HL7 Version 3 Domain Analysis Model: Virtual Medical Record for Clinical Decision Support - (vMR-CDS), Release 2

Project Coordinator and Document Editor
Kensaku Kawamoto, MD, PhD, University of Utah
Claude Nanjo, MPH, MAAS, Zynx Health Incorporated

Collaborators
David Shields, University of Utah
Victor Lee, MD, Zynx Health Incorporated
Aziz Boxwala, MD, PhD, FACMI, Meliorix Inc
Mark Roche, MD, MSMI, Roche Consulting
Bryn Rhodes, Veracity Solutions
Davide Sottara, PhD, Arizona State University
Andrew K. McIntyre, FRACP, MBBS, Medical-Objects
Yongjian Bao, PhD, GE Healthcare
Howard R. Strasberg, MD, MS, Wolters Kluwer Health
Peter R. Tattam, Tattam Software Enterprises Pty Ltd
Scott Bolte, MS, GE Healthcare
Peter Scott, MBBS, Medical-Objects
Keith Boone, GE Healthcare
Zhijing Liu, PhD, Siemens Healthcare
Chris Melo, Philips Healthcare
Nathan Hulse, PhD, Intermountain Healthcare
Jim Basilakis, MBBS, MS, University of Western Sydney
Robert Worden, Open Mapping Software, Limited
Daryl Chertcoff, HLN Consulting
Clayton Curtis, MD, PhD, U.S. Veterans Health Administration
Guilherme Del Fiol, MD, PhD, University of Utah
Emory Fry, MD, Uniformed Service University Health Sciences
Jean-Charles Dufour, MD, PhD, Université Aix-Marseille
Laurent CHARLOIS, Université de la Méditerranée

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Table of Contents

Table of Contents 2
Executive Summary 5
vMR DAM Specification 6
1. Modeling Methodology 6
2. Model Artifacts and Examples 8
3. Domain Analysis Model 9
3.1 Model 9
3.1.1 modelParent 9
3.1.1.1 cdsInput 9
3.1.1.1.1 CDSContext 10
3.1.1.1.2 CDSInput 11
3.1.1.1.3 CDSResource 11
3.1.1.2 cdsOutput 12
3.1.1.2.1 CDSOutput 12
3.1.1.3 cdsInputSpecification 12
3.1.1.3.1 CDSInputSpecification 13
3.1.1.3.2 ClinicalStatementInputSpecification 14
3.1.1.3.3 CodedAttributeRequirement 14
3.1.1.3.4 EvaluatedPersonInputSpecification 15
3.1.1.3.5 PatientInputSpecification 15
3.1.1.3.6 RelatedEntityInputSpecification 16
3.1.1.3.7 RelatedEvaluatedPersonInputSpecification 16
3.1.1.3.8 TimeAttributeRequirement 17
3.1.1.4 vmr 18
3.1.1.4.1 AdministrableSubstance 29
3.1.1.4.2 AdverseEvent 30
3.1.1.4.3 AdverseEventBase 30
3.1.1.4.4 AppointmentProposal 31
3.1.1.4.5 AppointmentRequest 31
3.1.1.4.6 BodySite 32
3.1.1.4.7 ClinicalStatement 33
3.1.1.4.8 ClinicalStatementEntityInRoleRelationship 34
3.1.1.4.9 ClinicalStatementRelationship 34
3.1.1.4.10 CodedIdentifier 34
3.1.1.4.11 CodedNameValuePair 35
3.1.1.4.12 ComplexIVProposal 35
3.1.1.4.13 DeniedAdverseEvent 35
3.1.1.4.14 DeniedProblem 36
3.1.1.4.15 DietProposal 36
3.1.1.4.16 DietQualifier 36
3.1.1.4.17 Documentation 37
3.1.1.4.18 DoseRestriction 37
3.1.1.4.19 EncounterBase 38

3.1.1.4.20 EncounterEvent 38
3.1.1.4.21 Entity 38
3.1.1.4.22 EntityRelationship 39
3.1.1.4.23 EvaluatedPerson 39
3.1.1.4.24 Facility 40
3.1.1.4.25 Goal 40
3.1.1.4.26 GoalBase 41
3.1.1.4.27 GoalProposal 41
3.1.1.4.28 ImagingProposal 42
3.1.1.4.29 LaboratoryProposal 42
3.1.1.4.30 MissedAppointment 42
3.1.1.4.31 ObservationBase 43
3.1.1.4.32 ObservationOrder 43
3.1.1.4.33 ObservationProposal 44
3.1.1.4.34 ObservationResult 44
3.1.1.4.35 Organization 45
3.1.1.4.36 PCAProposal 45
3.1.1.4.37 Person 45
3.1.1.4.38 Problem 46
3.1.1.4.39 ProblemBase 46
3.1.1.4.40 ProcedureBase 47
3.1.1.4.41 ProcedureEvent 47
3.1.1.4.42 ProcedureOrder 48
3.1.1.4.43 ProcedureProposal 48
3.1.1.4.44 RespiratoryCareProposal 49
3.1.1.4.45 ScheduledAppointment 50
3.1.1.4.46 ScheduledProcedure 50
3.1.1.4.47 Specimen 50
3.1.1.4.48 SubstanceAdministrationBase 51
3.1.1.4.49 SubstanceAdministrationEvent 52
3.1.1.4.50 SubstanceAdministrationOrder 52
3.1.1.4.51 SubstanceAdministrationProposal 53
3.1.1.4.52 SubstanceDispensationEvent 53
3.1.1.4.53 SupplyBase 54
3.1.1.4.54 SupplyEvent 54
3.1.1.4.55 SupplyOrder 55
3.1.1.4.56 SupplyProposal 55
3.1.1.4.57 TubeFeedingProposal 56
3.1.1.4.58 UnconductedObservation 56
3.1.1.4.59 UndeliveredProcedure 56
3.1.1.4.60 UndeliveredSubstanceAdministration 57
3.1.1.4.61 UndeliveredSupply 57
3.1.1.4.62 VMR 58
3.1.1.5 dataTypes 58
3.1.1.5.1 iso-21090-datatypes-simplified-vmr 60
3.1.1.5.1.1 AD 60

3.1.1.5.1.2 ADXP 60
3.1.1.5.1.3 ANY 61
3.1.1.5.1.4 BL 61
3.1.1.5.1.5 CD 61
3.1.1.5.1.6 CO 63
3.1.1.5.1.7 CS 65
3.1.1.5.1.8 ED 65
3.1.1.5.1.9 EN 67
3.1.1.5.1.10 ENXP 68
3.1.1.5.1.11 II 68
3.1.1.5.1.12 INT 69
3.1.1.5.1.13 IVL_INT 70
3.1.1.5.1.14 IVL_PQ 70
3.1.1.5.1.15 IVL_REAL 71
3.1.1.5.1.16 IVL_RTO 71
3.1.1.5.1.17 IVL_TS 72
3.1.1.5.1.18 PQ 72
3.1.1.5.1.19 QTY 74
3.1.1.5.1.20 REAL 74
3.1.1.5.1.21 RTO 74
3.1.1.5.1.22 ST 75
3.1.1.5.1.23 TEL 75
3.1.1.5.1.24 TS 76
3.1.1.5.1.25 XP 76

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.healthedecisions.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.

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 in February and March 2013 to improve alignment of vMR with the use cases defined by the ONC S&I Framework Health eDecisions initiative.

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 CCD, 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 and Examples

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

- 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).

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 Model

Type: **Package**
Package:

3.1.1 modelParent

Type: **Package**
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; constrained version of ISO 21090 data types.

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

3.1.1.1 cdsInput

Type: **Package**
Package: modelParent

Specifies input data used by CDS systems.

cdsInput - *(Class diagram)*

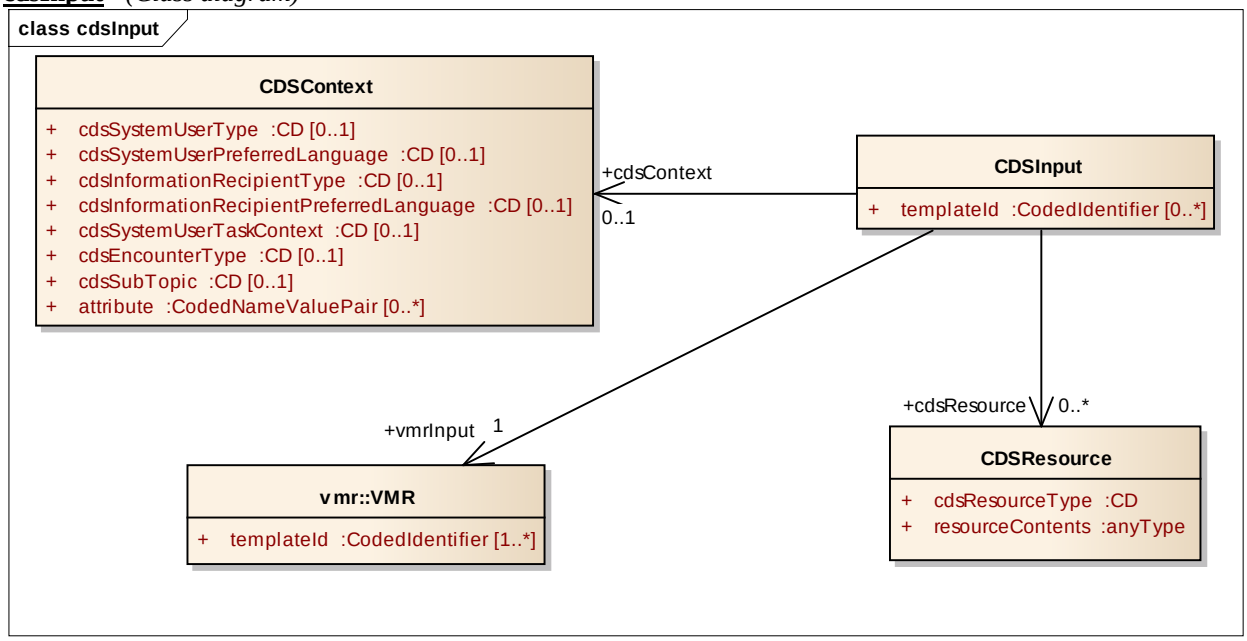

Figure: 1

3.1.1.1.1 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
cdsSystemUserType 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.).
cdsSystemUserPreferredLanguage 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.
cdsInformationRecipientType 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.).
cdsInformationRecipientPreferredLanguage 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.
cdsSystemUserTaskContext 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.
cdsEncounterType 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])

Attribute	Notes
cdsSubTopic CD [0..1]	Narrows down the knowledge request by specifying a subdomain of interest (e.g., indications, contraindications, dose).
attribute CodedNameValuePair [0..*]	A user-specified attribute for this class. The field 'attribute' supports user-defined attribute extensions for CDS contexts. New concepts defined in this manner need to have an associated template. Refer to Implementation Guide for details.

3.1.1.1.2 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
templateId CodedIdentifier [0..*]	The identifier of a set of constraints placed on a CDS input.

3.1.1.1.3 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
cdsResourceType 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.
resourceContents 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).

