



## **HL7 Version 3 Domain Analysis Model: Virtual Medical Record for Clinical Decision Support - (vMR-CDS), Release 3**

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## Executive Summary

A Virtual Medical Record (vMR) for Clinical Decision Support (CDS) is a data model for representing clinical data relevant to CDS. The vMR encompasses data about a patient's demographics and clinical history, as well as CDS inferences about the patient (e.g., recommended clinical interventions).

This Domain Analysis Model (DAM) includes the following:

- A specification of a vMR for CDS
- Structural specifications for inputs and outputs of CDS engines, which are composed primarily of vMR data
- A structural specification for identifying input data requirements for specific CDS use cases

In addition, examples are provided for clinical data represented using a vMR structure.

Several resources are not provided in this DAM but are expected to be needed for specific CDS implementations using the vMR. These resources include the following:

- Templates that constrain the vMR and its components for specific interoperability settings. Of note, it is anticipated that the S&I Framework Health eDecisions initiative will define such templates ([www.healthdecisions.org](http://www.healthdecisions.org)).
- Implementation guides for platform-specific implementation approaches for the vMR
- Mappings between HL7 balloted information structures and the vMR

Of note, the HL7 vMR project team plans on developing the above required resources and to contribute them through HL7 and through other dissemination channels. In particular, OpenCDS (<http://www.opencds.org>) will be making many of the above resources available as open-source contributions.

The vMR DAM was initially balloted in May 2010. Since then, the comments from that ballot have been incorporated to develop a DAM that is more closely aligned with the HL7 Reference Information Model. In particular, the vMR DAM has been re-designed so that it can be more easily populated from standard HL7 artifacts such as the HL7 Continuity of Care Document (CCD). vMR project team members have vetted and iteratively refined the approach proposed in this DAM through implementations of draft versions of the DAM, such as through the OpenCDS initiative.

## Revision History

### ***1. Revisions of HL7 vMR DAM Release 2 Specification Compared to HL7 vMR DAM Release 1 Specification***

Compared to Release 1, Release 2 of the vMR DAM includes the following revisions:

- Additional classes and attributes incorporated, especially with regard to orders and proposals
- Added capability for clinical statements and entities to be extended through the use of coded name-value pairs in addition to the use of clinical statement relationships and entity relationships
- CDS output specification added, to parallel the existing CDS input specification

### ***2. Revisions of HL7 vMR DAM Release 3 Specification Compared to HL7 vMR DAM Release 2 Specification***

Compared to Release 2, Release 3 of the vMR DAM includes the following revisions:

- Modified CDS output to be an abstract class
- Modified CDS context to contain additional attributes

Added a grouping clinical statement to enable clinical statements to be grouped (e.g., a group of clinical statement proposals, at least one of which should be performed)



# vMR DAM Specification

## 1. Modeling Methodology

The vMR DAM was developed in several stages.

As an important initial step the vMR project team conducted a multi-institutional analysis of CDS data needs encompassing 20 CDS systems from 4 nations, which included both large-scale home-grown CDS systems (e.g., CDS systems of the Veterans Health Administration, Intermountain Healthcare, and Partners Healthcare) as well as a number of commercial CDS systems (Siemens Soarian, Eclipsys Sunrise, Medical-Objects CDS, Altos OncoEMR, Hughes riskApps, Wolters Kluwer Health Infobutton API, and Medi-Span). This analysis identified the use of 131 atomic data elements across the 20 CDS systems. A manuscript summarizing the findings from this study is available at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3041317/>.

Using the results of this multi-institutional CDS data needs analysis as the foundation, an initial DAM was developed using the following modeling guidelines:

- Encompass all data elements identified as being used for CDS by the multi-institutional CDS data needs analysis
- Encompass additional data elements as being used for CDS based on input from CDS vendors and analysis of the Clinical Element Model from Intermountain Healthcare
- Encompass data elements that are required for national quality measure reporting
- Encompass data elements that are required for the transmission of population-level CDS artifacts
- Some general inclusion criteria for model classes, subclasses, and attributes are as follows:
  - Pareto Principle. Focus on the ~20% (minority) of items (e.g., substance administration, laboratory, imaging) that represent ~80% (majority) of the typical components of CDS interventions, while keeping the model more general for other domains and allowing for extensions
  - Granularity. Model classes, subclasses, and attributes should be created if there are sufficient unique properties to differentiate them from existing more general concepts
  - Terminology. Focus on the inclusion of data elements that are not already precoordinated into existing standard terminologies and/or instances of postcoordinated data elements that are required to support computability
- Use an extensible modeling approach, with the understanding that the model can be restricted later through implementation guides and profiles.
- Focus on modeling population-level data elements (e.g., core attributes such as frequency) while excluding patient-specific data elements (e.g., patient pregnancy status) while allowing patient-specific data elements to be addressed through extension mechanisms

The initial vMR DAM was balloted in May 2010. The ballot did pass the informative guide approval vote requirements. Subsequently, the vMR project team sought to do the following: (i) address the peer review comments and insights received during this process and (ii) implement draft versions of the vMR specification to ensure its usability. As some specific enhancements to the vMR resulting from this process, the vMR now includes concrete, constrained data types derived from ISO 21090 data types, and the vMR was more closely aligned with normative HL7 constructs to better enable semantic interoperability with these models.

Additional modeling work was undertaken to improve alignment of vMR with the use cases defined by the ONC S&I Framework Health eDecisions initiative. The changes were ballot-approved in May 2013, and ballot reconciliation activities were completed in July 2013.

In summary, a variety of artifacts and requirements were considered in developing the DAM. These considered artifacts and requirements include the data requirements of 20 CDS systems from 4 nations; data analysis from CDS vendors; a variety of relevant data models (e.g., HL7 CCDA, Pedigree, and Clinical Statement models, Intermountain Healthcare Clinical Element Model); the collective CDS implementation experience of the project members; trial implementations of the proposed data model (e.g., by OpenCDS); and similar data models that have been in operational use for several years (e.g., the data model of the SEBASTIAN CDS Web service). Specific data models that were considered in the DAM development process include the following.

- HL7 CCD specification, Release 1
- HITSP C32, C80, C83, and C154 specifications.
- HL7 Clinical Statement Pattern, Release 1
- HL7 Pedigree model, Release 1
- HL7 Immunization model, Release 2
- HL7 Pharmacy model, Release 1
- HL7 Observations model, Release 1

Of note, while the above models were used as references when specifying the DAM, a formal mapping process was not undertaken. We intend to monitor ongoing activities in the development of these models to identify if and how the vMR needs to be improved as a result.

## ***2. Model Artifacts***

A separate file archive that accompanies this document contains the following model artifacts:

- The Enterprise Architect UML model (.EAP) containing the vMR DAM. Of note, this ballot document was auto-generated from this Enterprise Architect file using a custom reporting template included in the file.
- An XMI UML file (.xmi) exported from Enterprise Architect

Separate implementation guides are provided for implementing the vMR using specific implementation technologies, such as XML and GELLO.

Issues identified and expected to be incorporated into future versions of the specification can be found on the HL7 vMR wiki at [http://wiki.hl7.org/index.php?title=Virtual\\_Medical\\_Record\\_\(vMR\)](http://wiki.hl7.org/index.php?title=Virtual_Medical_Record_(vMR)).

Provided below is detailed documentation of the vMR DAM.

### 3. Domain Analysis Model

Details of the vMR Domain Analysis Model are provided below.

#### 3.1 modelParent

Type:	<u>Package</u>
Package:	Model

The modelParent package is the parent package containing the following subsidiary model packages:

- cdsInput: specifies the data input used by CDS systems. A CDS system is considered to be an information system that provides clinicians, staff, patients or other individuals with knowledge and person-specific information, intelligently filtered or presented at appropriate times, to enhance health and health care. A CDS system user is an individual who makes use of such a CDS system for the purposes of enhancing health and health care.
- cdsOutput: specifies the data output generated by CDS systems.
- cdsInputSpecification: specifies the specific CDS input data required for a specific CDS use case.
- vmr: specifies data about a patient relevant for CDS.
- dataTypes: specifies data types used. The data types are a simplified/constrained version of the HL7 version 3 datatypes specification, release 2, which is itself based on the implementable specification of ISO 21090 data types.

Note that this is a platform-independent, logical data model from which platform-specific data models can be derived.

### 3.1.1 vmr

Type: **Package** «XSDschema»  
 Package: modelParent

Specifies data about a patient relevant for CDS.

**vmr** - (Class diagram)

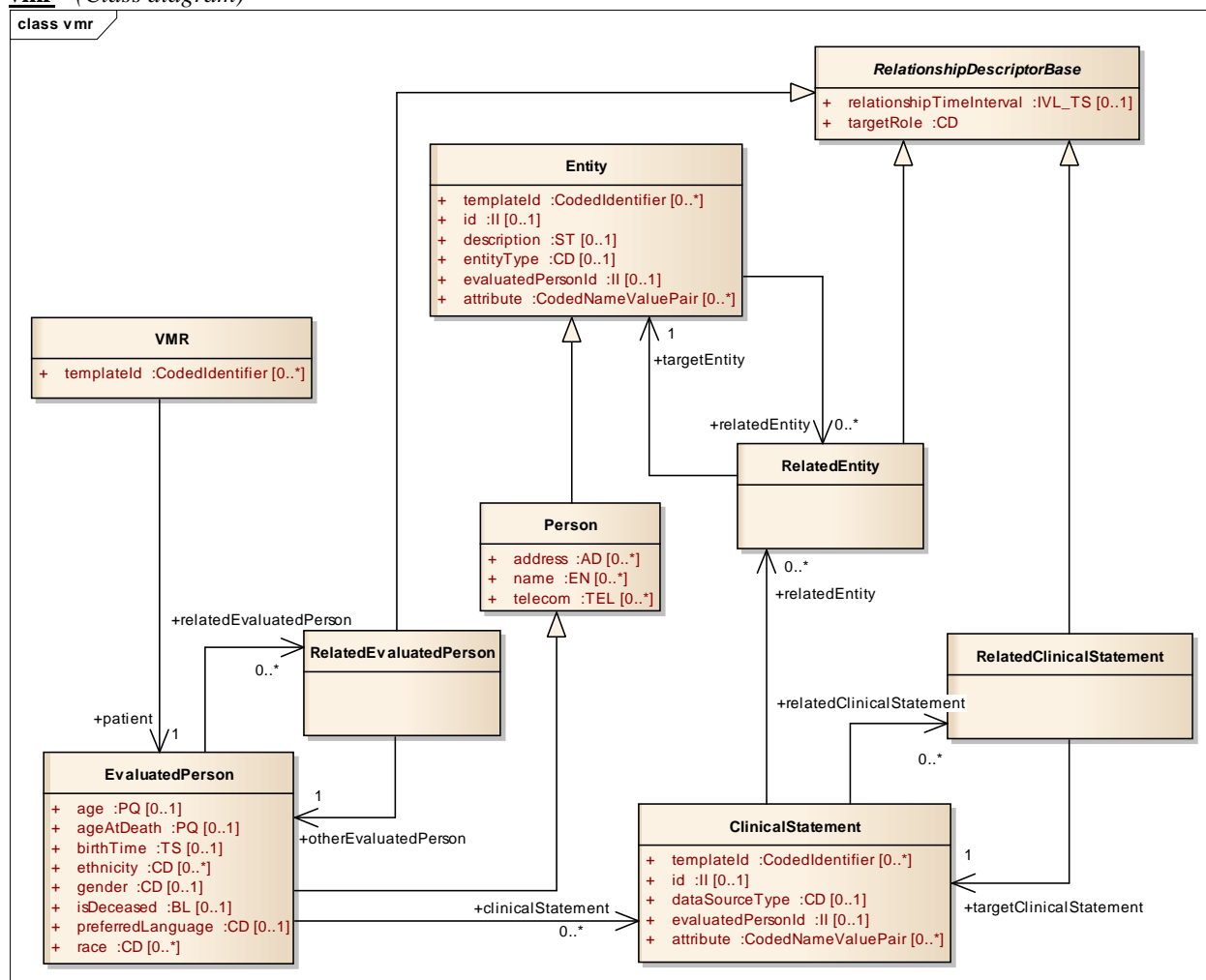


Figure: 1

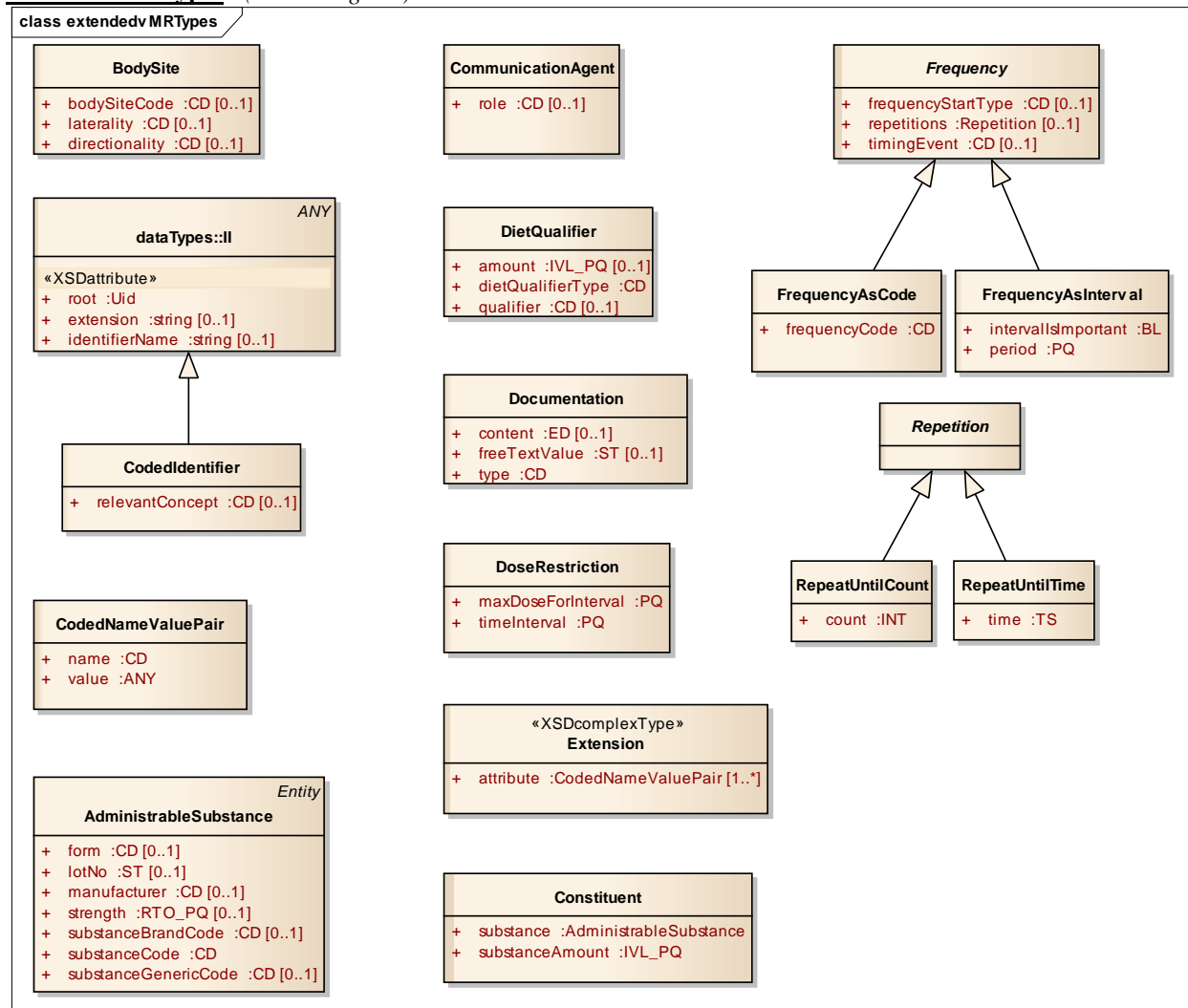
**extendedvMRTypes** - (Class diagram)

Figure: 2

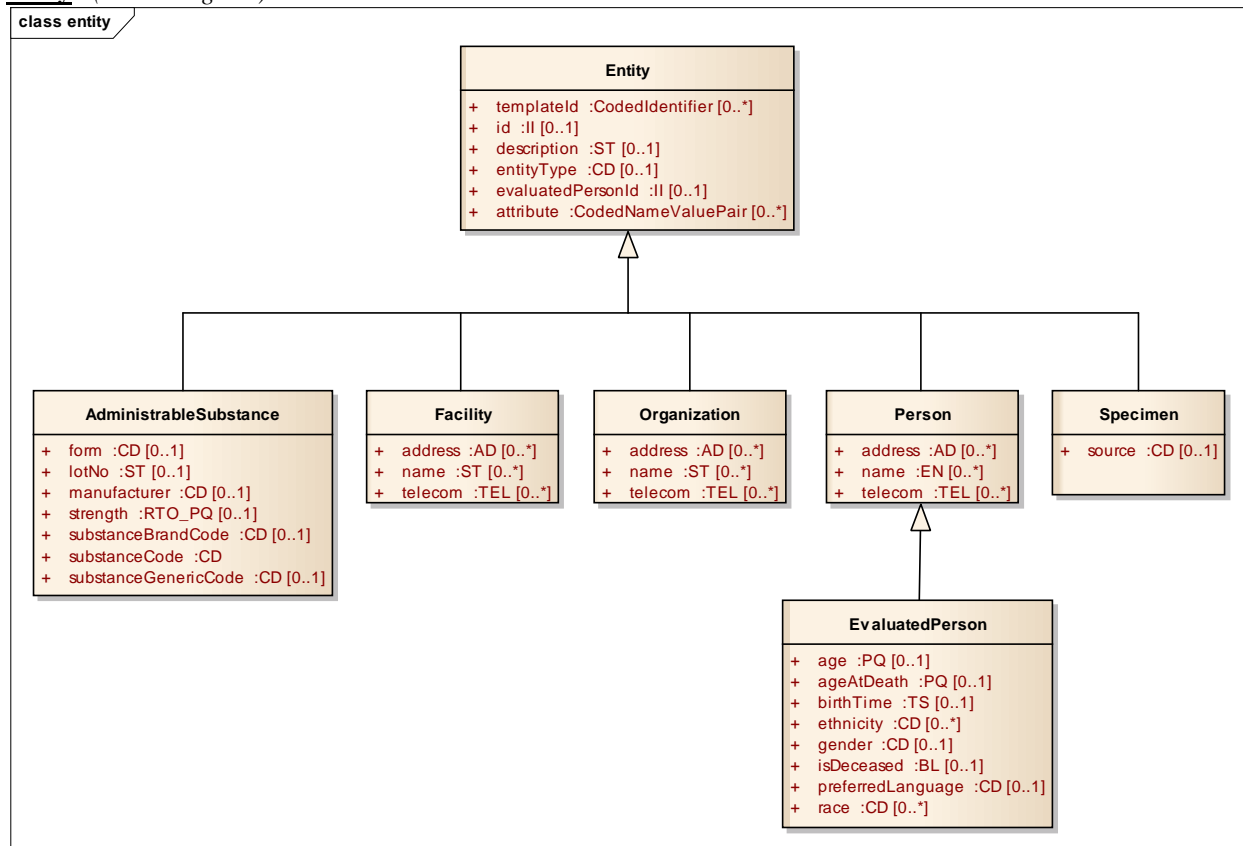
**entity** - (Class diagram)

Figure: 3

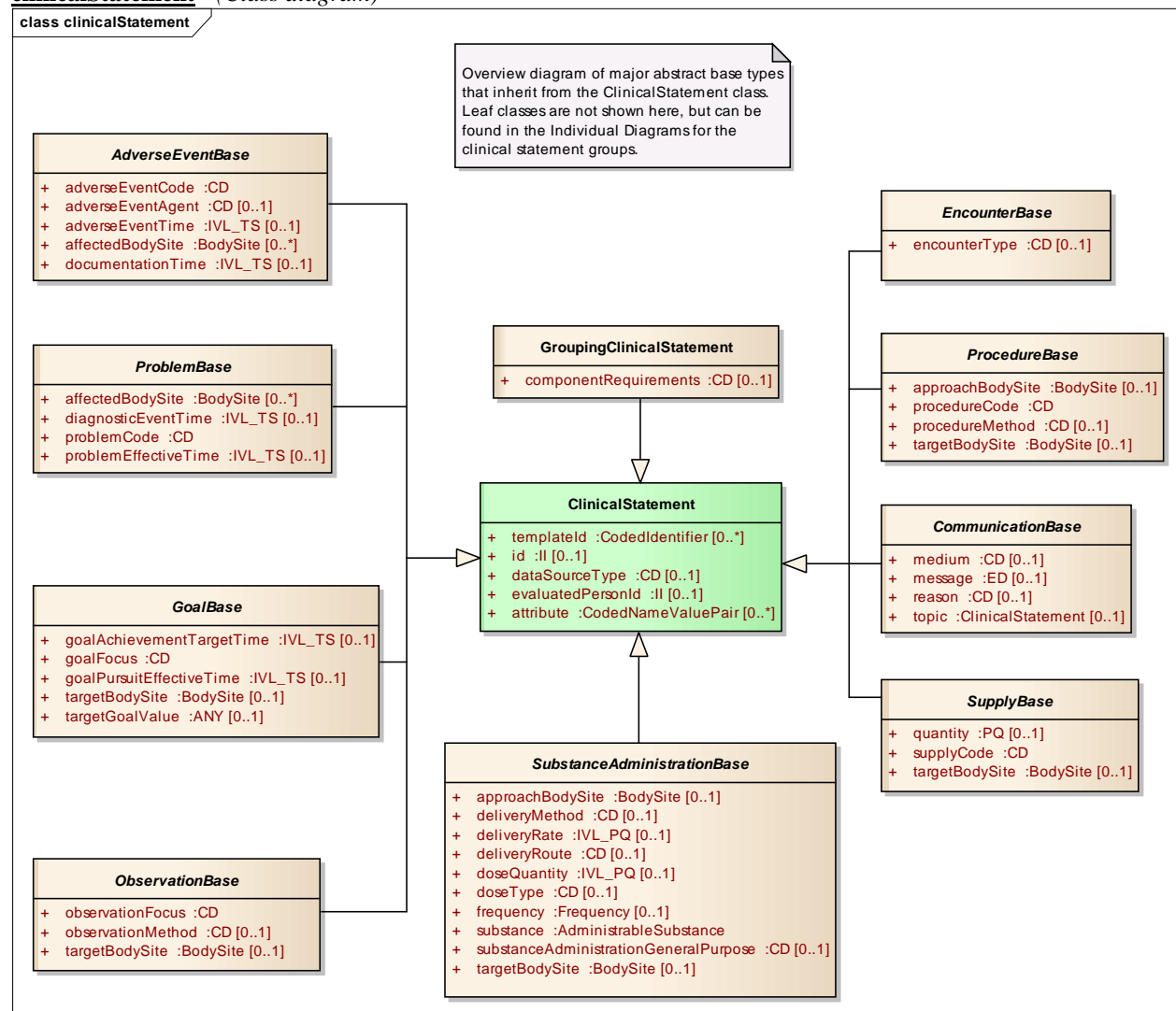
**clinicalStatement** - (Class diagram)

Figure: 4



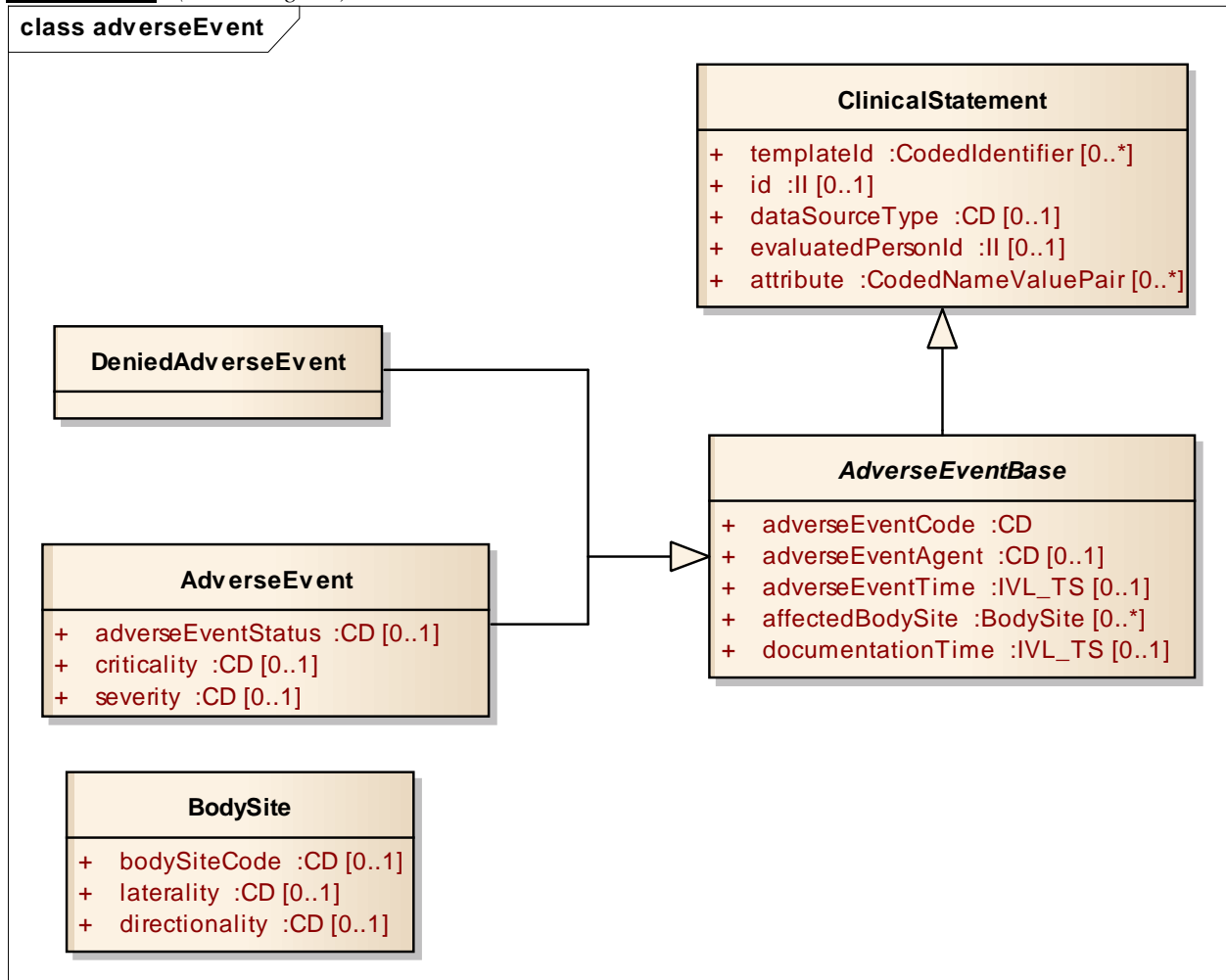
**adverseEvent** - (Class diagram)

