (N2-N)/2. **$(2^2 - 2) / 2 = 1$**
- Linking 2, 3 and 4 systems needs ?? Interfaces: **$(3^2 - 3) / 2 = 3$**
- Linking 6 systems needs as many as 15 interfaces, **$(6^2 – 6) / 2 = 15$**
- The benefits of using the HL7 standard increase rapidly with the number of systems involved. I = N

$(4^2 - 4) / 2 = 6$

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HL7 Version 3.0: *What and Why*

- Version 3.0 is a fundamental shift in the methodology HL7 uses to develop its standards specifications.
- Version 3.0 is a model-driven methodology based upon the Object Management Group's Unified Modeling Language (UML).
- Version 3.0 uses datatype specifications, vocabulary specifications, and a Reference Information Model (RIM), to derive the information component of V3 message specifications.
- Version 3.0 reduces optionality, maximizes reuse, and increases consistency in HL7 message specifications.
- Version 3.0 improves the quality of HL7 message specifications and includes support for conformance validation.
- Version 3.0 enables HL7 implementers to leverage emerging web services standards, conventions, and technologies.

HL7 v3.0 Foundational Artifacts

Reference Information Model

The HL7 Reference Information Model is the information model from which all other information models and message specifications are derived.

Datatype Specification

The HL7 Datatype Specification defines the structural format of the data carried in an attribute and influences the set of allowable values an attribute may assume.

Vocabulary Specification

The HL7 Vocabulary Specification defines the set of all concepts that can be taken as valid values in an instance of a coded attribute or data type property.

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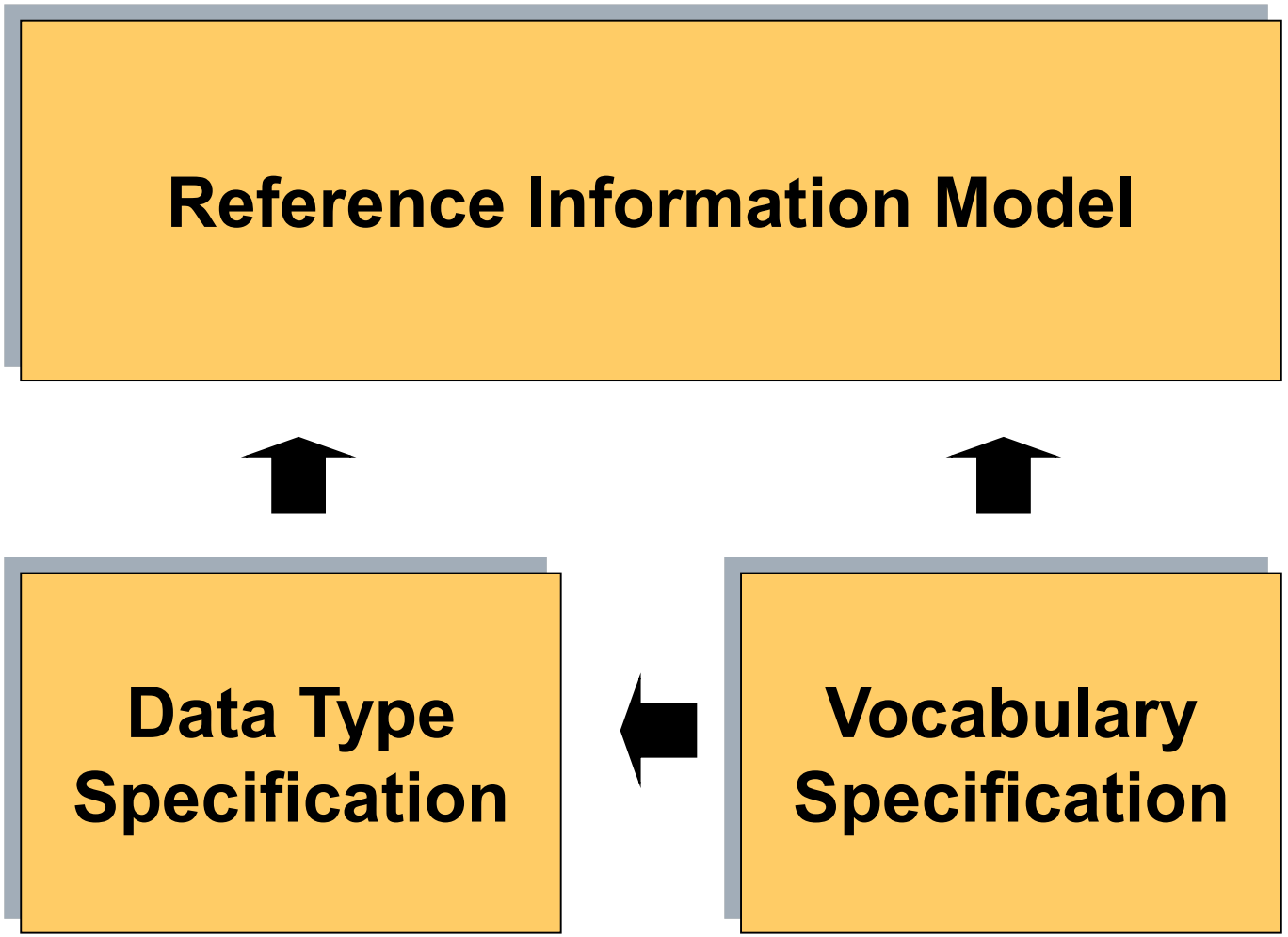
HL7 Version 3.0 Reference Models



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HL7 Reference Information Model

- The HL7 Reference Information Model (RIM) is a static model of health and health care information as viewed within the scope of HL7 standards development activities.
- It is the combined consensus view of information from the perspective of the HL7 working group and the HL7 international affiliates.
- The RIM is the ultimate source from which the information-related content of all HL7 version 3.0 protocol specification standards is drawn.
- The RIM is modeled using the modeling syntax defined by the Object Management Group's Unified Modeling Language (UML).
- UML is a graphical language for visualizing, specifying, constructing, and documenting the artifacts of a software-intensive system.

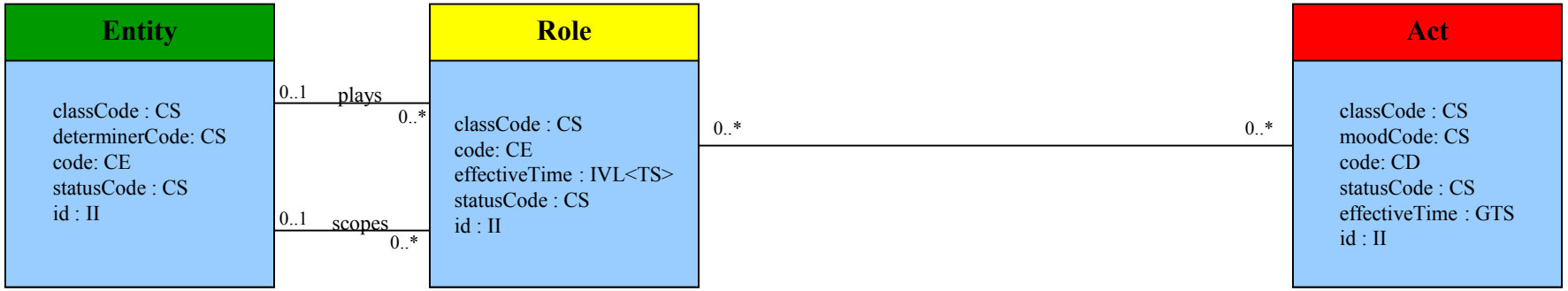
RIM Core Classes

- **Entity - <u>a physical thing or an organization/group of physical things capable of participating in Acts.</u>** This includes living subjects, organizations, material, and places.

- **Act – <u>a discernible action of interest in the healthcare domain.</u>** An instance of Act is a record of that action. Acts definitions (master files), orders, plans, and performance records (events) are all represented by an instance of Act.

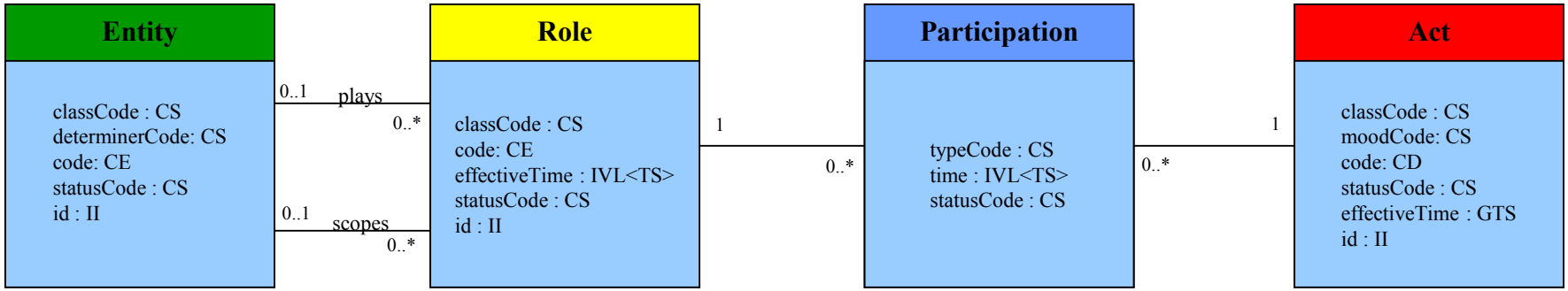
RIM Core Classes

- **Role – <u>a classification/specialization of an Entity defined by the relationship of the *playing* Entity to a *scoping* Entity</u>.** An example of Role is “Employee”. An employee is a classification attributed to a person which has an employment relationship with an organization (Employer).



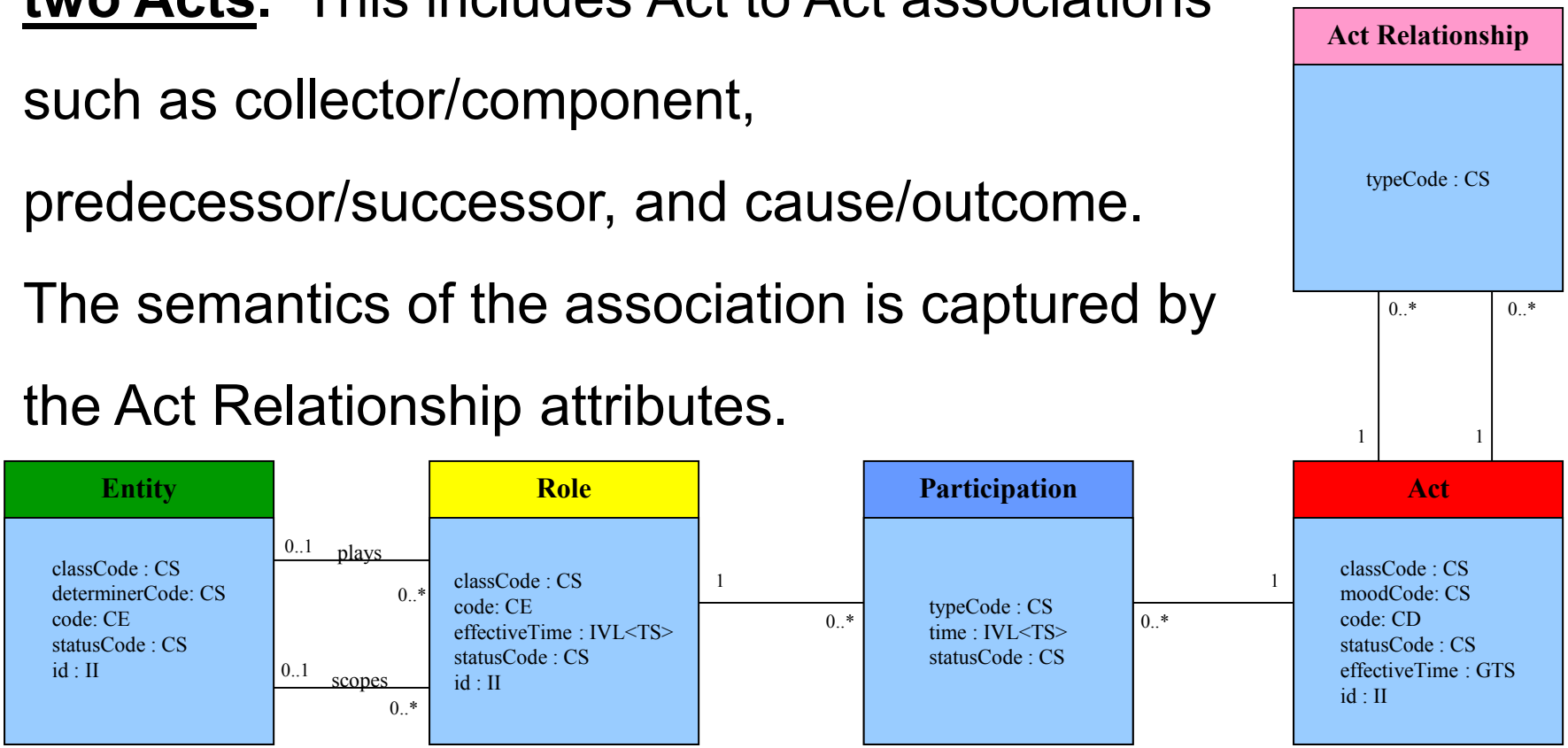
RIM Core Classes

- **Participation – <u>an association between a Role and an Act representing the function assumed by the Role within the context of the Act</u>.** A single Role may *participate* in multiple Acts and a single Act may have multiple *participating* Roles. A single Participation is always an association between a particular Role and a particular Act.