3.1.1.2 cdsOutput

Type: **Package**
Package: modelParent

Specifies output data generated by CDS systems.

cdsOutput - *(Class diagram)*

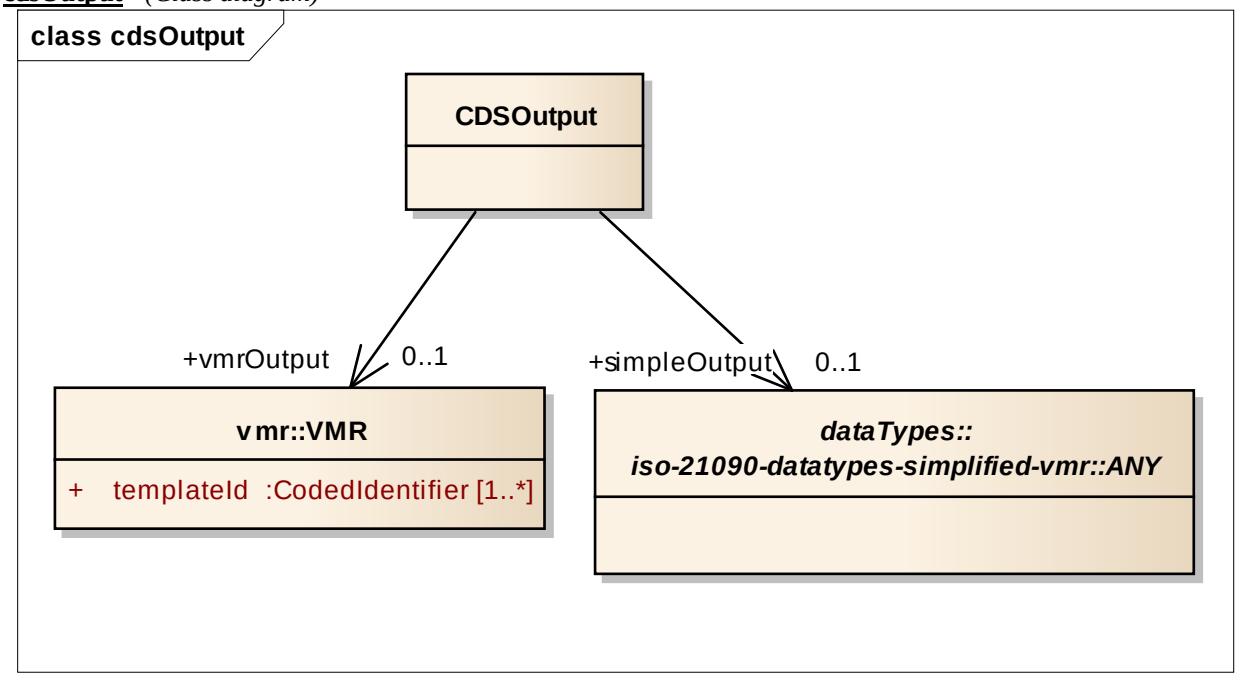

Figure: 2

3.1.1.2.1 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.

3.1.1.3 cdsInputSpecification

Type: **Package**
Package: modelParent

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

cdsInputSpecification - *(Class diagram)*

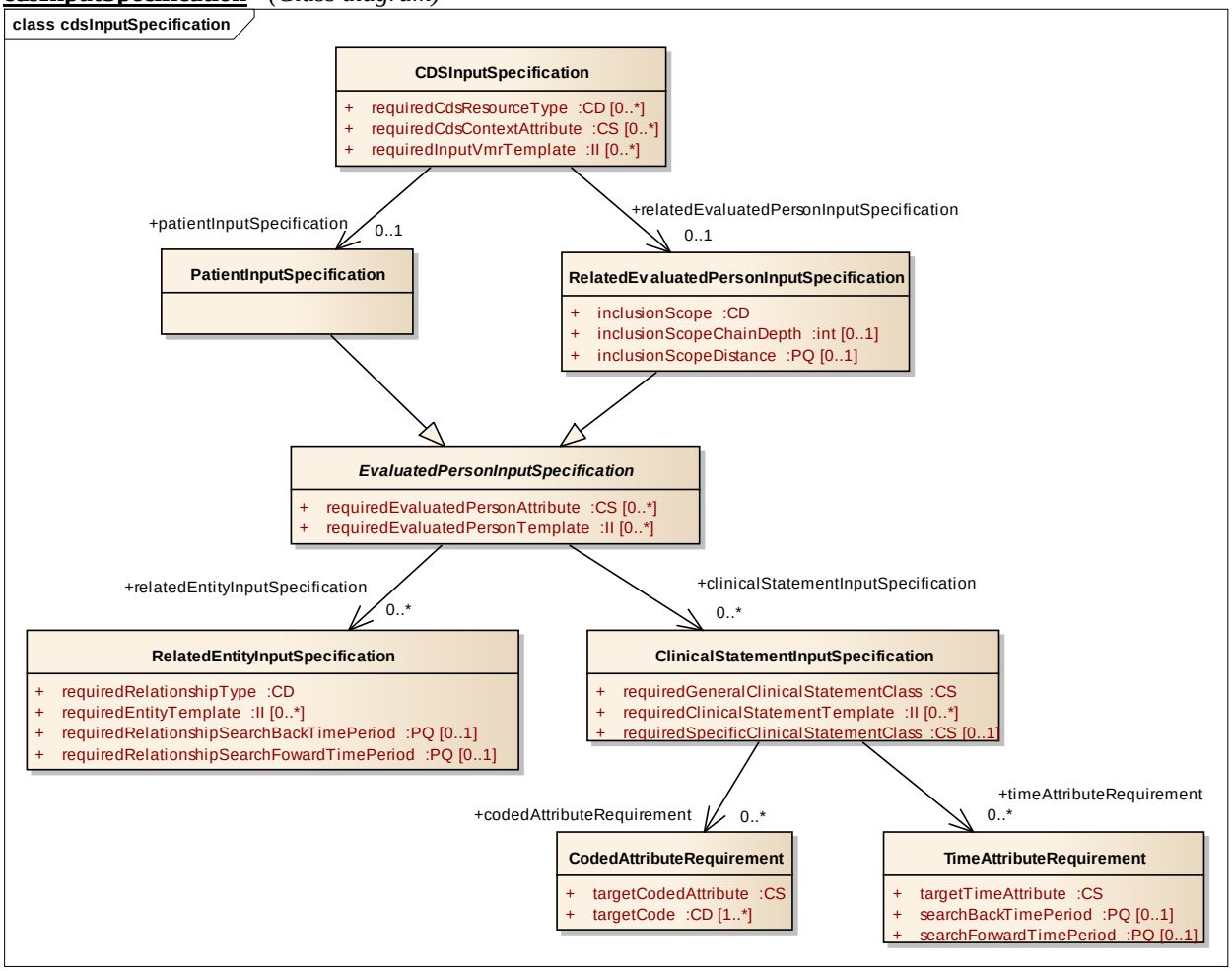

Figure: 3

3.1.1.3.1 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
requiredCdsResourceType 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).
requiredCdsContextAttribute CS [0..*]	The CDS context attribute (e.g., CDS system user preferred language) required.
requiredInputVmrTemplate II [0..*]	Identifier of a set of constraints that must be placed on the input vMR.

3.1.1.3.2 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
requiredGeneralClinicalStatementClass 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.
requiredClinicalStatementTemplate 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.
requiredSpecificClinicalStatementClass CS [0..1]	The specific class of clinical statement required. E.g., ProcedureOrder, ObservationResult.

3.1.1.3.3 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
targetCodedAttribute CS	The clinical statement's coded attribute that is the subject of restriction. E.g., problem code, problem status.
targetCode 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.

3.1.1.3.4 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
requiredEvaluatedPersonAttribute 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.
requiredEvaluatedPersonTemplate II [0..*]	Identifier of a set of constraints that must be placed on the EvaluatedPerson.

3.1.1.3.5 PatientInputSpecification

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

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

3.1.1.3.6 RelatedEntityInputSpecification

Type: **Class**
Package: cdsInputSpecification

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

Attributes

Attribute	Notes
requiredRelationshipType 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.
requiredEntityTemplate II [0..*]	Identifier of a set of constraints that must be placed on the related Entity.
requiredRelationshipSearchBackTimePeriod 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.
requiredRelationshipSearchFowardTimePeriod 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.

3.1.1.3.7 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
inclusionScope CD	The scope of evaluated persons to include. E.g., relative, sexual contacts, persons living in affected geographic zone.
inclusionScopeChainDepth 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,

Attribute	Notes
	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.
inclusionScopeDistance 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.

3.1.1.3.8 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
targetTimeAttribute CS	The time attribute targeted for restriction. E.g., procedure time, substance dispensation time.
searchBackTimePeriod 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.
searchForwardTimePeriod 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.

3.1.1.4 vmr

Type: **Package**
Package: modelParent

Specifies data about a patient relevant for CDS.