Figure: 5

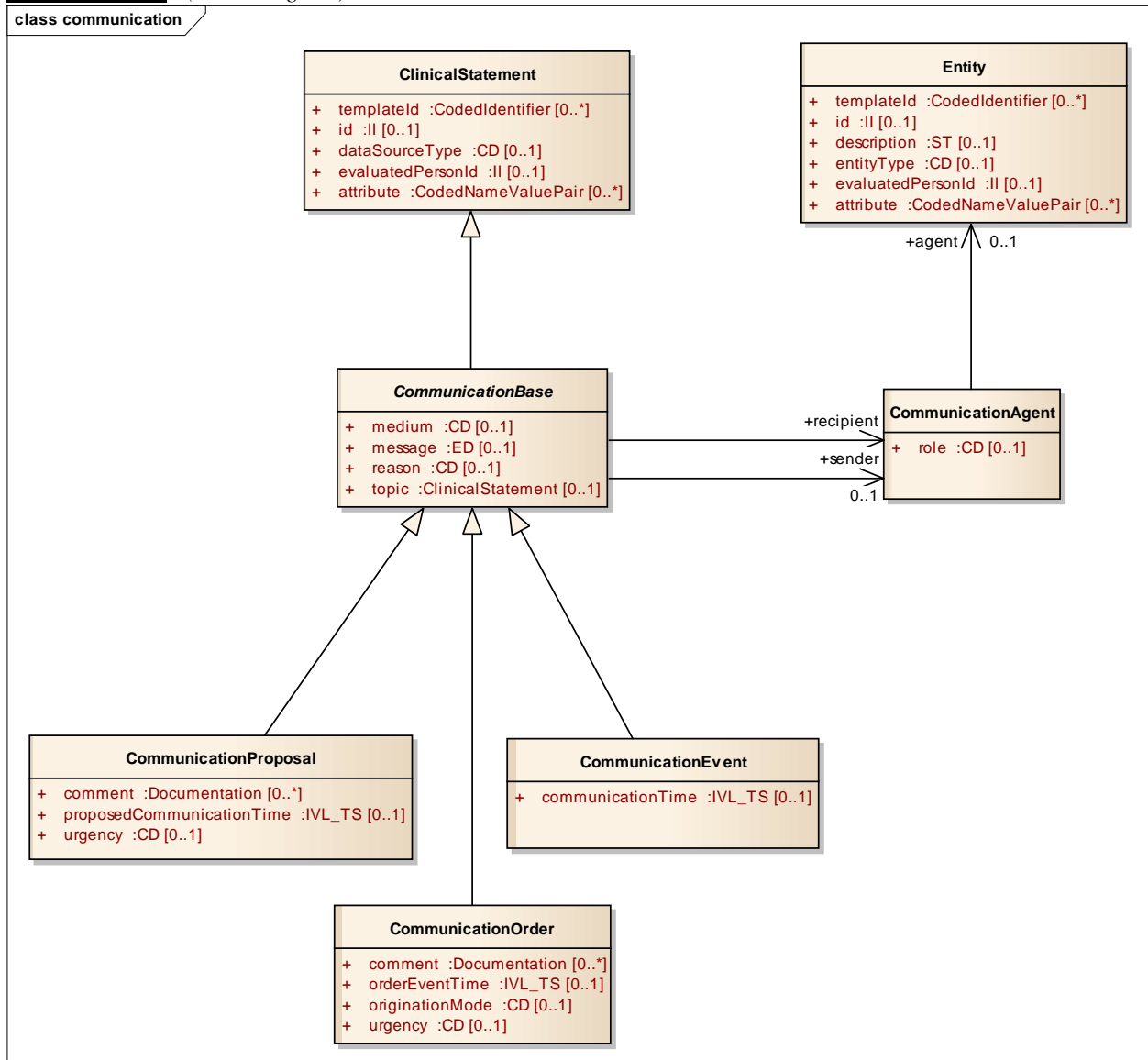
**communication** - (Class diagram)

Figure: 6

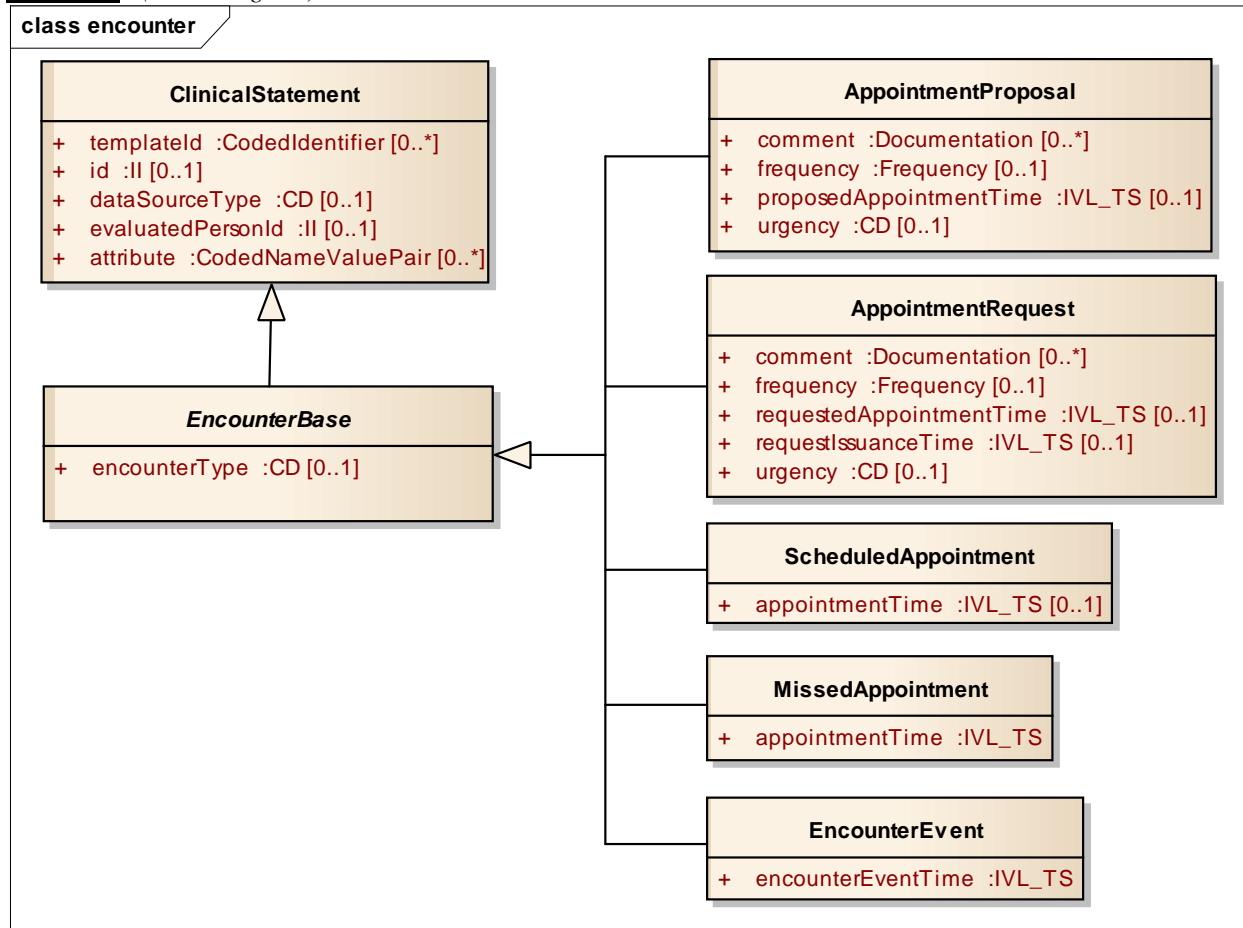
**encounter** - (Class diagram)

Figure: 7

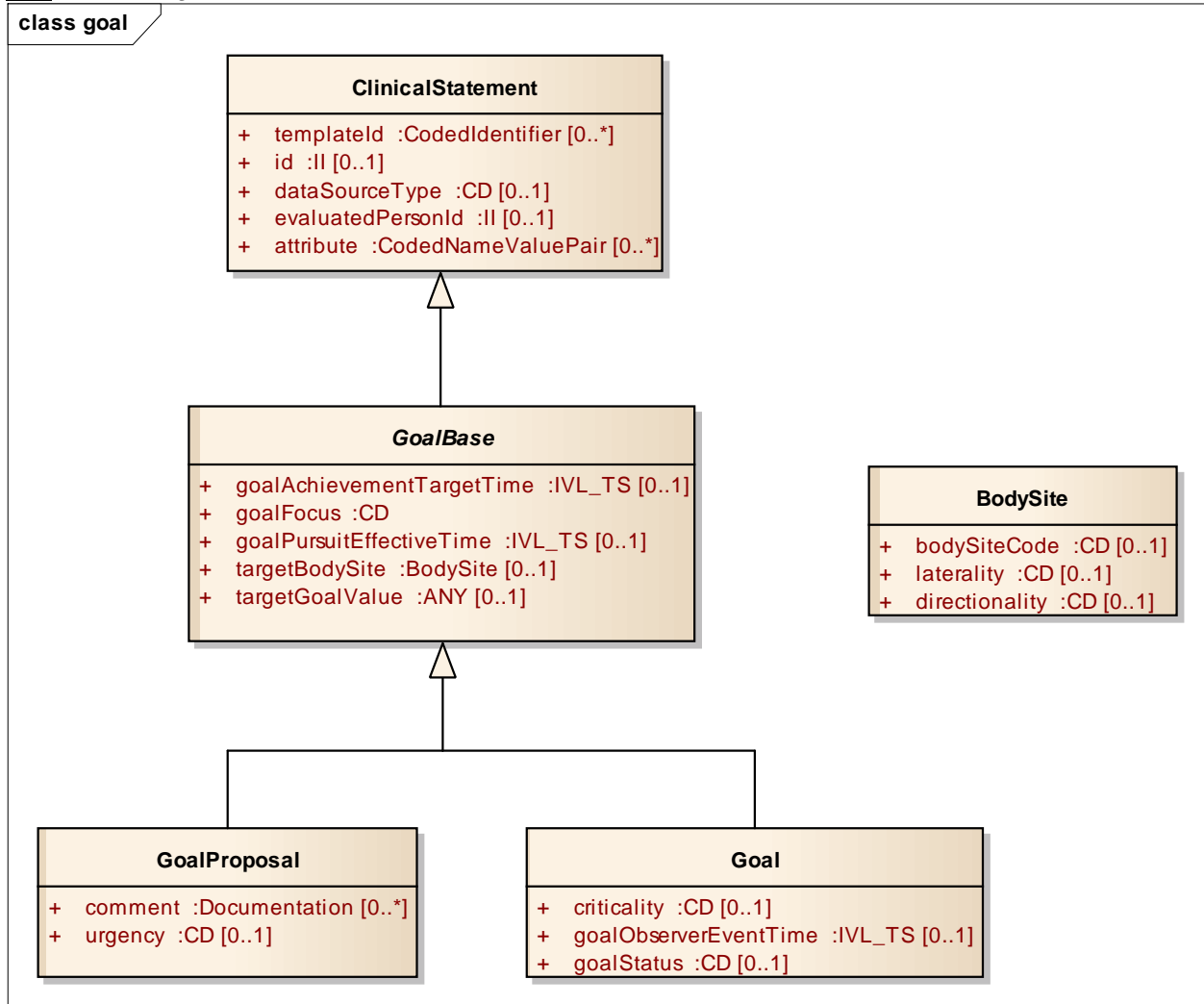
**goal** - (Class diagram)

Figure: 8

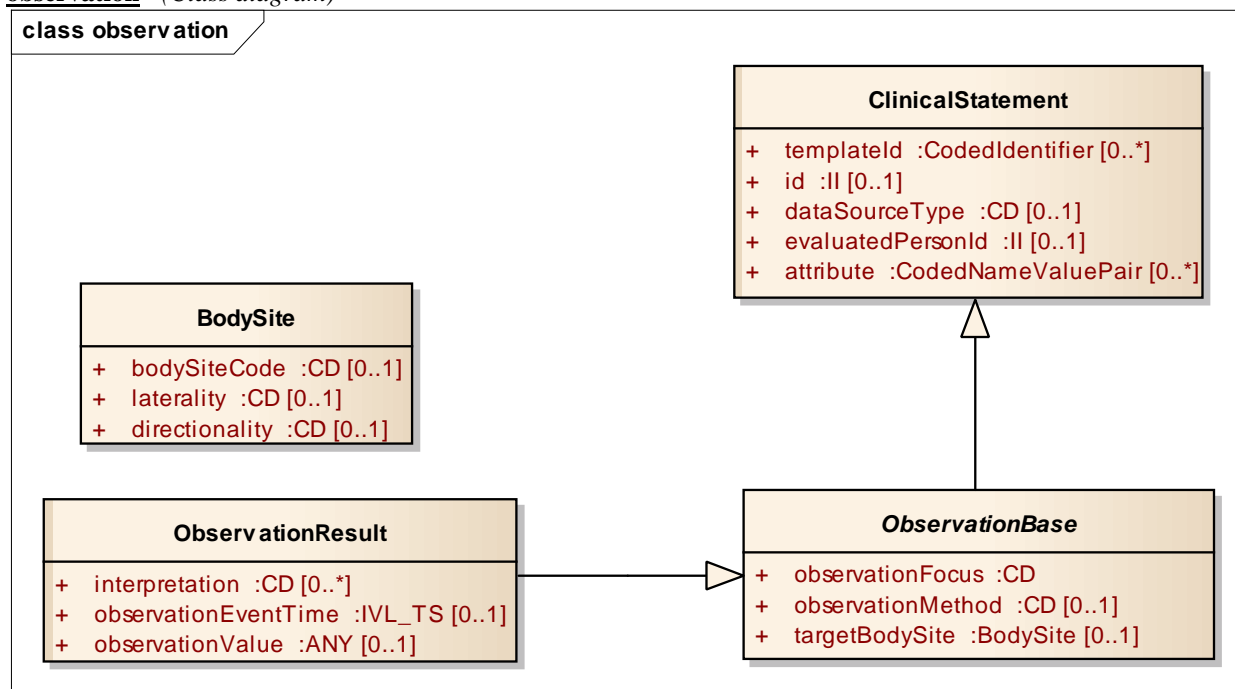
**observation** - (Class diagram)

Figure: 9

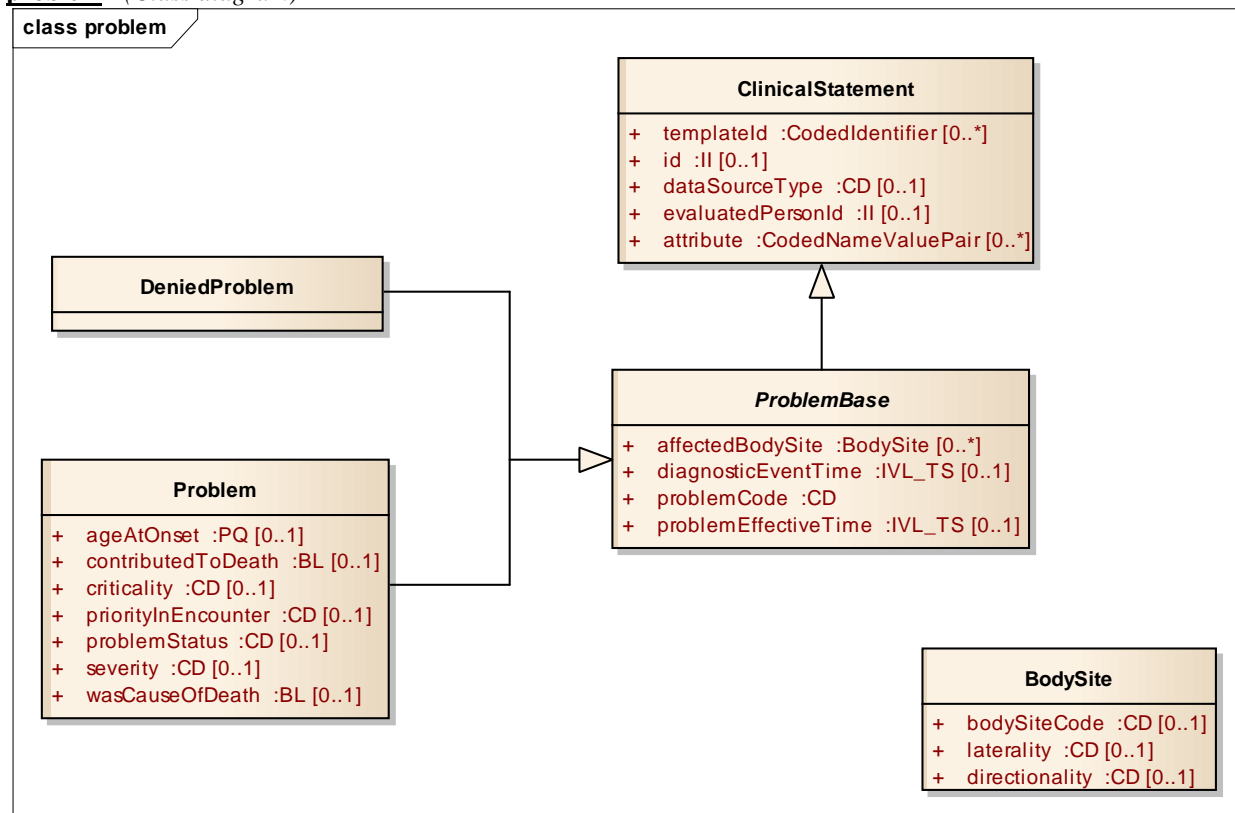
**problem** - (Class diagram)

Figure: 10

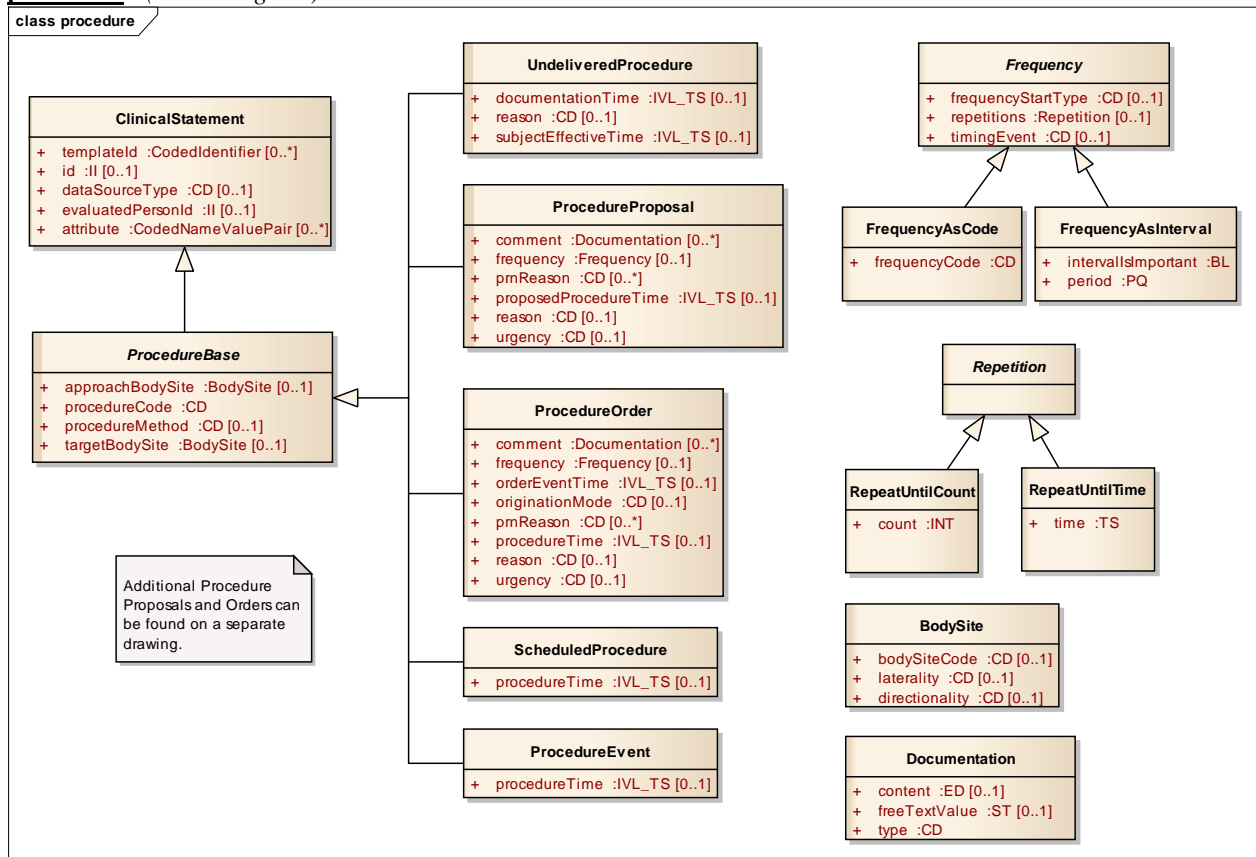
**procedure** - (Class diagram)

Figure: 11

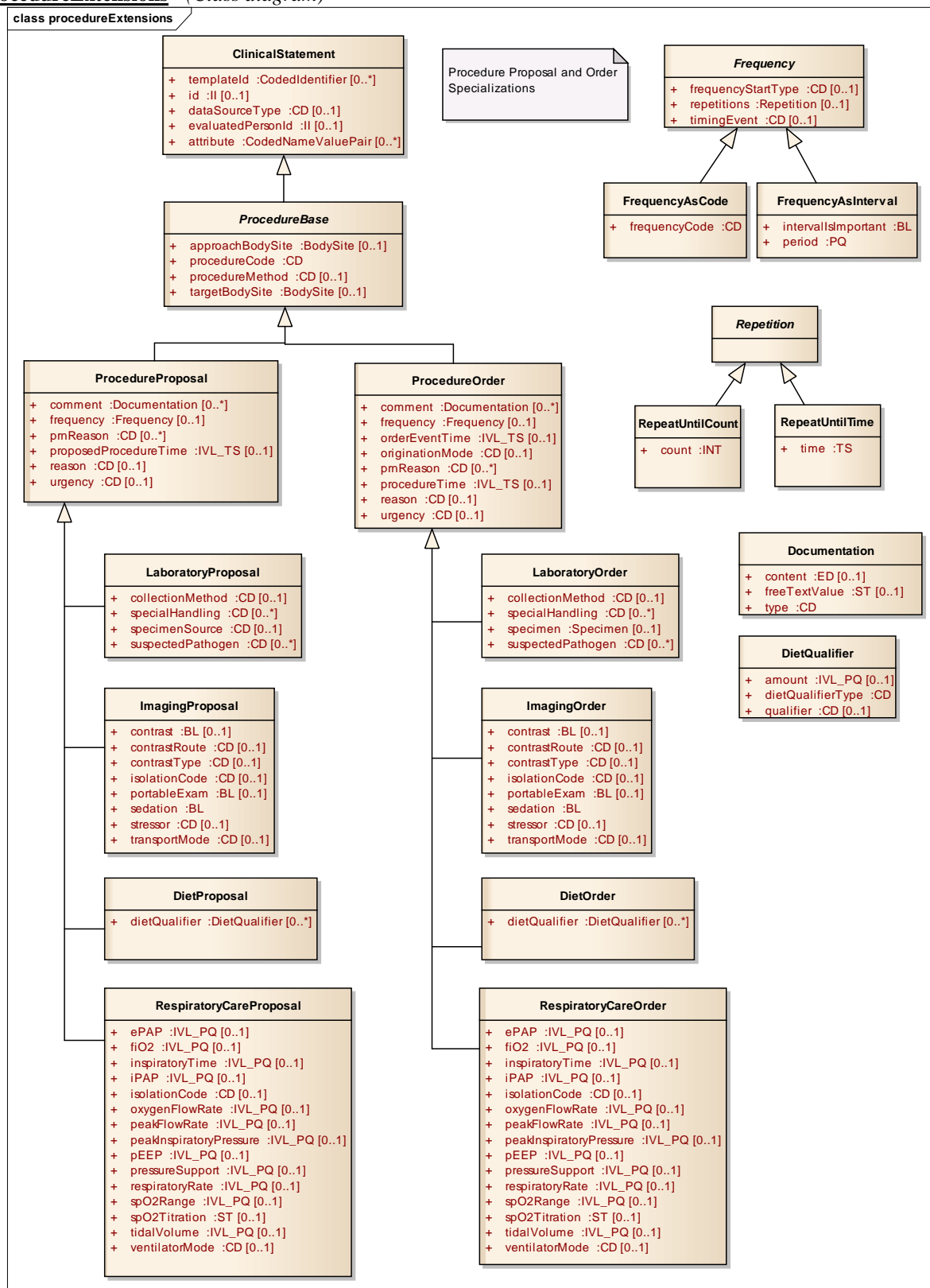
**procedureExtensions** - (Class diagram)

Figure: 12

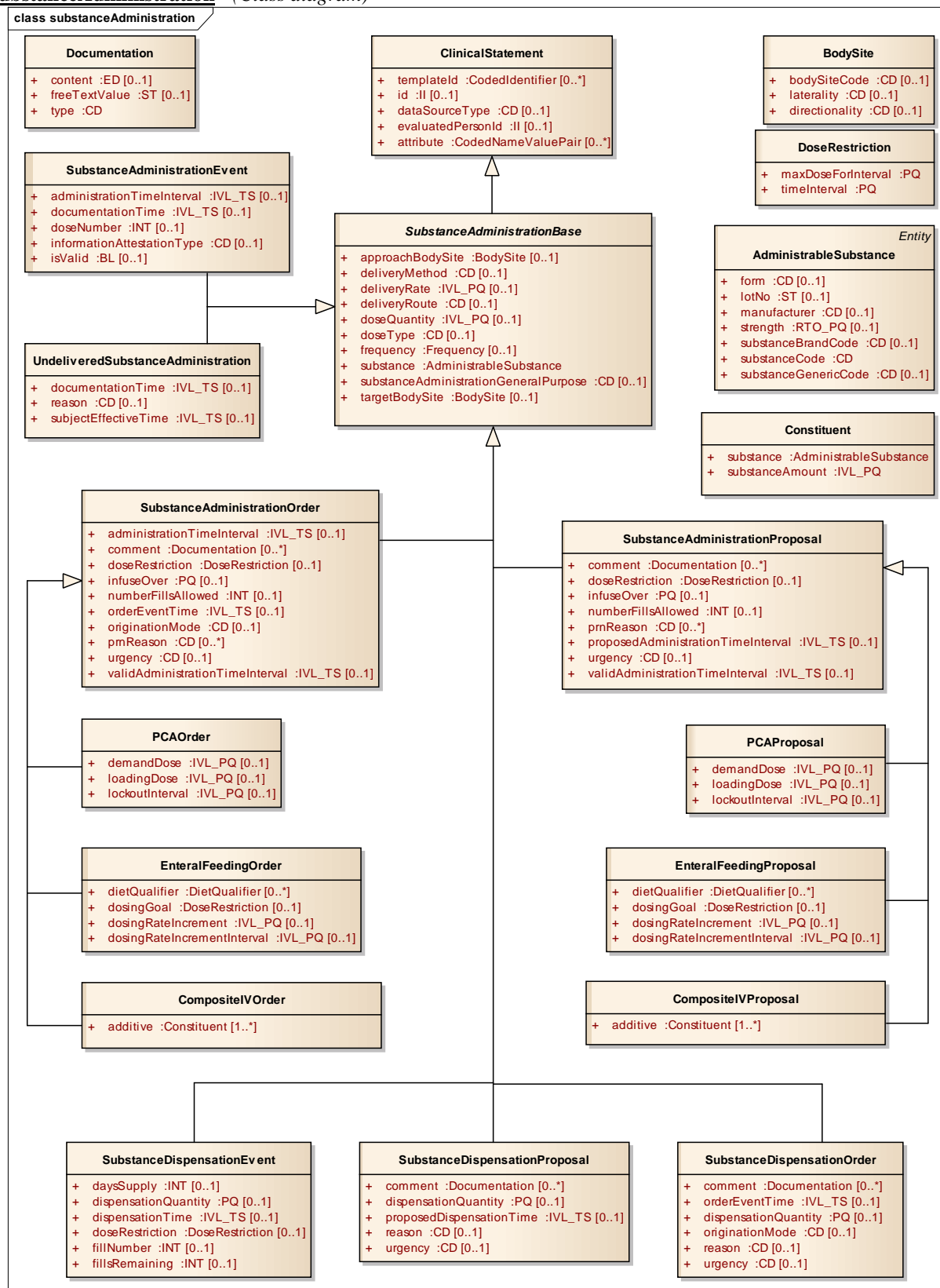
**substanceAdministration** - (Class diagram)

Figure: 13



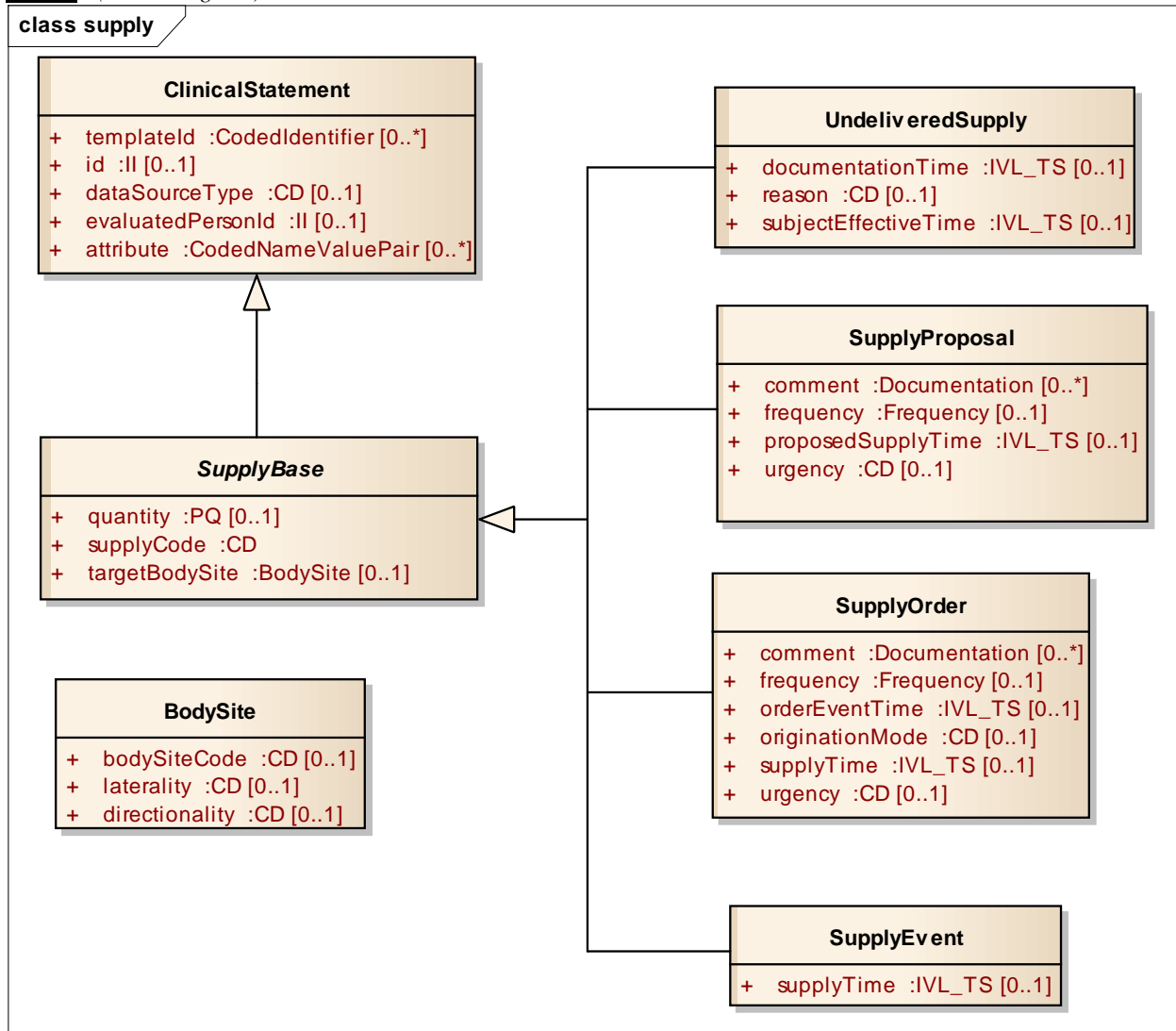
**supply** - (Class diagram)

Figure: 14

### 3.1.1.1 AdministrableSubstance

*Type:* **Class** **Entity**  
*Package:* vmr

A material of a particular constitution that can be given to a person to enable a clinical effect. It can have component administrable substances.