RIM Core Classes

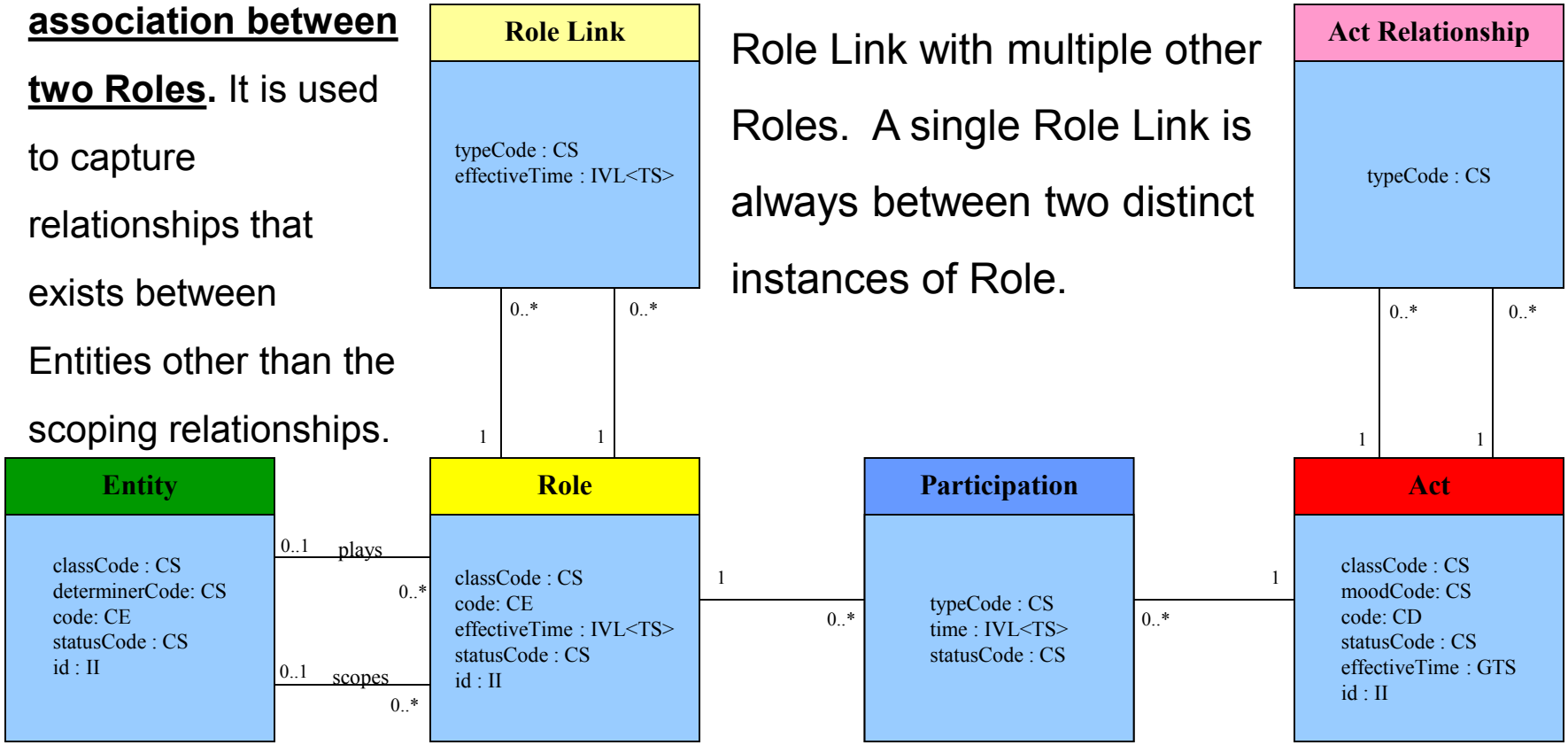
- **Act relationship – <u>an association between two Acts</u>.** This includes Act to Act associations such as collector/component, predecessor/successor, and cause/outcome. The semantics of the association is captured by the Act Relationship attributes.



RIM Core Classes

- **Role Link – <u>An association between two Roles</u>.** It is used to capture relationships that exists between Entities other than the scoping relationships.

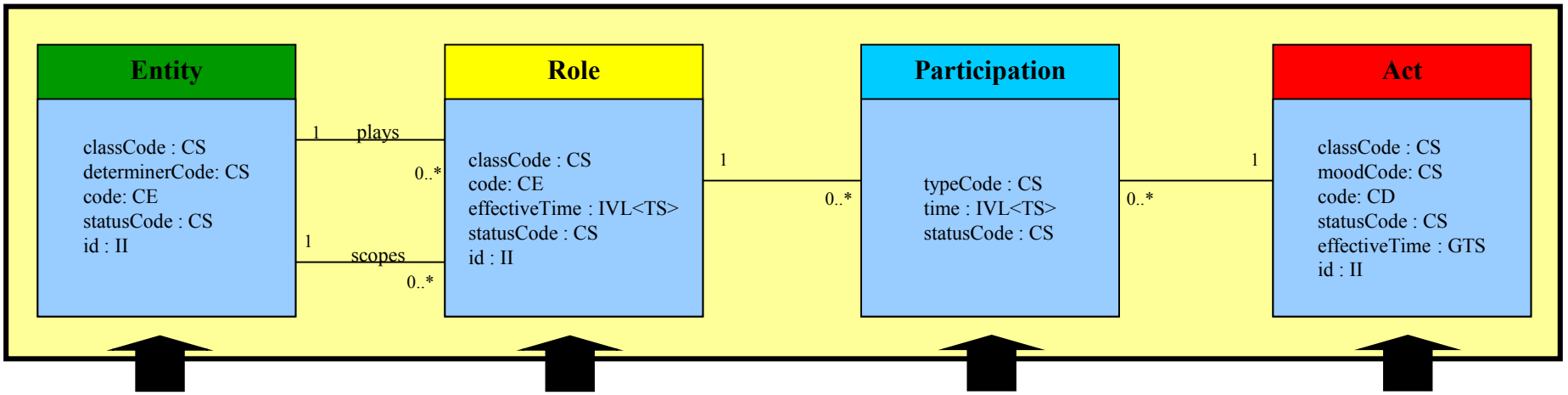
A single Role may have a Role Link with multiple other Roles. A single Role Link is always between two distinct instances of Role.



Definition of RIM Core Classes

- **Act – a discernible action of interest in the healthcare domain.** An instance of Act is a record of that action. Acts definitions (master files), orders, plans, and performance records (events) are all represented by an instance of Act.
- **Act relationship – an association between two Acts.** This includes Act to Act associations such as collector/component, predecessor/successor, and cause/outcome. The semantics of the association is captured by the Act Relationship attributes.
- **Entity - a physical thing or an organization/group of physical things capable of participating in Acts.** This includes living subjects, organizations, material, and places.
- **Participation – an association between a Role and an Act representing the function assumed by the Role within the context of the Act**. A single Role may *participate* in multiple Acts and a single Act may have multiple *participating* Roles. A single Participation is always an association between a particular Role and a particular Act.
- **Role – a classification/specialization of an Entity defined by the relationship of the *playing* Entity to a *scoping* Entity.** An example of Role is “Employee”. An employee is a classification attributed to a person which has an employment relationship with an organization (Employer).
- **Role Link – An association between two Roles.** It is used to capture relationships that exists between Entities other than the scoping relationships. A single Role may have a Role Link with multiple other Roles. A single Role Link is always between two distinct instances of Role.

RIM Backbone Classes



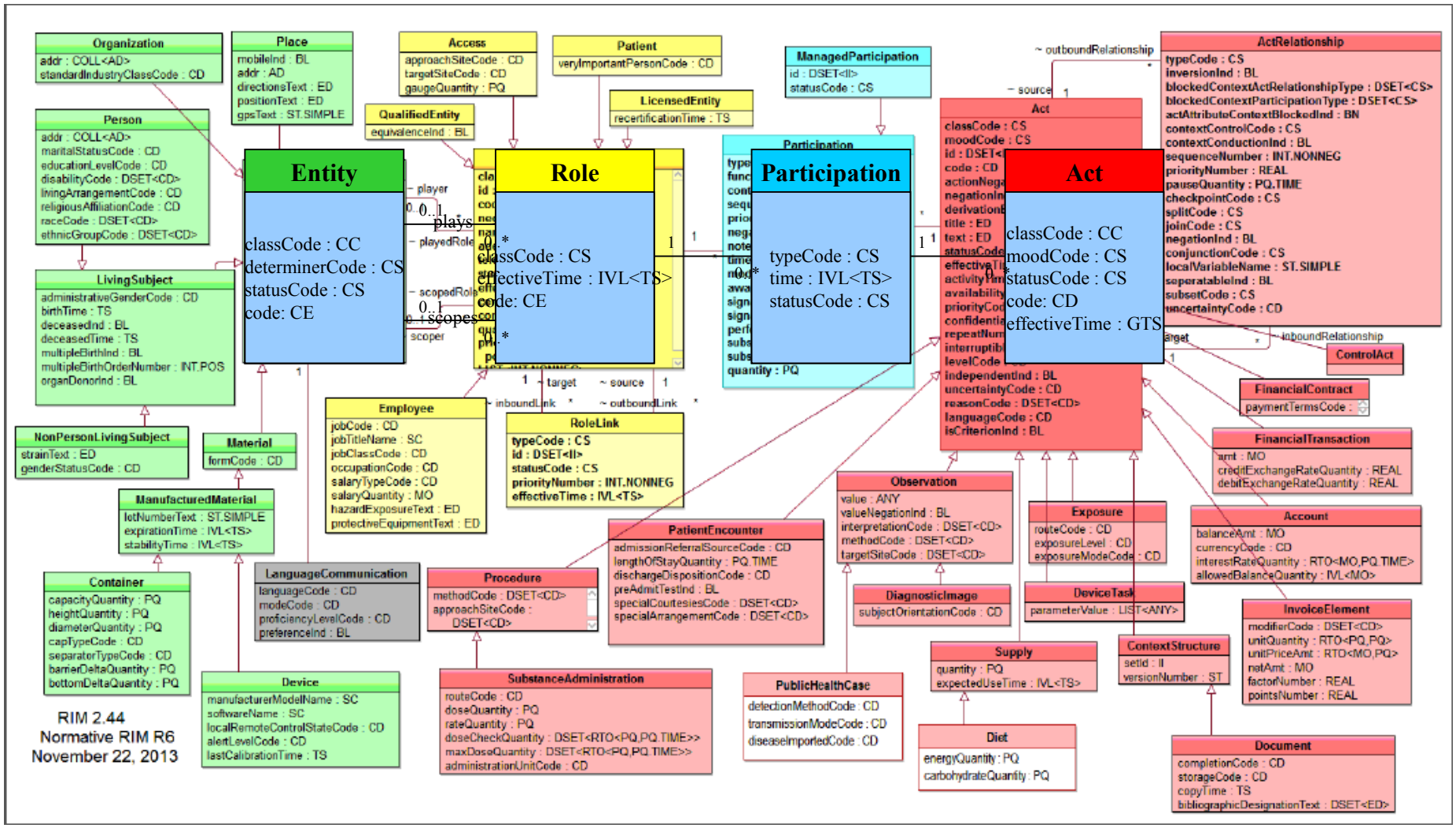
Living Subject
Place
Organization
Material

Licensed Entity
Patient
Access
Employee

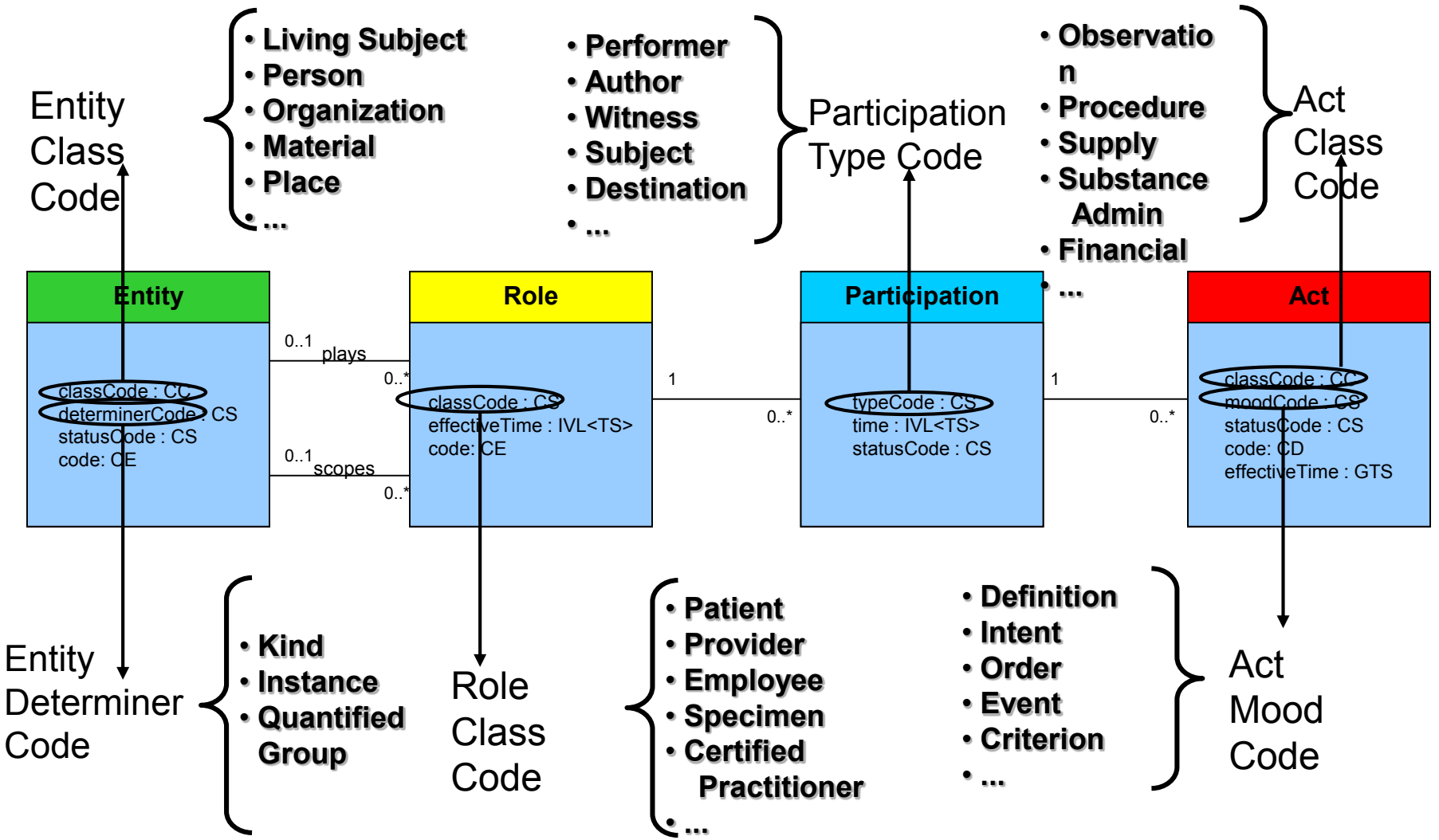
Managed Participation

Observation
Supply
Patient Encounter
Procedure
Device Task
Substance Administration
Financial Transaction
Invoice Element
Financial Contract
Account
Working List
Control Act

HL7 RIM Class Diagram



RIM Core Attribute Value Sets



Coded Structural Attributes

- RIM coded attributes with a data type of Coded Simple (CS) are referred to as “structural”
- A CS data type is assigned to an attribute when the only allowable code values for the attribute are determined by HL7
- There are 18 such attributes in the RIM. Each of them is bound to a vocabulary value set defined by HL7.