ExtendedvMRTypes - *(Class diagram)*

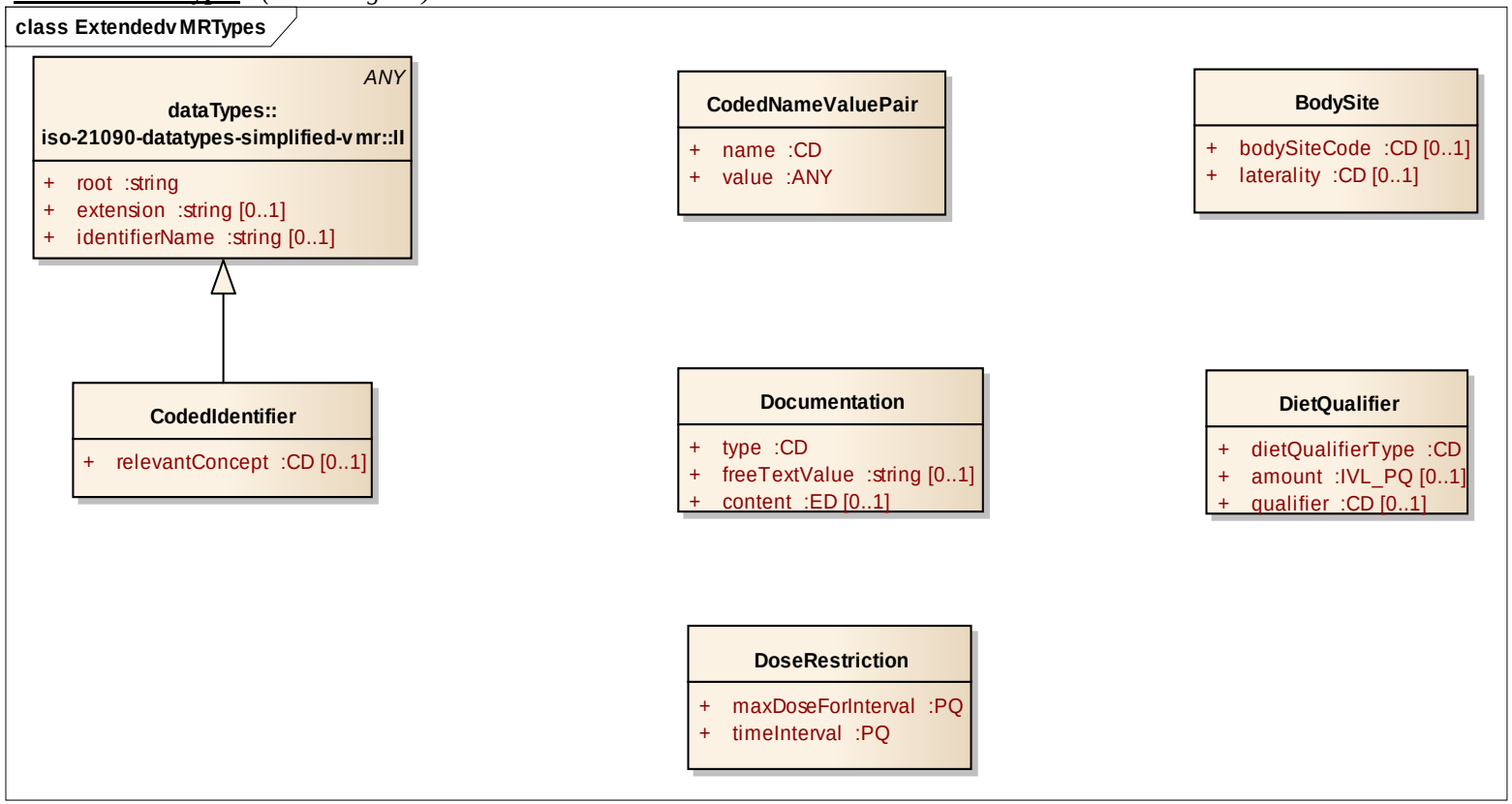

Figure: 4

vmr - *(Class diagram)*

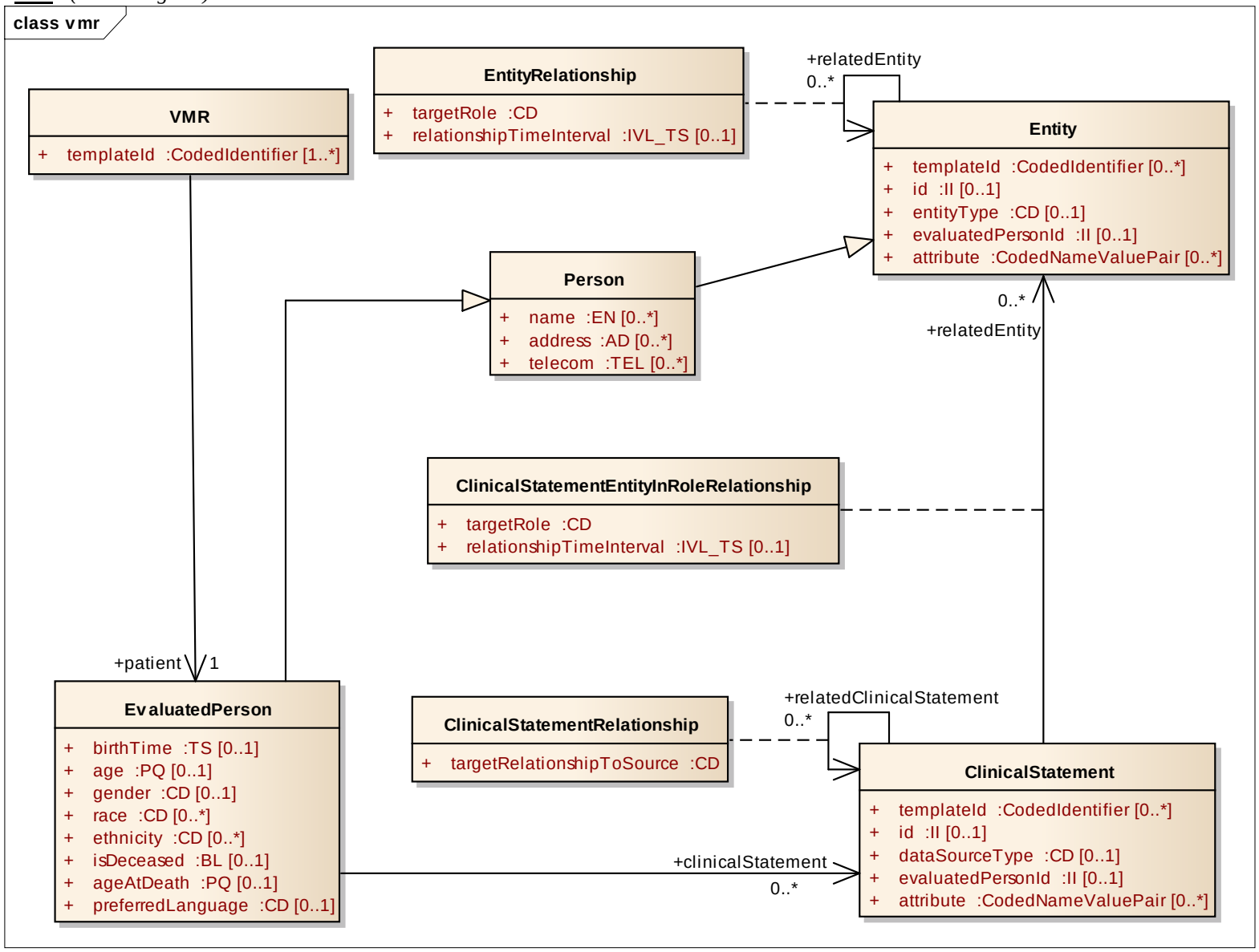

Figure: 5

entity - *(Class diagram)*

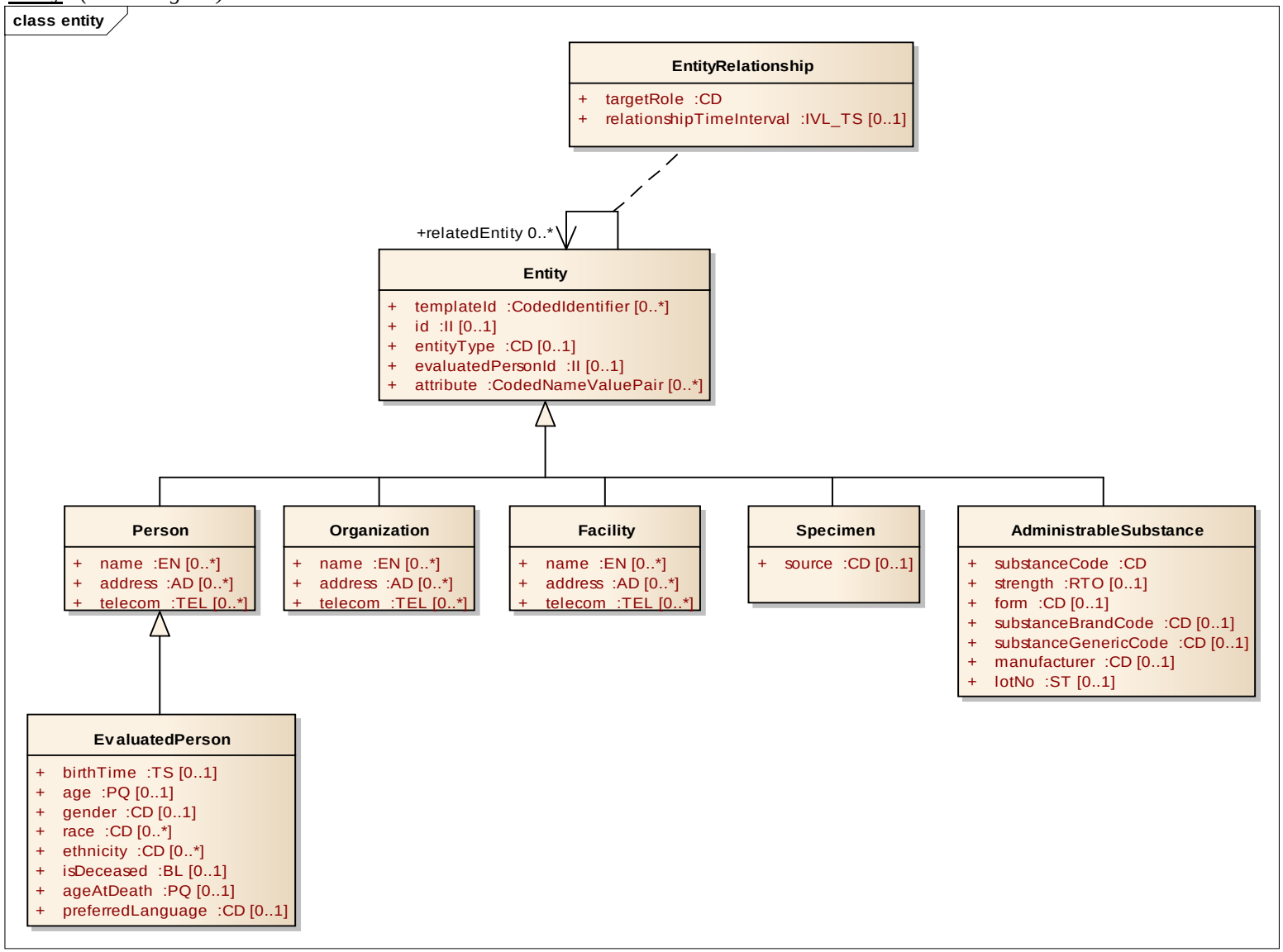

Figure: 6

clinicalStatement - *(Class diagram)*

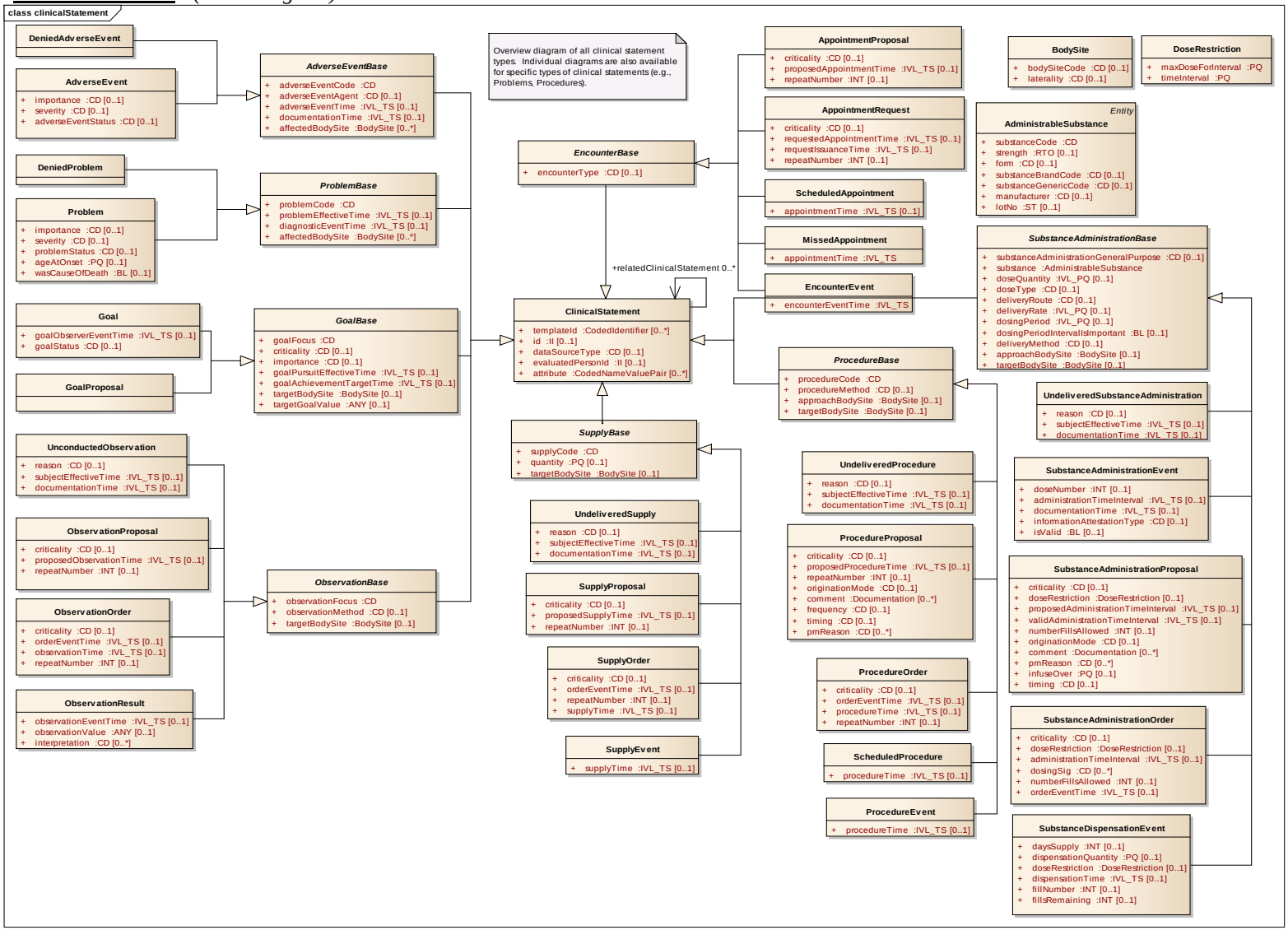

Figure: 8

ProcedureProposals - *(Class diagram)*