#### Attributes

Attribute	Notes
<b>form</b> CD [0..1]	The physical form of the substance as presented to the subject. E.g., tablet, patch, injectable, inhalant.
<b>lotNo</b> ST [0..1]	The number assigned by the manufacturer to the batch of manufactured substances in which this substance instance belongs. Used for quality control purposes.
<b>manufacturer</b> CD [0..1]	The organization that produces the substance. This is a CD and not an II because there are managed code systems for manufacturers.
<b>strength</b> RTO_PQ [0..1]	The concentration of the substance. E.g., 250 mg per 5 ml.
<b>substanceBrandCode</b> CD [0..1]	A code describing the product as a branded or trademarked entity from a controlled vocabulary.
<b>substanceCode</b> CD	The code that identifies the substance with as much specificity as appropriate, or as required by a template. E.g., aspirin, lisinopril. May be either a generic or brand code, unless otherwise restricted by a template.
<b>substanceGenericCode</b> CD [0..1]	A code describing the product as a substance produced and distributed without patent protection.

### 3.1.1.2 *AdverseEvent*

Type: **Class** **AdverseEventBase**  
 Package: vmr

Unfavorable healthcare event (e.g., death, rash, difficulty breathing) that is thought to have been caused by some agent (e.g., a medication, immunization, food, or environmental agent).

#### Attributes

Attribute	Notes
<b>adverseEventStatus</b> CD [0..1]	The state of the effects of this adverse event. E.g., active, inactive, resolved.
<b>criticality</b> CD [0..1]	Criticality: Applies to things about a patient - problems, observations, etc. (does not apply to actions) Characterizes impact on life, or durable impact on physiological function or on quality of life. Includes concepts such as life-threatening, or potential loss of function or capacity. E.g., Life threatening, potentially requires hospitalization, self-resolving. Different from severity in that a moderate subarachnoid hemorrhage is likely to be highly important, whereas a moderate headache is not.
<b>severity</b> CD [0..1]	Severity: Applies to things about a patient - problems, observations, etc. (does not apply to actions) Characterizes the intensity of the manifestation of the problem or observation or an adverse event. Includes concepts such as mild, moderate, severe. If the adverseEventCode is rash and severity is moderate, it means that the adverse event was a moderate rash.

### 3.1.1.3 *AdverseEventBase*

Type: **Class** **ClinicalStatement**  
 Package: vmr

Abstract base class for adverse events, which are unfavorable healthcare events (e.g., death, rash, difficulty breathing) that are thought to have been caused by some agent (e.g., a medication, immunization, food, or environmental agent). If a given agent is thought to cause multiple reactions, these reactions should be represented using multiple adverse events.

#### Attributes

Attribute	Notes
<b>adverseEventCode</b> CD	Coded nature of the effects of the adverse event; maps to the "value" of an adverse event observation. For an adverse event due to an identified agent, this is the reaction code. E.g., hives, difficulty breathing.
<b>adverseEventAgent</b> CD [0..1]	The causative agent of the adverse event, identified with as much specificity as available, or as required by a template. E.g., penicillin, peanuts.
<b>adverseEventTime</b> IVL_TS [0..1]	The time that reflects when the subject experienced the adverse event (in the case of AdverseEvent) or when the subject <i>did not</i> experience the adverse event (in the case of DeniedAdverseEvent).
<b>affectedBodySite</b> BodySite [0..*]	A body site affected by the adverse event.
<b>documentationTime</b> IVL_TS [0..1]	The time when the adverse event was documented (e.g., entered into an electronic health record system by a care provider).

### 3.1.1.4 AppointmentProposal

Type: **Class** EncounterBase  
 Package: vmr

Proposal, e.g., by a CDS system, for an Encounter to take place.

#### Attributes

Attribute	Notes
<b>comment</b> Documentation [0..*]	A comment, instruction, or note associated with the proposal. The type specifies the type of comment (e.g., 'Provider Instruction', 'Patient Instruction', 'Reason for Procedure', 'Consult Note', etc...) and the value of the comment represents the free text value.
<b>frequency</b> Frequency [0..1]	How often the proposed appointments must take place.
<b>proposedAppointmentTime</b> IVL_TS [0..1]	Proposed time for appointment. Optional, as the proposer (e.g., a CDS system) may wish to simply propose an appointment of a type (e.g., encounter with eye professional) without specifying a specific appointment time interval.  If RepeatUntilCount.count >= 2, then specifies proposed period within which the appointments should take place. In these cases, it is assumed that the appointments should be evenly distributed within the timeframe. E.g., if proposed time is 1/1/2011 to 12/31/2011, and RepeatUntilCount.count is 3, ideal appointment times would be 1/1/2011, 12/31/2011, and in the middle of the year.
<b>urgency</b> CD [0..1]	Urgency: Applies to actions - orders or proposals (does not apply to problems, observations) Characterizes how quickly an action must be initiated Includes concepts such as stat, urgent, routine

### 3.1.1.5 AppointmentRequest

Type: **Class** EncounterBase  
 Package: vmr

A request by a provider to schedule an appointment.

#### Attributes

Attribute	Notes
<b>comment</b> Documentation [0..*]	A comment, instruction, or note associated with the proposal. The type specifies the type of comment (e.g., 'Provider Instruction', 'Patient Instruction', 'Reason for Procedure', 'Consult Note', etc...) and the value of the comment represents the free text value.
<b>frequency</b> Frequency [0..1]	How often the requested appointments must take place.
<b>requestedAppointmentTime</b> IVL_TS [0..1]	Requested time for appointment.  If RepeatUntilCount.count >= 2, then specifies requested period within which the appointments should take place. In these cases, it is assumed that the appointments should be evenly distributed within the timeframe. E.g., if requested time is 1/1/2011 to 12/31/2011, and RepeatUntilCount.count is 3, ideal appointment times would be 1/1/2011, 12/31/2011, and in the middle of the year.
<b>requestIssuanceTime</b> IVL_TS [0..1]	Time when the encounter appointment was requested by the provider, as opposed to the time it was requested for.
<b>urgency</b> CD [0..1]	Urgency: Applies to actions - orders or proposals (does not apply to problems, observations) Characterizes how quickly an action must be initiated Includes concepts such as stat, urgent, routine

### 3.1.1.6 BodySite

Type: **Class**  
 Package: vmr

A location on an EvaluatedPerson's body. E.g., left breast, heart.

#### Attributes

Attribute	Notes
<b>bodySiteCode</b> CD [0..1]	A location on an EvaluatedPerson's body. May or may not encompass laterality. E.g., lung, left lung.
<b>laterality</b> CD [0..1]	The side of the body, from the EvaluatedPerson's perspective. E.g., left, right, bilateral.
<b>directionality</b> CD [0..1]	This is further specification of the body part by adding directionality, such as "upper", "lower", "frontal", "medial", etc.

### 3.1.1.7 ClinicalStatement

Type: Class  
Package: vmr

A record of something of clinical relevance that is being done, has been done, can be done, or is intended or requested to be done. A class that serves as the basis for other more specific clinical statements, such as ObservationEvent and ProcedureProposal. It is a concrete class that can be used as is or specialized as needed.

#### Naming and modeling conventions:

- in general, **attribute names** end in 'Code' if and only if the name of the attribute overlaps with the name of the parent class
- **times** are named as follows: **Time** is the default suffix for these attributes. **EventTime** is used to distinguish the time an order is placed vs. when the ordered act should take place. **EffectiveTime** and **TimeInterval** are used when there is a desire to emphasize that a prolonged time interval (e.g., > 1 day) can be used rather than a point in time or a short time interval. Note that regardless of the naming convention, **IVL\_TS** attributes allow time intervals of any length.
- **subjectEffectiveTime** is the time that is primarily related to the subject's experience of disease or treatment events (or durations), rather than when those events were reported or recorded by the performer
- **performerEventTime** is the event time that is primarily related to the performer, rather than the subject.
- the **state between ordering and the ordered event occurring** is modeled only in cases of procedures and encounters, due to the substantial rate at which orders do not result in events.

#### Approaches to representing specific statements:

- No known allergies --> DeniedAdverseEvent with adverseEventAgentCode that is the generic root-level code for substances and adverseEventCode that is the generic root-level code for adverse events.
- No known drug allergies --> DeniedAdverseEvent with adverseEventAgentCode that is the root-level code for medications and adverseEventCode that is the generic root-level code for adverse events.
- No known food allergies --> DeniedAdverseEvent with adverseEventAgentCode that is the root-level code for food and adverseEventCode that is the generic root-level code for adverse events.
- No known medications --> UndeliveredSubstanceAdministration with substance that is the root-level code for medications.
- No known problems --> DeniedProblem with problemCode that is the root-level code for problems or conditions.
- Patient takes an unknown drug --> SubstanceAdministrationEvent where code for substance represents "unknown medication".

#### Attributes

Attribute	Notes
<b>templateId</b> CodedIdentifier [0..*]	The identifier of a set of constraints placed on a clinical statement.
<b>id</b> II [0..1]	A unique ID of this clinical statement for reference purposes. It must be provided if user wants it returned as part of any output, otherwise it will be auto-generated, if needed, by CDS system. Does not need to be the actual ID of the source system.
<b>dataSourceType</b> CD [0..1]	A categorization of the type of information source making the clinical statement. Can be used, for example, to provide relevant information regarding the reliability of input data or to mark specific pieces of data as having been generated by a CDS system. E.g., administrative system, clinical system, patient or family member, external CDS system, this CDS system. Optional in the base vMR, but should consider providing when available.

Attribute	Notes
<b>evaluatedPersonId</b> II [0..1]	The 'owner' of this clinical statement.
<b>attribute</b> CodedNameValuePair [0..*]	A user-specified attribute for this class. The field 'attribute' supports user-defined attribute extensions for clinical concepts. New concepts defined in this manner need to have an associated template. Refer to Implementation Guide for details.

### 3.1.1.8 CodedIdentifier

Type: Class II  
Package: vmr

An II with an additional code to represent the associated concept. This is relevant for templates that are associated with a particular concept such as Barium Enema for instance.

#### Attributes

Attribute	Notes
<b>relevantConcept</b> CD [0..1]	Code specifying the concept represented by this identifier.

### 3.1.1.9 CodedNameValuePair

Type: Class  
Package: vmr

Class represents a generic Name-Value-Pair object where the name may be controlled by a terminology and the value may be any type deriving from ANY and/or defined by a template.

#### Attributes

Attribute	Notes
<b>name</b> CD	A code representing the name of the attribute.
<b>value</b> ANY	The value of the attribute.

### 3.1.1.10 CommunicationAgent

*Type:* Class  
*Package:* vmr

The end point of a communication - could be a specific individual or organization, or could be a role. Both role and agent can be specified.

#### Attributes

Attribute	Notes
<b>role</b> CD [0..1]	The functional role of the agent that can explain why that agent received or sent the communication. E.g., referring physician, public health agency

### 3.1.1.11 CommunicationBase

*Type:* Class ClinicalStatement  
*Package:* vmr

A communication is a message sent between a sender and a recipient for a purpose and about a topic. The sender and recipients may be specific persons or organizations or may be roles.

#### Attributes

Attribute	Notes
<b>medium</b> CD [0..1]	The communication medium, e.g., email, fax
<b>message</b> ED [0..1]	Text and other information to be communicated to the recipient
<b>reason</b> CD [0..1]	An indication, purpose or reason for why this action is being proposed., e.g., notify, alert, remind.
<b>topic</b> ClinicalStatement [0..1]	The focus or topic of the communication. e.g., Problem with problemCode tuberculosis, ObservationResult for serum potassium < 3



### 3.1.1.12 CommunicationEvent

*Type:* **Class** **CommunicationBase**  
*Package:* vmr

A communication event that is occurring or has occurred. E.g., an alert that was sent, a Direct message that was sent.

#### Attributes

Attribute	Notes
<b>communicationTime</b> IVL_TS [0..1]	Time when the communication was conducted.

### 3.1.1.13 CommunicationOrder

*Type:* **Class** **CommunicationBase**  
*Package:* vmr

An order to communicate. E.g., a physician requests to be notified when a lab result is available.

#### Attributes

Attribute	Notes
<b>comment</b> Documentation [0..*]	A comment, instruction, or note associated with the proposal. The type specifies the type of comment (e.g., 'Provider Instruction', 'Patient Instruction', 'Reason for Procedure', 'Consult Note', etc...) and the value of the comment represents the free text value.
<b>orderEventTime</b> IVL_TS [0..1]	The time when the order was made.
<b>originationMode</b> CD [0..1]	The mode the order was received (such as by telephone, electronic, verbal, written). This describes 'how' the communication was done as opposed to dataSourceType which specifies the 'where' and 'from'.
<b>urgency</b> CD [0..1]	Urgency: Applies to actions - orders or proposals (does not apply to problems, observations) Characterizes how quickly an action must be initiated Includes concepts such as stat, urgent, routine

### 3.1.1.14 CommunicationProposal

Type: **Class** CommunicationBase  
 Package: vmr

A proposal to communicate. E.g., the CDS system proposes that an alert be sent to a responsible provider, the CDS system proposes that the public health agency be notified about a reportable condition.

#### Attributes

Attribute	Notes
<b>comment</b> Documentation [0..*]	A comment, instruction, or note associated with the proposal. The type specifies the type of comment (e.g., 'Provider Instruction', 'Patient Instruction', 'Reason for Procedure', 'Consult Note', etc...) and the value of the comment represents the free text value.
<b>proposedCommunicationTime</b> IVL_TS [0..1]	The time interval in which the communication is proposed to be sent
<b>urgency</b> CD [0..1]	Urgency: Applies to actions - orders or proposals (does not apply to problems, observations) Characterizes how quickly an action must be initiated Includes concepts such as stat, urgent, routine

### 3.1.1.15 CompositeIVOrder

Type: **Class** SubstanceAdministrationOrder  
 Package: vmr

A class representing IV fluid orders that may consist of one or more additives mixed into a diluent (as represented by the substance attribute).

#### Attributes

Attribute	Notes
<b>additive</b> Constituent [1..*]	A substance that is mixed with a diluent which enables intravenous delivery to a patient; the additive is an active ingredient

### 3.1.1.16 CompositeIVProposal

Type: Class SubstanceAdministrationProposal  
 Package: vmr

A class representing IV fluid proposals that may consist of one or more additives mixed into a diluent (as represented by the substance attribute).

#### Attributes

Attribute	Notes
<b>additive</b> Constituent [1..*]	A substance that is mixed with a diluent which enables intravenous delivery to a patient; the additive is an active ingredient

### 3.1.1.17 Constituent

Type: Class  
 Package: vmr

A component of a multi-component substance administration. May be an additive in a composite IV.

#### Attributes

Attribute	Notes
<b>substance</b> AdministrableSubstance	Generally the ingredient of the constituent (e.g., dopamine) such as an additive in a composite IV.
<b>substanceAmount</b> IVL_PQ	The amount of the constituent that makes up the whole.

### 3.1.1.18 DeniedAdverseEvent

Type: Class AdverseEventBase  
 Package: vmr

A denial that the subject has or had the specified adverse event. E.g., if adverseEventCode is hives, adverse event agent is penicillin, and documentation time is 2011-05-01, an assertion was made on 2011-05-01 that the subject does not get hives as a reaction to penicillin.

Common denials of adverse events to a class of agents can be expressed as follows:

- No known allergies --> DeniedAdverseEvent with adverseEventAgentCode that is the generic root-level code for substances and adverseEventCode that is the generic root-level code for adverse events.
- No known drug allergies --> DeniedAdverseEvent with adverseEventAgentCode that is the root-level code for medications and adverseEventCode that is the generic root-level code for adverse events.
- No known food allergies --> DeniedAdverseEvent with adverseEventAgentCode that is the root-level code for food and adverseEventCode that is the generic root-level code for adverse events.

### 3.1.1.19 DeniedProblem

*Type:* **Class** **ProblemBase**  
*Package:* vmr

An assertion that the subject did not have the problem specified. For example, if problemCode is diabetes and diagnosticEventTime is 2011-05-01, then an assertion was made on 2011-05-01 that the subject does not have diabetes.

To assert that the subject has no known problems, a DeniedProblem can be asserted with a problemCode that is the root-level code for problems or conditions. E.g., if for a DeniedProblem, problemCode is the root-level code for problems or conditions and diagnosticEventTime is 2011-05-01, then an assertion was made on 2011-05-01 that the subject has no known problems as of that date.

### 3.1.1.20 DietOrder

*Type:* **Class** **ProcedureOrder**  
*Package:* vmr

A class representing a wide variety of allowable types of meals and/or specification of meal and/or nutrient restrictions for an individual patient, based on the patient's clinical condition

#### Attributes

Attribute	Notes
<b>dietQualifier</b> DietQualifier [0..*]	Diet proposals may be fully precoordinated in a terminology or specified by type only and allowing the nutrients (eg, specification of calories, carbohydrates, protein, fat, sodium, potassium, etc.) to be post-coordinated.

### 3.1.1.21 DietProposal

*Type:* **Class** **ProcedureProposal**  
*Package:* vmr

A class representing a wide variety of allowable types of meals and/or specification of meal and/or nutrient restrictions for an individual patient, based on the patient's clinical condition

#### Attributes

Attribute	Notes
<b>dietQualifier</b> DietQualifier [0..*]	Diet proposals may be fully precoordinated in a terminology or specified by type only and allowing the nutrients (eg, specification of calories, carbohydrates, protein, fat, sodium, potassium, etc.) to be post-coordinated.

### 3.1.1.22 DietQualifier

Type: **Class**  
 Package: vmr

"Diet qualifier allows the post-coordination of diets in cases where such post-coordination is required. Diets can vary greatly in how they are represented in terminologies. The most common use case for DietQualifier is to represent a nutrient that can be either stated as a quantity, a range, or as a code (e.g., 'Low Protein').

DietQualifier consists of the dietQualifierType (e.g., Sodium), the amount in the diet (e.g., 20-30g), and/or a qualifier such as 'Low Sodium'. Note that dietQualifierType is required and of type CD. Amount is optional and of type IVL\_PQ. qualifier is optional and of type CD. Either amount or qualifier is required and both may not be empty.

#### Attributes

Attribute	Notes
<b>amount</b> IVL_PQ [0..1]	The quantity of nutrient or bound to consider for this diet. For instance, 40mg, <40mg, 30mg<x<60mg, etc...
<b>dietQualifierType</b> CD	The type of nutrient that this diet contains. Nutrient types include: carbohydrates, lipids and fats, salts such as Sodium or Potassium, fibers, and also fluids.
<b>qualifier</b> CD [0..1]	Not all nutrients will be given using physical quantities. A fat may be specified as 'Low Fat', 'No Animal Fat', etc... Other examples include: 'Ketogenic 3:1 Ratio', 'Consistent Carb Low (1200-1500 Kcal)', etc... Note that fluid consistencies may also be specified as the qualifier of a Nutrient whose type is 'Fluid'. E.g., Honey Thick Liquids, Nectar Thick Liquids, Pudding Thick Liquids, Other

### 3.1.1.23 Documentation

Type: **Class**  
 Package: vmr

This type may be used to represent documentation that is either free text or richer in format (e.g., XML or HTML) where provenance is not relevant. The type of the documentation is determined by a code that represents the type of documentation ("e.g., a consult note, a provider instruction, a patient instruction, etc...). It is intended to represent comment fields and notes such as those associated with order entry forms. Either freeTextValue or content must be specified.

#### Attributes

Attribute	Notes
<b>content</b> ED [0..1]	The content of this document in encapsulated data format. The intent of this attribute is to support content with formatting such as XML and XHTML.
<b>freeTextValue</b> ST [0..1]	The free text representation of this document.
<b>type</b> CD	<ul style="list-style-type: none"> <li>Code that specifies the type of document represented: E.g., 'Instructions to Provider', 'Patient Instructions', 'Special Handling', etc...</li> </ul>

### 3.1.1.24 DoseRestriction

Type: Class  
Package: vmr

Referred to in CDA release 2 as maxDoseQuantity. Specifies the maximum dose that can be given in a specified time interval.

#### Attributes

Attribute	Notes
<b>maxDoseForInterval</b> PQ	Maximum amount of substance that can be given within the specified time interval.
<b>timeInterval</b> PQ	The time interval during which the dose specified is the maximum amount that should be administered.

### 3.1.1.25 EncounterBase

Type: Class    ClinicalStatement  
Package: vmr

The abstract base class for an encounter of an EvaluatedPerson with the healthcare system. If an encounter or appointment has been canceled, it should simply not be provided using this model. This allows the encounter and appointment classes to be used without an explicit encounter status check.

#### Attributes

Attribute	Notes
<b>encounterType</b> CD    [0..1]	Identifies the setting of the encounter with as much specificity as available, or as required by a template. E.g., outpatient encounter, inpatient encounter.

### 3.1.1.26 EncounterEvent

Type: Class    EncounterBase  
Package: vmr

EncounterEvent is the record of an interaction between an EvaluatedPerson and the healthcare system. It can be used to group observations and interventions performed during that interaction, through the use of relatedClinicalStatements.

#### Attributes

Attribute	Notes
<b>encounterEventTime</b> IVL_TS	The time of the encounter.

### 3.1.1.27 EnteralFeedingOrder

Type: Class SubstanceAdministrationOrder  
 Package: vmr

A class representing enteral nutrition orders for the delivery of enteral-fed substances (eg, Nutren, Ensure, RenalCal) for patients who are unable to consume diets orally; enteral feedings can be delivered to the stomach or varying parts of the small intestines using a variety of tube placement methods, depending on the clinical scenario. For instance, Nutren via nasogastric tube, 20 ml/hour, increase by 20 ml every 4 hours, goal of 75 ml/hour, water flushes 125 ml every shift.

#### Attributes

Attribute	Notes
<b>dietQualifier</b> DietQualifier [0..*]	Diet proposals may be fully precoordinated in a terminology or specified by type only and allowing the nutrients (eg, specification of calories, carbohydrates, protein, fat, sodium, potassium, etc.) to be post-coordinated.
<b>dosingGoal</b> DoseRestriction [0..1]	Target tube feeding rate. E.g., 75ml/hour.
<b>dosingRateIncrement</b> IVL_PQ [0..1]	Change in the dosing rate; usually an increase for a patient who is initiating tube feeding. E.g., 20 mL.
<b>dosingRateIncrementInterval</b> IVL_PQ [0..1]	Period of time after which the dosingRateIncrement should be attempted. E.g., 4 hours.

### 3.1.1.28 EnteralFeedingProposal

Type: Class SubstanceAdministrationProposal  
 Package: vmr

A class representing enteral nutrition proposals for the delivery of enteral-fed substances (eg, Nutren, Ensure, RenalCal) for patients who are unable to consume diets orally; enteral feedings can be delivered to the stomach or varying parts of the small intestines using a variety of tube placement methods, depending on the clinical scenario. For instance, Nutren via nasogastric tube, 20 ml/hour, increase by 20 ml every 4 hours, goal of 75 ml/hour, water flushes 125 ml every shift.

#### Attributes

Attribute	Notes
<b>dietQualifier</b> DietQualifier [0..*]	Diet proposals may be fully precoordinated in a terminology or specified by type only and allowing the nutrients (eg, specification of calories, carbohydrates, protein, fat, sodium, potassium, etc.) to be post-coordinated.
<b>dosingGoal</b> DoseRestriction [0..1]	Target tube feeding rate. E.g., 75ml/hour.
<b>dosingRateIncrement</b> IVL_PQ [0..1]	Change in the dosing rate; usually an increase for a patient who is initiating tube feeding. E.g., 20 mL.
<b>dosingRateIncrementInterval</b> IVL_PQ [0..1]	Period of time after which the dosingRateIncrement should be attempted. E.g., 4 hours.

### 3.1.1.29 Entity

*Type:* **Class**  
*Package:* vmr

A physical thing, group of physical things or an organization. It is a concrete class that can be used as is or specialized as needed.

#### Attributes

Attribute	Notes
<b>templateId</b> CodedIdentifier [0..*]	The identifier of a set of constraints placed on an Entity.
<b>id</b> II [0..1]	The entity's unique identifier. Used for internal tracking purposes. It must be provided if user wants it returned as part of any output, otherwise it will be auto-generated, if needed, by CDS system. Does not need to be the entity's "real" identifier.
<b>description</b> ST [0..1]	Human narrative for display purposes.
<b>entityType</b> CD [0..1]	The specific type of entity. E.g., healthcare organization, medical facility, pacemaker.
<b>evaluatedPersonId</b> II [0..1]	The ID of the evaluated person that this entity has a direct relationship to, generally the patient, but may be a different evaluatedPersonId when family history data is included, or related data pertinent to the patient but directly belonging to another evaluated person is present. This element is not normally needed when all relevant patient data is included in a single structured vMR, but may be essential when pieces of the vMR are furnished or referenced as separate structures in CDS inputs or outputs.
<b>attribute</b> CodedNameValuePair [0..*]	A user-specified attribute for this class. The field 'attribute' supports user-defined attribute extensions for entities. New concepts defined in this manner need to have an associated template. Refer to Implementation Guide for details.



### 3.1.1.30 *EvaluatedPerson*

*Type:* Class Person  
*Package:* vmr

A person who is the subject of evaluation by a CDS system. May be the focal patient or some other relevant person (e.g., a relative or a sexual contact). Includes demographic attributes, clinical statements, and related entities.