Coded “Structural” Attributes

- Act.classCode
- Act.moodCode
- Act.statusCode
- ActRelationship.checkpointCode
- ActRelationship.conjunctionCode
- ActRelationship.joinCode
- ActRelationship.splitCode
- ActRelationship.Type
- ActRelationship.contextControlCode
- Entity.classCode
- Entity.determinerCode
- Entity.statusCode
- ManagedParticipation.statusCode
- Participation.contextControlCode
- Participation.typeCode
- Role.classCode
- Role.statusCode
- RoleLink.typeCode

Act.classCode

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

Vocabulary domain: ActClass (CNE)

Attribute description:

A code specifying the major type of Act that this Act-instance represents.

Example

• Events, such as encounter, visits, and appointments

• Observations, such as tests, diagnoses, and examination fi ndings

• Notifications, such as alerts, confirmation, and consent

• The supply and administration of medicines and other consumables; clinical, administrative, and financial procedures:

Act.moodCode

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

Vocabulary domain: ActMood (CNE)

Attribute description:

A code distinguishing whether an Act is conceived of as a factual statement or in some other manner as a command, possibility, goal, etc.

Code Values:

EVN	Event (occurrence)	A service that actually happens, may be an ongoing service or a documentation of a past service
RQO	Request	A request or order for a service is an intent directed from a placer (request author) to a fulfiller (service performer)
PRMS	Promise	An intent to perform a service that has the strength of a commitment. Other parties may rely on the originator of such promise that said originator will see to it that the promised act will be fulfilled
PRP	Proposal	A nonmandated intent to perform an act. Used to record intents that are explicitly not orders
DEF	Definition	Definition of a service

Act.code

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

Vocabulary domain: ActCode (CWE)

Attribute description:

A code specifying the particular kind of Act that the Act-instance represents within its class.

statusCode specifi es the state of an Act:

New	Act is in preparatory stages and may not yet be acted upon
Active	The Act can be performed or is being performed
Completed	An Act that has terminated normally after all its constituents have been performed
Canceled	The Act has been abandoned before activation
Aborted	The Act has been terminated prior to the originally intended completion

Entity.classCode

3.2.1.1 **Entity**.classCode :: CS **(1..1)** Mandatory

Vocabulary domain: EntityClass (CNE)

Attribute description:

An HL7 defined value representing the class or category that the Entity instance represents.

Examples:

Person, Animal, Chemical Substance, Group, Organization

Rationale:

Due to the extremely large number of potential values for a code set representing all physical things in the universe, the class code indicates both the subtype branch of the Entity hierarchy used as well as a high level classifier to represent the instance of Entity. This can be used to constrain the eligible value domains for the Entity.code attribute.

Role.classCode

3.3.1.1 **Role**.classCode :: CS **(1..1)** Mandatory
Vocabulary domain: RoleClass (CNE)
Attribute description:

> **A code specifying the major category of a Role as defined by HL7 vocabulary.**

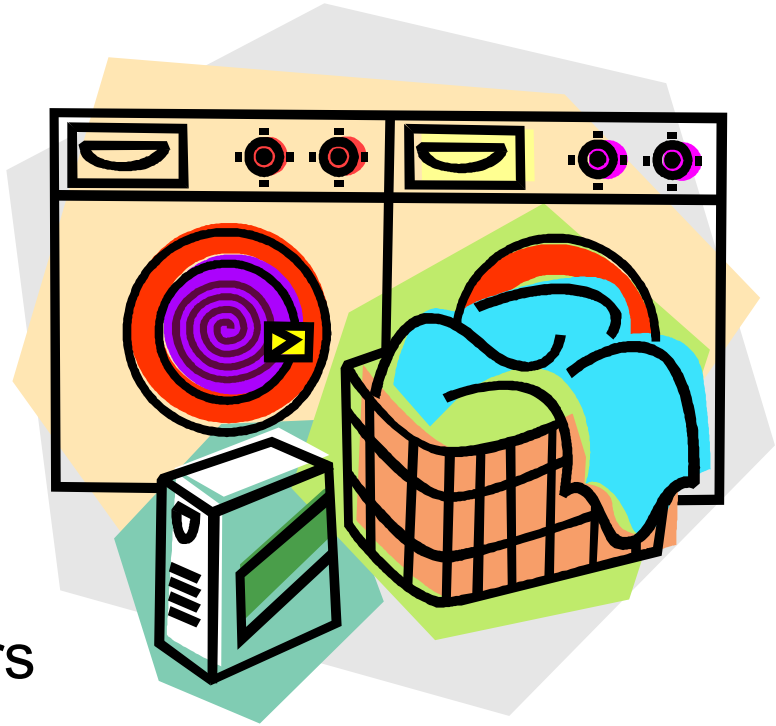
Each Entity can play multiple Roles. Examples of Roles include:

- **People, such as patient, practitioner, or employee**
- **Places such as hospital, home, clinic, or place of birth**
- **Organizations such as care provider, employer, or supplier**
- **Things such as drug, instrument, or computer system**
- **Responsible entities, such as parent, employer, or manufacturer**

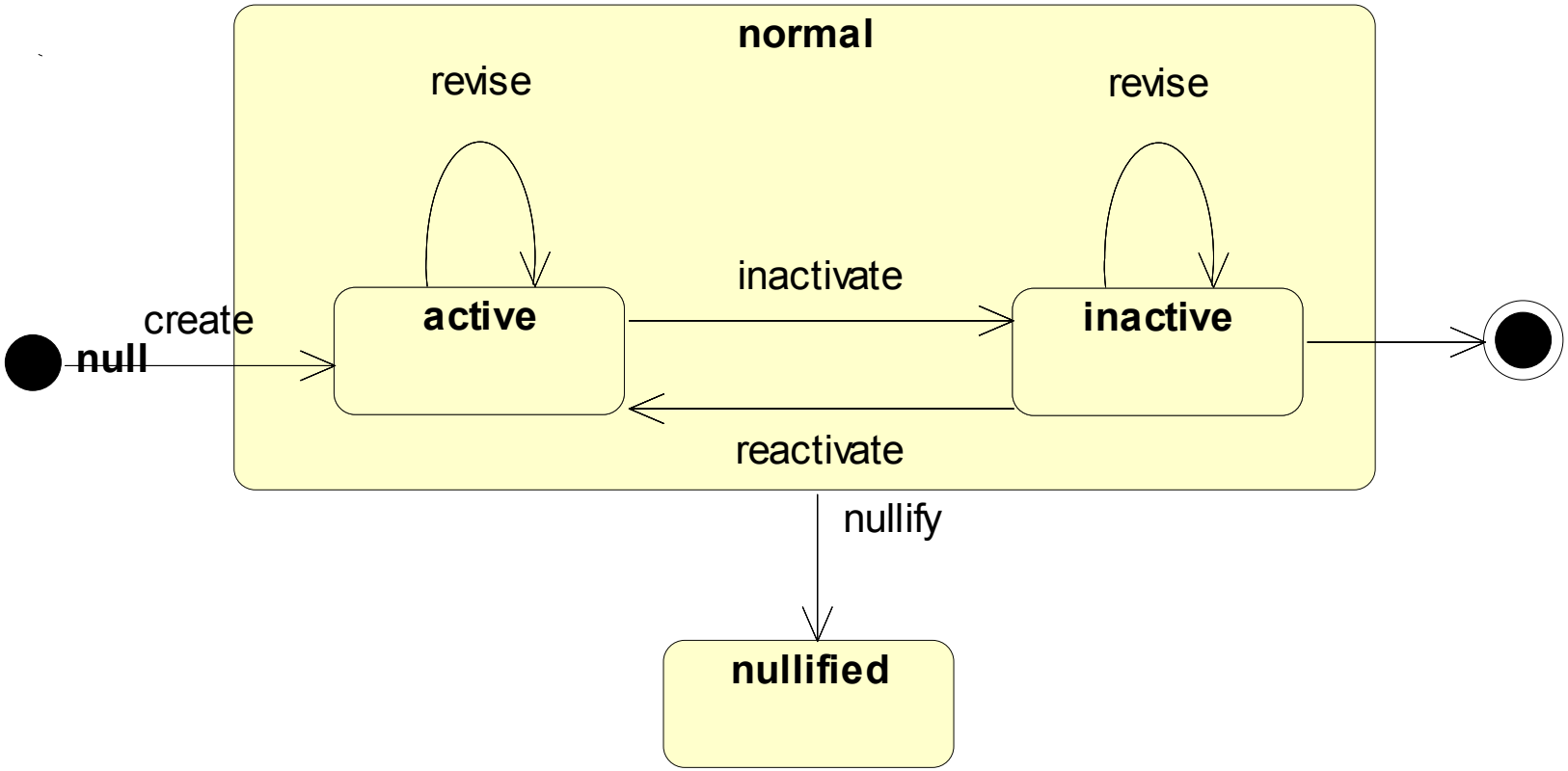
The

State Machine

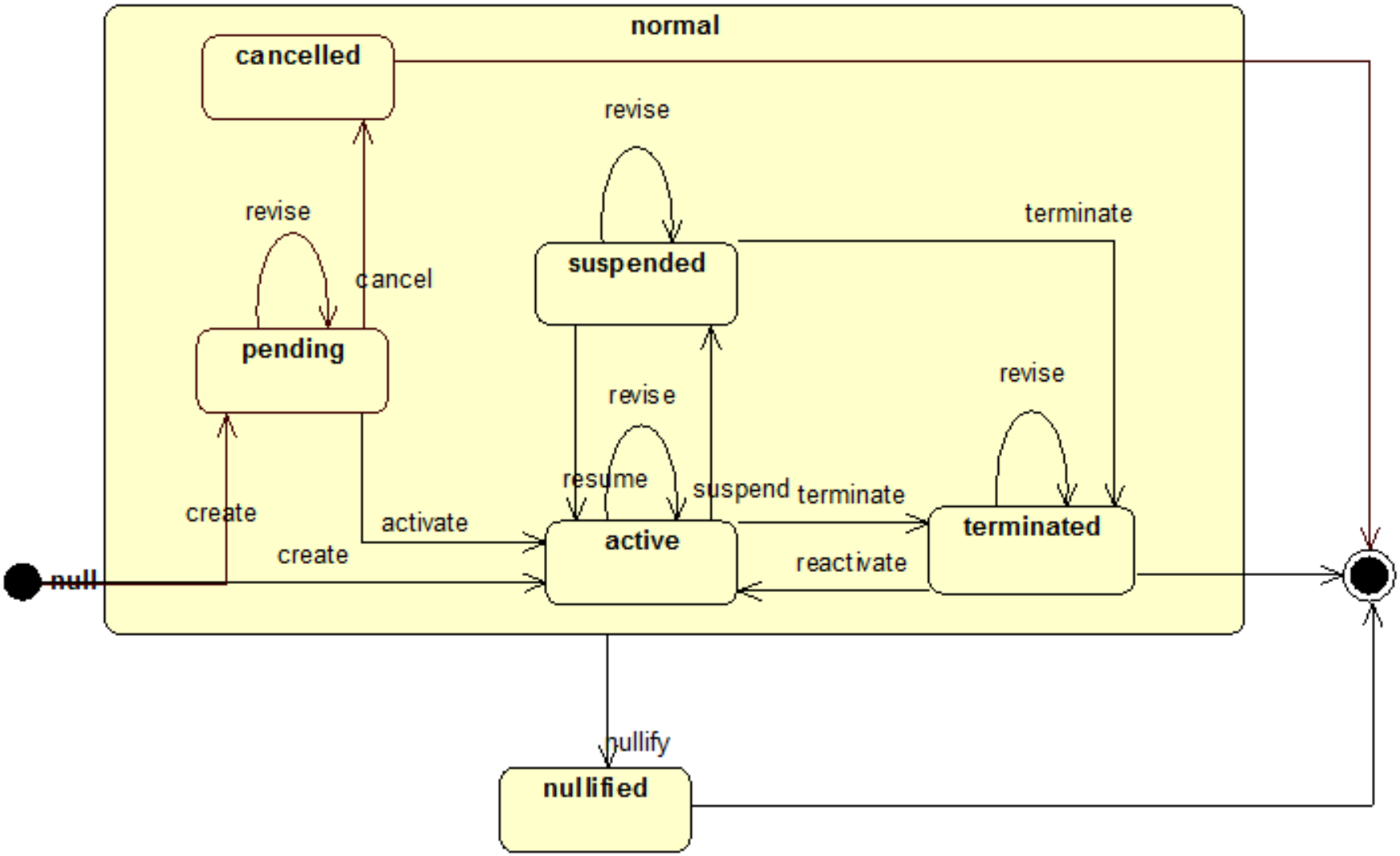
- The HL7 Reference Information Model includes state machines for the Entity, Role, ManagedParticipation, and Act classes.
- A state machine specifies the allowable states and valid state transitions for a given class.
- When a class transitions from one state to another sometimes triggers an interactions.