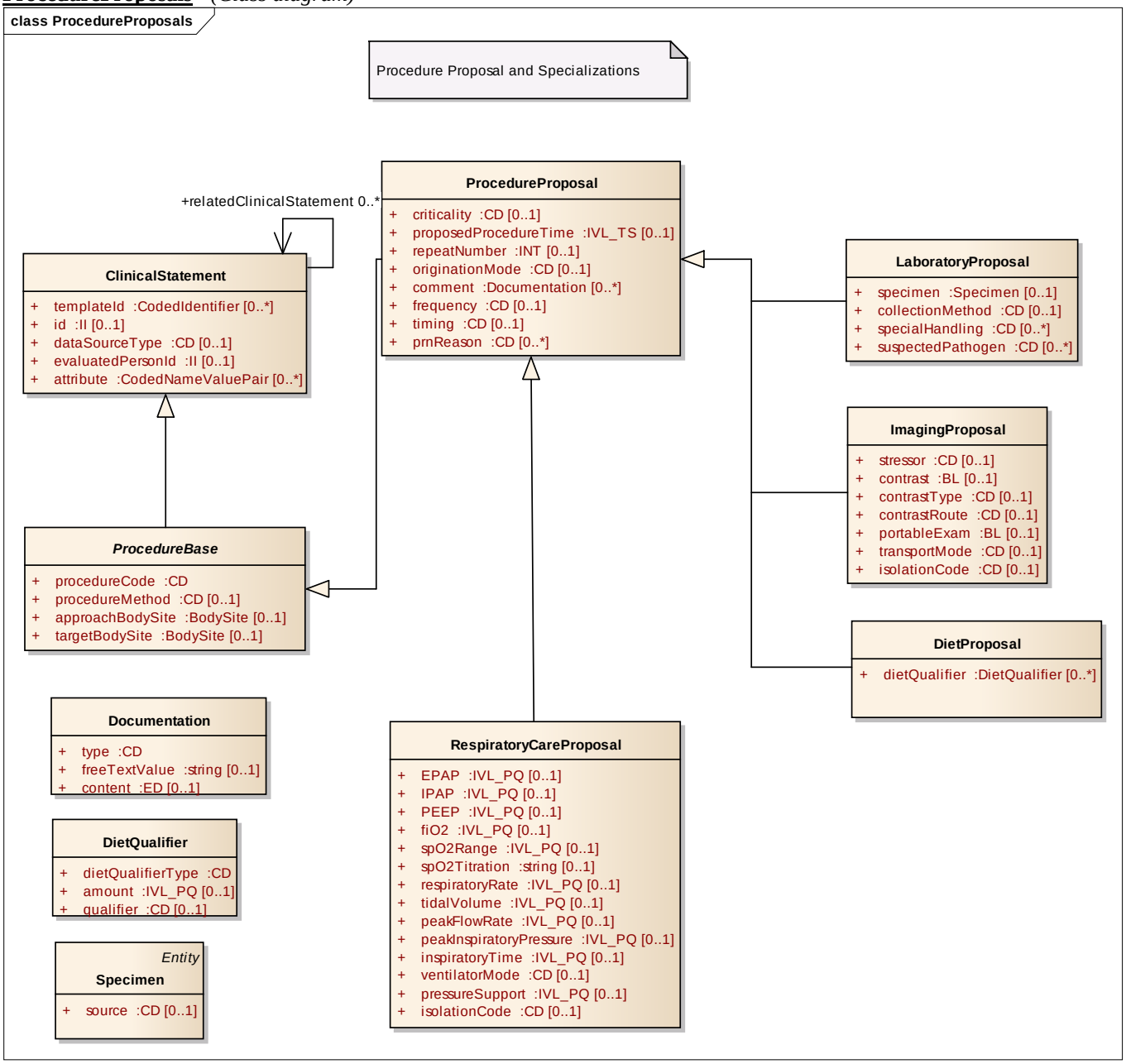

Figure: 7

adverseEvent - *(Class diagram)*

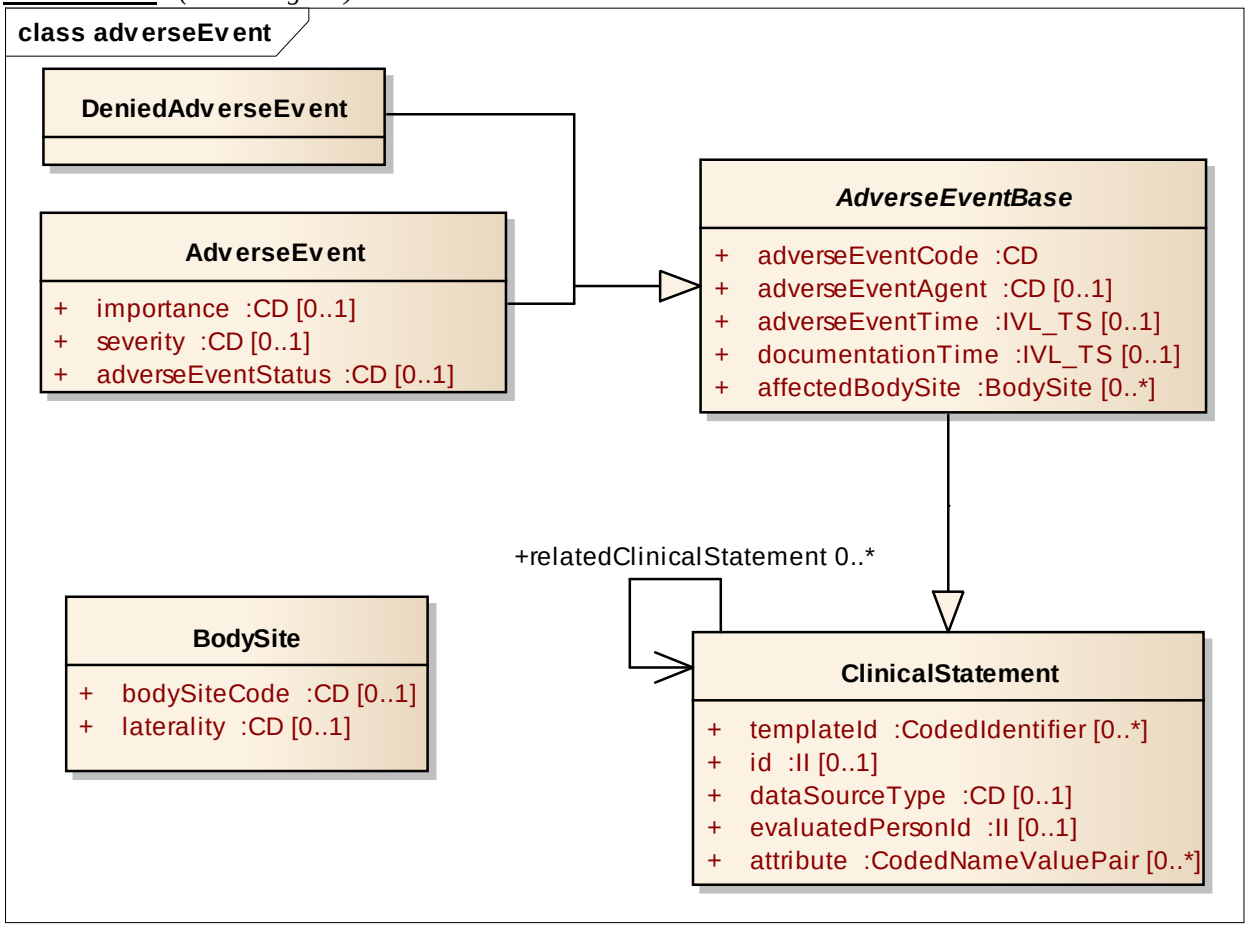

Figure: 9

encounter - *(Class diagram)*

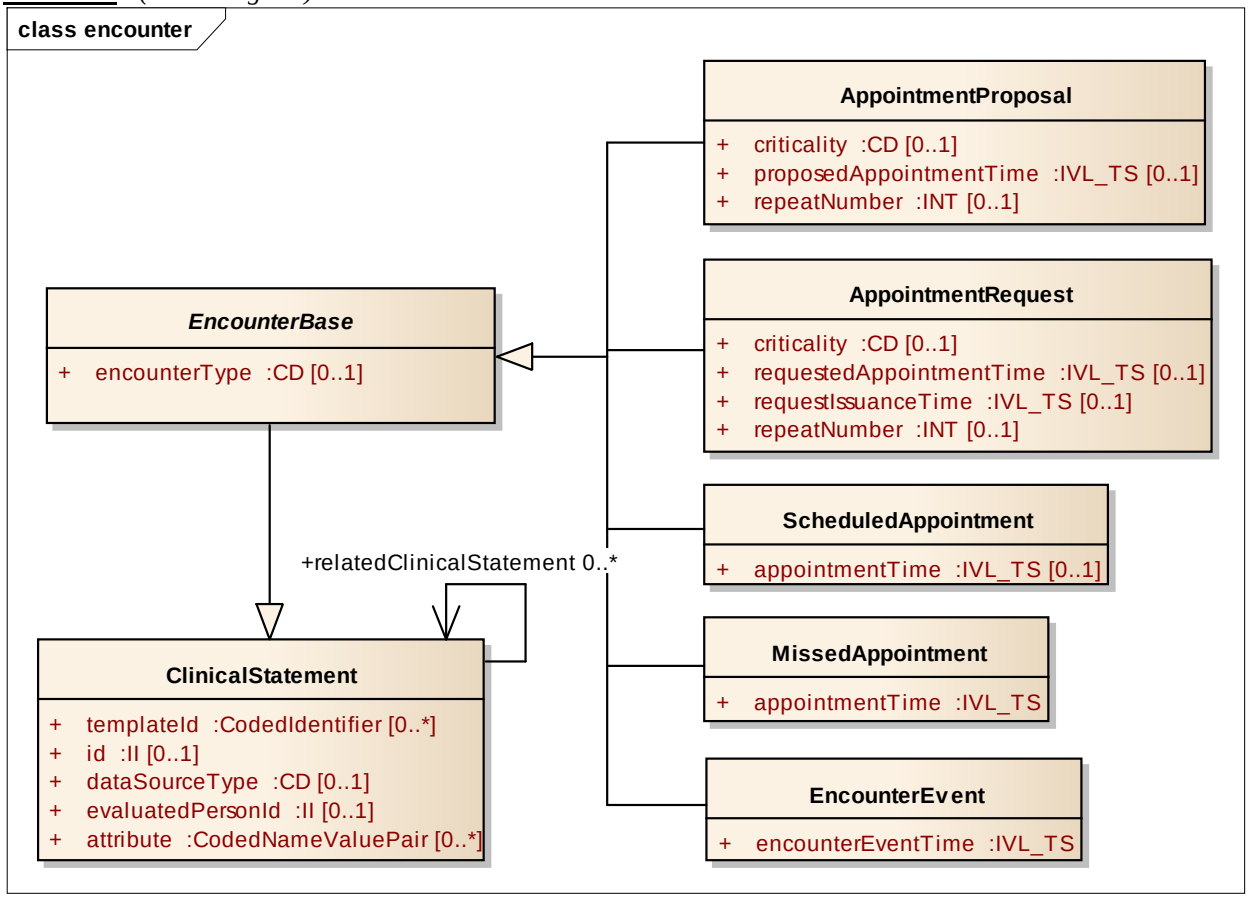

Figure: 10

goal - *(Class diagram)*

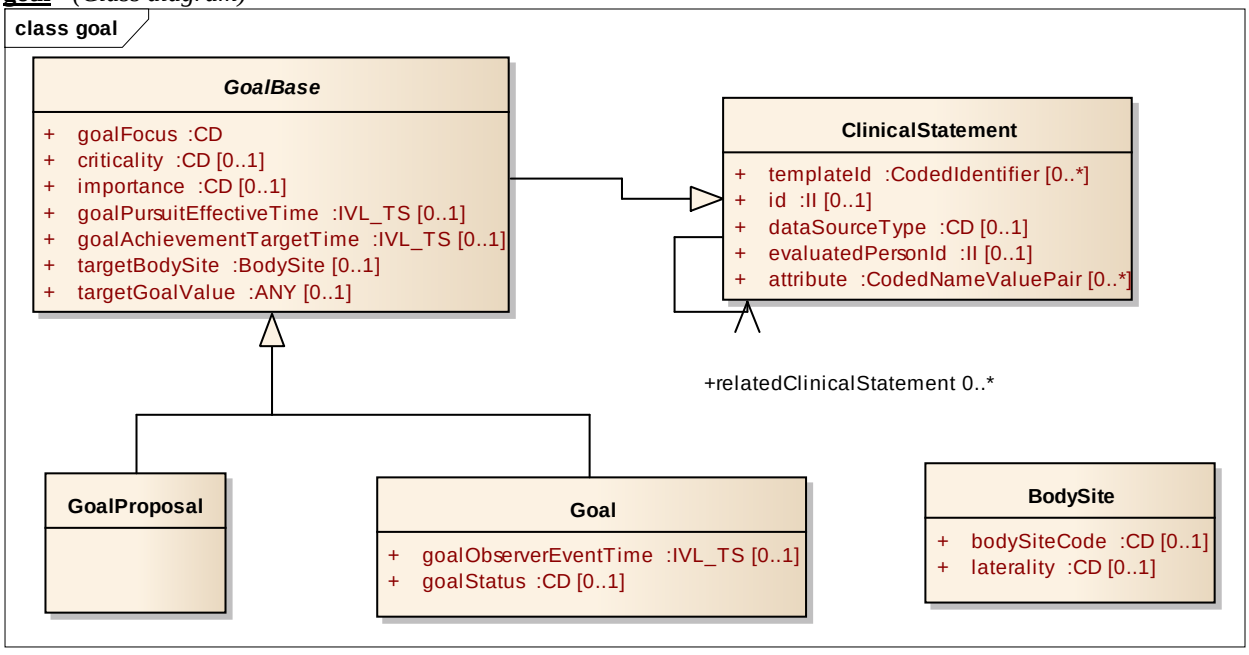

Figure: 11

observation - *(Class diagram)*

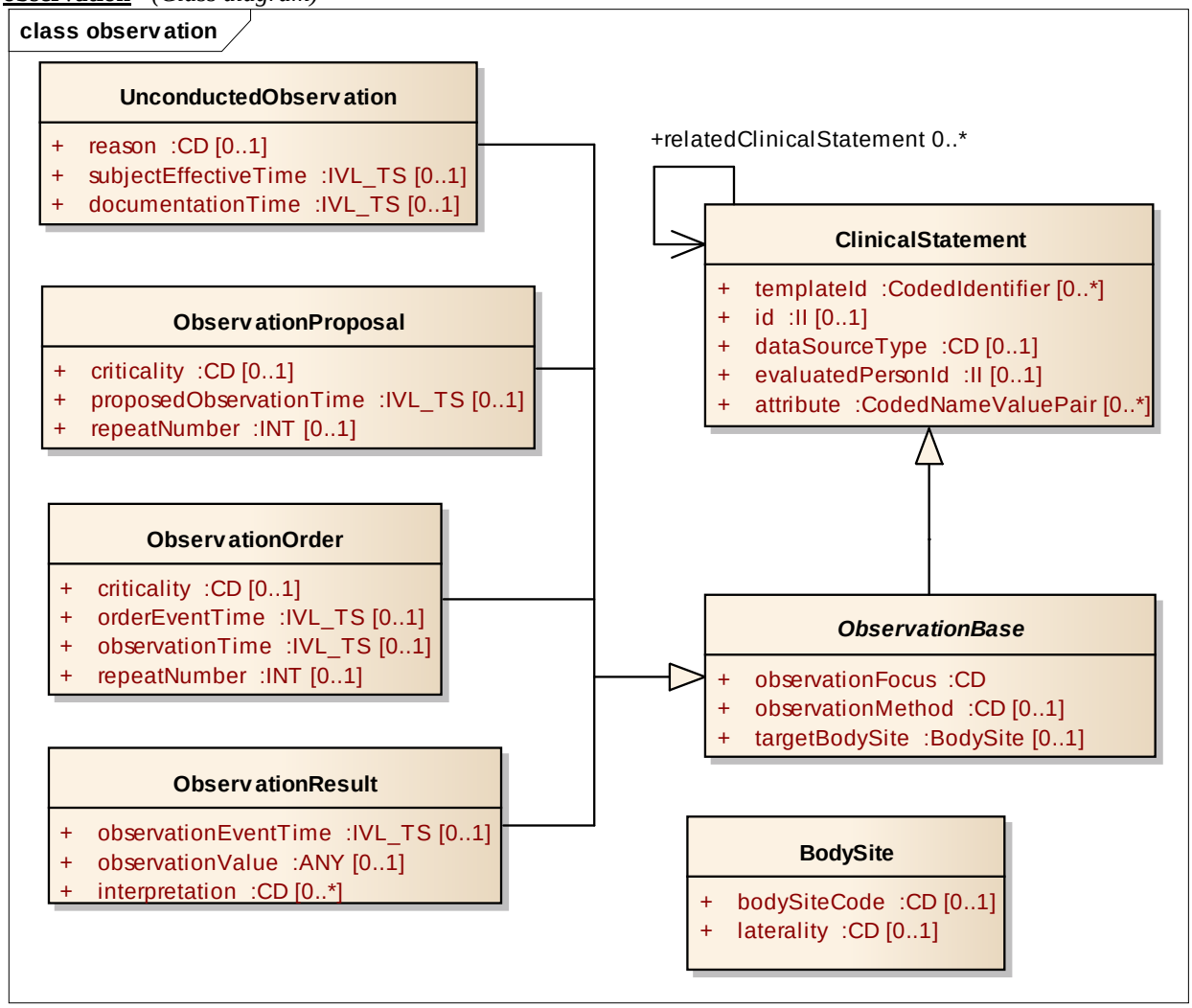

Figure: 12

problem - *(Class diagram)*