#### Attributes

Attribute	Notes
<b>age</b> PQ [0..1]	The person's age at the time of CDS evaluation. May potentially be provided instead of birthTime when birthTime is not available. E.g., 3.5 months, 63 years.
<b>ageAtDeath</b> PQ [0..1]	The age at which the person died.  Included to support family history-based inferencing.
<b>birthTime</b> TS [0..1]	The date on which the person was born.
<b>ethnicity</b> CD [0..*]	The person's ethnicity. An ethnicity or ethnic group is a group of people whose members identify with each other through a common heritage. E.g., Hispanic.
<b>gender</b> CD [0..1]	The person's gender. E.g., male, female. Typically will consist of administrative gender, with clinical gender noted using ObservationEvents.
<b>isDeceased</b> BL [0..1]	Whether the person is deceased.  Included to support family history-based inferencing.
<b>preferredLanguage</b> CD [0..1]	The person's language of preference. E.g., English.
<b>race</b> CD [0..*]	The person's race. Race is a classification of humans into large groups by various factors, such as heritable phenotypic characteristics or geographic ancestry. E.g., White, Asian.

### 3.1.1.31 *Extension*

*Type:* Class  
*Package:* vmr

Class attribute extension mechanism.

#### Attributes

Attribute	Notes
<b>attribute</b> CodedNameValuePair [1..*]	A user-specified attribute for this class. The field 'attribute' supports user-defined attribute extensions for the given class. New concepts defined in this manner need to have an associated template. Refer to Implementation Guide for details.

### 3.1.1.32 Facility

Type:

Class

Entity

Package:

vmr

A property such as a building that has been established to enable the performance of specific activities, typically by organizations. E.g., a hospital or clinic.

#### Attributes

Attribute	Notes
<b>address</b> AD [0..*]	The place or the name of the place where a facility is located or may be reached.
<b>name</b> ST [0..*]	A word or a combination of words by which a facility is known.
<b>telecom</b> TEL [0..*]	A locatable resource of a facility that is identified by a URI, such as a web page, a telephone number (voice, fax or some other resource mediated by telecommunication equipment), an e-mail address, or any other locatable resource that can be specified by a URL.

### 3.1.1.33 Frequency

*Type:* **Class**  
*Package:* vmr

Specification of the periodicity of recurring events, with both regular and irregular time intervals. The preferred approach to specifying a frequency is to use the FrequencyAsCode class. When a code is not available that meets the needs of the case, only then should the FrequencyAsInterval element be used.

#### Attributes

Attribute	Notes																																										
<b>frequencyStartType</b> CD [0..1]	Characterization of when to begin a specified cycle of frequencies; can be on a rolling or scheduled basis. With a “rolling” frequency, the first repetition occurs relative to an event (e.g., immediately after an order is processed). With a “scheduled” frequency, the first repetition occurs according to a predefined timetable (e.g., a hospital nursing unit might define “every 12 hours” to be 8:00 AM and 8:00 PM so after an order is processed, the first occurrence will not happen until the next instance in the timetable)																																										
<b>repetitions</b> Repetition [0..1]	The total number of times the procedure is requested. For instance, "CPK every 8 hours x 3" is a request for a CPK level to be obtained now and again in 8 and 16 hours for a total of 3 CPK measurements																																										
<b>timingEvent</b> CD [0..1]	Events in a patient's life that may be used to trigger a clinical action.  <u>Examples:</u> <a href="https://www.oasis-open.org/committees/ubl/lcsc/doc/qateam/Comment%20work%20from%20HL7/datatypes.html#section-Properties-of-Event-Related-Periodic-Interval-of-Time-(EIVL)">https://www.oasis-open.org/committees/ubl/lcsc/doc/qateam/Comment%20work%20from%20HL7/datatypes.html#section-Properties-of-Event-Related-Periodic-Interval-of-Time-(EIVL)</a>  Table 46: Domain TimingEven (partial): <table><tr><th>code</th><th>name</th><th>definition</th></tr><tr><td>AC</td><td>before meal</td><td>(from lat. ante cibus)</td></tr><tr><td>ACD</td><td>before lunch</td><td>(from lat. ante cibus diurnus)</td></tr><tr><td>ACM</td><td>before breakfast</td><td>(from lat. ante cibus matutinus)</td></tr><tr><td>ACV</td><td>before dinner</td><td>(from lat. ante cibus vespertinus)</td></tr><tr><td>HS</td><td>the hour of sleep</td><td>(e.g., H18-22)</td></tr><tr><td>IC</td><td>between meals</td><td>(from lat. inter cibus)</td></tr><tr><td>ICD</td><td>between lunch and dinner</td><td></td></tr><tr><td>ICM</td><td>between breakfast and lunch</td><td></td></tr><tr><td>ICV</td><td>between dinner and the hour of sleep</td><td></td></tr><tr><td>PC</td><td>after meal</td><td>(from lat. post cibus)</td></tr><tr><td>PCD</td><td>after lunch</td><td>(from lat. post cibus diurnus)</td></tr><tr><td>PCM</td><td>after breakfast</td><td>(from lat. post cibus matutinus)</td></tr><tr><td>PCV</td><td>after dinner</td><td>(from lat. post cibus vespertinus)</td></tr></table>	code	name	definition	AC	before meal	(from lat. ante cibus)	ACD	before lunch	(from lat. ante cibus diurnus)	ACM	before breakfast	(from lat. ante cibus matutinus)	ACV	before dinner	(from lat. ante cibus vespertinus)	HS	the hour of sleep	(e.g., H18-22)	IC	between meals	(from lat. inter cibus)	ICD	between lunch and dinner		ICM	between breakfast and lunch		ICV	between dinner and the hour of sleep		PC	after meal	(from lat. post cibus)	PCD	after lunch	(from lat. post cibus diurnus)	PCM	after breakfast	(from lat. post cibus matutinus)	PCV	after dinner	(from lat. post cibus vespertinus)
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ACM	before breakfast	(from lat. ante cibus matutinus)																																									
ACV	before dinner	(from lat. ante cibus vespertinus)																																									
HS	the hour of sleep	(e.g., H18-22)																																									
IC	between meals	(from lat. inter cibus)																																									
ICD	between lunch and dinner																																										
ICM	between breakfast and lunch																																										
ICV	between dinner and the hour of sleep																																										
PC	after meal	(from lat. post cibus)																																									
PCD	after lunch	(from lat. post cibus diurnus)																																									
PCM	after breakfast	(from lat. post cibus matutinus)																																									
PCV	after dinner	(from lat. post cibus vespertinus)																																									

### 3.1.1.34 FrequencyAsCode

Type: Class Frequency  
 Package: vmr

The interval in between events represented as a code such as TID, BID, q8h, etc.

#### Attributes

Attribute	Notes
<b>frequencyCode</b> CD	The interval in between events specified as a code originating in a standard terminology. For instance, TID, BID, q8h, etc.

### 3.1.1.35 FrequencyAsInterval

Type: Class Frequency  
 Package: vmr

A computable frequency representation that specifies the time span between events.

#### Attributes

Attribute	Notes
<b>intervalsImportant</b> BL	Together with dosingPeriod, identifies the frequency of substance administration. dosingPeriod identifies the periodicity of doses within a 24 hour timeframe, whereas dosingPeriodIntervalsImportant identifies whether doses should be equally spaced within that 24 hour period. E.g., a dosingPeriod of 8 hr would signify q8h if dosingPeriodIntervalsImportant is true, and TID if dosingPeriodIntervalsImportant is false.
<b>period</b> PQ	Together with dosingPeriodIntervalsImportant, identifies the frequency of substance administration. dosingPeriod identifies the periodicity of doses within a specified timeframe, which is often 24 hours (but may be different for some uses). E.g., a dosingPeriod of 3 times every 24 hrs would signify q8h if dosingPeriodIntervalsImportant is true, and TID if dosingPeriodIntervalsImportant is false. Other possibilities include 20 minutes every 2 hours for an infusion, or 30 minutes every 2 days for a medicated compress, etc.

**3.1.1.36 Goal**

Type: Class GoalBase  
 Package: vmr

A clinical end or aim towards which effort is directed.

Attributes

Attribute	Notes
<b>criticality</b> CD [0..1]	Criticality: Applies to things about a patient - problems, observations, etc. (does not apply to actions) Characterizes impact on life, or durable impact on physiological function or on quality of life. Includes concepts such as life-threatening, or potential loss of function or capacity. E.g., Life threatening, potentially requires hospitalization, self-resolving. Different from severity in that a moderate subarachnoid hemorrhage is likely to be highly important, whereas a moderate headache is not.
<b>goalObserverEventTime</b> IVL_TS [0..1]	The time that the observer made a note of the goal. It is primarily related to the creator or observer of the goal, rather than the subject.
<b>goalStatus</b> CD [0..1]	State of the attempt to reach this goal. E.g., active, inactive.

**3.1.1.37 GoalBase**

Type: Class ClinicalStatement  
 Package: vmr

Abstract base class for a goal, which is a clinical end or aim towards which effort is directed.

Attributes

Attribute	Notes
<b>goalAchievementTargetTime</b> IVL_TS [0..1]	The time that is targeted for the goal to be attained. For example, there may be a goal to reach a weight of X pounds by a particular date.
<b>goalFocus</b> CD	This is the code that identifies the metric that is the clinical subject of the goal with as much specificity as available, or as required by a template. Typically a measurable clinical attribute of the subject. E.g., weight, blood pressure, hemoglobin A1c level.
<b>goalPursuitEffectiveTime</b> IVL_TS [0..1]	The time in which the subject pursues the goal. This includes pursuing maintenance of a goal that has already been achieved. The end time of the interval may be "open" or not stated, if the goal is being indefinitely pursued. This time is optional, as, for example, a CDS system may simply wish to propose weight loss without specifying a pursuit effective time.
<b>targetBodySite</b> BodySite [0..1]	The body site that serves as the target of the goal. E.g., waist.
<b>targetGoalValue</b> ANY [0..1]	The metric whose achievement would signify the fulfillment of the goal. E.g., 150 pounds, 7.0%.

### 3.1.1.38 GoalProposal

*Type:* **Class** **GoalBase**  
*Package:* vmr

Proposal, e.g., by a CDS system, for establishing the goal specified.

#### Attributes

Attribute	Notes
<b>comment</b> Documentation [0..*]	A comment, instruction, or note associated with the proposal. The type specifies the type of comment (e.g., 'Provider Instruction', 'Patient Instruction', 'Reason for Procedure', 'Consult Note', etc...) and the value of the comment represents the free text value.
<b>urgency</b> CD [0..1]	Urgency: Applies to actions - orders or proposals (does not apply to problems, observations) Characterizes how quickly an action must be initiated Includes concepts such as stat, urgent, routine

### 3.1.1.39 GroupingClinicalStatement

*Type:* **Class** **ClinicalStatement**  
*Package:* vmr

A clinical statement which serves to group other clinical statements. For example, a grouping clinical statement could contain an intervention proposal and a substance administration proposal, one of which should be completed.

#### Attributes

Attribute	Notes
<b>componentRequirements</b> CD [0..1]	The requirements for the contained components. E.g., do at least one, do all.

### 3.1.1.40 ImagingOrder

Type: **Class** **ProcedureOrder**  
 Package: vmr

An order to perform an Imaging study. For instance, Chest Radiograph - PA and Lateral.

#### Attributes

Attribute	Notes
<b>contrast</b> BL [0..1]	Specification of whether contrast should be administered as part of the imaging study (e.g., Yes, No, Per Radiology)
<b>contrastRoute</b> CD [0..1]	Specification of the route of contrast (e.g., Oral, IV, Per Radiology) to be given as part of an imaging proposal
<b>contrastType</b> CD [0..1]	Specification of the kind of contrast (e.g., Barium, Gastrograffin) to be given as part of an imaging proposal. For example, Barium, Gastrograffin.
<b>isolationCode</b> CD [0..1]	Specification for type of precautions that should be taken when in proximity to the patient. For instance, Airborne Precautions, Contact Precautions, Droplet Precautions, Standard Precautions.
<b>portableExam</b> BL [0..1]	Designation of whether or not the imaging procedure should be performed at the patient's bedside (Yes) or if the procedure can be conducted in the location of the performing department (No)
<b>sedation</b> BL	'true' if patient will require sedation for this procedure.
<b>stressor</b> CD [0..1]	Type of physiologic or pharmacologic stress that will be subjected to the patient during the imaging procedure. For example, Adenosine, Dipyrdomole, Persantine, Thallium, Cardiolite, Dobutamine, Treadmill.
<b>transportMode</b> CD [0..1]	Specification of how a patient will be moved from their hospital room to the performing department

### 3.1.1.41 ImagingProposal

Type: Class ProcedureProposal  
 Package: vmr

A proposal for an Imaging Order. For instance, Chest Radiograph - PA and Lateral.

#### Attributes

Attribute	Notes
<b>contrast</b> BL [0..1]	Specification of whether contrast should be administered as part of the imaging study (e.g., Yes, No, Per Radiology)
<b>contrastRoute</b> CD [0..1]	Specification of the route of contrast (e.g., Oral, IV, Per Radiology) to be given as part of an imaging proposal
<b>contrastType</b> CD [0..1]	Specification of the kind of contrast (e.g., Barium, Gastrograffin) to be given as part of an imaging proposal. For example, Barium, Gastrograffin.
<b>isolationCode</b> CD [0..1]	Specification for type of precautions that should be taken when in proximity to the patient. For instance, Airborne Precautions, Contact Precautions, Droplet Precautions, Standard Precautions.
<b>portableExam</b> BL [0..1]	Designation of whether or not the imaging procedure should be performed at the patient's bedside (Yes) or if the procedure can be conducted in the location of the performing department (No)
<b>sedation</b> BL	'true' if patient will require sedation for this procedure.
<b>stressor</b> CD [0..1]	Type of physiologic or pharmacologic stress that will be subjected to the patient during the imaging procedure. For example, Adenosine, Dipyrdomole, Persantine, Thallium, Cardiolite, Dobutamine, Treadmill.
<b>transportMode</b> CD [0..1]	Specification of how a patient will be moved from their hospital room to the performing department

### 3.1.1.42 LaboratoryOrder

Type: Class ProcedureOrder  
 Package: vmr

An order for a laboratory test.

#### Attributes

Attribute	Notes
<b>collectionMethod</b> CD [0..1]	Specification of how the laboratory specimen should be obtained
<b>specialHandling</b> CD [0..*]	Special instructions on how to handle a laboratory specimen. For example, 'Keep on ice'.
<b>specimen</b> Specimen [0..1]	The source of the laboratory specimen to be collected.
<b>suspectedPathogen</b> CD [0..*]	The pathogen or pathogens that are felt to be the most likely cause of the patient's condition that led to the laboratory procedure proposal. For instance, Staphylococcus, Streptococcus, Pseudomonas, Neisseria.



### 3.1.1.43 LaboratoryProposal

Type: Class ProcedureProposal  
 Package: vmr

A proposal for a laboratory test.

#### Attributes

Attribute	Notes
<b>collectionMethod</b> CD [0..1]	Specification of how the laboratory specimen should be obtained
<b>specialHandling</b> CD [0..*]	Special instructions on how to handle a laboratory specimen. For example, 'Keep on ice'.
<b>specimenSource</b> CD [0..1]	The source of the laboratory specimen to be collected.
<b>suspectedPathogen</b> CD [0..*]	The pathogen or pathogens that are felt to be the most likely cause of the patient's condition that led to the laboratory procedure proposal. For instance, Staphylococcus, Streptococcus, Pseudomonas, Neisseria.

### 3.1.1.44 MissedAppointment

Type: Class EncounterBase  
 Package: vmr

An appointment that was (i) scheduled, (ii) not rescheduled or canceled, and (iii) for which the EvaluatedPerson did not show up.

#### Attributes

Attribute	Notes
<b>appointmentTime</b> IVL_TS	The time of the scheduled appointment that was missed.

### 3.1.1.45 ObservationBase

Type: Class ClinicalStatement  
 Package: vmr

The abstract base class for an observation, which is the act of recognizing and noting a fact.

#### Attributes

Attribute	Notes
<b>observationFocus</b> CD	This is the code that identifies the focus of the observation with as much specificity as available, or as required by a template. E.g., serum potassium level, hemoglobin A1c level, smoking status.
<b>observationMethod</b> CD [0..1]	The approach used to make the observation. E.g., direct measurement, indirect calculation, Enzyme-Linked Immunosorbent Assay.
<b>targetBodySite</b> BodySite [0..1]	The body site where the observation is being made. E.g., left lung.

### 3.1.1.46 ObservationResult

*Type:* **Class** **ObservationBase**  
*Package:* vmr

The findings from an observation.

#### Attributes

Attribute	Notes
<b>interpretation</b> CD [0..*]	Explanation of the results (e.g., fracture seen on x-ray), including an indication of the deviation of the result value from the reference range for the observation (e.g., high, low, within normal limits).
<b>observationEventTime</b> IVL_TS [0..1]	Time for the completion of the observation, including the interpretation.
<b>observationValue</b> ANY [0..1]	Actual observed results. E.g., 6.5 mg/dL, 5.7%.

### 3.1.1.47 Organization

*Type:* **Class** **Entity**  
*Package:* vmr

An Entity representing a formalized group of persons or other organizations with a common purpose and the infrastructure to carry out that purpose. E.g., a healthcare delivery organization.

#### Attributes

Attribute	Notes
<b>address</b> AD [0..*]	The place or the name of the place where an organization is located or may be reached.
<b>name</b> ST [0..*]	A word or a combination of words by which an organization is known.
<b>telecom</b> TEL [0..*]	A locatable resource of an organization that is identified by a URI, such as a web page, a telephone number (voice, fax or some other resource mediated by telecommunication equipment), an e-mail address, or any other locatable resource that can be specified by a URL.

### 3.1.1.48 PCAOrder

Type: **Class** SubstanceAdministrationOrder  
 Package: vmr

Order represents a Patient Controlled Analgesic. For instance, morphine PCA, 5 mg loading dose, followed by 10 mg/hr basal rate, 1 mg demand dose, lockout interval 10 min.

#### Attributes

Attribute	Notes
<b>demandDose</b> IVL_PQ [0..1]	A dose of an analgesic given in addition to the specified basal rate; usually delivered in response to an action such as a patient pressing a button that communicates with a PCA pump
<b>loadingDose</b> IVL_PQ [0..1]	The initial amount of an analgesic to be administered at one time.
<b>lockoutInterval</b> IVL_PQ [0..1]	The amount of time that must elapse after a PCA demand dose is administered before the next PCA demand dose can be delivered. For example, 10 minutes

### 3.1.1.49 PCAProposal

Type: **Class** SubstanceAdministrationProposal  
 Package: vmr

Order proposal represents a Patient Controlled Analgesic. For instance, morphine PCA, 5 mg loading dose, followed by 10 mg/hr basal rate, 1 mg demand dose, lockout interval 10 min.

#### Attributes

Attribute	Notes
<b>demandDose</b> IVL_PQ [0..1]	A dose of an analgesic given in addition to the specified basal rate; usually delivered in response to an action such as a patient pressing a button that communicates with a PCA pump
<b>loadingDose</b> IVL_PQ [0..1]	The initial amount of an analgesic to be administered at one time.
<b>lockoutInterval</b> IVL_PQ [0..1]	The amount of time that must elapse after a PCA demand dose is administered before the next PCA demand dose can be delivered. For example, 10 minutes

### 3.1.1.50 Person

*Type:*                    **Class**    **Entity**  
*Package:*              vmr

A human being.

#### Attributes

Attribute	Notes
<b>address</b> AD    [0..*]	The place or the name of the place where a person is located or may be reached.
<b>name</b> EN    [0..*]	A word or a combination of words by which a person is known.
<b>telecom</b> TEL    [0..*]	A locatable resource of a person that is identified by a URI, such as a web page, a telephone number (voice, fax or some other resource mediated by telecommunication equipment), an e-mail address, or any other locatable resource that can be specified by a URL.

### 3.1.1.51 Problem

Type: **Class** **ProblemBase**  
 Package: vmr

An assertion regarding a clinical condition of the subject that needs to be treated or managed.

#### Attributes

Attribute	Notes
<b>ageAtOnset</b> PQ [0..1]	The subject's age when the problem began.
<b>contributedToDeath</b> BL [0..1]	Whether the problem contributed to the subject's death.
<b>criticality</b> CD [0..1]	Criticality: Applies to things about a patient - problems, observations, etc. (does not apply to actions) Characterizes impact on life, or durable impact on physiological function or on quality of life. Includes concepts such as life-threatening, or potential loss of function or capacity. E.g., Life threatening, potentially requires hospitalization, self-resolving. Different from severity in that a moderate subarachnoid hemorrhage is likely to be highly important, whereas a moderate headache is not.
<b>priorityInEncounter</b> CD [0..1]	Specification of whether a diagnosis is a "primary" diagnosis or a "secondary" diagnosis. The "primary" diagnosis is the main reason for an encounter (eg, hospitalization or a visit to an outpatient clinic, urgent care, ED, etc.), is the main focus of diagnosis/treatment/evaluation for that encounter, and would likely determine how the encounter is billed. A "secondary" diagnosis could be a diagnosis that may or may not relate to the primary diagnosis, may or may not have been addressed during the encounter, and likely would not impact billing. An encounter would typically have a single primary diagnosis and either zero, one, or many secondary diagnoses.
<b>problemStatus</b> CD [0..1]	State of the problem. E.g., active, inactive, resolved.
<b>severity</b> CD [0..1]	Severity: Applies to things about a patient - problems, observations, etc. (does not apply to actions) Characterizes the intensity of the manifestation of the problem or observation or an adverse event Includes concepts such as mild, moderate, severe
<b>wasCauseOfDeath</b> BL [0..1]	Whether the problem was the cause of the subject's death.

### 3.1.1.52 ProblemBase

Type: **Class** **ClinicalStatement**  
Package: vmr

Abstract base class for problems, which are clinical conditions that need to be treated or managed.

#### Attributes

Attribute	Notes
<b>affectedBodySite</b> BodySite [0..*]	A body site affected by the problem (in the case of Problem) or not affected by the problem (in the case of DeniedProblem).
<b>diagnosticEventTime</b> IVL_TS [0..1]	The time when the evaluator identified the subject as having the condition (in the case of Problem) or as not having the condition (in the case of DeniedProblem).
<b>problemCode</b> CD	This is the code that identifies the problem or condition with as much specificity as available, or as required by a template. It might be an ICD9, ICD10, or SNOMED code, or whatever vocabularies are appropriate to describe the problem or condition. E.g., diabetes mellitus, congestive heart failure.
<b>problemEffectiveTime</b> IVL_TS [0..1]	The time that is primarily related to the subject's experience of the disease or condition, rather than when those events were reported or recorded by the evaluator.

### 3.1.1.53 ProcedureBase

Type: Class ClinicalStatement  
 Package: vmr

Abstract base class for a procedure, which is a series of steps taken on a subject to accomplish a clinical goal. Procedures include diagnostic testing, consultations, referrals, nursing procedures, making observations, and other clinical interventions excluding substance administrations.

#### Attributes

Attribute	Notes
<b>approachBodySite</b> BodySite [0..1]	The body site used for gaining access to the target body site. E.g., femoral artery for a coronary angiography.
<b>procedureCode</b> CD	This is the code that identifies the procedure with as much specificity as available, or as required by a template. E.g., appendectomy, coronary artery bypass graft surgery.
<b>procedureMethod</b> CD [0..1]	Describes the method used for the procedure and can vary depending on the procedure. For example, a surgical procedure method might be laparoscopic surgery or robotic surgery; an imaging procedure such as a chest radiograph might have methods that represent the views such as PA and lateral; a laboratory procedure like urinalysis might have a method of clean catch; a respiratory care procedure such as supplemental oxygen might have a method of nasal cannula, hood, face mask, or non-rebreather mask.
<b>targetBodySite</b> BodySite [0..1]	The body site where the procedure takes place. E.g., coronary blood vessels for coronary angiography.

### 3.1.1.54 ProcedureEvent

Type: Class ProcedureBase  
 Package: vmr

The actual event of performing a procedure.

#### Attributes

Attribute	Notes
<b>procedureTime</b> IVL_TS [0..1]	Time when procedure was done.

### 3.1.1.55 ProcedureOrder

Type: **Class** **ProcedureBase**  
 Package: vmr

An order for procedure to be done. Orders for making an observation (e.g., Pneumonia Severity Index, blood pressure, or PHQ-9 Depression Assessment) are also included in the scope of ProcedureOrder.

#### Attributes

Attribute	Notes
<b>comment</b> Documentation [0..*]	A comment, instruction, or note associated with the proposal. The type specifies the type of comment (e.g., 'Provider Instruction', 'Patient Instruction', 'Reason for Procedure', 'Consult Note', etc...) and the value of the comment represents the free text value.
<b>frequency</b> Frequency [0..1]	The interval in between procedures. For instance, 'Every 8 hours', 'TID', 'BID', 'q8h', etc... Frequency may be represented as either a code or as an interval.
<b>orderEventTime</b> IVL_TS [0..1]	The time when the order was made.
<b>originationMode</b> CD [0..1]	The mode the order was received (such as by telephone, electronic, verbal, written). This describes 'how' the communication was done as opposed to dataSourceType which specifies the 'where' and 'from'.
<b>prnReason</b> CD [0..*]	Indication for the procedure such as shortness of breath; Reasons such as "SpO2 less than x%" should be addressed as a PRN Instruction rather than a PRN Reason as it is unlikely that a value set can be identified for such range of possible observations. For example, Pain, Shortness of Breath, Insomnia, Nausea.
<b>procedureTime</b> IVL_TS [0..1]	Ordered time for procedure.  If RepeatUntilCount.count >= 2, then specifies period within which the procedures should take place. In these cases, it is assumed that the procedures should be evenly distributed within the timeframe. E.g., if ordered time is 1/1/2011 to 12/31/2011, and RepeatUntilCount.count is 3, ideal procedure times would be 1/1/2011, 12/31/2011, and in the middle of the year.
<b>reason</b> CD [0..1]	An indication, purpose or reason for why this action is being proposed.
<b>urgency</b> CD [0..1]	Urgency: Applies to actions - orders or proposals (does not apply to problems, observations) Characterizes how quickly an action must be initiated Includes concepts such as stat, urgent, routine



### 3.1.1.56 ProcedureProposal

Type: **Class** ProcedureBase  
 Package: vmr

Proposals for a procedure to take place, e.g., generated by a CDS system or by a consulting clinician. Proposals for making an observation (e.g., Pneumonia Severity Index, blood pressure, or PHQ-9 Depression Assessment) are also included in the scope of ProcedureProposal.

#### Attributes

Attribute	Notes
<b>comment</b> Documentation [0..*]	A comment, instruction, or note associated with the proposal. The type specifies the type of comment (e.g., 'Provider Instruction', 'Patient Instruction', 'Reason for Procedure', 'Consult Note', etc...) and the value of the comment represents the free text value.
<b>frequency</b> Frequency [0..1]	The interval in between procedures. For instance, 'Every 8 hours', TID, BID, q8h, etc... Frequency may be represented as either a code or as an interval.
<b>prnReason</b> CD [0..*]	Indication for the proposed procedure such as shortness of breath; Reasons such as "SpO2 less than x%" should be addressed as a PRN Instruction rather than a PRN Reason as it is unlikely that a value set can be identified for such range of possible observations. For example, Pain, Shortness of Breath, Insomnia, Nausea.
<b>proposedProcedureTime</b> IVL_TS [0..1]	Requested time for procedure.  If RepeatUntilCount.count >= 2, then specifies requested period within which the procedures should take place. In these cases, it is assumed that the procedures should be evenly distributed within the timeframe. E.g., if requested time is 1/1/2011 to 12/31/2011, and RepeatUntilCount.count is 3, ideal procedure times would be 1/1/2011, 12/31/2011, and in the middle of the year.
<b>reason</b> CD [0..1]	An indication, purpose or reason for why this action is being proposed.
<b>urgency</b> CD [0..1]	Urgency: Applies to actions - orders or proposals (does not apply to problems, observations) Characterizes how quickly an action must be initiated Includes concepts such as stat, urgent, routine

### 3.1.1.57 RelatedClinicalStatement

Type: **Class** RelationshipDescriptorBase  
 Package: vmr

The container for a relationship between a source and a target Clinical Statement.

### 3.1.1.58 *RelatedEntity*

*Type:* **Class** **RelationshipDescriptorBase**  
*Package:* vmr

A class that specifies the nature of the relationship between a *source* and *target* entity.

### 3.1.1.59 *RelatedEvaluatedPerson*

*Type:* **Class** **RelationshipDescriptorBase**  
*Package:* vmr

Person who has a clinical relationship to the patient and whose clinical data is relevant to that patient. This can include a relative, or sexual partner, etc...