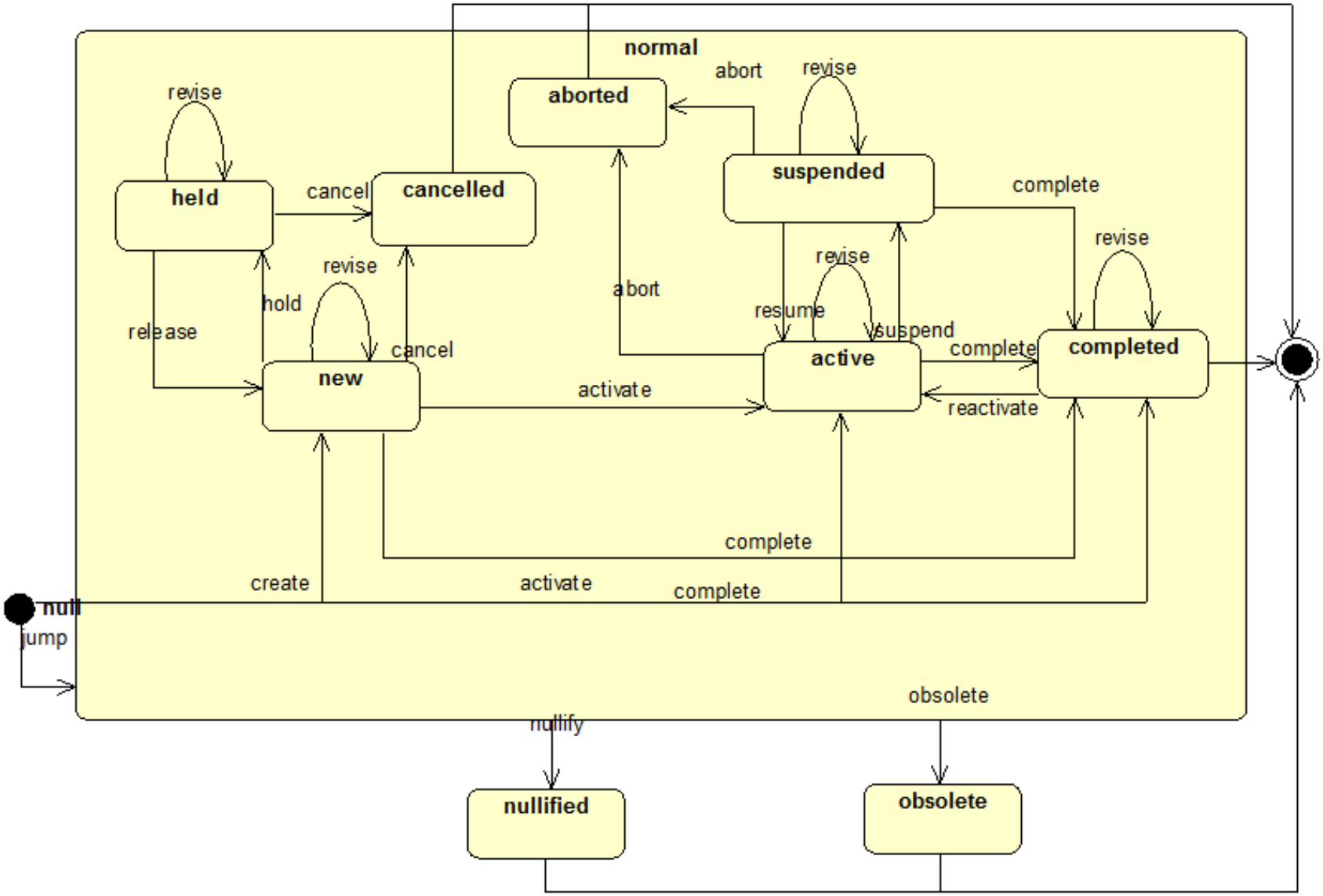
Entity State Machine



Role State Machine

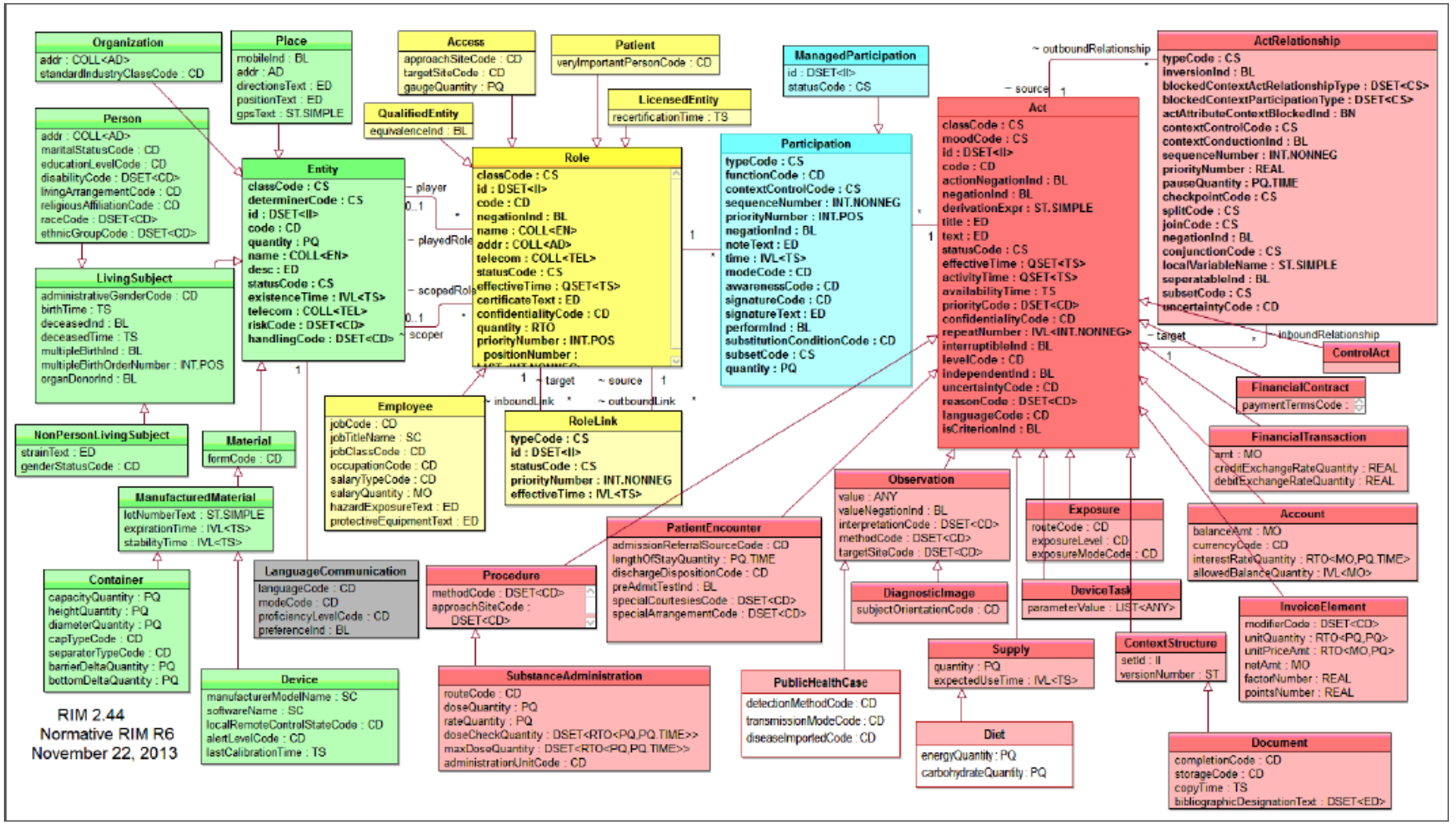


Act State Machine



Display	Definition
normal	Encompasses the expected states of an Act, but excludes "nullified" and "obsolete" which represent unusual terminal states for the life-cycle.
aborted	The Act has been terminated prior to the originally intended completion.
active	The Act can be performed or is being performed
cancelled	The Act has been abandoned before activation.
completed	An Act that has terminated normally after all of its constituents have been performed.
held	An Act that is still in the preparatory stages has been put aside. No action can occur until the Act is released.
new	An Act that is in the preparatory stages and may not yet be acted upon
suspended	An Act that has been activated (actions could or have been performed against it), but has been temporarily disabled. No further action should be taken against it until it is released
nullified	This Act instance was created in error and has been 'removed' and is treated as though it never existed. A record is retained for audit purposes only.
obsolete	This Act instance has been replaced by a new instance.

HL7 RIM Class Diagram



Clinical Document Architecture

Clinical Document Architecture (CDA)

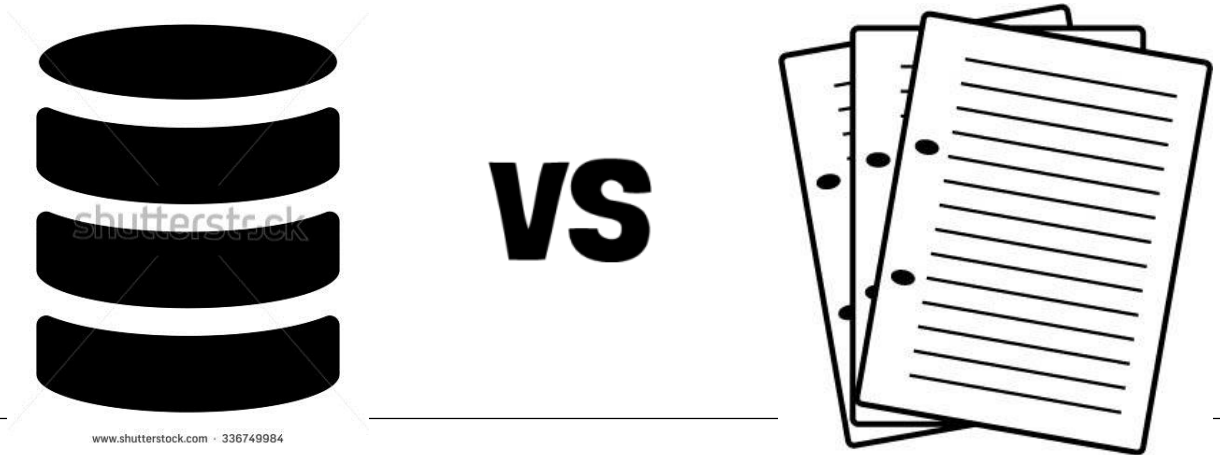
- CDA is a popular, flexible markup standard developed by HL7
- It defines the structure of certain medical records,
  - For Example:
    - Discharge Summaries
    - Progress Notes
    - Imaging Report
    - Admission & Physical

Cont.

- These documents can include text, images and other types of multimedia.
- It is better way to exchange information between providers and patients.
- The most popular use is for inter-enterprise information exchange.

Databases vs Documents

- Databases are organized for rapid search and retrieval and are updated by transactions.
- The database structure is designed by a computer professional, updated by
- various people, who may or may not know each other, and is accessed by others
- using queries.
- The person who updates the database has little or no control over who, if anyone, will ever read the data or for what purpose.
- The person who uses the database may know nothing about who entered the data and in what context.
- The lack of context makes it hard to evaluate the provenance of each item of information and whether or not you can rely on it.



Databases vs Documents

- a document, electronic or paper, is organized as a stand-alone artifact to convey human understanding.
- Each document has a set of metadata stating the contextual details of who created it, for whom, when, where, and about what subject.
- The author determines the content of the document, and can be held responsible for any errors.
- If readers have doubts about how to interpret it, they can contact the author requesting elaboration .

- Think about the fixed information contained in a simple letter
- Shared properties of documents:
  - persistence, stewardship, potential for authentication, wholeness, and human readability

Characteristics of CDA

- CDA uses a common design structure with the following six characteristics, as set forth by HL7:

  - Persistence
    - clinical document continues to exist in an unaltered state, for a time period
  - Stewardship
    - maintained by a trusted organization, e.g., a hospital, entrusted with its care
  - Potential for authentication
    - A clinical document is an assemblage of information that is intended to be legally authenticated

Cont.

- Context
  - a default context to the record, such as the patient identity and who created the document
- Wholeness
  - Authentication of a clinical document applies to the whole document, not just parts of it
- Human readability
  - a person can read the material on a browser or mobile device

CDA based on XML

- CDA uses HL7's Reference Information Model (RIM) to represent health concepts.
  - It puts data in a clinical or administrative context
  - Expresses how pieces of data are connected.
- With the HL7 format using XML and RIM, CDA allows EHRs and other health IT systems to process documents while also letting people easily read them on Web browsers and mobile devices.

Cont.

- CDA also takes advantage of coding systems such as
  - SNOMED CT (Systematized Nomenclature of Medicine -- Clinical Terms)
  - LOINC (Logical Observation Identifiers Names and Codes).

Cont.

- CDA ensure that patient records can be created and read by any EHR software system.
- Many EHR vendors can produce CDA from their proprietary formats, according to HL7.
- CDA does not identify a particular method for transferring the data in a document; like
  - DICOM ,MIME, FTP and HTTP
  - HL7 version 2 messages and HL7 version 3 messages.

Implementation of CDA

- CDA defines building blocks which can be used to contain healthcare data elements that can be captured, stored, accessed, displayed and transmitted electronically for use and reuse in many formats.
- Sets of these CDA standardized building blocks can be arranged for whatever needs exist

Cont.

- This approach offers tremendous flexibility; it allows for the creation of a comprehensive variety of clinical documents which share common design patterns and use a single base standard
- Arranging (or constraining) the CDA elements in defined ways using Implementation Guidelines (IGs) and templates produces clinical documents

Note

- CDA **DOES NOT** specify how documents are transported, simply how critical data elements should be encoded for exchange and interoperability
- CDA can contain both structured and unstructured information

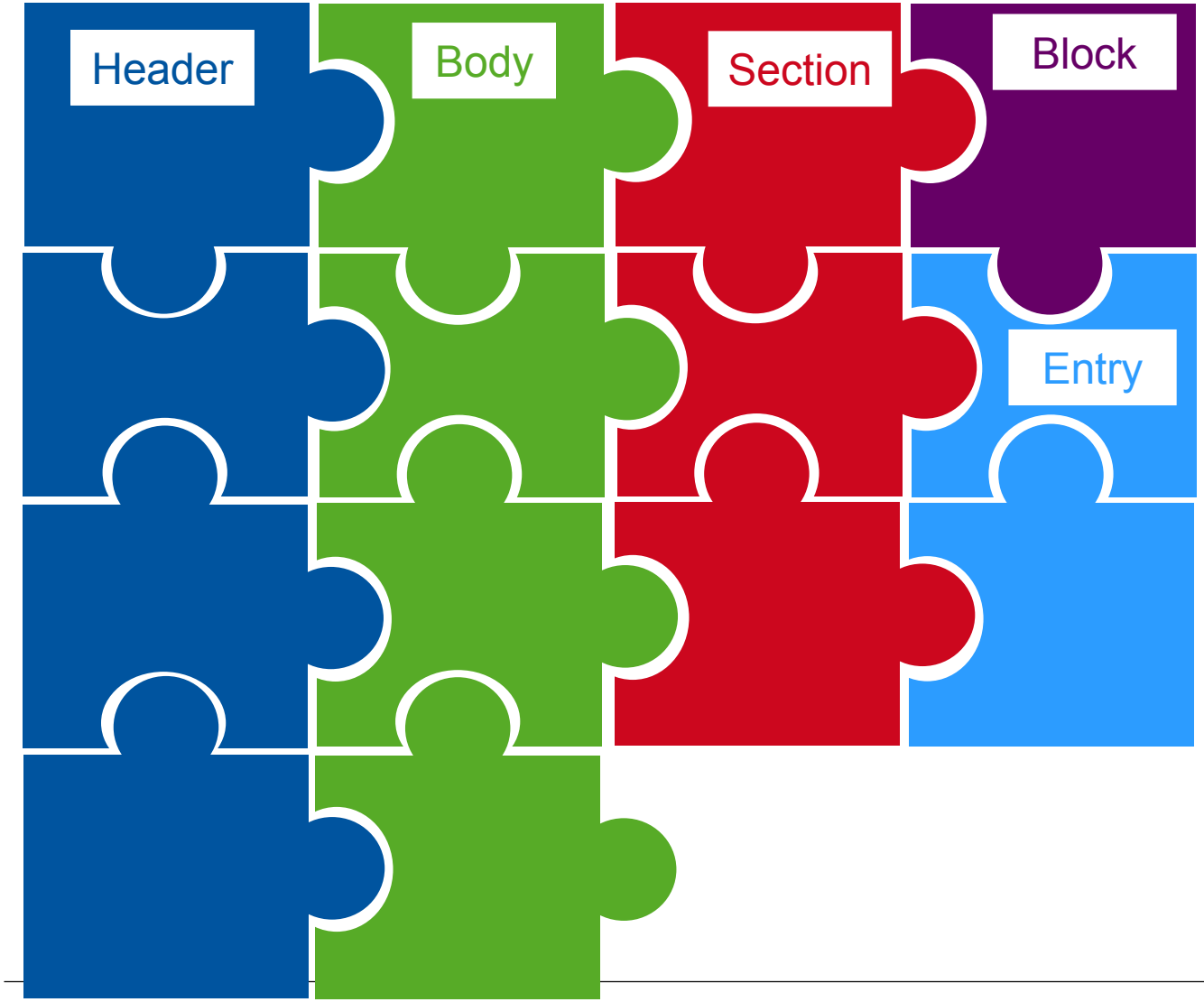
CDA Structure: Overview

- Every CDA document with a structured XML body must have AT LEAST **Header** AND one **Section**
- The XML structure for a CDA document nests data in the following way:
  - Header
  - Body
    - Section(s)
      - Narrative Block
      - Entry(s)