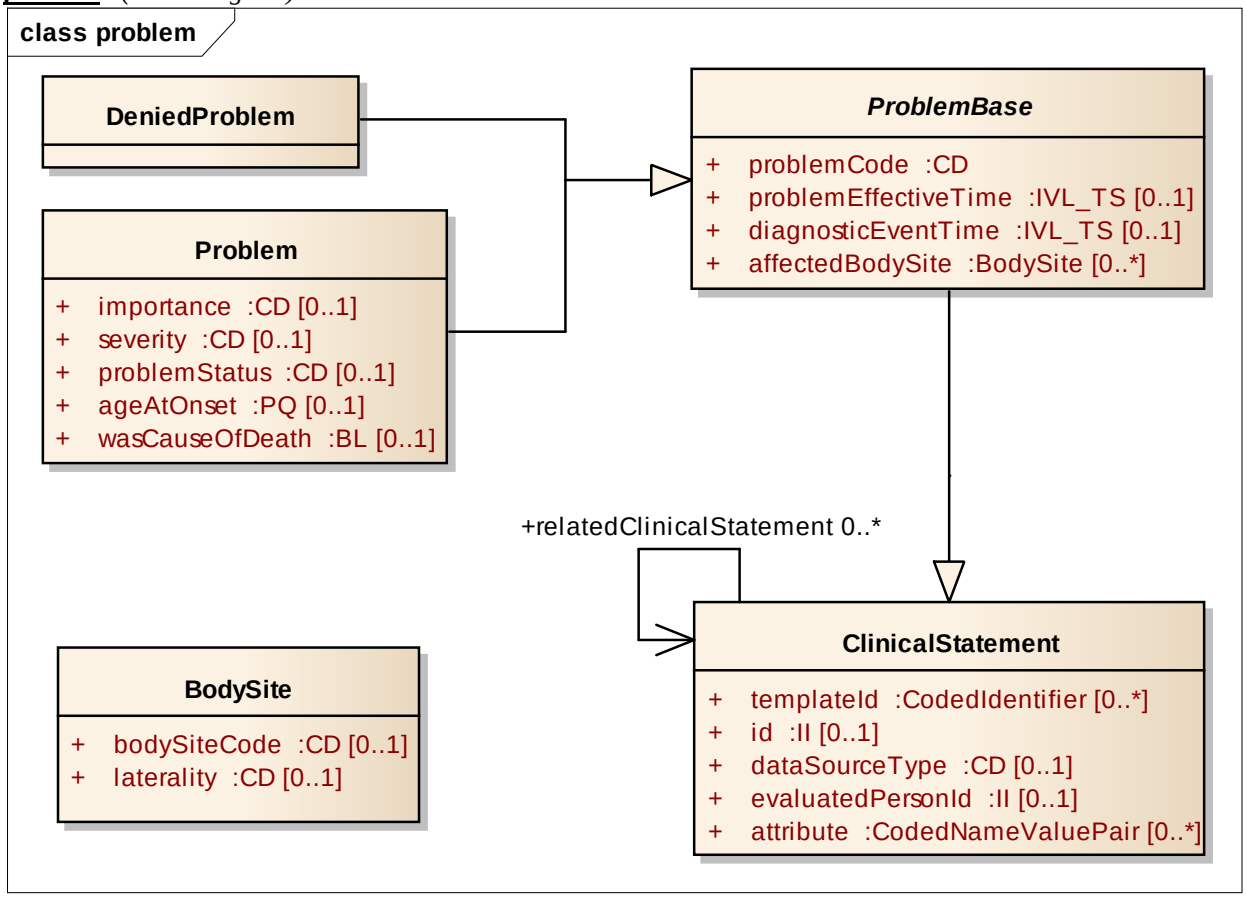

Figure: 13

procedure - *(Class diagram)*

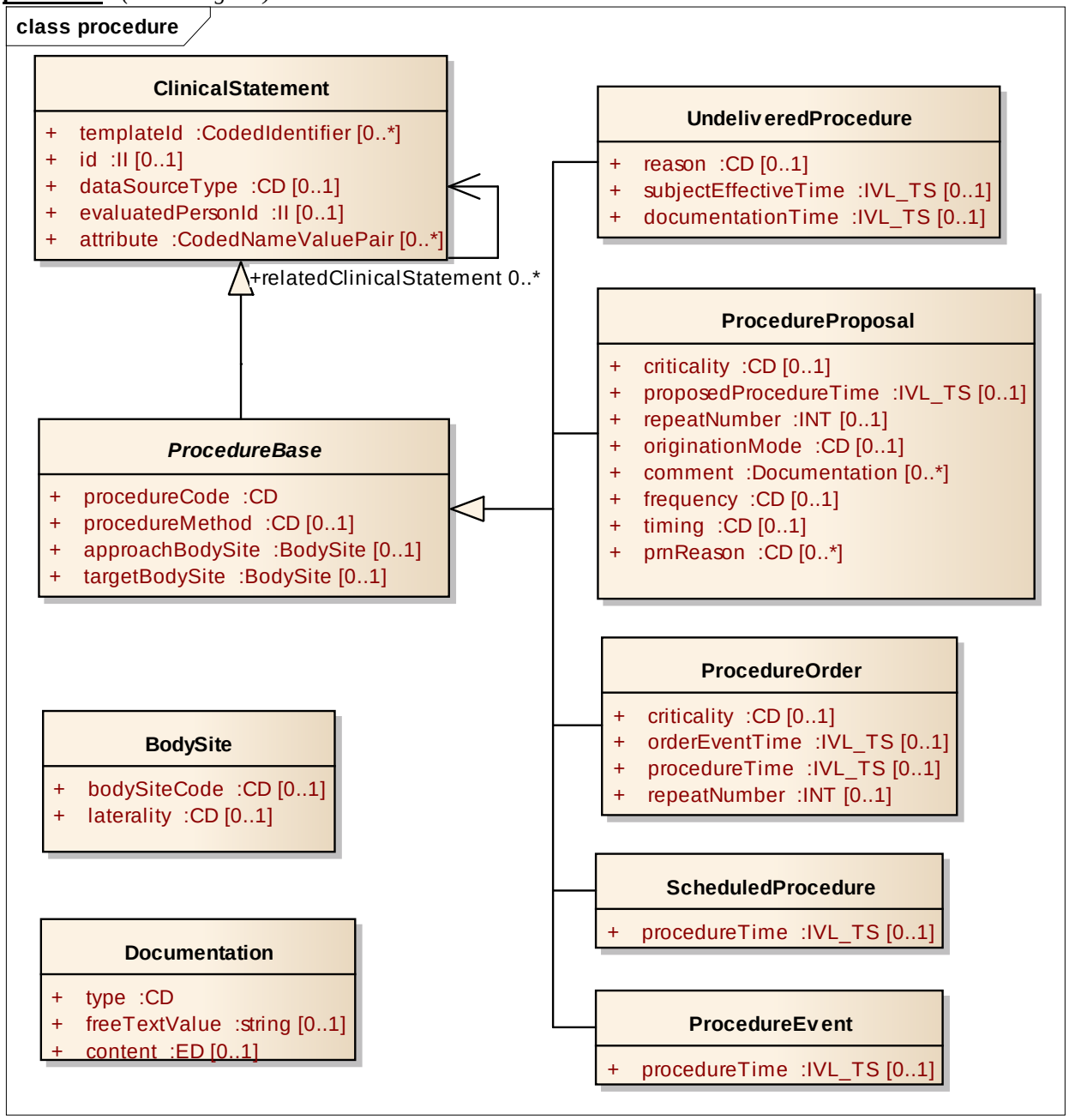

Figure: 14

substanceAdministration - *(Class diagram)*

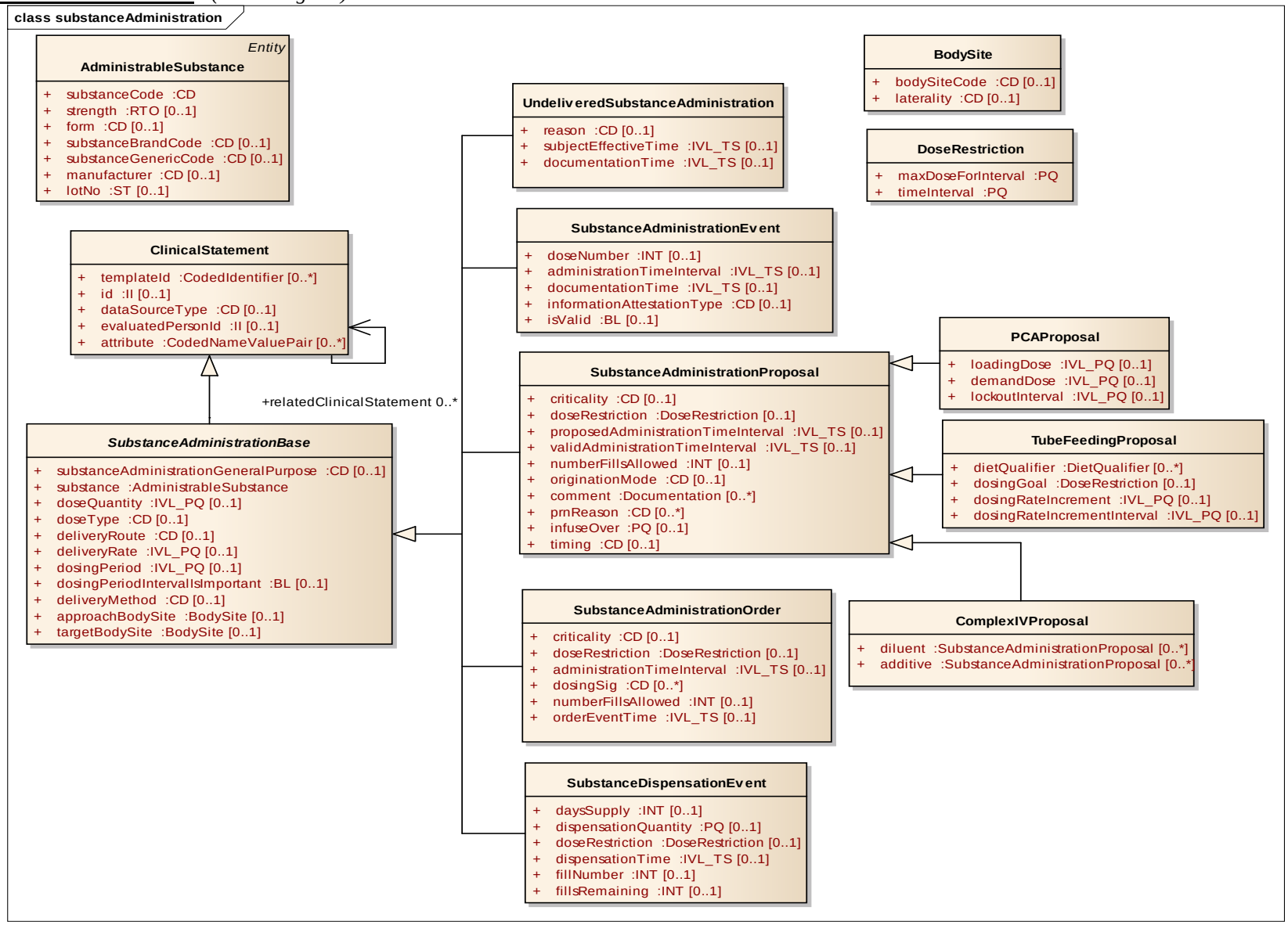

Figure: 15

supply - *(Class diagram)*

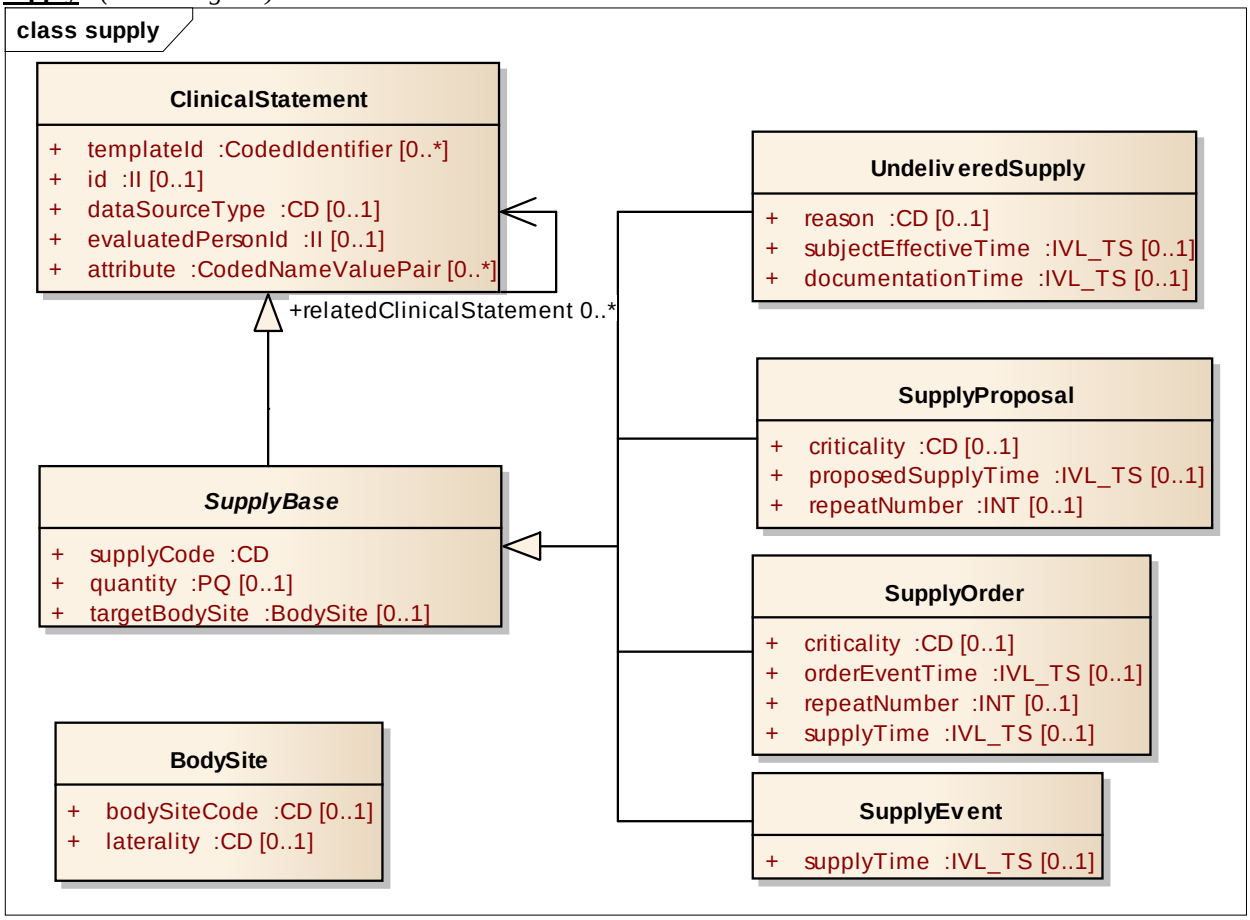

Figure: 16

3.1.1.4.1 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
substanceCode 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.
strength RTO [0..1]	The concentration of the substance. E.g., 250 mg per 5 ml.
form CD [0..1]	The physical form of the substance as presented to the subject. E.g., tablet, patch, injectable, inhalant.
substanceBrandCode CD [0..1]	A code describing the product as a branded or trademarked entity from a controlled vocabulary.