Notes to implementers: Do not use RelatedEntity to describe persons related to the patient. Use this related person instead.

### 3.1.1.60 *RelationshipDescriptorBase*

*Type:* **Class**  
*Package:* vmr

The relationship between one class and another.

#### Attributes

Attribute	Notes
<b>relationshipTimeInterval</b> IVL_TS [0..1]	The timeframe in which the relationship existed. E.g., timeframe when a Person served as the primary care provider for an EvaluatedPerson.
<b>targetRole</b> CD	The function or position served by the target Entity in relation to the source Entity. E.g., primary care provider, health insurance provider.

### 3.1.1.61 RepeatUntilCount

*Type:*                    **Class**    **Repetition**  
*Package:*                vmr

The total number of times the clinical action should be performed. For instance, "CPK every 8 hours x 3" is a request for a CPK level to be obtained now and again in 8 and 16 hours for a total of 3 CPK measurements.

#### Attributes

Attribute	Notes
<b>count</b> INT	The total number of times the clinical action should be performed.

### 3.1.1.62 RepeatUntilTime

*Type:*                    **Class**    **Repetition**  
*Package:*                vmr

The action should be repeated until the specified time. For instance, do X every 4 hours until Thursday at noon.

#### Attributes

Attribute	Notes
<b>time</b> TS	The action should be repeated until the specified time.

### 3.1.1.63 Repetition

*Type:*                    **Class**  
*Package:*                vmr

Specification of the endpoint of a repetitive action. Must be extended by either RepeatUntilCount or RepeatUntilTime.

### 3.1.1.64 RespiratoryCareOrder

Type: **Class** **ProcedureOrder**  
 Package: vmr

Orders that encompass supplemental oxygen (eg, nasal cannula, face mask), BiPAP/CPAP, and mechanical ventilation. While these are vastly different respiratory care concepts, the associated data elements can be constrained through templates.

#### Attributes

Attribute	Notes
<b>ePAP</b> IVL_PQ [0..1]	Expiratory positive airway pressure, often expressed in cmH2O in the United States. Example: 5 cmH2O
<b>fiO2</b> IVL_PQ [0..1]	Fraction of inspired oxygen, expressed as a percentage. For example, 100%.
<b>inspiratoryTime</b> IVL_PQ [0..1]	Specification of the duration of the positive airway pressure applied by a mechanical ventilator. For example, 1 second.
<b>iPAP</b> IVL_PQ [0..1]	Inspiratory positive airway pressure, often expressed in cmH2O in the United States. For example, 10 cmH2O
<b>isolationCode</b> CD [0..1]	Describes the kinds of precautions that should be taken for the patient. Values include: Airborne Precautions, Contact Precautions, Droplet Precautions, Standard Precautions, Neutropenic (Reverse) Precautions
<b>oxygenFlowRate</b> IVL_PQ [0..1]	The rate at which oxygen is administered to the patient; generally in liters per minute
<b>peakFlowRate</b> IVL_PQ [0..1]	Specification of the maximum allowable rate of airflow delivered by a mechanical ventilator. For example, 60 L/min.
<b>peakInspiratoryPressure</b> IVL_PQ [0..1]	Specification of the maximum airway pressure allowed to be delivered by the ventilator in order to prevent barotrauma, applies to volume-controlled ventilation modes. For example, 35 cmH2O.
<b>pEEP</b> IVL_PQ [0..1]	Positive end expiratory pressure, the alveolar pressure above atmospheric pressure that exists at the end of expiration, often expressed in cmH2O in the United States. For example, 5 cmH2O.
<b>pressureSupport</b> IVL_PQ [0..1]	Specification of the additional amount of pressure that is added to a mechanical ventilation mode, often CPAP mode. Not to be confused with pressure control ventilation mode. For example, 500 mL
<b>respiratoryRate</b> IVL_PQ [0..1]	Number of machine-delivered breaths per minute, in the context of mechanical ventilation, expressed as breaths/minute. For example, 14 breaths/minute.
<b>spO2Range</b> IVL_PQ [0..1]	Target oxygen saturation, expressed as a percentage. For instance, 95-100%
<b>spO2Titration</b> ST [0..1]	Titration instructions to achieve target oxygen saturation. An example might include: "Titrate oxygen to maintain SpO2 > 93%"
<b>tidalVolume</b> IVL_PQ [0..1]	Volume of air delivered with each machine-delivered breath, often expressed in mL in the United States. For example, 500 mL.
<b>ventilatorMode</b> CD [0..1]	Primary setting on a mechanical ventilator that specifies how machine breaths will be delivered to a patient. Examples: Assist Control (AC), Synchronized Intermittent Mandatory Ventilation (SIMV), Pressure Support Ventilation (PS or PSV), Pressure-Regulated Volume Control (PRVC)

### 3.1.1.65 RespiratoryCareProposal

Type: **Class** **ProcedureProposal**  
 Package: vmr

Order proposals that encompass supplemental oxygen (eg, nasal cannula, face mask), BiPAP/CPAP, and mechanical ventilation. While these are vastly different respiratory care concepts, the associated data elements can be constrained through templates.

#### Attributes

Attribute	Notes
<b>ePAP</b> IVL_PQ [0..1]	Expiratory positive airway pressure, often expressed in cmH2O in the United States. Example: 5 cmH2O
<b>fiO2</b> IVL_PQ [0..1]	Fraction of inspired oxygen, expressed as a percentage. For example, 100%.
<b>inspiratoryTime</b> IVL_PQ [0..1]	Specification of the duration of the positive airway pressure applied by a mechanical ventilator. For example, 1 second.
<b>iPAP</b> IVL_PQ [0..1]	Inspiratory positive airway pressure, often expressed in cmH2O in the United States. For example, 10 cmH2O
<b>isolationCode</b> CD [0..1]	Describes the kinds of precautions that should be taken for the patient. Values include: Airborne Precautions, Contact Precautions, Droplet Precautions, Standard Precautions, Neutropenic (Reverse) Precautions
<b>oxygenFlowRate</b> IVL_PQ [0..1]	The rate at which oxygen is administered to the patient; generally in liters per minute
<b>peakFlowRate</b> IVL_PQ [0..1]	Specification of the maximum allowable rate of airflow delivered by a mechanical ventilator. For example, 60 L/min.
<b>peakInspiratoryPressure</b> IVL_PQ [0..1]	Specification of the maximum airway pressure allowed to be delivered by the ventilator in order to prevent barotrauma, applies to volume-controlled ventilation modes. For example, 35 cmH2O.
<b>pEEP</b> IVL_PQ [0..1]	Positive end expiratory pressure, the alveolar pressure above atmospheric pressure that exists at the end of expiration, often expressed in cmH2O in the United States. For example, 5 cmH2O.
<b>pressureSupport</b> IVL_PQ [0..1]	Specification of the additional amount of pressure that is added to a mechanical ventilation mode, often CPAP mode. Not to be confused with pressure control ventilation mode. For example, 500 mL
<b>respiratoryRate</b> IVL_PQ [0..1]	Number of machine-delivered breaths per minute, in the context of mechanical ventilation, expressed as breaths/minute. For example, 14 breaths/minute.
<b>spO2Range</b> IVL_PQ [0..1]	Target oxygen saturation, expressed as a percentage. For instance, 95-100%
<b>spO2Titration</b> ST [0..1]	Titration instructions to achieve target oxygen saturation. An example might include: "Titrate oxygen to maintain SpO2 > 93%"
<b>tidalVolume</b> IVL_PQ [0..1]	Volume of air delivered with each machine-delivered breath, often expressed in mL in the United States. For example, 500 mL.
<b>ventilatorMode</b> CD [0..1]	Primary setting on a mechanical ventilator that specifies how machine breaths will be delivered to a patient. Examples: Assist Control (AC), Synchronized Intermittent Mandatory Ventilation (SIMV), Pressure Support Ventilation (PS or PSV), Pressure-Regulated Volume Control (PRVC)

### 3.1.1.66 ScheduledAppointment

Type: Class EncounterBase  
Package: vmr

A clinical appointment that has been scheduled. If rescheduled, the appointmentTime may change.

#### Attributes

Attribute	Notes
<b>appointmentTime</b> IVL_TS [0..1]	The time of the scheduled appointment.

### 3.1.1.67 ScheduledProcedure

Type: Class ProcedureBase  
Package: vmr

A procedure that has been scheduled to take place.

#### Attributes

Attribute	Notes
<b>procedureTime</b> IVL_TS [0..1]	The time of the scheduled procedure.

### 3.1.1.68 Specimen

Type: Class Entity  
Package: vmr

A sample of tissue, blood, urine, water, air, etc., taken for the purposes of diagnostic examination or evaluation.

#### Attributes

Attribute	Notes
<b>source</b> CD [0..1]	The specimen source. E.g., sputum, urine, blood, stool

### 3.1.1.69 SubstanceAdministrationBase

Type: Class ClinicalStatement  
 Package: vmr

Abstract base class for giving a material of a particular constitution to a person to enable a clinical effect.

#### Attributes

Attribute	Notes
<b>approachBodySite</b> BodySite [0..1]	The body site used for gaining access to the target body site for the purposes of the substance administration.
<b>deliveryMethod</b> CD [0..1]	Methodology used to administer the substance. E.g., gastric feeding tube, gastrostomy, drip
<b>deliveryRate</b> IVL_PQ [0..1]	Rate of substance administration. E.g., 1000 mL/hr.
<b>deliveryRoute</b> CD [0..1]	The physical route through which the substance is administered. E.g., IV, PO.
<b>doseQuantity</b> IVL_PQ [0..1]	The amount of substance. E.g., 1 tab, 325 mg, 1-2 tabs.
<b>doseType</b> CD [0..1]	The type of dose. E.g., initial, maintenance, loading.
<b>frequency</b> Frequency [0..1]	The interval in between substance administrations. For instance, 'Every 8 hours', TID, BID, q8h, etc... Frequency may be represented as either a code or as an interval.
<b>substance</b> AdministrableSubstance	A material of a particular constitution that can be given to a person to enable a clinical effect.
<b>substanceAdministrationGeneralPurpose</b> CD [0..1]	The general purpose for the substance administration. E.g., medication, immunization.
<b>targetBodySite</b> BodySite [0..1]	The body site where the substance is delivered.

### 3.1.1.70 SubstanceAdministrationEvent

*Type:* **Class** **SubstanceAdministrationBase**  
*Package:* vmr

The actual administration of the substance.

Handling of entries in "current medication list" with no other data than current medications could be as follows:  
 - SubstanceAdministrationEvent with documentationTime = time when snapshot was taken of current medication list, administrationEventTime = null if no data provided on when medication was started or stopped, administrationTime with specified Low but null High if data only provided on when medication was started.

To specify "patient takes an unknown drug", use a code for substance that represents "unknown medication".

#### Attributes

Attribute	Notes
<b>administrationTimeInterval</b> IVL_TS [0..1]	The time when the substance is administered. An unspecified high time interval signifies that the administration is ongoing. Left optional to allow use for a medication list that does not have this data.
<b>documentationTime</b> IVL_TS [0..1]	The time when the substance administration is documented.
<b>doseNumber</b> INT [0..1]	Identifies which dose this substance administration represents within a series of doses. Most commonly used for immunizations.
<b>informationAttestationType</b> CD [0..1]	How the substance administration was claimed or verified. E.g., patient-reported, observed by care provider, performed by care provider. Can be used as a gauge of reliability, or when verified substance administration (e.g., for tuberculosis treatment) is required.
<b>isValid</b> BL [0..1]	Primarily designed to support analysis of previous immunizations.



### 3.1.1.71 SubstanceAdministrationOrder

Type: **Class** SubstanceAdministrationBase  
 Package: vmr

A clinical order for a substance administration. Includes medication prescriptions.

#### Attributes

Attribute	Notes
<b>administrationTimeInterval</b> IVL_TS [0..1]	Ordered time for administering the substance.
<b>comment</b> Documentation [0..*]	A comment, instruction, or note associated with the proposal. The type specifies the type of comment (e.g., 'Provider Instruction', 'Patient Instruction', 'Reason for Procedure', 'Consult Note', etc...) and the value of the comment represents the free text value.
<b>doseRestriction</b> DoseRestriction [0..1]	Specifies the maximum dose that can be given in a specified time interval.
<b>infuseOver</b> PQ [0..1]	Represents the actual time the medication is infused. Note the difference between infuseOver and duration. An orderable may call for infusing a patient TID for an hour each time over a duration of 5 days.
<b>numberFillsAllowed</b> INT [0..1]	The number of fills allowed. Must be 1 or greater.
<b>orderEventTime</b> IVL_TS [0..1]	Time when order was made.
<b>originationMode</b> CD [0..1]	The mode the order was received (such as by telephone, electronic, verbal, written). This describes 'how' the communication was done as opposed to dataSourceType which specifies the 'where' and 'from'.
<b>prnReason</b> CD [0..*]	Indication for the proposed procedure such as shortness of breath; Reasons such as "SpO2 less than x%" should be addressed as a PRN Instruction rather than a PRN Reason as it is unlikely that a value set can be identified for such range of possible observations. For example, Pain, Shortness of Breath, Insomnia, Nausea.
<b>urgency</b> CD [0..1]	Urgency: Applies to actions - orders or proposals (does not apply to problems, observations) Characterizes how quickly an action must be initiated Includes concepts such as stat, urgent, routine
<b>validAdministrationTimeInterval</b> IVL_TS [0..1]	Acceptable time for administering the substance. Distinct from proposedAdministrationTimeInterval that this time includes acceptable but suboptimal administration times. This is an important aspect of immunizations, which have recommended and acceptable/valid timeframes for administration that can differ.

### 3.1.1.72 SubstanceAdministrationProposal

Type: **Class** SubstanceAdministrationBase  
 Package: vmr

Proposal for a substance administration. Used, for example, when a CDS system proposes that a medication or vaccination be given.

#### Attributes

Attribute	Notes
<b>comment</b> Documentation [0..*]	A comment, instruction, or note associated with the proposal. The type specifies the type of comment (e.g., 'Provider Instruction', 'Patient Instruction', 'Reason for Procedure', 'Consult Note', etc...) and the value of the comment represents the free text value.
<b>doseRestriction</b> DoseRestriction [0..1]	Specifies the maximum dose that can be given in a specified time interval.
<b>infuseOver</b> PQ [0..1]	Represents the actual time the medication is infused. Note the difference between infuseOver and duration. An orderable may call for infusing a patient TID for an hour each time over a duration of 5 days.
<b>numberFillsAllowed</b> INT [0..1]	The number of fills allowed. Must be 1 or greater.
<b>prnReason</b> CD [0..*]	Indication for the proposed procedure such as shortness of breath; Reasons such as "SpO2 less than x%" should be addressed as a PRN Instruction rather than a PRN Reason as it is unlikely that a value set can be identified for such range of possible observations. For example, Pain, Shortness of Breath, Insomnia, Nausea.
<b>proposedAdministrationTimeInterval</b> IVL_TS [0..1]	Proposed time for administering the substance.
<b>urgency</b> CD [0..1]	Urgency: Applies to actions - orders or proposals (does not apply to problems, observations) Characterizes how quickly an action must be initiated Includes concepts such as stat, urgent, routine
<b>validAdministrationTimeInterval</b> IVL_TS [0..1]	Acceptable time for administering the substance. Distinct from proposedAdministrationTimeInterval that this time includes acceptable but suboptimal administration times. This is an important aspect of immunizations, which have recommended and acceptable/valid timeframes for administration that can differ.

### 3.1.1.73 SubstanceDispensationEvent

Type: **Class** SubstanceAdministrationBase  
 Package: vmr

This is the Event of a pharmacy filling a prescription.

#### Attributes

Attribute	Notes
<b>daysSupply</b> INT [0..1]	The number of days this dispensation should last.
<b>dispensationQuantity</b> PQ [0..1]	The amount of substance provided.
<b>dispensationTime</b> IVL_TS [0..1]	Time when substance was dispensed.
<b>doseRestriction</b> DoseRestriction [0..1]	Specifies the maximum dose that can be given in a specified time interval.
<b>fillNumber</b> INT [0..1]	The current fill number. 1 if it is the first fill on this prescription, 2 if it is the second, etc. Must be 1 or greater.
<b>fillsRemaining</b> INT [0..1]	The number of fills remaining on prescription.

### 3.1.1.74 SubstanceDispensationOrder

Type: **Class** SubstanceAdministrationBase  
 Package: vmr

A clinical order for a substance dispensation. That is the substance is to be dispensed but not administered.

#### Attributes

Attribute	Notes
<b>comment</b> Documentation [0..*]	A comment, instruction, or note associated with the proposal. The type specifies the type of comment (e.g., 'Provider Instruction', 'Patient Instruction', 'Reason for Procedure', 'Consult Note', etc...) and the value of the comment represents the free text value.
<b>orderEventTime</b> IVL_TS [0..1]	Time when order was made.
<b>dispensationQuantity</b> PQ [0..1]	The amount of substance provided.
<b>originationMode</b> CD [0..1]	The mode the order was received (such as by telephone, electronic, verbal, written). This describes 'how' the communication was done as opposed to dataSourceType which specifies the 'where' and 'from'.
<b>reason</b> CD [0..1]	An indication, purpose or reason for why this action is being proposed.
<b>urgency</b> CD [0..1]	Urgency of the substance administration. Coding system values indicating the urgency of a requested or proposed observation (e.g., please give Vitamin K STAT).

### 3.1.1.75 SubstanceDispensationProposal

*Type:* **Class** **SubstanceAdministrationBase**  
*Package:* vmr

Specifies that a substance needs to be dispensed but not administered to a patient (eg, “naloxone at bedside”).

Constrain all attributes out from SubstanceAdministrationBase except substance.

#### Attributes

Attribute	Notes
<b>comment</b> Documentation [0..*]	A comment, instruction, or note associated with the proposal. The type specifies the type of comment (e.g., 'Provider Instruction', 'Patient Instruction', 'Reason for Procedure', 'Consult Note', etc...) and the value of the comment represents the free text value.
<b>dispensationQuantity</b> PQ [0..1]	The amount of substance to be provided.
<b>proposedDispensationTime</b> IVL_TS [0..1]	Proposed time for dispensing the substance.
<b>reason</b> CD [0..1]	An indication, purpose or reason for why this action is being proposed.
<b>urgency</b> CD [0..1]	Urgency of the substance administration. Coding system values indicating the urgency of a requested or proposed observation (e.g., please give Vitamin K STAT).

### 3.1.1.76 SupplyBase

*Type:* **Class** **ClinicalStatement**  
*Package:* vmr

Abstract base class for the provision of some clinical material or equipment to the subject, such as a wheelchair.

#### Attributes

Attribute	Notes
<b>quantity</b> PQ [0..1]	Amount of material described by the supplyCode.
<b>supplyCode</b> CD	This is the code that identifies the material supplied with as much specificity as available, or as required by a template. E.g., wheelchair, bandages.
<b>targetBodySite</b> BodySite [0..1]	Body site where supply is to be used.

### 3.1.1.77 SupplyEvent

Type: Class SupplyBase  
 Package: vmr

The provision of some clinical material or equipment to the subject, such as a wheelchair.

#### Attributes

Attribute	Notes
<b>supplyTime</b> IVL_TS [0..1]	When the supply was delivered.

### 3.1.1.78 SupplyOrder

Type: Class SupplyBase  
 Package: vmr

A provider's order to deliver the supply.

#### Attributes

Attribute	Notes
<b>comment</b> Documentation [0..*]	A comment, instruction, or note associated with the proposal. The type specifies the type of comment (e.g., 'Provider Instruction', 'Patient Instruction', 'Reason for Procedure', 'Consult Note', etc...) and the value of the comment represents the free text value.
<b>frequency</b> Frequency [0..1]	The interval in between supply orders. For instance, 'Every 8 hours', 'TID', 'BID', 'q8h', etc... Frequency may be represented as either a code or as an interval.
<b>orderEventTime</b> IVL_TS [0..1]	The time when the supply was ordered.
<b>originationMode</b> CD [0..1]	The mode the order was received (such as by telephone, electronic, verbal, written). This describes 'how' the communication was done as opposed to dataSourceType which specifies the 'where' and 'from'.
<b>supplyTime</b> IVL_TS [0..1]	Ordered time for supply.  If RepeatUntilCount.count >= 2, then specifies period within which the supplies should take place. In these cases, it is assumed that the supplies should be evenly distributed within the timeframe. E.g., if ordered time is 1/1/2011 to 12/31/2011, and RepeatUntilCount.count is 3, ideal supply times would be 1/1/2011, 12/31/2011, and in the middle of the year.
<b>urgency</b> CD [0..1]	Urgency: Applies to actions - orders or proposals (does not apply to problems, observations) Characterizes how quickly an action must be initiated Includes concepts such as stat, urgent, routine

### 3.1.1.79 SupplyProposal

Type: Class SupplyBase  
 Package: vmr

Proposal, e.g., by a CDS system, for a Supply to be delivered.

#### Attributes

Attribute	Notes
<b>comment</b> Documentation [0..*]	A comment, instruction, or note associated with the proposal. The type specifies the type of comment (e.g., 'Provider Instruction', 'Patient Instruction', 'Reason for Procedure', 'Consult Note', etc...) and the value of the comment represents the free text value.
<b>frequency</b> Frequency [0..1]	The interval in between supply orders. For instance, 'Every 8 hours', 'TID', 'BID', 'q8h', etc... Frequency may be represented as either a code or as an interval.
<b>proposedSupplyTime</b> IVL_TS [0..1]	Requested time for supply.  If RepeatUntilCount.count >= 2, then specifies requested period within which the supplies should take place. In these cases, it is assumed that the supplies should be evenly distributed within the timeframe. E.g., if requested time is 1/1/2011 to 12/31/2011, and RepeatUntilCount.count is 3, ideal supply times would be 1/1/2011, 12/31/2011, and in the middle of the year.
<b>urgency</b> CD [0..1]	Urgency: Applies to actions - orders or proposals (does not apply to problems, observations) Characterizes how quickly an action must be initiated Includes concepts such as stat, urgent, routine

### 3.1.1.80 UndeliveredProcedure

Type: Class ProcedureBase  
 Package: vmr

Documentation that a procedure was not delivered. E.g., documentation that a surgery was not performed because the patient refused.

#### Attributes

Attribute	Notes
<b>documentationTime</b> IVL_TS [0..1]	Time when the non-delivery of the procedure was documented.
<b>reason</b> CD [0..1]	The reason the procedure was not performed. E.g., patient refused, inadequate time.
<b>subjectEffectiveTime</b> IVL_TS [0..1]	Time when procedure might have been done, but was not. Optional, as may simply want to note that a procedure was never done.

### 3.1.1.81 UndeliveredSubstanceAdministration

Type: Class SubstanceAdministrationBase  
 Package: vmr

Documents the non-delivery of a substance. E.g., documents that an influenza immunization was not given because the patient refused or had an adverse reaction to a previous flu vaccine.

#### Attributes

Attribute	Notes
<b>documentationTime</b> IVL_TS [0..1]	Time when the non-delivery of the substance was documented.
<b>reason</b> CD [0..1]	Reason why the substance was not administered.
<b>subjectEffectiveTime</b> IVL_TS [0..1]	Time interval when subject did not receive substance. Optional, as may simply want to note that a particular substance was never administered.

### 3.1.1.82 UndeliveredSupply

Type: Class SupplyBase  
 Package: vmr

Documentation that the indicated material was not provided to the subject.

#### Attributes

Attribute	Notes
<b>documentationTime</b> IVL_TS [0..1]	Time when the non-delivery of the supply was documented.
<b>reason</b> CD [0..1]	The reason the supply was not provided. E.g., patient refused, inadequate time.
<b>subjectEffectiveTime</b> IVL_TS [0..1]	Time when the supply should have been delivered, but was not. Optional, as may simply want to note that a supply was never done.

### 3.1.1.83 VMR

*Type:* **Class**  
*Package:* vmr

A virtual medical record (vMR) contains data about a patient relevant for CDS, either with regard to the data used for generating inferences (input) or the conclusions reached as a result of analyzing the data (output). A vMR may contain, for example, problems and medications or CDS-generated assessments and recommended actions. Note that CDS-generated assessments and recommended actions would typically be considered a CDS output but could also be used as a CDS input as well (e.g., prior CDS system recommendations could influence current CDS system recommendations).

This model does allow for the presence of data belonging to related persons (such as in the case of family history, or public health infectious disease cases) for a single patient. These related persons are modeled as EvaluatedPersons who have associated ClinicalStatements. Note that this model is not designed to be a data model for providing CDS for a large population.

Note that enumerations and value domains are anticipated to be specified in profiles in additional ballots.

#### Attributes

Attribute	Notes
<b>templateId</b> CodedIdentifier [0..*]	The identifier of a set of constraints placed on a vMR.



### 3.1.2 dataTypes

*Type:* **Package «XSDschema»**  
*Package:* modelParent

Specifies data types used. The data types are a simplified/constrained version of the HL7 version 3 datatypes specification, release 2, which is itself based on the implementable specification of ISO 21090 data types.