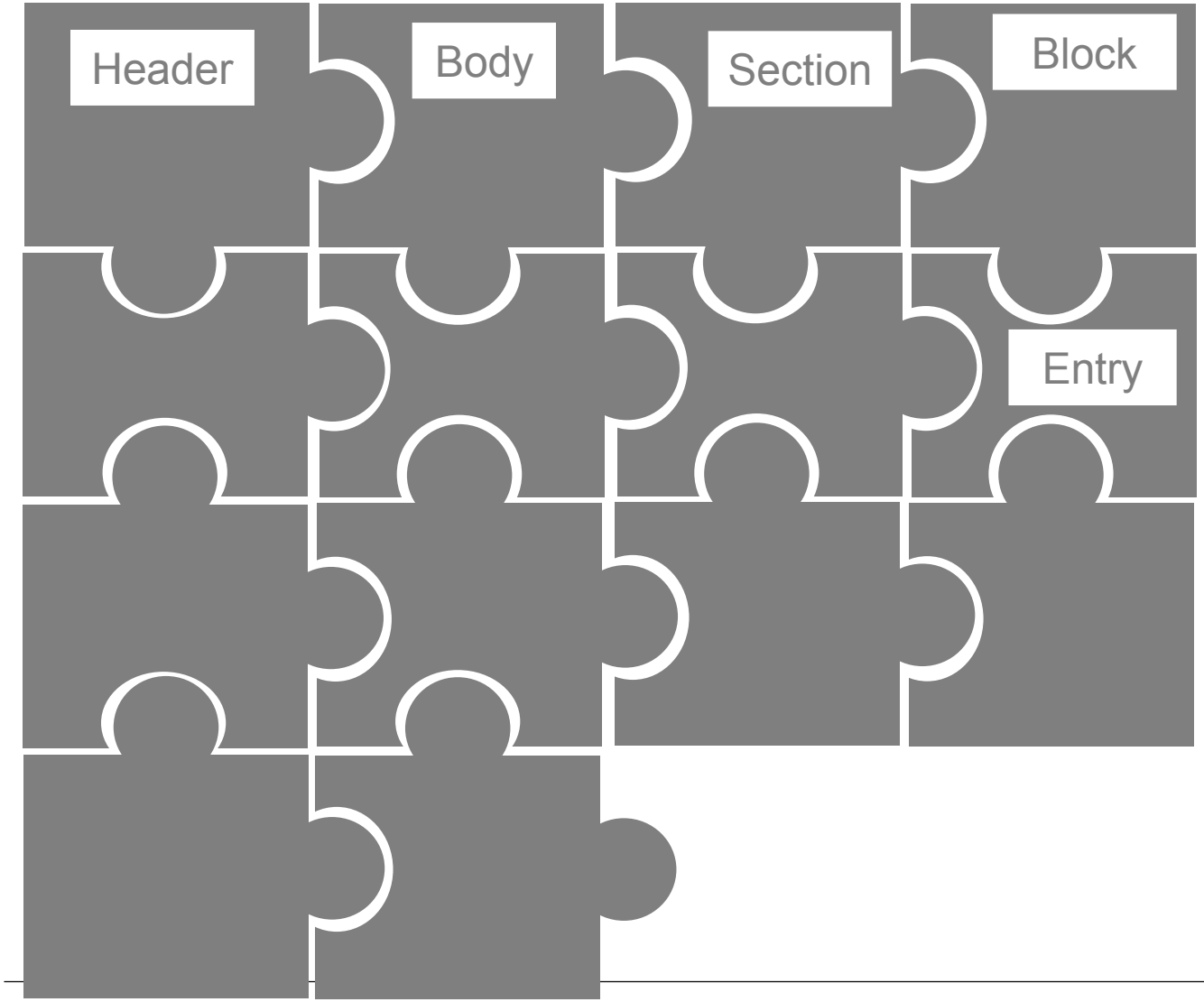
Cont.

- **Header** – includes patient information, author, creation date, document type, provider, etc.
- **Body** – includes admission details, diagnosis, patient details, medications, follow-up, etc. Presented as free text in one or multiple sections, and may optionally also include coded entries.

Cont.



CDA Header



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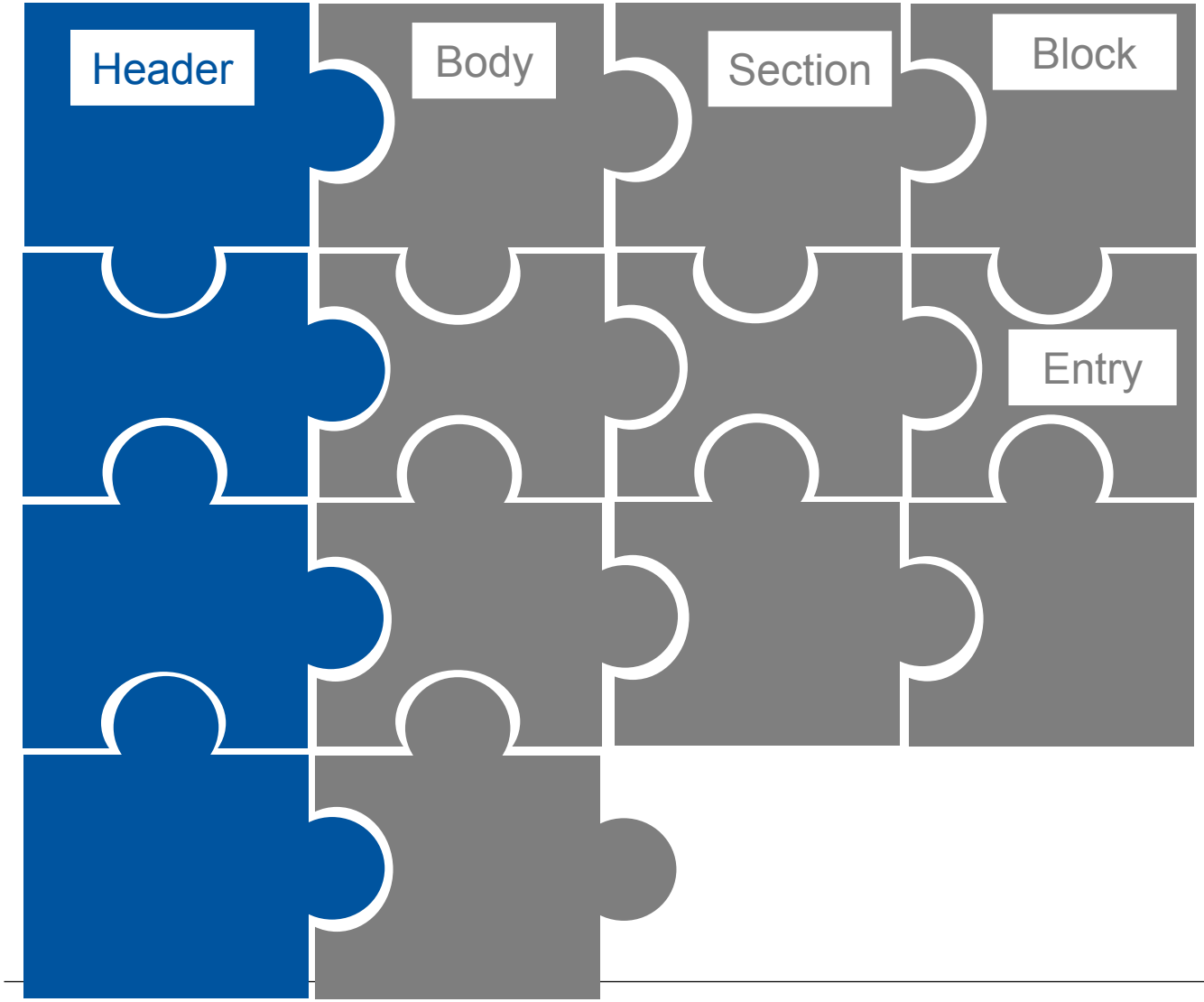
CDA Header



- It sets the context for the clinical document as a whole
- Enables clinical document exchange across and within institutions;
- Facilitates clinical document management
- Facilitates compilation of an individual patient's clinical documents into a electronic patient record.

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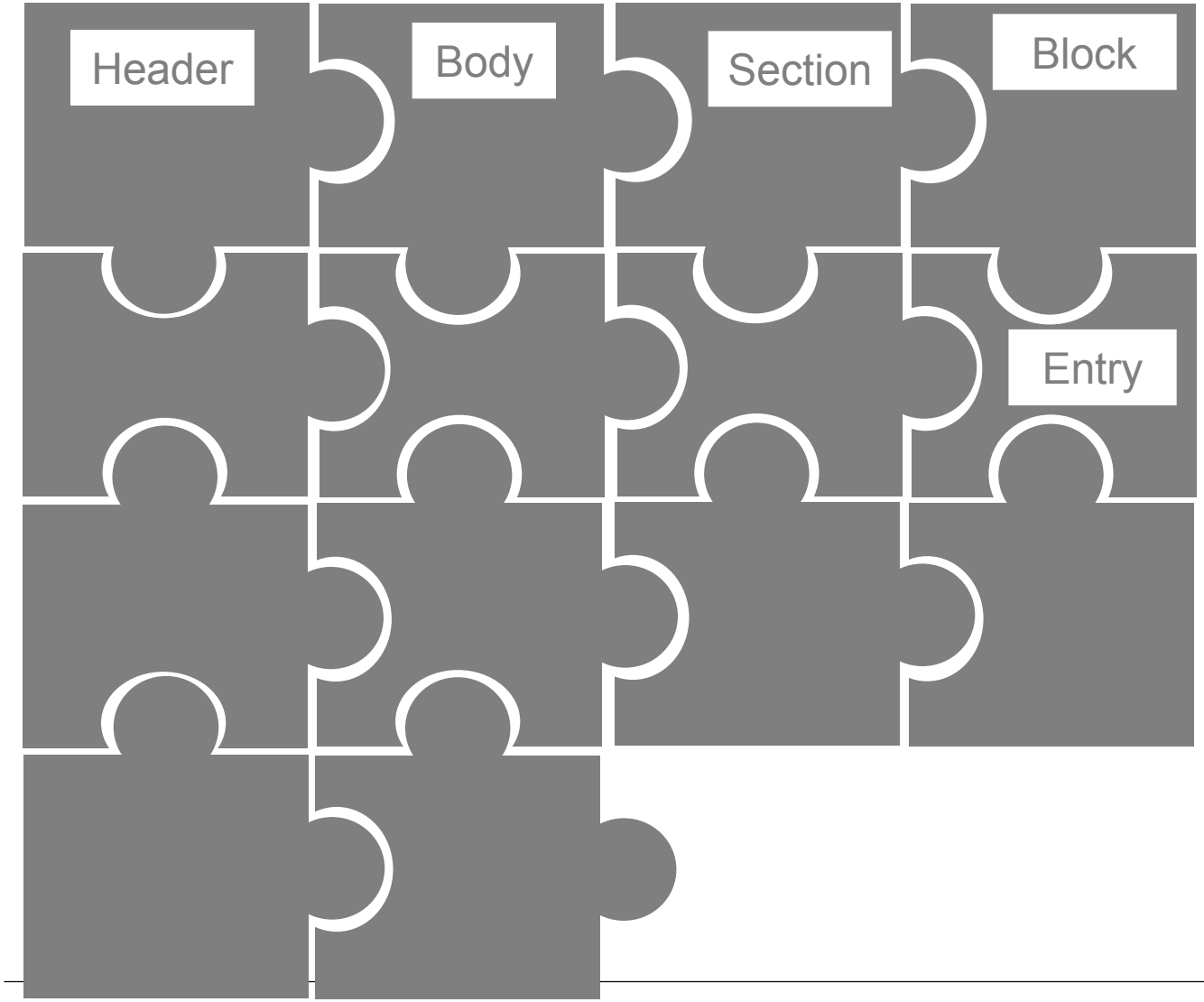
CDA Body



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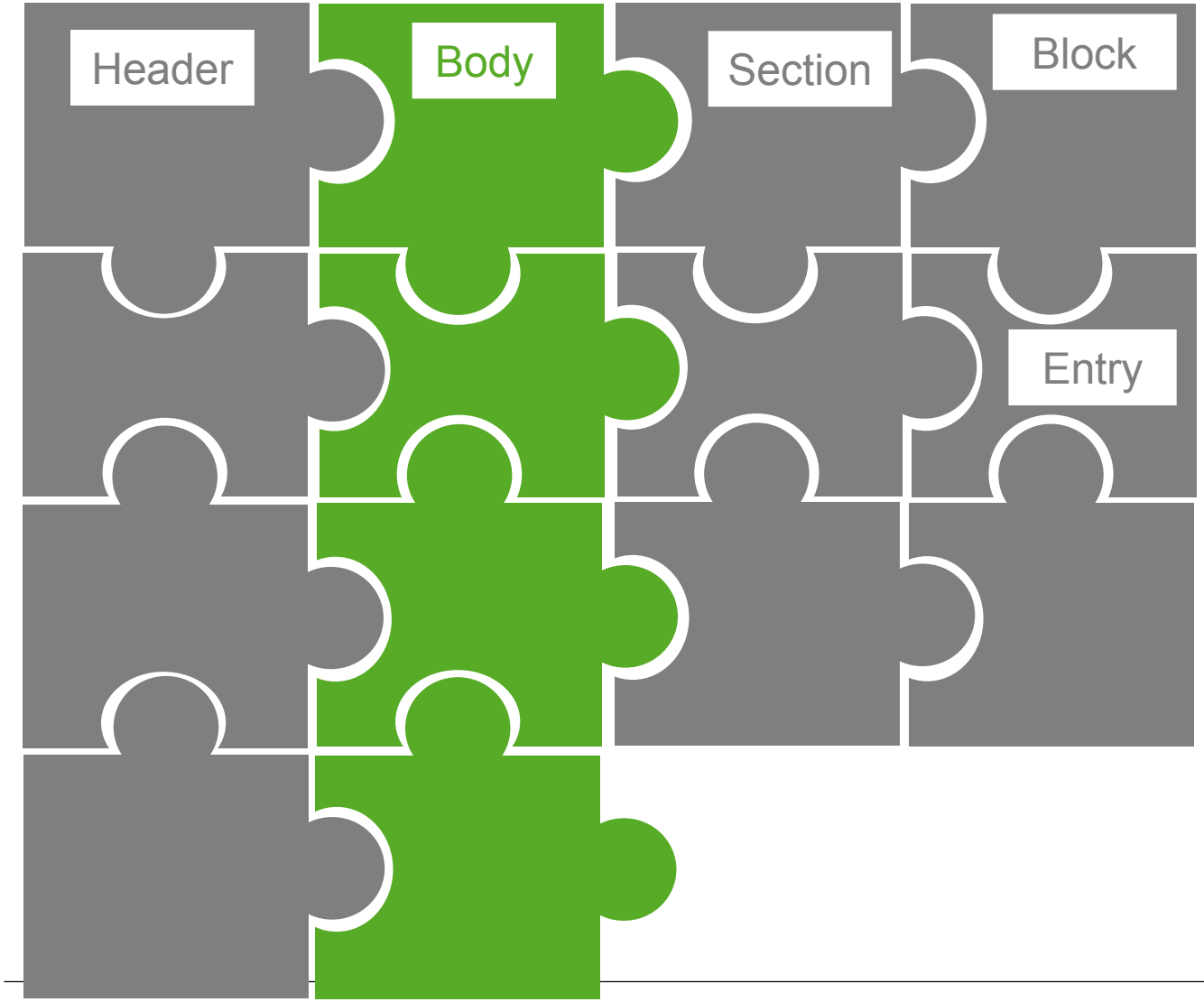
CDA Body



The **Body** contains the clinical report and can contain an unstructured “blob” or structured content organized in one or more **Sections**.