Attribute	Notes
substanceGenericCode CD [0..1]	A code describing the product as a substance produced and distributed without patent protection.
manufacturer 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.
lotNo 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.

3.1.1.4.2 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
importance CD [0..1]	The clinical importance or seriousness of the adverse event. 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.
severity CD [0..1]	The intensity of the adverse event. E.g., severe, moderate. If the adverseEventCode is rash and severity is moderate, it means that the adverse event was a moderate rash.
adverseEventStatus CD [0..1]	The state of the effects of this adverse event. E.g., active, inactive, resolved.

3.1.1.4.3 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
adverseEventCode 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.
adverseEventAgent 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.
adverseEventTime IVL_TS [0..1]	The time that reflects when the subject experienced the adverse event (in the case of AdverseEvent) or when the subject *did not* experience the adverse event (in the case of DeniedAdverseEvent).

Attribute	Notes
documentationTime 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).
affectedBodySite BodySite [0..*]	A body site affected by the adverse event.

3.1.1.4.4 AppointmentProposal

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

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

Attributes

Attribute	Notes
criticality CD [0..1]	The urgency of the proposed encounter.
proposedAppointmentTime 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 repeatNumber >= 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 repeatNumber is 3, ideal appointment times would be 1/1/2011, 12/31/2011, and in the middle of the year.
repeatNumber INT [0..1]	The proposed number of appointment to make.

3.1.1.4.5 AppointmentRequest

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

A request by a provider to schedule an appointment.

Attributes

Attribute	Notes
criticality CD [0..1]	The urgency of the requested encounter.
requestedAppointmentTime IVL_TS [0..1]	Requested time for appointment. If repeatNumber >= 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 repeatNumber is 3, ideal appointment times would be 1/1/2011, 12/31/2011, and in the middle of the year.

Attribute	Notes
requestIssuanceTime IVL_TS [0..1]	Time when the encounter appointment was requested by the provider, as opposed to the time it was requested for.
repeatNumber INT [0..1]	The requested number of appointment to make.

3.1.1.4.6 BodySite

Type: **Class**
Package: vmr

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

Attributes

Attribute	Notes
bodySiteCode CD [0..1]	A location on an EvaluatedPerson's body. May or may not encompass laterality. E.g., lung, left lung.
laterality CD [0..1]	The side of the body, from the EvaluatedPerson's perspective. E.g., left, right, bilateral.

3.1.1.4.7 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. An abstract base class that serves as the basis for concrete clinical statements, such as ObservationEvent and ProcedureProposal.

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
templateId CodedIdentifier [0..*]	The identifier of a set of constraints placed on a clinical statement.
id II [0..1]	A unique ID of this clinical statement for reference purposes. Does not need to be the actual ID of the source system. While *id* is optional in this model to support ID assignment post-creation in some use cases, when defined, a ClinicalStatement will *require* the eventual assignment of a unique ID.
dataSourceType 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

Attribute	Notes
	when available.
evaluatedPersonId II [0..1]	The 'owner' of this clinical statement.
attribute 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.

3.1.1.4.8 ClinicalStatementEntityInRoleRelationship

Type: **AssociationClass**
Package: vmr

The relationship between a ClinicalStatement and an Entity serving the indicated function or position.

Attributes

Attribute	Notes
targetRole CD	The function or position of the Entity in relationship to the ClinicalStatement. E.g., healthcare provider, laboratory specimen, subject of procedure.
relationshipTimeInterval IVL_TS [0..1]	The timeframe in which the relationship existed.

3.1.1.4.9 ClinicalStatementRelationship

Type: **Class**
Package: vmr

The relationship between two ClinicalStatements.

Attributes

Attribute	Notes
targetRelationshipToSource CD	The target clinical statement's relationship to the source clinical statement. E.g., if relationship is "part of", then target clinical statement is part of source clinical statement. In an XML context, the target clinical statement would be the one that is enclosed within the source clinical statement.

3.1.1.4.10 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
relevantConcept CD [0..1]	Code specifying the concept represented by this identifier.

3.1.1.4.11 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
name CD	A code representing the name of the attribute.
value ANY	The value of the attribute.

3.1.1.4.12 ComplexIVProposal

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

A class representing IV fluids that may consist of one or more diluents and additives.

Attributes

Attribute	Notes
diluent SubstanceAdministrationProposal [0..*]	A fluid base (sometimes called a "base solution") into which an additive is mixed in order to prepare IV fluids for patient administration; the diluent is an inactive ingredient
additive SubstanceAdministrationProposal [0..*]	A substance that is mixed with a diluent which enables intravenous delivery to a patient; the additive is an active ingredient

3.1.1.4.13 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.

3.1.1.4.14 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 conditionsand 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.

3.1.1.4.15 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
dietQualifier 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.

3.1.1.4.16 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
dietQualifierType 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.
amount IVL_PQ [0..1]	The quantity of nutrient or bound to consider for this diet. For instance, 40mg, <40mg, 30mg<x<60mg, etc...
qualifier 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

3.1.1.4.17 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
type CD	Code that specifies the type of document represented: E.g., 'Instructions to Provider', 'Patient Instructions', 'Special Handling', etc...
freeTextValue string [0..1]	The free text representation of this document.
content 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.

3.1.1.4.18 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
maxDoseForInterval PQ	Maximum amount of substance that can be given within the specified time interval.
timeInterval PQ	The time interval during which the dose specified is the maximum amount that should be administered.

3.1.1.4.19 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
encounterType CD [0..1]	Identifies the type of encounter with as much specificity as available, or as required by a template. E.g., outpatient encounter, outpatient cardiology encounter.

3.1.1.4.20 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
encounterEventTime IVL_TS	The time of the encounter.

3.1.1.4.21 Entity

Type: **Class**
Package: vmr

A physical thing, group of physical things or an organization.

Attributes

Attribute	Notes
templateId CodedIdentifier [0..*]	The identifier of a set of constraints placed on an Entity.
id II [0..1]	The entity's unique identifier. Used for internal tracking purposes; must be provided. Does not need to be the entity's "real" identifier. Note that while *id* is specified as optional to support the use case where an entity is created and only later assigned an ID, the eventual assignment of a unique entity identifier is required.
entityType	The specific type of entity. E.g., healthcare organization, medical

Attribute	Notes
CD [0..1]	facility, pacemaker.
evaluatedPersonId II [0..1]	The person referencing this entity, generally the patient.
attribute 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.

3.1.1.4.22 EntityRelationship

Type: **AssociationClass**
Package: vmr

The relationship between one Entity and another Entity.

Attributes

Attribute	Notes
targetRole CD	The function or position served by the target Entity in relation to the source Entity. E.g., primary care provider, health insurance provider.
relationshipTimeInterval 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.

3.1.1.4.23 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
birthTime TS [0..1]	The date on which the person was born.
age 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.
gender CD [0..1]	The person's gender. E.g., male, female. Typically will consist of administrative gender, with clinical gender noted using ObservationEvents.
race 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.
ethnicity 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.
isDeceased BL [0..1]	Whether the person is deceased.

Attribute	Notes
	Included to support family history-based inferencing.
ageAtDeath PQ [0..1]	The age at which the person died. Included to support family history-based inferencing.
preferredLanguage CD [0..1]	The person's language of preference. E.g., English.

3.1.1.4.24 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
name EN [0..*]	A word or a combination of words by which a facility is known.
address AD [0..*]	The place or the name of the place where a facility is located or may be reached.
telecom 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.

3.1.1.4.25 Goal

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

A clinical end or aim towards which effort is directed.

Attributes

Attribute	Notes
goalObserverEventTime 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.
goalStatus CD [0..1]	State of the attempt to reach this goal. E.g., active, inactive.

3.1.1.4.26 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
goalFocus 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.
criticality CD [0..1]	Urgency of the goal. Coding system values indicating the urgency of a requested or proposed observation (e.g., please do xyz STAT).
importance CD [0..1]	The clinical importance or seriousness of the goal. 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.
goalPursuitEffectiveTime 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.
goalAchievementTargetTime 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.
targetBodySite BodySite [0..1]	The body site that serves as the target of the goal. E.g., waist.
targetGoalValue ANY [0..1]	The metric whose achievement would signify the fulfillment of the goal. E.g., 150 pounds, 7.0%.

3.1.1.4.27 GoalProposal

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

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

3.1.1.4.28 ImagingProposal

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

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

Attributes

Attribute	Notes
stressor 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.
contrast BL [0..1]	Specification of whether contrast should be administered as part of the imaging study (e.g., Yes, No, Per Radiology)
contrastType 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.
contrastRoute CD [0..1]	Specification of the route of contrast (e.g., Oral, IV, Per Radiology) to be given as part of an imaging proposal
portableExam 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)
transportMode CD [0..1]	Specification of how a patient will be moved from their hospital room to the performing department
isolationCode 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.

3.1.1.4.29 LaboratoryProposal

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

A proposal for a laboratory test.

Attributes

Attribute	Notes
specimen Specimen [0..1]	The source of the collected laboratory specimen
collectionMethod CD [0..1]	Specification of how the laboratory specimen should be obtained
specialHandling CD [0..*]	Special instructions on how to handle a laboratory specimen. For example, 'Keep on ice'.
suspectedPathogen 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.

3.1.1.4.30 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
appointmentTime IVL_TS	The time of the scheduled appointment that was missed.

3.1.1.4.31 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
observationFocus 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.
observationMethod CD [0..1]	The approach used to make the observation. E.g., direct measurement, indirect calculation, Enzyme-Linked Immunosorbent Assay.
targetBodySite BodySite [0..1]	The body site where the observation is being made. E.g., left lung.

3.1.1.4.32 ObservationOrder

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

An order by a provider to conduct an observation, such as a laboratory test.

Attributes

Attribute	Notes
criticality CD [0..1]	Urgency of observation. Coding system values indicating the urgency of a requested or proposed observation (e.g., please do xyz STAT).
orderEventTime IVL_TS [0..1]	Time when the order was created.
observationTime IVL_TS [0..1]	Time when the observation should be performed. If repeatNumber >= 2, then specifies period within which the observations should take place. In these cases, it is assumed that the observations should be evenly distributed within the timeframe. E.g., if proposed time is 1/1/2011 to 12/31/2011, and repeatNumber is 3, ideal observation times would be 1/1/2011, 12/31/2011, and in the middle of the year.

Attribute	Notes
repeatNumber INT [0..1]	The number of times the observation should be made.