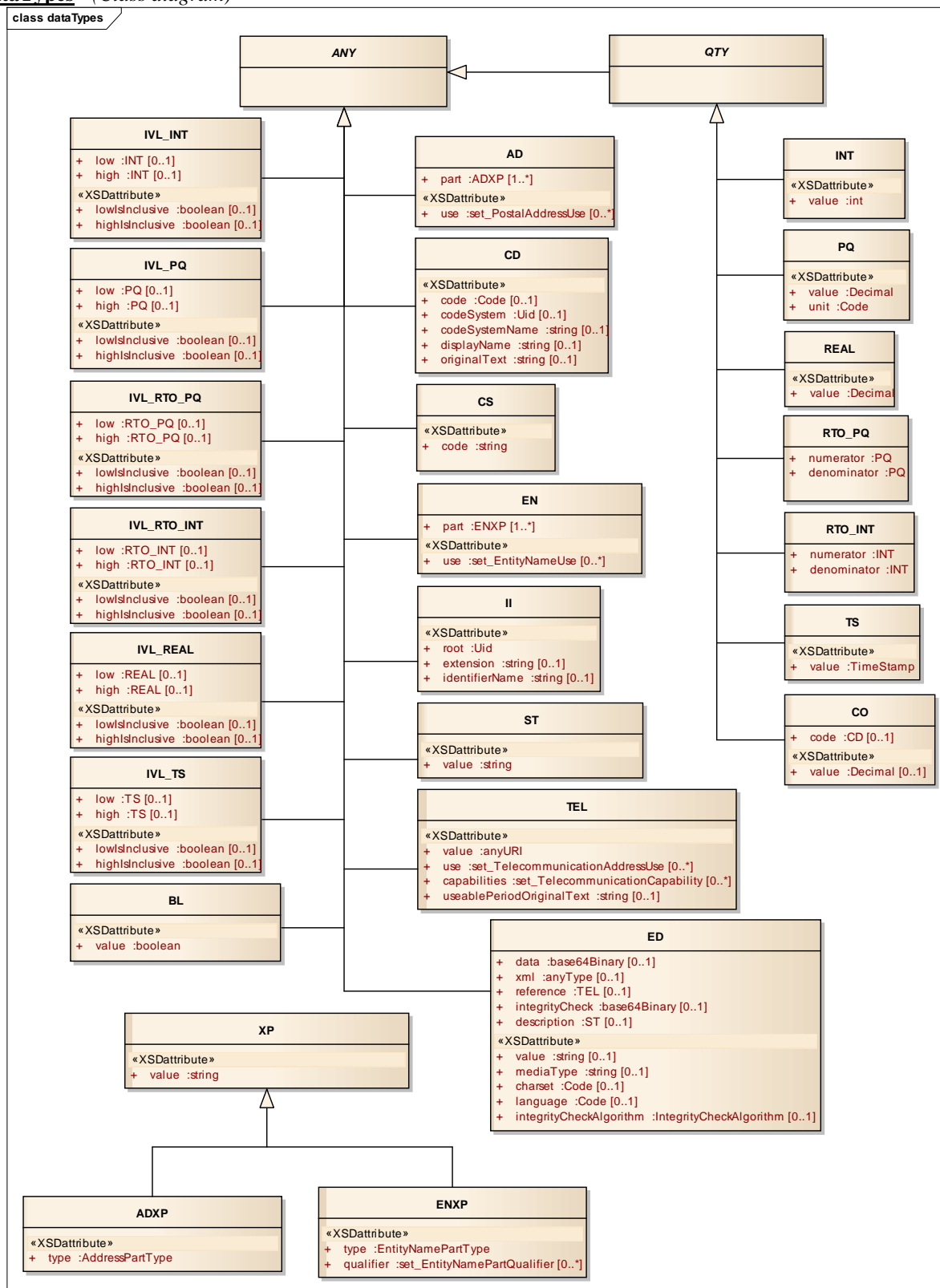
**dataTypes** - (Class diagram)

Figure: 15

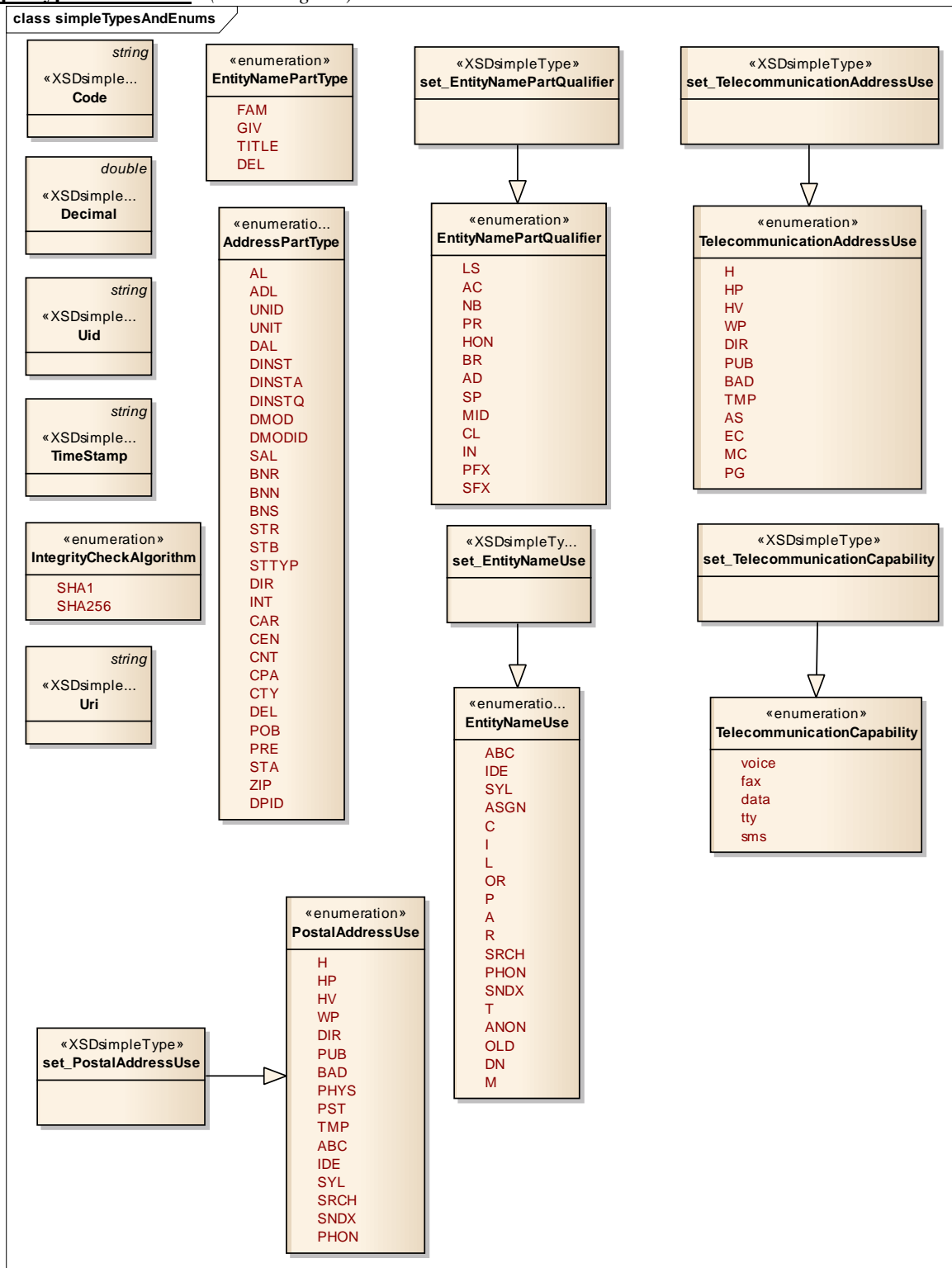
**simpleTypesAndEnums** - (Class diagram)

Figure: 16

### 3.1.2.1 AD

*Type:* **Class** **ANY**  
*Package:* dataTypes

Mailing and home or office addresses.

AD is primarily used to communicate data that will allow printing mail labels, or that will allow a person to physically visit that address. The postal address datatype is not supposed to be a container for additional information that might be useful for finding geographic locations (e.g., GPS coordinates) or for performing epidemiological studies. Such additional information should be captured by other, more appropriate data structures.

Addresses are essentially sequences of address parts, but add a "use" code and a valid time range for information about if and when the address can be used for a given purpose.

#### Attributes

Attribute	Notes
<b>use</b> set_PostalAddressUse [0..*]	A set of codes advising a system or user which address in a set of like addresses to select for a given purpose. An address without specific use code might be a default address useful for any purpose, but an address with a specific use code would be preferred for that respective purpose. If populated, the values contained in this attribute SHALL be taken from the HL7 PostalAddressUse code system.
<b>part</b> ADXP [1..*]	A sequence of address parts, such as street or post office Box, city, postal code, country, etc.

### 3.1.2.2 ADXP

*Type:* **Class** **XP**  
*Package:* dataTypes

A part with a type-tag signifying its role in the address. Typical parts that exist in about every address are street, house number, or post box, postal code, city, country but other roles may be defined regionally, nationally, or on an enterprise level (e.g. in military addresses).

#### Attributes

Attribute	Notes
<b>type</b> AddressPartType	Whether an address part names the street, city, country, postal code, post box, address line 1, etc. The value of this attribute SHALL be taken from the HL7 AddressPartType code system.

### 3.1.2.3 ANY

*Type:* **Class**  
*Package:* dataTypes

Defines the basic properties of every data value. This is conceptually an abstract type, meaning that no proper value can be just a data value without belonging to any concrete type. Every public concrete type is a specialization of this general abstract DataValue type.

This class is maintained despite the lack of attributes to maintain compatibility with the ISO 21090 data structure.

### 3.1.2.4 AddressPartType

*Type:* **Enumeration**  
*Package:* dataTypes

Specifies whether an address part names the street, city, country, postal code, post box, etc. If the type is NULL the address part is unclassified.

Concept Domain AddressPartType. ValueSet OID: 2.16.840.1.113883.11.10642. CodeSystem "AddressPartType", OID: 2.16.840.1.113883.5.16, Owner: HL7

#### Attributes

Attribute	Notes
<b>AL</b>	Address Line: An address line is for either an additional locator, a delivery address or a street address. An address generally has only a delivery address line or a street address line, but not both.
<b>ADL</b>	Additional Locator: This can be a unit designator, such as apartment number, suite number, or floor. There may be several unit designators in an address (e.g., "3rd floor, Appt. 342".) This can also be a designator pointing away from the location (e.g. Across the street from).
<b>UNID</b>	Unit Identifier: The number or name of a specific unit contained within a building or complex, as assigned by that building or complex.
<b>UNIT</b>	Unit Designator: Indicates the type of specific unit contained within a building or complex. E.g. Apartment, Floor
<b>DAL</b>	Delivery Address Line: A delivery address line is frequently used instead of breaking out delivery mode, delivery installation, etc. An address generally has only a delivery address line or a street address line, but not both.
<b>DINST</b>	Delivery Installation Type: Indicates the type of delivery installation (the facility to which the mail will be delivered prior to final shipping via the delivery mode.) Example: post office, letter carrier depot, community mail center, station, etc.
<b>DINSTA</b>	Delivery Installation Area: The location of the delivery installation, usually a town or city, and is only required if the area is different from the municipality. Area to which mail delivery service is provided from any postal facility or service such as an individual letter carrier, rural route, or postal route.
<b>DINSTQ</b>	Delivery Installation Qualifier: A number, letter or name identifying a delivery installation. E.g., for Station A, the delivery installation qualifier would be 'A'.

Attribute	Notes
<b>DMOD</b>	Delivery Mode: Indicates the type of service offered, method of delivery. For example: post office box, rural route, general delivery, etc.
<b>DMODID</b>	Delivery Mode Identifier: Represents the routing information such as a letter carrier route number. It is the identifying number of the designator (the box number or rural route number).
<b>SAL</b>	Street Address Line: A street address line is frequently used instead of breaking out build number, street name, street type, etc. An address generally has only a delivery address line or a street address line, but not both.
<b>BNR</b>	Building Number: The number of a building, house or lot alongside the street. Also known as "primary street number". This does not number the street but rather the building.
<b>BNN</b>	Building Number Numeric: The numeric portion of a building number
<b>BNS</b>	Building Number Suffix: Any alphabetic character, fraction or other text that may appear after the numeric portion of a building number
<b>STR</b>	Street Name: The name of the street, including the type
<b>STB</b>	Street Name Base: The base name of a roadway or artery recognized by a municipality (excluding street type and direction)
<b>STTYP</b>	Street Type: The designation given to the street. (e.g. Street, Avenue, Crescent, etc.)
<b>DIR</b>	Direction (e.g., N, S, W, E)
<b>INT</b>	Intersection: An intersection denotes that the actual address is located at or close to the intersection of two or more streets
<b>CAR</b>	Care Of: The name of the party who will take receipt at the specified address, and will take on responsibility for ensuring delivery to the target recipient
<b>CEN</b>	Census Tract: A geographic sub-unit delineated for demographic purposes.
<b>CNT</b>	Country
<b>CPA</b>	County or Parish: A sub-unit of a state or province. (49 of the United States of America use the term "county;" Louisiana uses the term "parish".)
<b>CTY</b>	Municipality: The name of the city, town, village, or other community or delivery center
<b>DEL</b>	Delimiter: Delimiters are printed without framing white space. If no value component is provided, the delimiter appears as a line break.
<b>POB</b>	Post Box: A numbered box located in a post station.
<b>PRE</b>	Precinct: A subsection of a municipality
<b>STA</b>	State or Province: A sub-unit of a country with limited sovereignty in a federally organized country.
<b>ZIP</b>	Postal Code: A postal code designating a region defined by the postal service.
<b>DPID</b>	A value that uniquely identifies the postal address. (Often used in barcodes).

### 3.1.2.5 BL

*Type:* **Class** **ANY**  
*Package:* dataTypes

BL stands for the values of two-valued logic. A BL value can be either true or false.

#### Attributes

Attribute	Notes
<b>value</b> boolean	The value of the BL.

### 3.1.2.6 CD

*Type:* **Class** **ANY**  
*Package:* dataTypes

A CD is a reference to a concept defined in an external code system, terminology, or ontology.

A CD may also contain an original text or phrase that served as the basis of the coding.

#### Attributes

Attribute	Notes
<b>code</b> Code [0..1]	The plain code symbol defined by the code system, or an expression in a syntax defined by the code system which describes the concept. Code SHALL be an exact match to a plain code symbol or expression defined by the code system. If the code system defines a code or expression that includes whitespace, the code SHALL include the whitespace. An expression can only be used where the codeSystem either defines an expression syntax, or there is a generally accepted syntax for the codeSystem. A code system may be defined that only defines an expression syntax with bindings to other code Systems for the elements of the expression.  It is at the discretion of the interpreting system whether to check for an expression instead of a simple code and evaluate the expression instead of treating the expression as a code. In some cases, it may be unclear or ambiguous whether the code represents a single symbol or an expression. This usually arises where the code system defines an expression language and then defines pre-coordinated concepts with symbols which match their expression, e.g. UCUM. In other cases, it is safe to treat the expression as a symbol. There is no guarantee that this is always safe: the definitions of the codeSystem should always be consulted to determine how to handle potential expressions.
<b>codeSystem</b> Uid [0..1]	The code system that defines the code, or if no code was found, the codeSystem in which no code was found. Code systems SHALL be referred to by a UID, which allows unambiguous reference to standard code systems and other local codesystems. Where either ISO or HL7 have assigned UID to code Systems, then these UIDs SHALL be used. Otherwise implementations SHALL use an appropriate ISO Object Identifier (OID) or UUID to construct a globally unique local coding system identifier.
<b>codeSystemName</b> string [0..1]	The common name of the coding system.

Attribute	Notes
	<p>The code system name has no computational value. codeSystemName can never modify the meaning of codeSystem and cannot exist without codeSystem.</p> <p>Information Processing Entities claiming direct or indirect conformance SHALL NOT functionally rely on codeSystemName. In addition, they MAY choose not to implement codeSystemName; but SHALL NOT reject instances because codeSystemName is present.</p> <p>Note: The purpose of a code system name is to assist an unaided human interpreter of a code value to interpret codeSystem.</p>
<p><b>displayName</b> string [0..1]</p>	<p>A name, title, or representation for the code or expression as it exists in the code system.</p> <p>If populated, the displayName SHALL be a valid human readable representation of the concept as defined by the code system at the time of data entry. The displayName SHALL conform to any rules defined by the codingSystem; if the codeSystem does not define a human representation for the code or expression, then none can be provided. displayName is included both as a courtesy to an unaided human interpreter of a code value and as a documentation of the name used to display the concept to the user. The display name has no functional meaning; it SHALL never exist without a code; and it SHALL never modify the meaning of the code. A display name may not be present if the code is an expression for which no display name has been assigned or can be derived. Information Processing Entities claiming direct or indirect conformance MAY choose not to implement displayName but SHALL NOT reject instances because displayName is present.</p> <p>Display names SHALL not alter the meaning of the code value. Therefore, display names SHOULD NOT be presented to the user on a receiving application system without ascertaining that the display name adequately represents the concept referred to by the code value. Communication SHALL NOT simply rely on the display name. The display name's main purpose is to support implementation debugging.</p>
<p><b>originalText</b> string [0..1]</p>	<p>The text as seen and/or selected by the user who entered the data which represents the intended meaning of the user. This attribute is equivalent to originalText.value in the ISO 21090 model.</p> <p>Note: Local implementations may influence what is required to represent that original text.</p> <p>Original text can be used in a structured user interface to capture what the user saw as a representation of the code on the data input screen, or in a situation where the user dictates or directly enters text, it is the text entered or uttered by the user.</p> <p>It is valid to use the CD datatype to store only the text that the user entered or uttered. In this situation, original text will exist without a code. In a situation where the code is assigned sometime after the text was entered, originalText is the text or phrase used as the basis for assigning the code.</p> <p>The original text SHALL be an excerpt of the relevant information in the original sources, rather than a pointer or exact reproduction. Thus the original text SHALL be represented in plain text form. In specific</p>



Attribute	Notes
	<p>circumstances, when clearly described the context of use, the originalText may be a reference to some other text artefact for which the resolution scope is clearly described.</p> <p>Values of type CD MAY have a original text despite not having a code. Any CD value with no code signifies a coding exception. In this case, originalText is a name or description of the concept that was not coded.</p>

### 3.1.2.7 CO

*Type:* **Class** **QTY**  
*Package:* dataTypes

Represents data where coded values are associated with a specific order.

Note: CO may be used for things that model rankings and scores, e.g. likert scales, pain, Apgar values, etc, where there is a) implied ordering, b) no implication that the distance between each value is constant, and c) the total number of values is finite. CO may also be used in the context of an ordered code system. In this case, it may not be appropriate or even possible to use the value attribute, but CO may still be used so that models that make use of such code systems may introduce model elements that involve statements about the order of the terms in a domain.

The relative order of values in a code system need not be independently obvious in the literal representation of the CO. In these circumstances, is expected that an application will look up the ordering of these values from some definition of the code system.

Some of the code systems will directly assign numerical value to the concepts that are suitable for some mathematical operations.

Though it would generally make sense, applications SHOULD not assume that the translations of the code, if provided, will have the same ordering as the CO. Translations SHALL not be considered when the ordering of the code system is determined.

#### Attributes

Attribute	Notes
<b>value</b> Decimal [0..1]	A numerical value associated with the coded ordinal value. The value may be constrained to an integer in some contexts of use. If code is nonNull, value SHALL only be nonNull if the code system explicitly assigns a value to the concept.
<b>code</b> CD [0..1]	A code representing the definition of the ordinal item

### 3.1.2.8 CS

*Type:* Class ANY  
*Package:* dataTypes

Coded data in its simplest form, where only the code is not predetermined.

The code system and code system version are implied and fixed by the context in which the CS value occurs.

Due to its highly restricted functionality, CS SHALL only be used for simple structural attributes with highly controlled and stable terminologies where:

- all codes come from a single code system
- codes are not reused if their concept is deprecated
- the publication and extensibility properties of the code system are well described and understood

#### Attributes

Attribute	Notes
<b>code</b> string	The plain code symbol defined by the code system. If the code value is empty or null, then there is no code in the code system that represents the concept. Code SHALL only contain characters that are either a letter, a digit, or one of '.', '-', '_' or ':'. Code systems that are used with CS SHALL NOT define code symbols or expression syntaxes that contain whitespace or any other characters not in this list.

### 3.1.2.9 Code

*Type:* Class string  
*Package:* dataTypes

A code representing the string data. For example, the string data may be a user-message out of a message-catalog where the code represents the identifier of the message in the message catalog.

### 3.1.2.10 Decimal

*Type:* Class double  
*Package:* dataTypes

A number that is not restricted to an integer, and may contain fractional values between two integers.

### 3.1.2.11 ED

*Type:* **Class** **ANY**  
*Package:* dataTypes

Data that is primarily intended for human interpretation or for further machine processing outside the scope of this specification. This includes unformatted or formatted written language, multimedia data, or structured information as defined by a different standard (e.g., XML-signatures.)

Encapsulated data can be present in two forms, inline or by reference. The content is the same whether it is located inline or remote. Inline data is communicated or moved as part of the encapsulated data value, whereas by-reference data may reside at a different location: a URL/URI that provides reference to the information required to locate the data. Inline data may be provided in one of 3 different ways:

- 1) as a plain sequence of characters (value)
- 2) as a binary (a sequence of bytes) (data)
- 3) as xml content (xml)

Content **SHALL** be provided if the ED has no nullFlavor. The content may be provided in-line (using only one of value, data or xml), or it may be provided as a reference. Content may be provided in-line and a reference also may be given; in these cases, it is expected that the content of the reference will be exactly the same as the in-line content. Information Processing Entities are not required to check this, but may regard it as an error condition if the content does not match

#### Attributes

Attribute	Notes
<b>data</b> base64Binary [0..1]	A simple sequence of byte values that contains the content. (Base64 Encoded String).
<b>xml</b> anyType [0..1]	The content represented in plain XML form.  A direct representation is provided for XML. This is because this specification includes an XML serialization of the data, and this xml attribute is handled specially in the serialisation form. The xml data is not different in any semantic sense to the same data if represented in the value or data attributes.
<b>reference</b> TEL [0..1]	A URL the target of which provides the binary content.  The semantic value of an encapsulated data value is the same, regardless whether the content is present as inline content or just by reference. However, an encapsulated data value without inline content behaves differently, since any attempt to examine the content requires the data to be downloaded from the reference. An encapsulated data value may have both inline content and a reference.  If data is provided in the value, data or xml attributes, the reference <b>SHALL</b> point to the same data. It is an error if the data resolved through the reference does not match either the integrity check, data as provided, or data that had earlier been retrieved through the reference and then cached. The mediatype of the ED <b>SHALL</b> match the type returned by accessing the reference.  The reference may contain a usablePeriod to indicate that the data may only be available for a limited period of time. Whether the reference is limited by a usablePeriod or not, the content of the reference <b>SHALL</b> be fixed for all time. Any application using the reference <b>SHALL</b> always receive the same data, or an error. The reference cannot be reused to

Attribute	Notes
	send a different version of the same data, or different data
<b>integrityCheck</b> base64Binary [0..1]	<p>A checksum calculated over the binary data</p> <p>The purpose of this property, when communicated with a reference is for anyone to validate later whether the reference still resolved to the same content that the reference resolved to when the encapsulated data value with reference was created. If the attribute is null, there is no integrityCheck.</p> <p>It is an error if the data resolved through the reference does not match the integrity check.</p> <p>The integrity check is calculated according to the integrityCheckAlgorithm. By default, the Secure Hash Algorithm-1 (SHA-1) shall be used. The integrity check is binary encoded according to the rules of the integrity check algorithm.</p> <p>The integrity check is calculated over the raw binary data that is contained in the data component, or that is accessible through the reference. No transformations are made before the integrity check is calculated. If the data is compressed, the Integrity Check is calculated over the compressed data.</p>
<b>description</b> ST [0..1]	<p>An alternative description of the media where the media is not able to be rendered.</p> <p>E.g. Short text description of an image or sound clip, etc. This attribute is not intended to be a complete substitute for the original. For complete substitutes, use the &amp;#34;translation&amp;#34; property.</p> <p>The intent of this property is to allow compliance with disability requirements such as those expressed in American&amp;#39;s with Disability Act (also known as &amp;#34;Section 508&amp;#34;), where there is a requirement to provide a short text description of included media in some form that can be read by a screen reader. This is similar to a very short thumbnail with mediaType = text/plain.</p>
<b>value</b> string [0..1]	<p>A simple sequence of characters that contains the content.</p> <p>If value is used, the mediatype is fixed to text/plain and the charset must be consistent with the String Character Set. Refer to section 6.7.5 for more details</p>
<b>mediaType</b> string [0..1]	<p>Identifies the type of the encapsulated data and can be used to determine a method to interpret or render the content.</p> <p>The IANA defined domain of media types is established by the IETF RFCs 2045 and 2046. mediaType has a default value of text/plain and cannot be null. If the media type is different to text/plain, the &amp;#60;i&amp;#62;mediaType&amp;#60;i&amp;#62; attribute SHALL be populated.</p> <p>If the content is compressed using a specified compression algorithm, the mediaType SHALL refer the mediaType of the uncompressed data, whether the data is accessed by reference or not.</p>
<b>charset</b> Code [0..1]	<p>An Internet Assigned Numbers Authority (IANA) Charset Registered character set and character encoding for character-based encoding types&amp;#60;b&amp;#62;. &amp;#60;b&amp;#62;</p> <p>Whenever the content of the ED is character type data in any form, the charset property needs to be known. If the content is provided directly in</p>

Attribute	Notes
	the value attribute, then the charset SHALL be a known character set consistent with the String Character Set. Refer to section 6.7.5 for more details. If the content is provided as a reference, and the access method does not provide the charset for the content (such as by a mime header), then the charset SHALL be conveyed as part of the ED
<b>language</b> Code [0..1]	<p>The human language of the content. Valid codes are taken from the IETF RFC 3066. If this attribute is null, the language may be inferred from elsewhere, either from the context or from unicode language tags, for example.</p> <p>Conformance profiles SHOULD define defaulting rules for language for a given usage environment of this specification.</p> <p>Note: While language attribute usually alters the interpretation of the text, the language attribute does not alter the meaning of the characters in the text.</p>
<b>integrityCheckAlgorithm</b> IntegrityCheckAlgorithm [0..1]	<p>The algorithm used to compute the integrityCheck value.</p> <p>If populated, the value of this attribute SHALL be taken from the HL7 IntegrityCheckAlgorithm code system.</p>

### 3.1.2.12 EN

*Type:* Class ANY  
*Package:* dataTypes

A name for a person, organization, place or thing.

Examples: 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.

Entity names are essentially sequences of entity name parts, but add a "use" code.

#### Attributes

Attribute	Notes
<b>part</b> ENXP [1..*]	A sequence of name parts, such as given name or family name, prefix, suffix, etc.
<b>use</b> set_EntityNameUse [0..*]	<p>A set of codes advising a system or user which name in a set of names to select for a given purpose.</p> <p>A name without specific use code might be a default name useful for any purpose, but a name with a specific use code would be preferred for that respective purpose. Names SHOULD not be collected without at least one use code, but names MAY exist without use code, particularly for legacy data.</p> <p>If populated, the values contained in this attribute SHALL be taken from the HL7 EntityNameUse2 code system.</p>

### 3.1.2.13 ENXP

*Type:* **Class** **XP**  
*Package:* dataTypes

A part with a type code signifying the role of the part in the whole entity name, and qualifier codes for more detail about the name part type. (Typical name parts for person names are given names, and family names, titles, etc.).

#### Attributes

Attribute	Notes
<b>type</b> EntityNamePartType	Indicates whether the name part is a given name, family name, prefix, suffix, etc. The value of this attribute SHALL be taken from the HL7 EntityNamePartType2 code system.
<b>qualifier</b> set_EntityNamePartQualifier [0..*]	The qualifier is a set of codes each of which specifies a certain subcategory of the name part in addition to the main name part type. For example, a given name may be flagged as a nickname (CL), a family name may be a name acquired by marriage (SP) or a name from birth (BR). If populated, the values contained in this attribute SHALL be taken from the HL7 EntityNamePartQualifier2 code system.

### 3.1.2.14 EntityNamePartQualifier

*Type:* **Enumeration**  
*Package:* dataTypes

The qualifier is a set of codes each of which specifies a certain subcategory of the name part in addition to the main name part type. For example, a given name may be flagged as a nickname, a family name may be a pseudonym or a name of public records.

ValueSet OID: [TBD], CodeSystem "EntityNamePartTypeQualifier", OID: 2.16.840.1.113883.5.43. CodeSystem "EntityNamePartTypeQualifierR2", OID: 2.16.840.1.113883.5.1122, Owner: HL7

#### Attributes

Attribute	Notes
<b>LS</b>	Legal Status
<b>AC</b>	Academic
<b>NB</b>	Nobility
<b>PR</b>	Professional
<b>HON</b>	Honorific
<b>BR</b>	Birth
<b>AD</b>	Acquired
<b>SP</b>	Spouse

Attribute	Notes
<b>MID</b>	Middle Name
<b>CL</b>	Call Me
<b>IN</b>	Initial
<b>PFX</b>	Prefix
<b>SFX</b>	Suffix

### 3.1.2.15 EntityNamePartType

Type: Enumeration  
Package: dataTypes

Indicates whether the name part is a given name, family name, prefix, suffix, etc.

ValueSet OID: [TBD], CodeSystem "EntityNamePartType", OID: 2.16.840.1.113883.5.43. CodeSystem "EntityNamePartTypeR2", OID: 2.16.840.1.113883.5.1122, Owner: HL7

#### Attributes

Attribute	Notes
<b>FAM</b>	Family Name
<b>GIV</b>	Given Name
<b>TITLE</b>	Title
<b>DEL</b>	Delimiter: Delimiters are printed without framing white space. If no value component is provided, the delimiter appears as a line break.

### 3.1.2.16 EntityNameUse

Type: **Enumeration**  
 Package: dataTypes

A set of codes advising a system or user which name in a set of names to select for a given purpose.

ValueSet OID: [TBD], CodeSystem "EntityNameUse", OID: 2.16.840.1.113883.5.45. CodeSystem "EntityNameUseR2", OID: 2.16.840.1.113883.5.1120, Owner: HL7

#### Attributes

Attribute	Notes
<b>ABC</b>	Alphabetic: Alphabetic transcription of name (Japanese: romaji)
<b>IDE</b>	Ideographic: Ideographic representation of name (e.g., Japanese kanji, Chinese characters)
<b>SYL</b>	Syllabic: Syllabic transcription of name (e.g., Japanese kana, Korean hangul)
<b>ASGN</b>	Assigned: A name assigned to a person. Reasons some organizations assign alternate names may include not knowing the person's name, or to maintain anonymity. Some, but not necessarily all, of the name types that people call "alias" may fit into this category.
<b>C</b>	License: As recorded on a license, record, certificate, etc. (only if different from legal name)
<b>I</b>	Indigenous/Tribal: e.g. Chief Red Cloud
<b>L</b>	Known as/conventional/the one you use
<b>OR</b>	official registry: The formal name as registered in an official (government) registry, but which name might not be commonly used. Particularly used in countries with a law system based on Napoleonic law.
<b>P</b>	Pseudonym: A self asserted name that the person is using or has used.
<b>A</b>	Artist/Stage: Includes writer's pseudonym, stage name, etc
<b>R</b>	Religious: e.g. Sister Mary Francis, Brother John
<b>SRCH</b>	Search Type Uses: A name intended for use in searching or matching.
<b>PHON</b>	Phonetic: The address as understood by the data enterer, i.e. a close approximation of a phonetic spelling of the address, not based on a phonetic algorithm.
<b>SNDX</b>	A name spelled according to the SoundEx algorithm.
<b>T</b>	Obsolete, meaning not known
<b>ANON</b>	Anonymized name, designed to hide the actual identify of a person. (Obsolete, use ASGN instead)
<b>OLD</b>	Obsolete name, no longer in use
<b>DN</b>	Obsolete, meaning not known
<b>M</b>	Married name (obsolete, use "C" for name as recorded on a certificate or license)



**3.1.2.17 //**

*Type:* **Class** **ANY**  
*Package:* dataTypes

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 usually defined based on ISO object identifiers.