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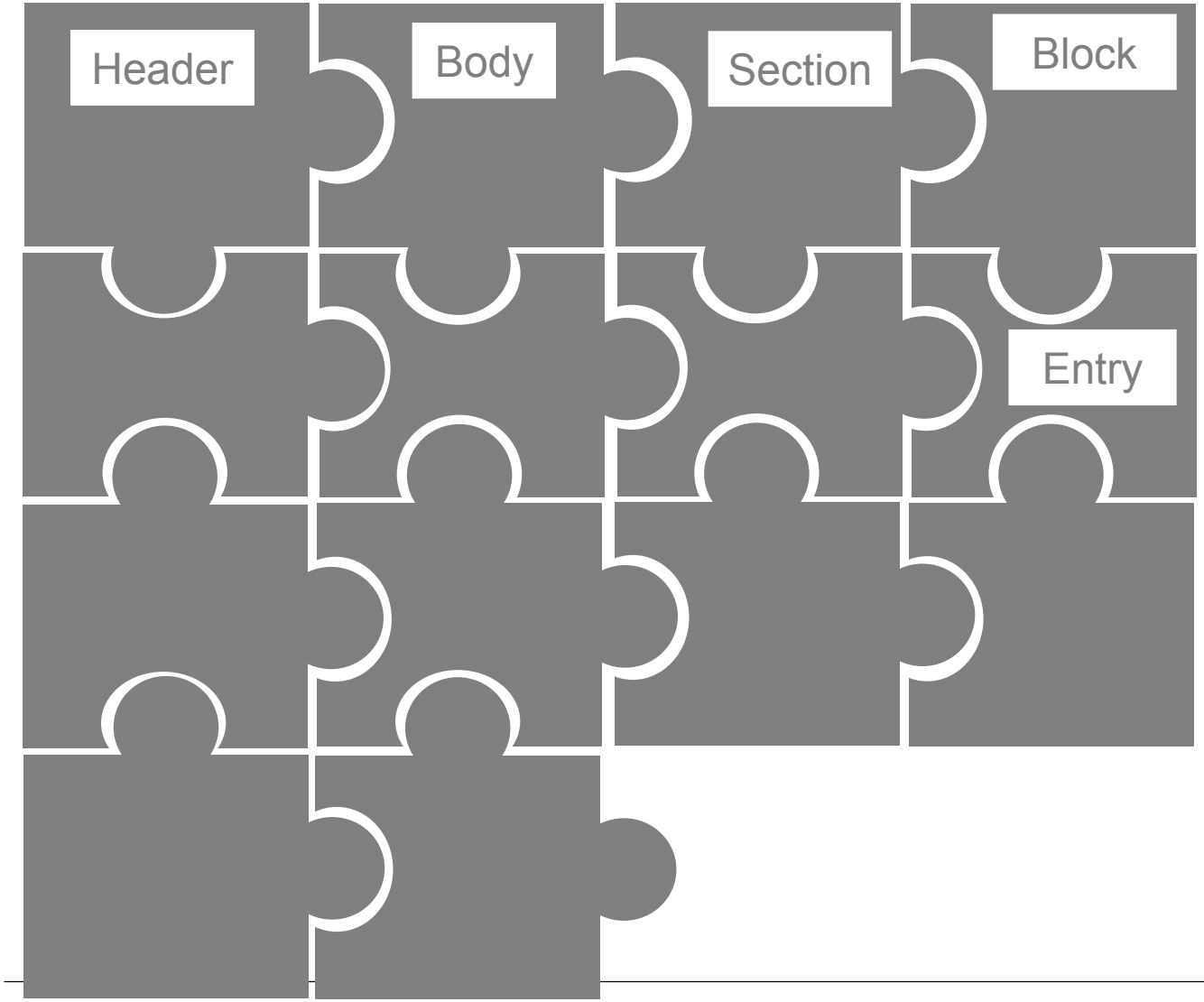
CDA Sections



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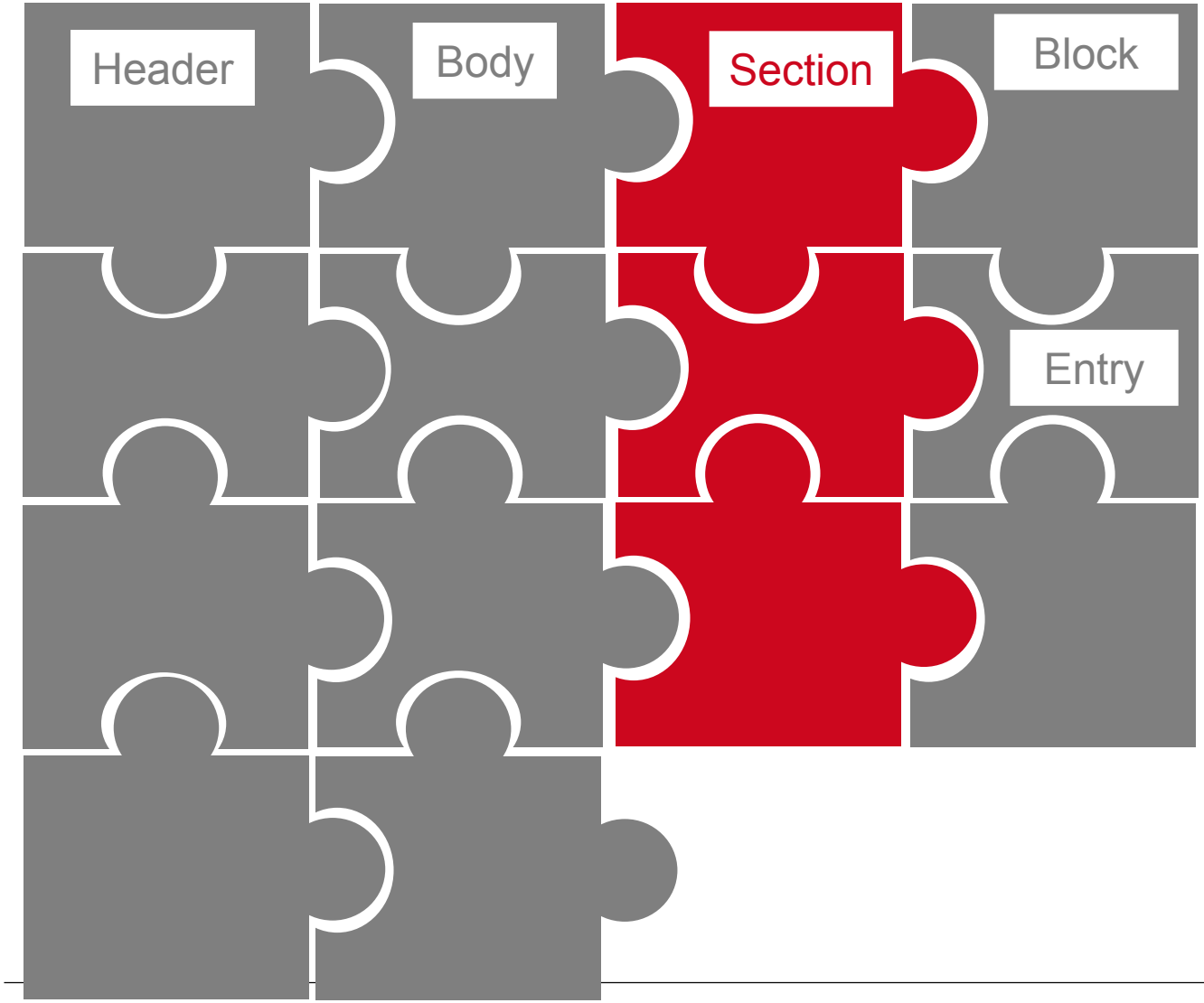
CDA Sections



Each **Section** contains one **Narrative Block** and zero to many coded **Entries**.

Examples include**:**

1. Allergies
2. Meds
3. Problems
4. Immunizations
5. Vital Signs

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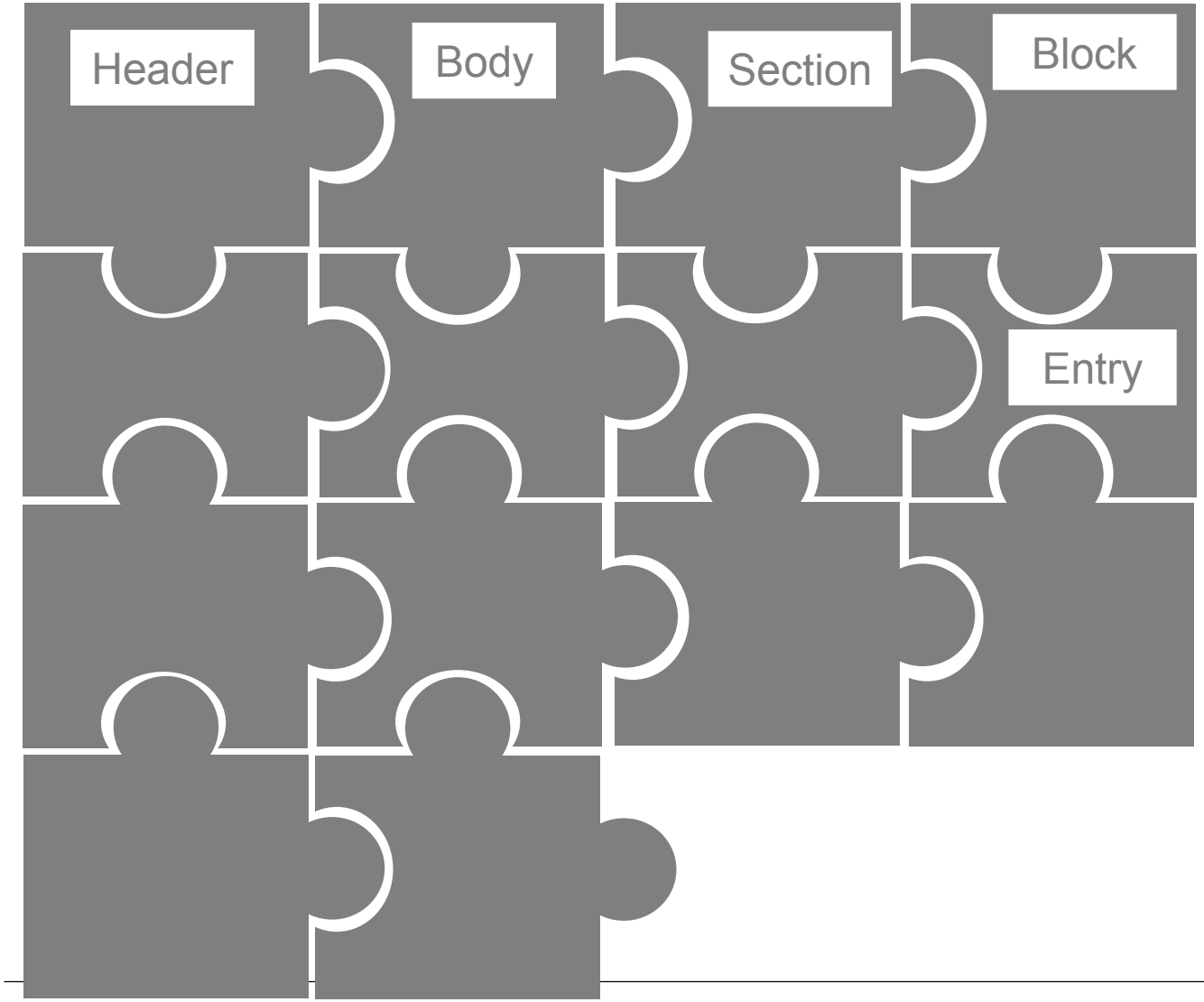
CDA Block



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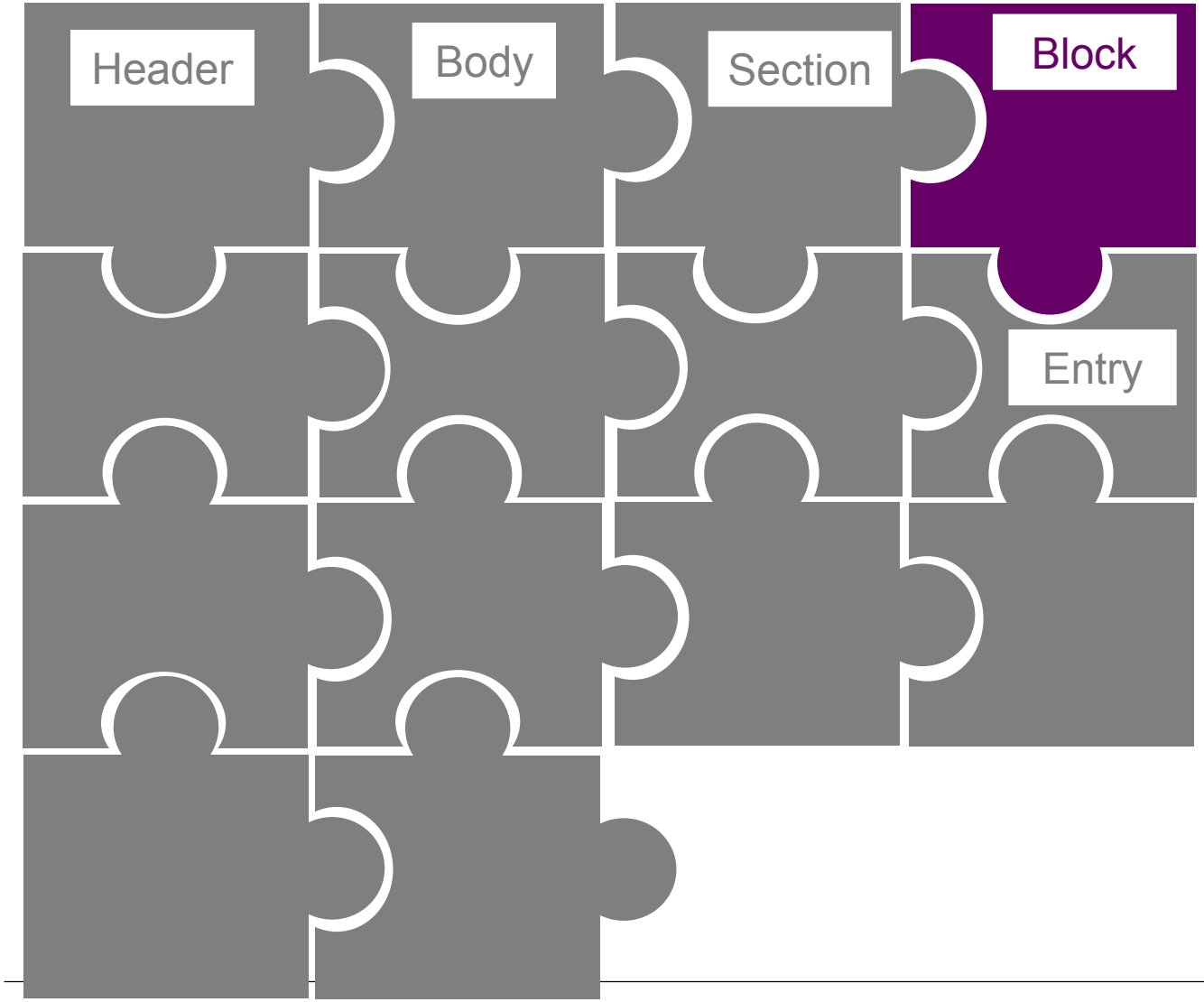
CDA Block



Blocks allow "human-readability" of a CDA document. Within a document section, the narrative block represents content to be rendered for viewing.

The **Block** has fixed markup, and must be populated by the document originator.

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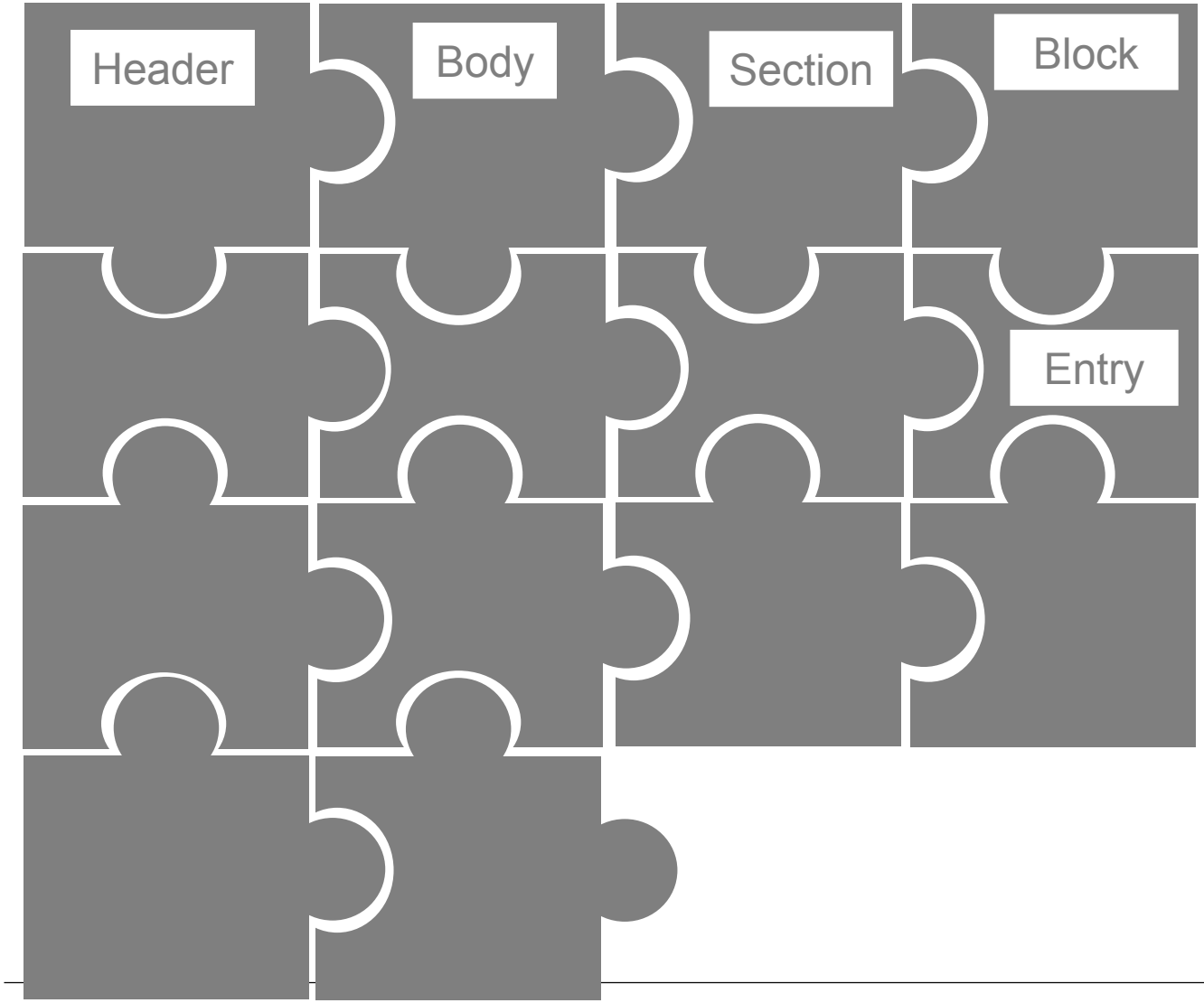
CDA Entry



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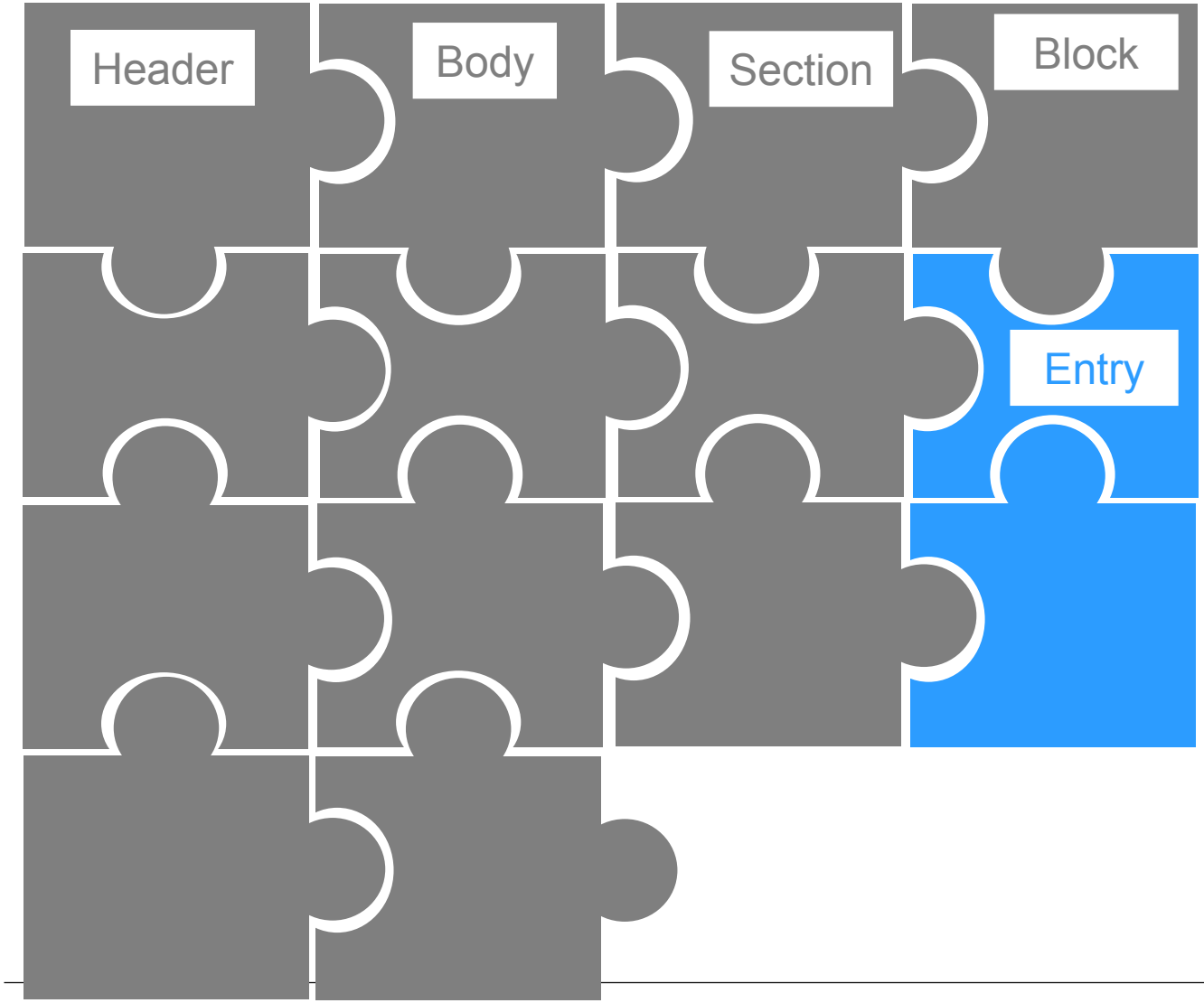
CDA Entry



Entries allow "machine-readability" (e.g. decision support applications).

Within a document section, an entry represents structured content for further computer processing.

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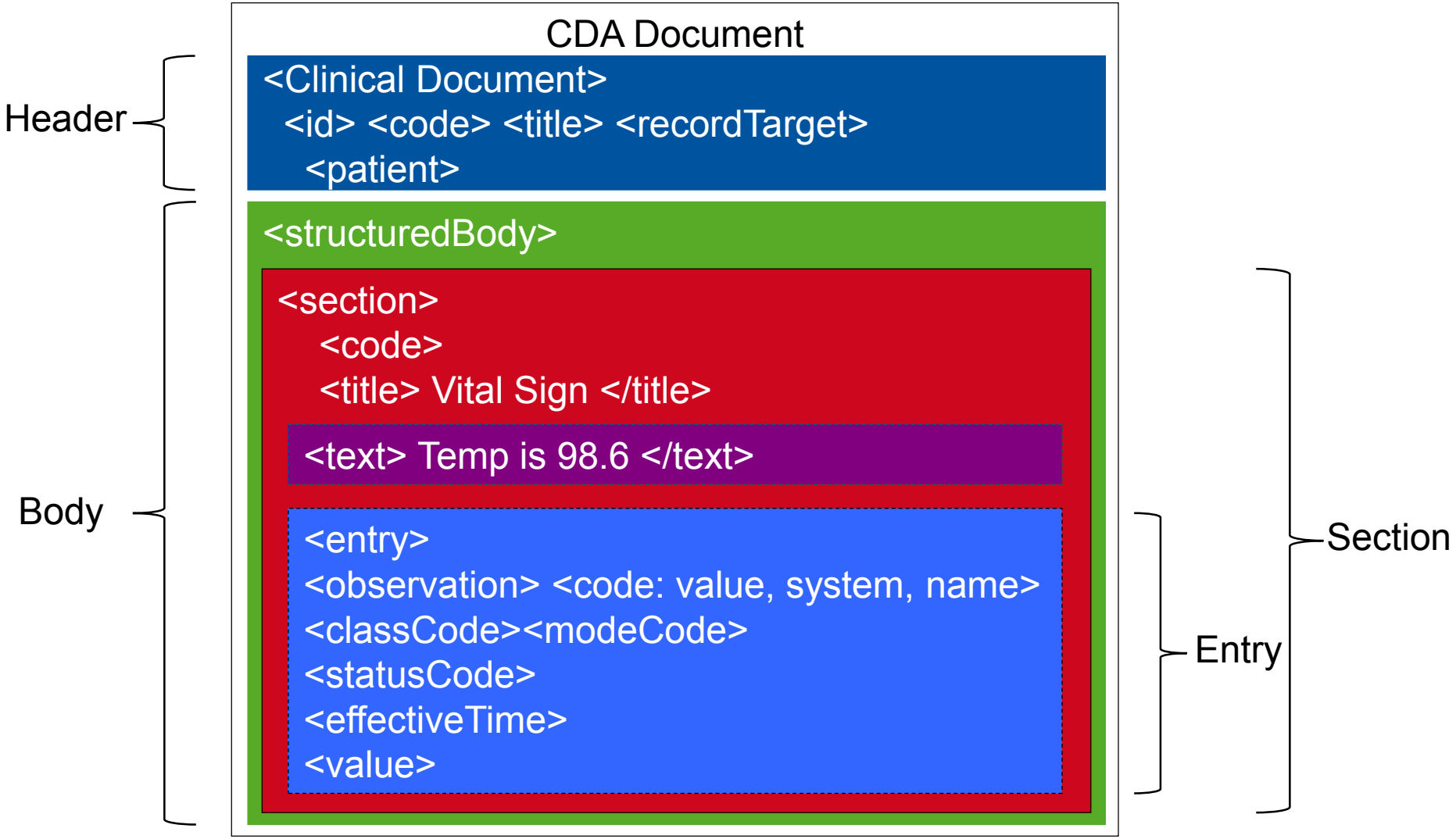
CDA Document Structure Example



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Practice

- In this xml, identify the CDA Structure

```
<?xml version="1.0" encoding="UTF-8"?>
<levelone xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:noNamespaceSchemaLocation="levelone_1.0.xsd">
  <clinical_document_header>
    <id EX="53123456" RT="2.16.840.1.113883.3.7.2.34556.1"/>
    <document_type_cd V="11490-0" S="2.16.840.1.113883.6.1" DN="Discharge Note"/>
    <origination_dttm V="20010412"/>
    <provider>
      <provider.type_cd V="CON"/>
      <person>
        <id EX="123456" RT="2.16.840.1.113883.3.7.2.12345.1.2"/>
      </person>
    </provider>
    <patient>
      <patient.type_cd V="PATSBJ"/>
      <person>
        <id EX="993534233" RT="2.16.840.1.113883.3.7.2.12345.1.2"/>
      </person>
    </patient>
  </clinical_document_header>
  <body>
    <section>
      <caption>Discharge Note</caption>
      <paragraph>
        <content> This is a very short note. </content>
      </paragraph>
    </section>
  </body>
</levelone>
```