An identifier allows someone to select one record, object or thing from a set of candidates. Usually an identifier alone without any context is not usable. Identifiers are distinguished from concept descriptors as concept descriptors never identify an individual thing, although there may sometimes be an individual record or object that represents the concept.

Information Processing Entities claiming direct or indirect conformance SHALL never assume that receiving applications can infer the identity of issuing authority or the type of the identifier from the identifier or components thereof.

**Attributes**

Attribute	Notes
<b>root</b> Uid	A unique identifier that guarantees the global uniqueness of the instance identifier. If root is populated, and there is no extension, then the root is a globally unique identifier in its own right. In the presence of a non-null extension, the root is the unique identifier for the "namespace" of the identifier in the extension. Note that this does NOT necessarily correlate with the organization that manages the issuing of the identifiers. A given organization may manage multiple identifier namespaces, and control over a given namespace may transfer from organization to organization over time while the root remains the same. This field can be either a DCE UUID, an Object Identifier (OID), or a special identifier taken from lists that may be published by ISO or HL7. Comparison of root values is always case sensitive. UUID's SHALL be represented in upper case, so UUID case should always be preserved. The root SHALL not be used to carry semantic meaning - all it does is ensure global computational uniqueness.
<b>extension</b> string [0..1]	A character string as a unique identifier within the scope of the identifier root. The root and extension scheme means that the concatenation of root and extension SHALL be a globally unique identifier for the item that this II value identifies. Some identifier schemes define certain style options to their code values. For example, the U.S. Social Security Number (SSN) is normally written with dashes that group the digits into a pattern "123-12-1234". However, the dashes are not meaningful and a SSN can also be represented as "123121234" without the dashes. In the case where identifier schemes provide for multiple representations, HL7 or ISO may make a ruling about which is the preferred form and document that ruling where that respective external identifier scheme is recognized. If no <i>extension</i> attribute is provided in a non-null <i>II</i> , then the root is the complete unique identifier.
<b>identifierName</b> string [0..1]	A human readable description for this identifier.

**3.1.2.18 INT**

*Type:* **Class** **QTY**  
*Package:* dataTypes

Integer numbers (-1,0,1,2, 100, 3398129, etc.) are precise numbers that are results of counting and enumerating. Integer numbers are discrete, the set of integers is infinite but countable. No arbitrary limit is imposed on the range of integer numbers.

**Attributes**

Attribute	Notes
<b>value</b> int	The value of the INT. Note that this specification imposes no limitations on the size of integer, but most implementations will map this to a 32 or 64 bit integer.

**3.1.2.19 IVL\_INT**

*Type:* **Class** **ANY**  
*Package:* dataTypes

A set of consecutive values of an ordered base datatype.

Any ordered type can be the basis of an IVL; it does not matter whether the base type is discrete or continuous. If the base datatype is only partially ordered, all elements of the IVL must be elements of a totally ordered subset of the partially ordered datatype. For example, PQ is considered ordered. However the ordering of PQs is only partial; a total order is only defined among comparable quantities (quantities of the same physical dimension). While IVLs between 2 and 4 meter exists, there is no IVL between 2 meters and 4 seconds.

**Attributes**

Attribute	Notes
<b>low</b> INT [0..1]	This is the low limit. If the low limit is not known, it may be null. The low limit SHALL NOT be positive infinity.
<b>high</b> INT [0..1]	This is the high limit. If the high limit is not known, it may be null. The high limit SHALL NOT be negative infinity, and SHALL be higher than the low limit if one exists.
<b>lowIsInclusive</b> boolean [0..1]	This attribute is called lowIsClosed in the ISO 21090 specification and lowClosed in the HL7 Data Types R2 specification.  Whether low is included in the IVL (is closed) or excluded from the IVL (is open).
<b>highIsInclusive</b> boolean [0..1]	This attribute is called highIsClosed in the ISO 21090 specification and highClosed in the HL7 Data Types R2 specification.  Whether high is included in the IVL (is closed) or excluded from the IVL (is open).

### 3.1.2.20 IVL\_PQ

*Type:* **Class** **ANY**  
*Package:* dataTypes

A set of consecutive values of an ordered base datatype.

Any ordered type can be the basis of an IVL; it does not matter whether the base type is discrete or continuous. If the base datatype is only partially ordered, all elements of the IVL must be elements of a totally ordered subset of the partially ordered datatype. For example, PQ is considered ordered. However the ordering of PQs is only partial; a total order is only defined among comparable quantities (quantities of the same physical dimension). While IVLs between 2 and 4 meter exists, there is no IVL between 2 meters and 4 seconds.

#### Attributes

Attribute	Notes
<b>low</b> PQ [0..1]	This is the low limit. If the low limit is not known, it may be null. The low limit SHALL NOT be positive infinity.
<b>high</b> PQ [0..1]	This is the high limit. If the high limit is not known, it may be null. The high limit SHALL NOT be negative infinity, and SHALL be higher than the low limit if one exists.
<b>lowIsInclusive</b> boolean [0..1]	This attribute is called lowIsClosed in the ISO 21090 specification and lowClosed in the HL7 Data Types R2 specification.  Whether low is included in the IVL (is closed) or excluded from the IVL (is open).
<b>highIsInclusive</b> boolean [0..1]	Whether high is included in the IVL (is closed) or excluded from the IVL (is open).

### 3.1.2.21 IVL\_REAL

*Type:* **Class** **ANY**  
*Package:* dataTypes

A set of consecutive values of an ordered base datatype.

Any ordered type can be the basis of an IVL; it does not matter whether the base type is discrete or continuous. If the base datatype is only partially ordered, all elements of the IVL must be elements of a totally ordered subset of the partially ordered datatype. For example, PQ is considered ordered. However the ordering of PQs is only partial; a total order is only defined among comparable quantities (quantities of the same physical dimension). While IVLs between 2 and 4 meter exists, there is no IVL between 2 meters and 4 seconds.

#### Attributes

Attribute	Notes
<b>low</b> REAL [0..1]	This is the low limit. If the low limit is not known, it may be null. The low limit SHALL NOT be positive infinity.
<b>high</b> REAL [0..1]	This is the high limit. If the high limit is not known, it may be null. The high limit SHALL NOT be negative infinity, and SHALL be higher than the low limit if one exists.
<b>lowIsInclusive</b> boolean [0..1]	This attribute is called lowIsClosed in the ISO 21090 specification and lowClosed in the HL7 Data Types R2 specification.  Whether low is included in the IVL (is closed) or excluded from the IVL (is open).

Attribute	Notes
<b>highIsInclusive</b> boolean [0..1]	This attribute is called highIsClosed in the ISO 21090 specification and highClosed in the HL7 Data Types R2 specification.  Whether high is included in the IVL (is closed) or excluded from the IVL (is open).

### 3.1.2.22 IVL\_RTO\_INT

*Type:* Class ANY  
*Package:* dataTypes

A set of consecutive values of an ordered base datatype.

Any ordered type can be the basis of an IVL; it does not matter whether the base type is discrete or continuous. If the base datatype is only partially ordered, all elements of the IVL must be elements of a totally ordered subset of the partially ordered datatype. For example, PQ is considered ordered. However the ordering of PQs is only partial; a total order is only defined among comparable quantities (quantities of the same physical dimension). While IVLs between 2 and 4 meter exists, there is no IVL between 2 meters and 4 seconds.

#### Attributes

Attribute	Notes
<b>low</b> RTO_INT [0..1]	This is the low limit. If the low limit is not known, it may be null. The low limit SHALL NOT be positive infinity.
<b>high</b> RTO_INT [0..1]	This is the high limit. If the high limit is not known, it may be null. The high limit SHALL NOT be negative infinity, and SHALL be higher than the low limit if one exists.
<b>lowIsInclusive</b> boolean [0..1]	This attribute is called lowIsClosed in the ISO 21090 specification and lowClosed in the HL7 Data Types R2 specification.  Whether low is included in the IVL (is closed) or excluded from the IVL (is open).
<b>highIsInclusive</b> boolean [0..1]	This attribute is called highIsClosed in the ISO 21090 specification and highClosed in the HL7 Data Types R2 specification.  Whether high is included in the IVL (is closed) or excluded from the IVL (is open).

**3.1.2.23 IVL\_RTO\_PQ**

*Type:* **Class** **ANY**  
*Package:* dataTypes

A set of consecutive values of an ordered base datatype.

Any ordered type can be the basis of an IVL; it does not matter whether the base type is discrete or continuous. If the base datatype is only partially ordered, all elements of the IVL must be elements of a totally ordered subset of the partially ordered datatype. For example, PQ is considered ordered. However the ordering of PQs is only partial; a total order is only defined among comparable quantities (quantities of the same physical dimension). While IVLs between 2 and 4 meter exists, there is no IVL between 2 meters and 4 seconds

**Attributes**

Attribute	Notes
<b>low</b> RTO_PQ [0..1]	This is the low limit. If the low limit is not known, it may be null. The low limit SHALL NOT be positive infinity.
<b>high</b> RTO_PQ [0..1]	This is the high limit. If the high limit is not known, it may be null. The high limit SHALL NOT be negative infinity, and SHALL be higher than the low limit if one exists.
<b>lowIsInclusive</b> boolean [0..1]	This attribute is called lowIsClosed in the ISO 21090 specification and lowClosed in the HL7 Data Types R2 specification.  Whether low is included in the IVL (is closed) or excluded from the IVL (is open).
<b>highIsInclusive</b> boolean [0..1]	This attribute is called highIsClosed in the ISO 21090 specification and highClosed in the HL7 Data Types R2 specification.  Whether high is included in the IVL (is closed) or excluded from the IVL (is open).

### 3.1.2.24 IVL\_TS

*Type:* **Class** **ANY**  
*Package:* dataTypes

A set of consecutive values of an ordered base datatype.

Any ordered type can be the basis of an IVL; it does not matter whether the base type is discrete or continuous. If the base datatype is only partially ordered, all elements of the IVL must be elements of a totally ordered subset of the partially ordered datatype. For example, PQ is considered ordered. However the ordering of PQs is only partial; a total order is only defined among comparable quantities (quantities of the same physical dimension). While IVLs between 2 and 4 meter exists, there is no IVL between 2 meters and 4 seconds.

#### Attributes

Attribute	Notes
<b>low</b> TS [0..1]	This is the low limit. If the low limit is not known, it may be null. The low limit SHALL NOT be positive infinity.
<b>high</b> TS [0..1]	This is the high limit. If the high limit is not known, it may be null. The high limit SHALL NOT be negative infinity, and SHALL be higher than the low limit if one exists.
<b>lowIsInclusive</b> boolean [0..1]	This attribute is called lowIsClosed in the ISO 21090 specification and lowClosed in the HL7 Data Types R2 specification.  Whether low is included in the IVL (is closed) or excluded from the IVL (is open).
<b>highIsInclusive</b> boolean [0..1]	This attribute is called highIsClosed in the ISO 21090 specification and highClosed in the HL7 Data Types R2 specification.  Whether high is included in the IVL (is closed) or excluded from the IVL (is open).

### 3.1.2.25 IntegrityCheckAlgorithm

*Type:* **Enumeration**  
*Package:* dataTypes

The algorithm used to compute the integrityCheck value.

#### Attributes

Attribute	Notes
<b>SHA1</b>	secure hash algorithm - 1 This algorithm is defined in FIPS PUB 180-1: Secure Hash Standard. As of April 17, 1995.
<b>SHA256</b>	secure hash algorithm - 256 This algorithm is defined in FIPS PUB 180-2: Secure Hash Standard.

**3.1.2.26 PQ**

*Type:* **Class** **QTY**  
*Package:* dataTypes

A dimensioned quantity expressing the result of measuring.

**Attributes**

Attribute	Notes
<b>value</b> Decimal	The number which is multiplied by the unit to make the PQ.
<b>unit</b> Code	<p>The unit of measure specified in the Unified Code for Units of Measure (UCUM).</p> <p>UCUM defines two forms of expression, case sensitive and case insensitive. <i>PQ</i> uses the case sensitive codes. The codeSystem OID for the case sensitive form is 2.16.840.1.113883.6.8. The default value for unit is the UCUM code "1" (unity).</p> <p>Equality of physical quantities does not require the values and units to be equal independently. Value and unit is only how we represent physical quantities. For example, 1 m equals 100 cm. Although the units are different and the values are different, the physical quantities are equal. Therefore one should never expect a particular unit for a physical quantity but instead allow for automated conversion between different comparable units.</p> <p>The unit SHALL come from UCUM, which only specifies unambiguous measurement units. Sometimes it is not clear how some measurements in healthcare map to UCUM codes.</p> <p>Note: The general pattern for a measurement is <i>value</i> <u>unit</u> of <b>Thing</b>. In this scheme, the PQ represents the <i>value</i> and the <u>unit</u>, and the <b>Thing</b> is described by some coded concept that is linked to the PQ by the context of use. This maps obviously to some measurements, such as <b>Patient Body Temperature</b> of 37 <u>Celsius</u>, and 250 <u>mg/day</u> of <b>Salicylate</b>.</p> <p>However for some measurements that arise in healthcare, the scheme is not so obvious. Two classic examples are 5 Drinks of Beer, and 3 Acetaminophen tablets. At first glance it is tempting to classify these measurements like this: 5 <u>drinks</u> of <b>Beer</b> and 3 <b>Acetaminophen</b> <u>tablets</u>. The problem with this is that UCUM does not support units of "beer", "tablets" or "scoops".</p> <p>The reason for this is that neither tablets or scoops are proper units. What kind of tablets? How big is the glass? In these kinds of cases, the concept that appears to be a unit needs to further specified before interoperability is established. If a correct amount is required, then it is generally appropriate to specify an exact measurement with an appropriate UCUM unit. If this is not possible, then the concept is not part of the measurement. UCUM provides a unit called unity for use in these cases. The proper way to understand these measurements as 3 <u>1</u> <b>Acetaminophen</b> tablets, where 1 is the UCUM unit for unity, and the <b>Thing</b> has a qualifier. The context of use will need to provide the extra qualifying information.</p>

### 3.1.2.27 PostalAddressUse

Type: **Enumeration**  
 Package: dataTypes

A set of codes advising a system or user which address in a set of like addresses to select for a given purpose.

ValueSet OID: 2.16.840.1.113883.11.190. CodeSystem "PostalAddressUse", OID: 2.16.840.1.113883.5.1012, Owner: HL7

#### Attributes

Attribute	Notes
<b>H</b>	Home Address: A communication address at a home, attempted contacts for business purposes might intrude privacy and chances are one will contact family or other household members instead of the person one wishes to call. Typically used with urgent cases, or if no other contacts are available.
<b>HP</b>	Primary Home: The primary home, to reach a person after business hours.
<b>HV</b>	Vacation Home: A vacation home, to reach a person while on vacation.
<b>WP</b>	Work Place: An office address. First choice for business related contacts during business hours.
<b>DIR</b>	Direct: Indicates a work place address or telecommunication address that reaches the individual or organization directly without intermediaries. For phones, often referred to as a 'private line'.
<b>PUB</b>	Public: Indicates a work place address or telecommunication address that is a 'standard' address which may reach a reception service, mail-room, or other intermediary prior to the target entity.
<b>BAD</b>	Bad Address: A flag indicating that the address is bad, in fact, useless.
<b>PHYS</b>	Physical Visit Address: Used primarily to visit an address.
<b>PST</b>	Postal Address: Used to send mail.
<b>TMP</b>	Temporary Address: A temporary address, may be good for visit or mailing. Note that an address history can provide more detailed information.
<b>ABC</b>	Alphabetic: Alphabetic transcription of name (Japanese: romaji)
<b>IDE</b>	Ideographic: Ideographic representation of name (e.g., Japanese kanji, Chinese characters)
<b>SYL</b>	Syllabic: Syllabic transcription of name (e.g., Japanese kana, Korean hangul)
<b>SRCH</b>	Search Type Uses: A name intended for use in searching or matching.
<b>SNDX</b>	Soundex: An address spelled according to the SoundEx algorithm.
<b>PHON</b>	phonetic: The address as understood by the data enterer, i.e. a close approximation of a phonetic spelling of the address, not based on a phonetic algorithm.



**3.1.2.28 QTY**

*Type:* **Class** **ANY**  
*Package:* dataTypes

The quantity datatype is an abstract generalization for all datatypes whose domain values has an order relation (less-or-equal) and where difference is defined in all of the datatype's totally ordered value subsets.

**3.1.2.29 REAL**

*Type:* **Class** **QTY**  
*Package:* dataTypes

Fractional numbers. Typically used whenever quantities are measured, estimated, or computed from other real numbers. The typical representation is decimal, where the number of significant decimal digits is known as the precision.

**Attributes**

<b>Attribute</b>	<b>Notes</b>
<b>value</b> Decimal	The value of the REAL.

**3.1.2.30 RTO\_INT**

*Type:* **Class** **QTY**  
*Package:* dataTypes

A ratio of integers constructed as the quotient of a numerator integer value divided by a denominator integer value. Common factors in the numerator and denominator are not automatically cancelled out.

The RTO datatype supports titers (e.g., 1:128) and other quantities produced by laboratories that truly represent ratios. Ratios are not simply structured numerics, particularly blood pressure measurements (e.g. 120/60) are not ratios.

Notes:

1. Ratios are different from rational numbers, i.e., in ratios common factors in the numerator and denominator never cancel out. A ratio of two real or integer numbers is not automatically reduced to a real number. This datatype is not defined to generally represent rational numbers. It is used only if common factors in numerator and denominator are not supposed to cancel out. This is only rarely the case. For observation values, ratios occur almost exclusively with titers. In most other cases, REAL should be used instead of the RTO.

**Attributes**

<b>Attribute</b>	<b>Notes</b>
<b>numerator</b> INT	The integer quantity that is being divided in the ratio. This represents the numerator.expression.value from the ISO21090 datatypes.
<b>denominator</b> INT	The integer quantity that divides the numerator in the ratio. The denominator SHALL not be zero. This represents the denominator.expression.value from the ISO 21090 datatypes.

**3.1.2.31 RTO\_PQ**

*Type:* **Class** **QTY**  
*Package:* dataTypes

A quantity constructed as the quotient of a numerator quantity divided by a denominator quantity.

Common factors in the numerator and denominator are not automatically cancelled out.

The RTO datatype supports titers (e.g., 1:128) and other quantities produced by laboratories that truly represent ratios. Ratios are not simply structured numerics, particularly blood pressure measurements (e.g. 120/60) are not ratios.

Notes:

1. Ratios are different from rational numbers, i.e., in ratios common factors in the numerator and denominator never cancel out. A ratio of two real or integer numbers is not automatically reduced to a real number. This datatype is not defined to generally represent rational numbers. It is used only if common factors in numerator and denominator are not supposed to cancel out. This is only rarely the case. For observation values, ratios occur almost exclusively with titers. In most other cases, REAL should be used instead of the RTO.

**Attributes**

Attribute	Notes
<b>numerator</b> PQ	The quantity that is being divided in the ratio
<b>denominator</b> PQ	The quantity that divides the numerator in the ratio. The denominator SHALL not be zero.

**3.1.2.32 ST**

*Type:* **Class** **ANY**  
*Package:* dataTypes

The character string datatype stands for text data, primarily intended for machine processing (e.g., sorting, querying, indexing, etc.) or direct display. Used for names, symbols, presentation and formal expressions.

A ST SHALL have at least one character or else be null.

**Attributes**

Attribute	Notes
<b>value</b> string	The actual content of the string.

**3.1.2.33 TEL**

*Type:* **Class** **ANY**  
*Package:* dataTypes

A locatable resource that is identified by a URI, such as a web page, a telephone number (voice, fax or some other resource mediated by telecommunication equipment), an e-mail address, or any other locatable resource that can be specified by a URL.

The address is specified as a Universal Resource Locator (URL) qualified by time specification and use codes that help in deciding which address to use for a given time and purpose.

The value attribute is constrained to be a uniform resource locator specified according to IETF RFCs 1738 and 2806 when used in this datatype.

Note: The intent of this datatype is to be a locator, not an identifier; this datatype is used to refer to a locatable resource using a URL, and knowing the URL allows one to locate the object. However some use cases have arisen where a URI is used to refer to a locatable resource. Though this datatype allows for URIs to be used, the resource identified SHOULD always be locatable. A common use of locatable URIs is to refer to SOAP attachments.

**Attributes**

Attribute	Notes
<b>value</b> anyURI	A uniform resource identifier specified according to IETF RFC 2396. The URI specifies the protocol and the contact point defined by that protocol for the resource. Examples: Notable uses of the telecommunication address datatype are for telephone and telefax numbers, e-mail addresses, Hypertext references, FTP references, etc.
<b>use</b> set_TelecommunicationAddressUse [0..*]	One or more codes advising system or user which telecommunication address in a set of like addresses to select for a given telecommunication need. The telecommunication use code is not a complete classification for equipment types or locations. Its main purpose is to suggest or discourage the use of a particular telecommunication address. There are no easily defined rules that govern the selection of a telecommunication address. Conformance statements may clarify what rules may apply or how additional rules are applied. If populated, the values contained in this attribute SHALL be taken from the HL7 TelecommunicationAddressUse code system
<b>capabilities</b> set_TelecommunicationCapability [0..*]	One or more codes advising a system or user what telecommunication capabilities are known to be associated with the telecommunication address. If populated, the values contained in this attribute SHALL be taken from the HL7 TelecommunicationCapability code system
<b>useablePeriodOriginalText</b> string [0..1]	This attribute is equivalent to the originalText.value attribute within the useablePeriod attribute of this class in the ISO 21090 specification.  The periods of time during which the telecommunication address can be used.  For a telephone number, this can indicate the time of day in which the party can be reached on that telephone. For a web address, it may specify a time range in which the web content is promised to be available under the given address.

**3.1.2.34 TS**

*Type:* **Class** **QTY**  
*Package:* dataTypes

A quantity specifying a point on the axis of natural time. A point in time is most often represented as a calendar expression.

**Attributes**

Attribute	Notes
<b>value</b> TimeStamp	The value of the TS. value is a string with the format "YYYY[MM[DD[HH[MM[SS[U[U[U[U]]]]]]]]][+ -ZZzz]" that conforms to the constrained ISO 8601 defined in ISO 8824 (ASN.1) under clause 32 (generalized time). The format should be used to the degree of precision that is appropriate.

**3.1.2.35 TelecommunicationAddressUse**

*Type:* **Enumeration**  
*Package:* dataTypes

One or more codes advising a system or user which telecommunication address in a set of like addresses to select for a given telecommunication need.

ValueSet OID: 2.16.840.1.113883.11.201. CodeSystem "TelecommunicationAddressUse", OID: 2.16.840.1.113883.5.1011, Owner: HL7

**Attributes**

Attribute	Notes
<b>H</b>	Home Address: A communication address at a home, attempted contacts for business purposes might intrude privacy and chances are one will contact family or other household members instead of the person one wishes to call.
<b>HP</b>	Primary Home: The primary home, to reach a person after business hours.
<b>HV</b>	Vacation Home: vacation home, to reach a person while on vacation.
<b>WP</b>	Work Place: An office address. First choice for business related contacts during business hours.
<b>DIR</b>	Direct: Indicates a work place address or telecommunication address that reaches the individual or organization directly without intermediaries. For phones, often referred to as a 'private line'.
<b>PUB</b>	Public: Indicates a work place address or telecommunication address that is a 'standard' address which may reach a reception service, mail-room, or other intermediary prior to the target entity.
<b>BAD</b>	Bad Address: A flag indicating that the address is bad, in fact, useless.
<b>TMP</b>	Temporary Address: A temporary address, may be good for visit or mailing. Note that an address history can provide more detailed information.
<b>AS</b>	Answering Service: An automated answering machine used for less urgent cases and if the main purpose of contact is to leave a message or access an automated announcement.

Attribute	Notes
<b>EC</b>	Emergency Contact: A contact specifically designated to be used for emergencies. This is the first choice in emergencies, independent of any other use codes.
<b>MC</b>	Mobile Contact: A telecommunication device that moves and stays with its owner. May have characteristics of all other use codes, suitable for urgent matters, not the first choice for routine business.
<b>PG</b>	Pager: A paging device suitable to solicit a callback or to leave a very short message.

### 3.1.2.36 TelecommunicationCapability

Type: Enumeration  
Package: dataTypes

One or more codes advising a system or user what telecommunication capabilities are known to be associated with the telecommunication address.

ValueSet OID: [to be assigned]. CodeSystem "TelecommunicationCapabilities", OID: 2.16.840.1.113883.5.1118, Owner: HL7

#### Attributes

Attribute	Notes
<b>voice</b>	Voice This device can receive voice calls (i.e. talking to another person, or a recording device, or a voice activated computer)
<b>fax</b>	Fax This device can receive faxes.
<b>data</b>	Data This device can receive data calls (i.e. modem)
<b>tty</b>	Text This device is a text telephone.
<b>sms</b>	SMS This device can receive SMS messages.

### 3.1.2.37 TimeStamp

Type: Class string  
Package: dataTypes

Represents a timestamp such as 20101127235417.123+0930

### 3.1.2.38 Uid

*Type:* **Class** **string**  
*Package:* dataTypes

A unique identifier string is a character string which identifies an object in a globally unique and timeless manner. The allowable formats and values and procedures of this data type are strictly controlled by HL7. At this time, user-assigned identifiers SHALL only be certain character representations of ISO Object Identifiers (OID) and DCE Universally Unique Identifiers (UUID). In addition, HL7 reserves the right to assign other forms of UIDs (RUID), such as mnemonic identifiers for code systems.

The sole purpose of UID is to be a globally and timelessly unique identifier. The form of UID, whether it is an OID, a UUID or a RUID, is entirely irrelevant. As far as HL7 is concerned, the only thing one can do with a UID is denote to the object for which it stands. Comparison of UIDs is literal, i.e. if two UIDs are literally identical, they are assumed to denote to the same object. If two UIDs are not literally identical they may not denote to the same object. Note that this comparison is case sensitive; (OID)s do not have letters subject to case, (UUID)s are fixed to uppercase, and (RUID)s have a fixed case.

protected type UniqueIdentifierString alias UID specializes ST.SIMPLE;

No difference in semantics is recognized between the different allowed forms of UID. The different forms are not distinguished by a component within or aside from the identifier string itself.

Even though this specification recognizes no semantic difference between the different forms of the unique identifier forms, there are differences of how these identifiers are built and managed, which is the sole reason to define subtypes of UID for each of the variants.

### 3.1.2.39 Uri

*Type:* **Class** **string**  
*Package:* dataTypes

Universal Resource Identifier

### 3.1.2.40 XP

*Type:* **Class**  
*Package:* dataTypes

A part of a name or address. Each part is a character string.

#### Attributes

Attribute	Notes
<b>value</b> string	The actual string value of the part.

### 3.1.2.41 set\_EntityNamePartQualifier

Type: Class EntityNamePartQualifier  
Package: dataTypes

### 3.1.2.42 set\_EntityNameUse

Type: Class EntityNameUse  
Package: dataTypes

### 3.1.2.43 set\_PostalAddressUse

Type: Class PostalAddressUse  
Package: dataTypes

### 3.1.2.44 set\_TelecommunicationAddressUse

Type: Class TelecommunicationAddressUse  
Package: dataTypes

### 3.1.2.45 set\_TelecommunicationCapability

Type: Class TelecommunicationCapability  
Package: dataTypes

### 3.1.3 cdsInput

Type: **Package** «XSDschema»

Package: modelParent

Specifies input data used by CDS systems.

**cdsInput** - (Class diagram)

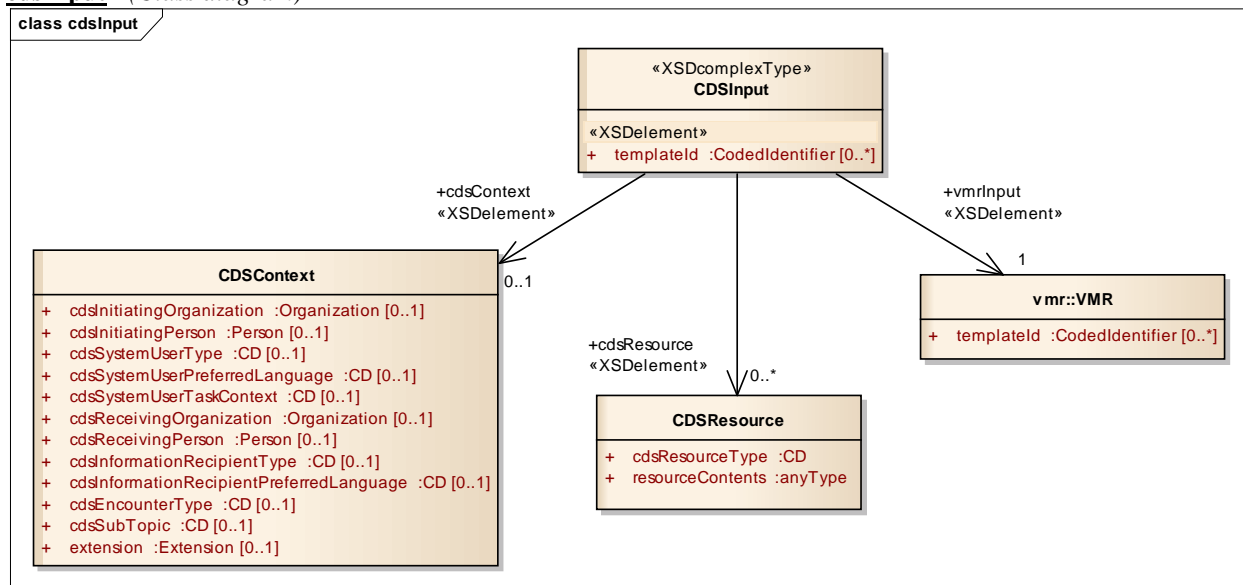


Figure: 17



### 3.1.3.1 CDSContext

Type: **Class**  
 Package: cdsInput

The situation or context within which a CDS evaluation is made. Included in CDS inputs for HL7 Context-Aware Knowledge Retrieval (Infobutton) Knowledge Request standard. Used, for example, to generate human-readable care guidance in the end-user's preferred language.

#### Attributes

Attribute	Notes
<b>cdsInitiatingOrganization</b> Organization [0..1]	Organization that initiated the CDS request.
<b>cdsInitiatingPerson</b> Person [0..1]	Person in the initiating organization who initiated the CDS request.
<b>cdsSystemUserType</b> CD [0..1]	The type of individual using the CDS system. E.g., patient, healthcare provider, or specific type of healthcare provider (physician, nurse, etc.).
<b>cdsSystemUserPreferredLanguage</b> CD [0..1]	Preferred language of the person who is using the system. Used, for example, to indicate the language in which the user interface should be rendered. E.g., English, Spanish.
<b>cdsSystemUserTaskContext</b> CD [0..1]	The task that a CDS system user is performing. E.g., laboratory results review, medication list review. Can be used to tailor CDS outputs, such as recommended information resources.
<b>cdsReceivingOrganization</b> Organization [0..1]	Organization that the response will be directed towards.
<b>cdsReceivingPerson</b> Person [0..1]	Person in the receiving organization that the response will be directed towards.
<b>cdsInformationRecipientType</b> CD [0..1]	The type of individual who consumes the CDS content. May be different from CDS system user type (e.g., if clinician is getting disease management guidance for provision to a patient). E.g., patient, healthcare provider, or specific type of healthcare provider (physician, nurse, etc.).
<b>cdsInformationRecipientPreferredLanguage</b> CD [0..1]	Preferred language of the person who will consume the CDS content. Used, for example, to indicate the language in which the content should be written. E.g., English, Spanish.
<b>cdsEncounterType</b> CD [0..1]	The type of patient encounter (e.g., inpatient, outpatient) in which the knowledge request takes place. Encounter type (Value set: ActEncounterCode [2.16.840.1.113883.1.11.13955])
<b>cdsSubTopic</b> CD [0..1]	Narrows down the knowledge request by specifying a subdomain of interest (e.g., indications, contraindications, dose).
<b>extension</b> Extension [0..1]	Section for user-defined CDSContext attributes.

### 3.1.3.2 CDSInput

Type: **Class**  
 Package: cdsInput

The parent class containing the data used by a CDS system to generate inferences. Includes an input vMR and optionally CDS context and/or CDS resource data.

#### Attributes

Attribute	Notes
<b>templateId</b> CodedIdentifier [0..*]	The identifier of a set of constraints placed on a CDS input.

### 3.1.3.3 CDSResource

Type: **Class**  
 Package: cdsInput

A resource independent of individual patients, provided to a CDS engine to facilitate patient evaluation. Includes, for example, local antibiogram data (local susceptibility profile of microbes to different antimicrobial agents), local formulary restrictions, or CDS system user preference on which guidelines to use for health maintenance (e.g., HEDIS vs. USPSTF).

#### Attributes

Attribute	Notes
<b>cdsResourceType</b> CD	The type of CDS resource, as defined by a coded taxonomy. A resource independent of individual patients, provided to a CDS engine to facilitate patient evaluation. E.g., local antibiogram, local formulary restrictions, CDS system user preference on which guidelines to use for health maintenance (e.g., HEDIS vs. USPSTF). The specified data structure used to convey the related resourceContents must be identifiable from the cdsResourceType.
<b>resourceContents</b> anyType	The data structure of the resource depends on the CDS resource type. E.g., local antibiogram data, local formulary restrictions, CDS system user preference on which guidelines to use for health maintenance (e.g., HEDIS vs. USPSTF).

### 3.1.4 cdsInputSpecification

Type: **Package** «XSDschema»  
 Package: modelParent

Specifies the specific CDS input data required for a specific CDS use case.

**cdsInputSpecification** - (Class diagram)

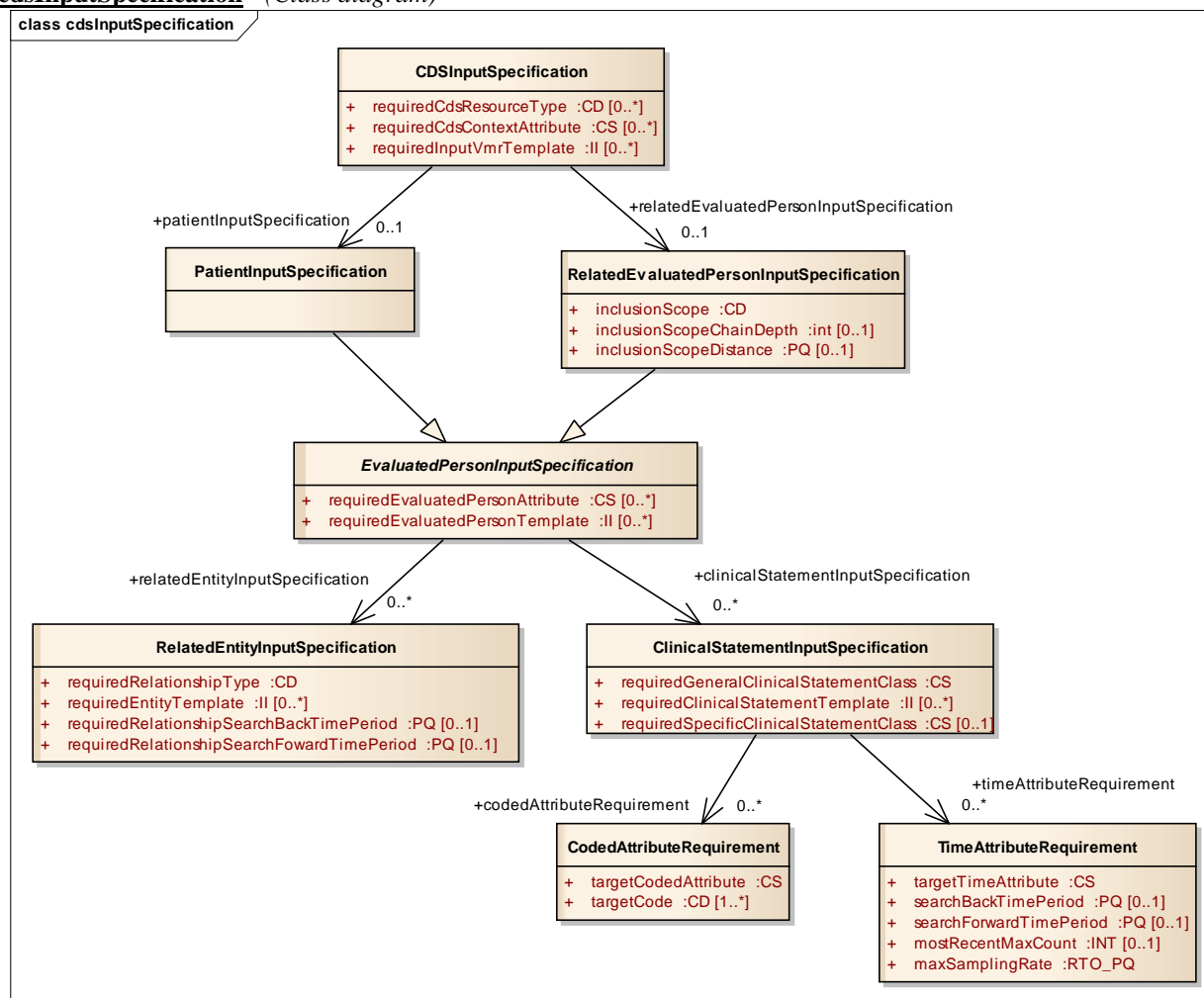


Figure: 18

### 3.1.4.1 CDSInputSpecification

*Type:* **Class**  
*Package:* cdsInputSpecification

The parent class containing the data required by a specific CDS use case. For example, this class can be used to specify that the evaluation of a patient for the need for a mammogram requires the following data: (i) gender; (ii) age; (iii) past mastectomy history; and (iv) past mammogram history.

Can include a detailed input specification for the focal patient as well as for related evaluated persons. Note that it is assumed that the superset of data required for related evaluated persons are the same for each of the related evaluated persons (e.g., relatives). If input specifications are not provided regarding patients or other evaluated persons, then this signifies that no further constraints are being placed on required data other than what is expressed through the input data model and its existing template(s).

#### Attributes

Attribute	Notes
<b>requiredCdsResourceType</b> CD [0..*]	The type of CDS resource required. Required input parameters (e.g., mammogram testing frequency) can be specified using this attribute (e.g., with a CD representing mammogram testing frequency).
<b>requiredCdsContextAttribute</b> CS [0..*]	The CDS context attribute (e.g., CDS system user preferred language) required.
<b>requiredInputVmrTemplate</b> II [0..*]	Identifier of a set of constraints that must be placed on the input vMR.

### 3.1.4.2 ClinicalStatementInputSpecification

*Type:* **Class**  
*Package:* cdsInputSpecification

Specifies the clinical statements required regarding the evaluated person of interest. Can include CodedAttributeRequirements and TimeAttributeRequirements.

If no CodedAttributeRequirement specified, all relevant clinical statements are required regardless of their coded attributes. If no TimeAttributeRequirement specified, all relevant clinical statements are required regardless of their time attributes. All specified CodedAttributeRequirements and TimeAttributeRequirements should be fulfilled in provided ClinicalStatements.

#### Attributes

Attribute	Notes
<b>requiredGeneralClinicalStatementClass</b> CS	The general class of clinical statement required. E.g., Procedure, Observation.  If only the general clinical statement type is specified (i.e., requiredSpecificClinicalStatementType is not specified), then it will be assumed that all members of the specified general clinical statement types are desired.
<b>requiredClinicalStatementTemplate</b> II [0..*]	Identifier of a set of constraints that must be placed on the ClinicalStatement. Allows, for example, the specification of required detailed clinical models that correspond to templates.
<b>requiredSpecificClinicalStatementClass</b> CS [0..1]	The specific class of clinical statement required. E.g., ProcedureOrder, ObservationResult.

### 3.1.4.3 CodedAttributeRequirement

*Type:* **Class**  
*Package:* cdsInputSpecification

A requirement for a coded attribute of a clinical statement. Specified in terms of the target coded attribute and the code(s) for that attribute that allow the requirement to be fulfilled.

#### Attributes

Attribute	Notes
<b>targetCodedAttribute</b> CS	The clinical statement's coded attribute that is the subject of restriction. E.g., problem code, problem status.
<b>targetCode</b> CD [1..*]	A target code for the target coded attribute. If a clinical statement has a target coded attribute (e.g., problem code) that matches one of the target codes (e.g., ICD9CM 250.00), then the coded attribute requirement is met.

### 3.1.4.4 EvaluatedPersonInputSpecification

*Type:* **Class**  
*Package:* cdsInputSpecification

Specifies the data required for an evaluated person. Can include (i) a specification of the person attributes (e.g., gender) required; (ii) a specification of the templates that must be applied; (iii) a specification of the data required for related entities; and (iv) a specification of the clinical statements required.

#### Attributes

Attribute	Notes
<b>requiredEvaluatedPersonAttribute</b> CS [0..*]	Required attribute of the EvaluatedPerson. Note that if an attribute is required by a specified template, it must be provided regardless of whether its need is specified here.
<b>requiredEvaluatedPersonTemplate</b> II [0..*]	Identifier of a set of constraints that must be placed on the EvaluatedPerson.

### 3.1.4.5 PatientInputSpecification

*Type:* **Class** **EvaluatedPersonInputSpecification**  
*Package:* cdsInputSpecification

The data required for the patient. Is a specialization of the EvaluatedPersonInputSpecification class.

### 3.1.4.6 *RelatedEntityInputSpecification*

*Type:* **Class**  
*Package:* cdsInputSpecification

Specifies the data required regarding entities related to the evaluated person of interest.

#### Attributes

Attribute	Notes
<b>requiredRelationshipType</b> CD	Required type of relationship to Entities other than EvaluatedPersons, if available. Note that requirements for other EvaluatedPersons are specified separately within the RelatedEvaluatedPersonInputSpecification class. E.g., primary care provider, health insurance provider.
<b>requiredEntityTemplate</b> II [0..*]	Identifier of a set of constraints that must be placed on the related Entity.
<b>requiredRelationshipSearchBackTimePeriod</b> PQ [0..1]	This requirement is met if the relationship time interval overlaps with the time interval that starts at (index evaluation time - requiredRelationshipSearchBackTimePeriod) and ends at (index evaluation time). The earlier point is considered to be exclusive and the ending point is considered to be inclusive. E.g., if the index evaluation time is 7/1/2011 at 4pm and the requiredRelationshipSearchBackTimePeriod is 1 year, then this requirement is met if the relationshipTimeInterval overlaps with any time after 4pm on 7/1/2010 and up to and including 7/1/2011 at 4pm.
<b>requiredRelationshipSearchForwardTimePeriod</b> PQ [0..1]	This requirement is met if the relationship time interval overlaps with the time interval that starts at (index evaluation time) and ends at (index evaluation time + requiredRelationshipSearchForwardTimePeriod). The earlier point is considered to be exclusive and the ending point is considered to be inclusive. E.g., if the index evaluation time is 7/1/2011 at 4pm and the requiredRelationshipSearchForwardTimePeriod is 1 year, then this requirement is met if the relationshipTimeInterval overlaps with any time after 4pm on 7/1/2011 and up to and including 7/1/2012 at 4pm.

### 3.1.4.7 *RelatedEvaluatedPersonInputSpecification*

*Type:* **Class** **EvaluatedPersonInputSpecification**  
*Package:* cdsInputSpecification

The data required for evaluated persons related to the patient. Is a specialization of the EvaluatedPersonInputSpecification class. Includes a specification of the scope of evaluated persons that are required.

#### Attributes

Attribute	Notes
<b>inclusionScope</b> CD	The scope of evaluated persons to include. E.g., relative, sexual contacts, persons living in affected geographic zone.
<b>inclusionScopeChainDepth</b> int [0..1]	The number of links to traverse to identify evaluated persons within the specific scope. E.g., 3 in combination with scope of relative would indicate up to 3rd degree relatives. If neither inclusionScopeChainDepth nor inclusionScopeDistance are specified, then all available evaluated persons with the indicated scope should be included. E.g., if inclusion scope is sexual contact and no scope depth/distance is specified, then all sexual contacts of the focal person and of other persons related through sexual contact should be included.
<b>inclusionScopeDistance</b> PQ [0..1]	The distance to traverse to identify evaluated persons within the specific scope. E.g., 5 miles in combination with scope of living in affected area would indicate people living within a 5 mile radius of a location of interest. If neither inclusionScopeChainDepth nor inclusionScopeDistance are specified, then all available evaluated persons with the indicated scope should be included. E.g., if inclusion scope is sexual contact and no scope depth/distance is specified, then all sexual contacts of the focal person and of other persons related through sexual contact should be included.

### 3.1.4.8 *TimeAttributeRequirement*

*Type:* **Class**  
*Package:* cdsInputSpecification

A requirement for a time attribute of a clinical statement. Specified in terms of the target time attribute and the required time interval for that attribute in relationship to the index evaluation time. A searchBackTimePeriod and/or a searchForwardTimePeriod must be provided.

#### Attributes

Attribute	Notes
<b>targetTimeAttribute</b> CS	The time attribute targeted for restriction. E.g., procedure time, substance dispensation time.
<b>searchBackTimePeriod</b> PQ [0..1]	The time attribute requirement is met if the target time attribute overlaps with the time interval that starts at (index evaluation time - searchBackTimePeriod) and ends at (index evaluation time). The earlier point is considered to be exclusive and the ending point is considered to be inclusive. E.g., if the index evaluation time is 7/1/2011 at 4pm and the searchBackTimePeriod is 1 year, then the time attribute requirement is met if the targetTimeAttribute has overlaps with anytime after 4pm on 7/1/2010 and up to and including 7/1/2011 at 4pm.

Attribute	Notes
<b>searchForwardTimePeriod</b> PQ [0..1]	The time attribute requirement is met if the target time attribute overlaps with the time interval that starts at (index evaluation time) and ends at (index evaluation time + searchForwardTimePeriod). The earlier point is considered to be exclusive and the ending point is considered to be inclusive. E.g., if the index evaluation time is 7/1/2011 at 4pm and the searchForwardTimePeriod is 1 year, then the time attribute requirement is met if the targetTimeAttribute has overlaps with anytime after 4pm on 7/1/2011 and up to and including 7/1/2012 at 4pm.
<b>mostRecentMaxCount</b> INT [0..1]	The maximum number of most recent clinical statements to return.
<b>maxSamplingRate</b> RTO_PQ	In the case where there are large number of available clinical statements, it may be useful to specify a sampling rate to reduce the number to be evaluated. For example, when there have been large numbers of vital signs taken by automated equipment, it may be useful to evaluate a subset of the entire group.



### 3.1.5 cdsOutput

*Type:* **Package** «XSDschema»

*Package:* modelParent

Specifies output data generated by CDS systems.

**cdsOutput** - (Class diagram)

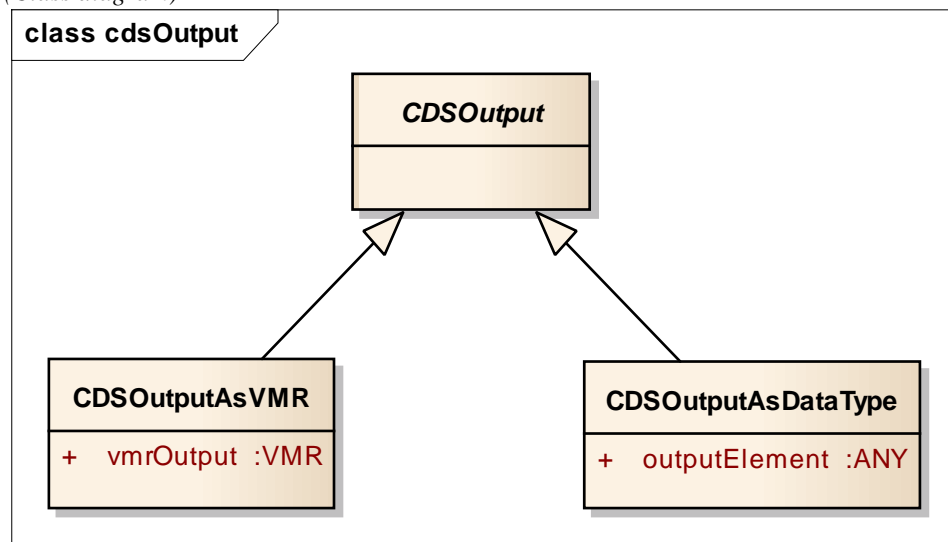


Figure: 19

#### 3.1.5.1 CDSOutput

*Type:* **Class**

*Package:* cdsOutput

The parent class containing the data used by a CDS system to communicate inferences. Can use the vMR data structure or a base data type to communicate the results.

#### 3.1.5.2 CDSOutputAsDataType

*Type:* **Class** CDSOutput

*Package:* cdsOutput

A single data element of ANY data type as output of CDS.

##### Attributes

Attribute	Notes
<b>outputElement</b> ANY	A single data element of type ANY intended for output from CDS.

### 3.1.5.3 CDSOutputAsVMR

Type:

Class

CDSOutput

Package:

cdsOutput

The parent class containing the data used by a CDS system to communicate inferences. Can use the vMR data structure or a base data type to communicate the results.

#### Attributes

Attribute	Notes
<b>vmrOutput</b> VMR	Output from CDS structured as a VMR record

### 3.1.6 cdsOutputSpecification

Type: **Package** «XSDschema»  
 Package: modelParent

Specifies the specific CDS output data produced for a specific CDS use case.

**cdsOutputSpecification** - (Class diagram)

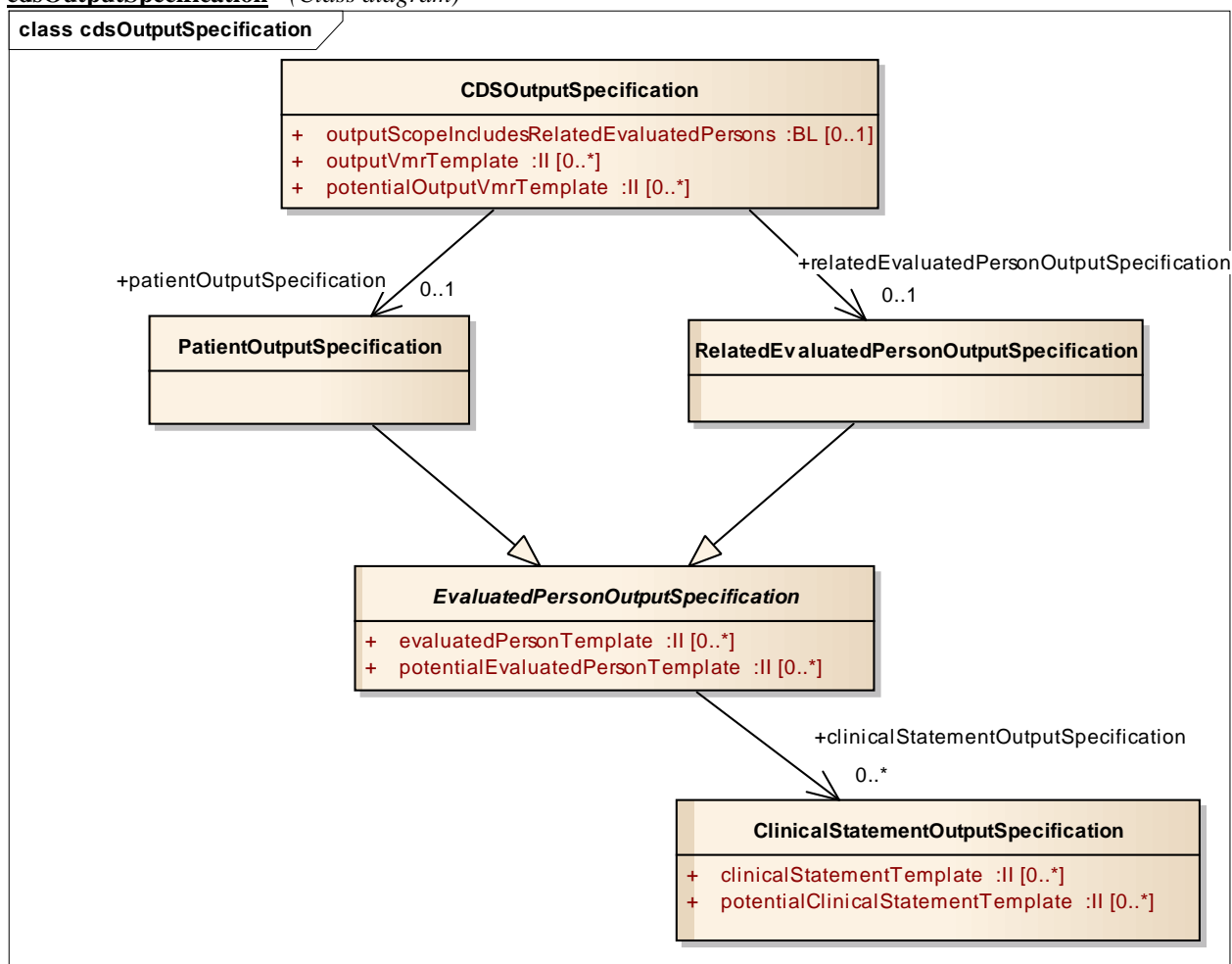


Figure: 20

### 3.1.6.1 CDSOutputSpecification

*Type:* **Class**  
*Package:* cdsOutputSpecification

The parent class containing the output to be provided by a specific CDS use case. For example, this class can be used to specify that the evaluation of a patient for the need for a mammogram will return a templated observation specifying whether the intervention is needed, and a templated observation specifying when the intervention was last done.

Can include a detailed output specification for the focal patient as well as for related evaluated persons. Note that it is assumed that the superset of results returned for related evaluated persons are the same for each of the related evaluated persons (e.g., relatives). If output specifications are not provided regarding patients or other evaluated persons, then this signifies that no further constraints are being placed on returned results other than what is expressed through the output data model and its existing template(s).

#### Attributes

Attribute	Notes
<b>outputScopeIncludesRelatedEvaluatedPersons</b> BL [0..1]	Specifies whether the scope of the output potentially includes related evaluated persons (e.g., family members). If not specified, the default expected behavior is that related evaluated persons will not be included within the scope.
<b>outputVmrTemplate</b> II [0..*]	Identifier of a set of constraints that SHALL be placed on the output vMR.
<b>potentialOutputVmrTemplate</b> II [0..*]	Identifier of a set of constraints that MAY be placed on the output vMR.

### 3.1.6.2 ClinicalStatementOutputSpecification

*Type:* **Class**  
*Package:* cdsOutputSpecification

Specifies the output clinical statements regarding the evaluated person of interest.

#### Attributes

Attribute	Notes
<b>clinicalStatementTemplate</b> II [0..*]	Identifier of constrained clinical statement that SHALL be provided as a part of the evaluation result.
<b>potentialClinicalStatementTemplate</b> II [0..*]	Identifier of constrained clinical statement that MAY be provided as a part of the evaluation result.

### 3.1.6.3 *EvaluatedPersonOutputSpecification*

*Type:* Class  
*Package:* cdsOutputSpecification

Specifies the evaluation results to be provided for an evaluated person. Specifies the templates that SHALL or MAY be applied.

#### Attributes

Attribute	Notes
<b>evaluatedPersonTemplate</b> II [0..*]	Identifier of a set of constraints that SHALL be placed on the EvaluatedPerson.
<b>potentialEvaluatedPersonTemplate</b> II [0..*]	Identifier of a set of constraints that MAY be placed on the EvaluatedPerson.

### 3.1.6.4 *PatientOutputSpecification*

*Type:* Class EvaluatedPersonOutputSpecification  
*Package:* cdsOutputSpecification

The evaluation results to be returned for the patient. Is a specialization of the EvaluatedPersonOutputSpecification class.

### 3.1.6.5 *RelatedEvaluatedPersonOutputSpecification*

*Type:* Class EvaluatedPersonOutputSpecification  
*Package:* cdsOutputSpecification

The results that will be provided for evaluated persons related to the patient. Is a specialization of the EvaluatedPersonOutputSpecification class.