Practice

- In this xml, identify the CDA Structure

```
<?xml version="1.0" encoding="UTF-8"?>
<levelone xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:noNamespaceSchemaLocation="levelone_1.0.xsd">
  <clinical_document_header>
    <id EX="53123456" RT="2.16.840.1.113883.3.7.2.34556.1"/>
    <document_type_cd V="11490-0" S="2.16.840.1.113883.6.1" DN="Discharge Note"/>
    <origination_dttm V="20010412"/>
    <provider>
      <provider.type_cd V="CON"/>
      <person>
        <id EX="123456" RT="2.16.840.1.113883.3.7.2.12345.1.2"/>
      </person>
    </provider>
    <patient>
      <patient.type_cd V="PATSBJ"/>
      <person>
        <id EX="993534233" RT="2.16.840.1.113883.3.7.2.12345.1.2"/>
      </person>
    </patient>
  </clinical_document_header>
  <body>
    <section>
      <caption>Discharge Note</caption>
      <paragraph>
        <content> This is a very short note. </content>
      </paragraph>
    </section>
  </body>
</levelone>
```

header

id

Document type

Provider

Patient

body

section

Templates

- TEMPLATES
  - In engineering, complex problems can some times be solved by breaking the problem down into smaller parts and finding solutions for the small parts
  - CDA Templates do exactly this
- CDA Implementation Guides
  - Essentially a collection of templates gathered to together for a particular purpose

Templates

- What is a Template?
- A template represents a formal definition of a set of constraints on a model
- A template has two parts:
  - Metadata such as an identifier, version, description, etc.
  - Body that contains the actual constraints
- Templates can be seen as a "set of instructions" for the proper creation of an instance of data for a specific use

CDA Templates -Levels of Constraint

- The CDA standard describes conformance requirements in terms of three general levels corresponding to three different, incremental types of conformance statements:

- Level 1 requirements impose constraints upon the CDA Header.
  The body of a Level 1 document may be XML or an alternate allowed format. If XML, it must be CDA-conformant markup.

- Level 2 requirements specify constraints at the section level of a CDA XML document:
  most critically, the section code and the cardinality of the sections themselves, whether optional or required.

- Level 3 requirements specify constraints at the entry level within a section.
  A specification is considered “Level 3” if it requires any entry-level templates.

Types of Templates

- Document-level templates:
  These templates constrain fields in the CDA header, and define containment relationships to CDA sections.

- Section-level templates:
- These templates constrain fields in the CDA section, and define containment relationships to CDA entries.

- Entry-level templates:
- These templates constrain the CDA clinical statement model in accordance with real world observations and acts.

- Other templates:
- These templates group a common set of constraints for reuse in CDA documents.

Templates –Conformance Statements

- CDA Templates are expressed as a collection of Conformance Statements
- Conformance statements constrain some aspect of a CDA class or classes
- Example:
  - SHALL contain exactly one [1..1] @classCode="OBS" Observation (CodeSystem: 2.16.840.1.113883.5.6 HL7ActClass) STATIC (CONF:7345)

Constraint Types

- Optionality (aka. Appearance):
  determine whether a particular element must appear in models or messages derived from the base model, and/or whether the element is precluded from appearing therein.

- Cardinality:
  define the number of repetitions that may occur for a given element.

- Type:
  limit the structure (datatype) of the element in question.

- Vocabulary:
  limit the set of concepts that can be taken as valid values in an instance of a coded attribute or field.

Optionality Constraints -Conformance Verbs

- SHALL: an absolute requirement
- SHALL NOT: an absolute prohibition against inclusion
- SHOULD/SHOULD NOT: best practice or recommendation. There may be valid reasons to ignore an item, but the full implications must be understood and carefully weighed before choosing a different course
- MAY/NEED NOT: truly optional; can be included or omitted as the author decides with no implications

Cardinality Constraints

- Number of times a repeating element may appear in a CDA document instance
- Expressed as a minimum and a maximum values: [0..1]
- Examples:
  - [0..1] as zero to one present
  - [1..1] as one and only one present
  - [1..*] as one or more present
  - [0..*] as zero to many present
  - [0..0] as zero present

Type Constraints

- All attributes in HL7 V3 models (such as CDA) have an associated data type
  - Data types are essentially a collection attributes that describe the data being conveyed
  - All the V3 data types derive from a data type called ANY
- The most common data type constrain in templates is for the Observation.valueattribute which uses the ANY data type
- In a CDA Observation template, a specific data type needs to be assigned to the Observation.value
- Example:
  SHALL contain exactly one [1..1] value with @xsi:type="CD"
- xsi:typeis the XML schema language mechanism for overriding an element's base data type

HL7 - Code Data Types

- CD (Concept Descriptor) is the most complex code data type

- provides the functionality of CE (*Coded with Equivalents*) as well as <qualifier > elements to enable postcoordinated expressions to be exchanged.
- <qualifier > elements are made up of name-value pairs, where <name > is the type of relationship and <value > is the value of the qualifier.

- For example, the term “compression fracture of neck of femur” can be represented as a postcoordinated SNOMED CT expression using compositional grammar as follows:

```
71620000|fracture of femur|: 116676008|associated
   morphology|=21947006|compression fracture|,363698007|finding
   site|=29627003|structure of neck of femur|
```

HL7 - Code Data Types

Expression represented by using the CD data type as:

```
<code code="71620000"codeSystem="2.16.840.1.113883.6.96"
    codeSystemName="SNOMED CT"
    displayName="fracture of femur">
  <qualifier>
    <name code="363698007" displayName="finding site"
       codeSystem="2.16.840.1.113883.6.96" />
    <value code="29627003" displayName="structure of neck of
    femur"/>
  </qualifier>
  <qualifier>
    <name code="116676008" displayName="associated
    morphology"/>
    <value code="21947006" displayName="compression
    fracture"/>
  </qualifier>
</code>
```

Type Constraints

```
<value xsi:type="CD"
      code="T2“codeSystem="2.16.840.1.113883.15.6“
      codeSystemName="TNM 7. Edition"
      displayName="Tumor &gt; 20 mm but &lt;= to50 mm in greatest dimension"/>
<value xsi:type="PQ" value="57" unit="a"/>
```

Vocabulary Constraints

- Limit the set of concepts that can be taken as valid values in an instance of a coded attribute or field

- Single code binding –Limiting the value to a single coded value
  - Example: SHALL contain exactly one [1..1] code/@code="21843-8" Usual Occupation Hx(CodeSystem: LOINC 2.16.840.1.113883.6.1)

- Value Set binding –Limiting the set to a value set of allowed codes

  - SHALL contain exactly one [1..1] value with @xsi:type="CD" to record the occupation of the patient, where the @code SHALL be selected from ValueSetCensus Occupation Codes 2.16.840.1.114222.4.11.6036 DYNAMIC.

  - Value-set constraints can be STATIC, meaning that they are bound to a specified version of a value set, or DYNAMIC, meaning that they are bound to the most current version of the value set.

Vocabulary Constraints

- Code system constraint narrows the allowed values to a single or multiple code systems
  - where the code SHALL be selected from LOINC (CodeSystem: 2.16.840.1.113883.6.1) or SNOMED CT (CodeSystem: 2.16.840.1.113883.6.96) (CONF:7166).

OIDs –ISO Object Identifier

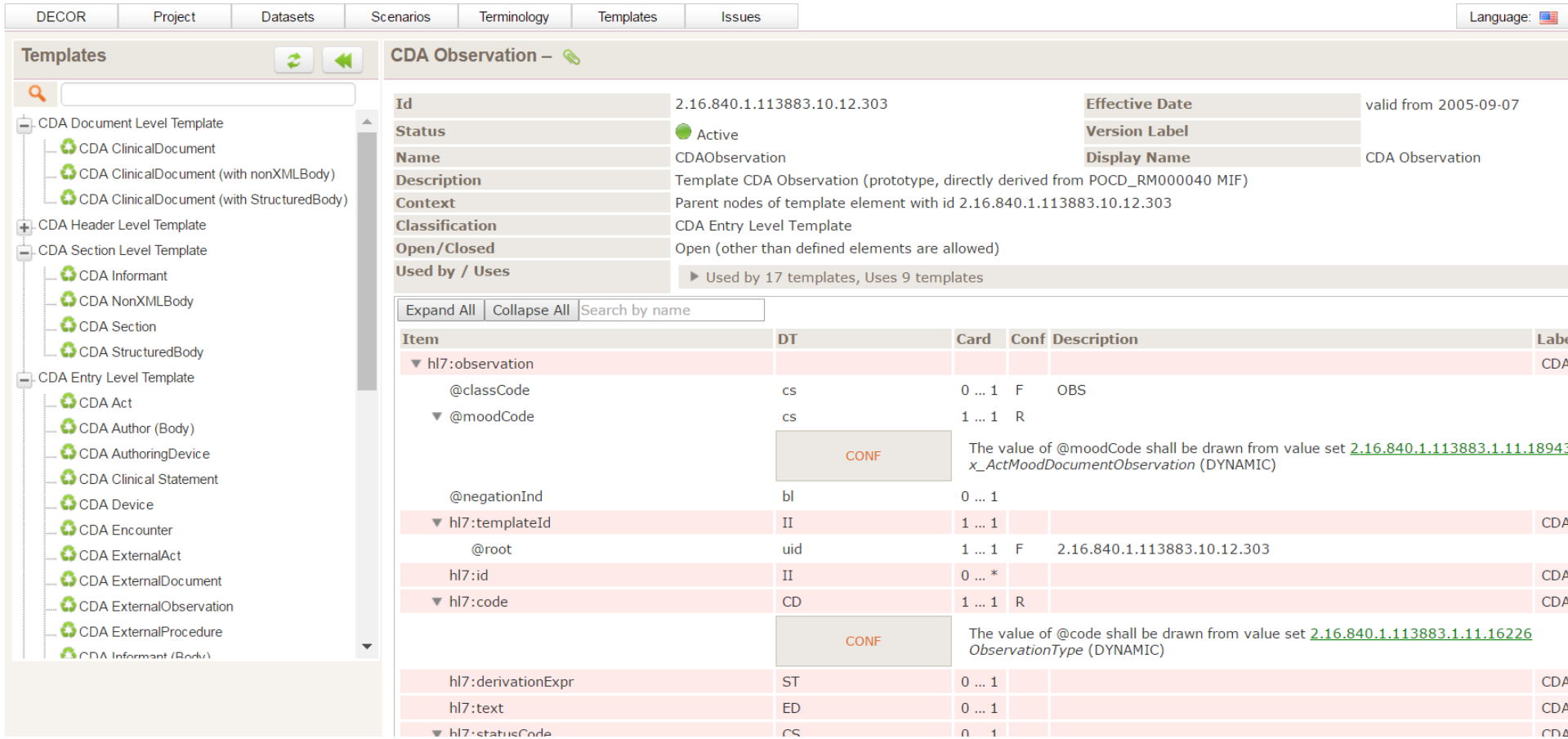
- A string of numbers and dots that are used to uniquely identify an object.
  2.16.840.1.113883.6.1

- HL7 uses OIDs to identify coding systems and value sets
- An OID is a node in a hierarchical tree structure, with the leftmost number representing the root and the rightmost number representing a leaf.
  - Each branch under the root corresponds to an assigning authority.

- HL7 has its own OID 2.16.840.1.113883 (iso.country.us.organization.hl7) and maintains an OID registry with around 3,000 nodes.

- CDA Templates use OIDs to uniquely identify the template
  SHALL contain exactly one [1..1] templateId such that it
  a. SHALL contain exactly one [1..1] @root="1.3.6.1.4.1.19376.1.5.3.1.3.28“

CDA R2 Standard - Templates



http://art-decor.org/art-decor/decor-templates--ad1bbr-

▼ hl7:interpretationCode	CE	0 ... *		CDAObservation
	CONF	The value of @code shall be drawn from value set 2.16.840.1.113883.1.11.78 *ObservationInterpretation* (DYNAMIC)		
▼ hl7:methodCode	CE	0 ... *		CDAObservation
	CONF	The value of @code shall be drawn from value set 2.16.840.1.113883.1.11.14079 *ObservationMethod* (DYNAMIC)		
▼ hl7:targetSiteCode	CD	0 ... *		CDAObservation
@codeSystem		1 ... 1	F	2.16.840.1.113883.5.1052

ObservationMethod – 2.16.840.1.113883.1.11.14079 (repository)

Name	ObservationMethod	**Display Name**	ObservationMethod
Version	2014-03-26T00:00:00 (repository: ad2bbr-) ▾	**Status**	Final
Version Label	DEFN=UV=VO=1360-20160323	**Id**	2.16.840.1.113883.1.11.14079

Description

History description 2014-03-26: Lock all vaue sets untouched since 2014-03-26 to trackingId 2014T1_2014_03_26

description:
A code that provides additional detail about the means or technique used to ascertain the observation.

Examples: Blood pressure measurement method: arterial puncture vs. sphygmomanometer (Riva-Rocci), sitting vs. supine position, etc.

Constraints: In all observations the method is already partially specified by the Act.code. In this case, the methodCode NEED NOT be used at all. The methodCode MAY still be used to identify this method more clearly in addition to what is implied from the Act.code. However, an information consumer system or process SHOULD NOT depend on this methodCode information for method detail that is implied by the Act.code.

If the methodCode is used to express method detail that is also implied by the Act.code, the methodCode MUST NOT be in conflict with the implied method of the Act.code.

Source Codesystems	2.16.840.1.113883.5.84	Observation Method

Values

Level/Type	Code	Display Name	Codesystem	Description
0-L	**0001**	**Complement fixation**	**Observation Method**	
0-L	0002	Computed axial tomography	Observation Method	
0-L	0003	HLAR agar test	Observation Method	
0-L	0004	Macroscopic observation	Observation Method	
0-L	0005	Magnetic resonance	Observation Method	
0-L	0006	Morphometry	Observation Method	
0-L	0007	Positron emission tomography	Observation Method	
0-L	0008	SAMHSA confirmation	Observation Method	

- Examples:
- https://github.com/brettmarquard/HL7-C-CDA-Task-Force-Examples/blob/master/CCD_Transition_of_Care_Ambulatory_Complete_NoKnown_Medication_Allergies.xml

- https://www.w3.org/TR/grddl-primer/hl7-sample.xml

- http://www.vico.org/CDAR22005_HL7SP/