3.1.1.4.33 ObservationProposal

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

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

Attributes

Attribute	Notes
criticality CD [0..1]	Urgency of observation. Coding system values indicating the urgency of a requested or proposed observation (e.g., please do xyz STAT).
proposedObservationTime IVL_TS [0..1]	Time when it is proposed to do the observation. If repeatNumber >= 2, then specifies proposed period within which the observations should take place. In these cases, it is assumed that the observations should be evenly distributed within the timeframe. E.g., if proposed time is 1/1/2011 to 12/31/2011, and repeatNumber is 3, ideal observation times would be 1/1/2011, 12/31/2011, and in the middle of the year.
repeatNumber INT [0..1]	The number of times the observation should be made.

3.1.1.4.34 ObservationResult

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

The findings from an observation.

Attributes

Attribute	Notes
observationEventTime IVL_TS [0..1]	Time for the completion of the observation, including the interpretation.
observationValue ANY [0..1]	Actual observed results. E.g., 6.5 mg/dL, 5.7%.
interpretation CD [0..*]	Explanation of the results. E.g., high, low, within normal limits.

3.1.1.4.35 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
name EN [0..*]	A word or a combination of words by which an organization is known.
address AD [0..*]	The place or the name of the place where an organization is located or may be reached.
telecom 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.

3.1.1.4.36 PCAProposal

Type: **Class** **SubstanceAdministrationProposal**
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
loadingDose IVL_PQ [0..1]	The initial amount of an analgesic to be administered at one time.
demandDose 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
lockoutInterval 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

3.1.1.4.37 Person

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

A human being.

Attributes

Attribute	Notes
name	A word or a combination of words by which a person is known.

Attribute	Notes
EN [0..*]	
address AD [0..*]	The place or the name of the place where a person is located or may be reached.
telecom 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.

3.1.1.4.38 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
importance CD [0..1]	Importance of problem. E.g., may be codes for primary, secondary as applies to an encounter diagnosis from administrative data, or codes for the degree of threat to the patient's health caused by the problem (e.g., life-threatening, requires hospitalization).
severity CD [0..1]	The intensity of the problem. E.g., severe, moderate.
problemStatus CD [0..1]	State of the problem. E.g., active, inactive, resolved.
ageAtOnset PQ [0..1]	The subject's age when the problem began.
wasCauseOfDeath BL [0..1]	Whether the problem was the cause of the subject's death.

3.1.1.4.39 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
problemCode 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.
problemEffectiveTime 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.

Attribute	Notes
diagnosticEventTime 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).
affectedBodySite 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).

3.1.1.4.40 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.

Attributes

Attribute	Notes
procedureCode 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.
procedureMethod 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.
approachBodySite BodySite [0..1]	The body site used for gaining access to the target body site. E.g., femoral artery for a coronary angiography.
targetBodySite BodySite [0..1]	The body site where the procedure takes place. E.g., coronary blood vessels for coronary angiography.

3.1.1.4.41 ProcedureEvent

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

The actual event of performing a procedure.

Attributes

Attribute	Notes
procedureTime IVL_TS [0..1]	Time when procedure was done.

3.1.1.4.42 ProcedureOrder

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

An order for procedure to be done.

Attributes

Attribute	Notes
criticality CD [0..1]	Urgency of the procedure.
orderEventTime IVL_TS [0..1]	The time when the order was made.
procedureTime IVL_TS [0..1]	Ordered time for procedure. If repeatNumber >= 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 repeatNumber is 3, ideal procedure times would be 1/1/2011, 12/31/2011, and in the middle of the year.
repeatNumber INT [0..1]	Number of times the procedure should take place.

3.1.1.4.43 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.

Attributes

Attribute	Notes
criticality CD [0..1]	Urgency of the proposed procedure.
proposedProcedureTime IVL_TS [0..1]	Requested time for procedure. If repeatNumber >= 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 repeatNumber is 3, ideal procedure times would be 1/1/2011, 12/31/2011, and in the middle of the year.
repeatNumber INT [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.
originationMode 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'.
comment 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

Attribute	Notes
	of the comment represents the free text value.
frequency CD [0..1]	The interval in between events. For instance, TID, BID, q8h, etc.
timing CD [0..1]	Timing relative to some event. Today, Tomorrow, On Admission to ICU, etc...
prnReason 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.

3.1.1.4.44 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
EPAP IVL_PQ [0..1]	Expiratory positive airway pressure, often expressed in cmH20 in the United States. Example: 5 cmH2O
IPAP IVL_PQ [0..1]	Inspiratory positive airway pressure, often expressed in cmH20 in the United States. For example, 10 cmH2O
PEEP IVL_PQ [0..1]	Positive end expiratory pressure, the alveolar pressure above atmospheric pressure that exists at the end of expiration, often expressed in cmH20 in the United States. For example, 5 cmH2O.
fiO2 IVL_PQ [0..1]	Fraction of inspired oxygen, expressed as a percentage. For example, 100%.
spO2Range IVL_PQ [0..1]	Target oxygen saturation, expressed as a percentage. For instance, 95-100%
spO2Titration string [0..1]	Titration instructions to achieve target oxygen saturation. An example might include: "Titrate oxygen to maintain SpO2 > 93%"
respiratoryRate 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.
tidalVolume 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.
peakFlowRate IVL_PQ [0..1]	Specification of the maximum allowable rate of airflow delivered by a mechanical ventilator. For example, 60 L/min.
peakInspiratoryPressure 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.
inspiratoryTime IVL_PQ [0..1]	Specification of the duration of the positive airway pressume applied by a mechanical ventilator. For example, 1 second.
ventilatorMode 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),

Attribute	Notes
	Pressure-Regulated Volume Control (PRVC)
pressureSupport 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
isolationCode 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

3.1.1.4.45 ScheduledAppointment

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

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

Attributes

Attribute	Notes
appointmentTime IVL_TS [0..1]	The time of the scheduled appointment.

3.1.1.4.46 ScheduledProcedure

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

A procedure that has been scheduled to take place.

Attributes

Attribute	Notes
procedureTime IVL_TS [0..1]	The time of the scheduled procedure.

3.1.1.4.47 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
source CD [0..1]	The specimen source. E.g., sputum, urine, blood, stool

3.1.1.4.48 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
substanceAdministrationGeneralPurpose CD [0..1]	The general purpose for the substance administration. E.g., medication, immunization.
substance AdministrableSubstance	A material of a particular constitution that can be given to a person to enable a clinical effect.
doseQuantity IVL_PQ [0..1]	The amount of substance. E.g., 1 tab, 325 mg, 1-2 tabs.
doseType CD [0..1]	The type of dose. E.g., initial, maintenance, loading.
deliveryRoute CD [0..1]	The physical route through which the substance is administered. E.g., IV, PO.
deliveryRate IVL_PQ [0..1]	Rate of substance administration. E.g., 1000 mL/hr.
dosingPeriod IVL_PQ [0..1]	Together with dosingPeriodIntervalIsImportant, 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 dosingPeriodIntervalIsImportant is true, and TID if dosingPeriodIntervalIsImportant is false. Other possibilities include 20 minutes every 2 hours for an infusion, or 30 minutes every 2 days for a medicated compress, etc.
dosingPeriodIntervalIsImportant BL [0..1]	Together with dosingPeriod, identifies the frequency of substance administration. dosingPeriod identifies the periodicity of doses within a 24 hour timeframe, whereas dosingPeriodIntervalIsImportant identifies whether doses should be equally spaced within that 24 hour period. E.g., a dosingPeriod of 8 hr would signify q8h if dosingPeriodIntervalIsImportant is true, and TID if dosingPeriodIntervalIsImportant is false.
deliveryMethod CD [0..1]	Methodology used to administer the substance. E.g., gastric feeding tube, gastrostomy, drip
approachBodySite BodySite [0..1]	The body site used for gaining access to the target body site for the purposes of the substance administration.
targetBodySite BodySite [0..1]	The body site where the substance is delivered.

3.1.1.4.49 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
doseNumber INT [0..1]	Identifies which dose this substance administration represents within a series of doses. Most commonly used for immunizations.
administrationTimeInterval 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.
documentationTime IVL_TS [0..1]	The time when the substance administration is documented.
informationAttestationType 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.
isValid BL [0..1]	Primarily designed to support analysis of previous immunizations.

3.1.1.4.50 SubstanceAdministrationOrder

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

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

Attributes

Attribute	Notes
criticality 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).
doseRestriction DoseRestriction [0..1]	Specifies the maximum dose that can be given in a specified time interval.
administrationTimeInterval IVL_TS [0..1]	Ordered time for administering the substance.
dosingSig CD [0..*]	Directions for the substance administration as identified in Sig codes. E.g., qam, qhs, prn.
numberFillsAllowed INT [0..1]	The number of fills allowed. Must be 1 or greater.

Attribute	Notes
orderEventTime IVL_TS [0..1]	Time when order was made.

3.1.1.4.51 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
criticality 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).
doseRestriction DoseRestriction [0..1]	Specifies the maximum dose that can be given in a specified time interval.
proposedAdministrationTimeInterval IVL_TS [0..1]	Proposed time for administering the substance.
validAdministrationTimeInterval 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.
numberFillsAllowed INT [0..1]	The number of fills allowed. Must be 1 or greater.
originationMode 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'.
comment 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.
prnReason 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.
infuseOver 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.
timing CD [0..1]	Timing relative to some event. Today, Tomorrow, On Admission to ICU, etc...

3.1.1.4.52 SubstanceDispensationEvent

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

This is the Event of a pharmacy filling a prescription.

Attributes

Attribute	Notes
daysSupply INT [0..1]	The number of days this dispensation should last.
dispensationQuantity PQ [0..1]	The amount of substance provided.
doseRestriction DoseRestriction [0..1]	Specifies the maximum dose that can be given in a specified time interval.
dispensationTime IVL_TS [0..1]	Time when substance was dispensed.
fillNumber 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.
fillsRemaining INT [0..1]	The number of fills remaining on prescription.

3.1.1.4.53 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
supplyCode 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.
quantity PQ [0..1]	Amount of material described by the supplyCode.
targetBodySite BodySite [0..1]	Body site where supply is to be used.

3.1.1.4.54 SupplyEvent

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

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

Attributes

Attribute	Notes
supplyTime IVL_TS [0..1]	When the supply was delivered.

3.1.1.4.55 SupplyOrder

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

A provider's order to deliver the supply.

Attributes

Attribute	Notes
criticality CD [0..1]	Urgency of the supply.
orderEventTime IVL_TS [0..1]	The time when the supply was ordered.
repeatNumber INT [0..1]	Number of times supply should be delivered.
supplyTime IVL_TS [0..1]	Ordered time for supply. If repeatNumber >= 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 repeatNumber is 3, ideal supply times would be 1/1/2011, 12/31/2011, and in the middle of the year.

3.1.1.4.56 SupplyProposal

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

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

Attributes

Attribute	Notes
criticality CD [0..1]	Urgency of the proposed supply.
proposedSupplyTime IVL_TS [0..1]	Requested time for supply. If repeatNumber >= 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 repeatNumber is 3, ideal supply times would be 1/1/2011, 12/31/2011, and in the middle of the year.
repeatNumber INT [0..1]	Number of times supply should be delivered.

3.1.1.4.57 TubeFeedingProposal

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

A class representing enteral nutrition proposals for the delivery of tube-fed substances (eg, Nutren, Ensure, RenalCal) for patients who are unable to consume diets orally; tube 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
dietQualifier 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.
dosingGoal DoseRestriction [0..1]	Target tube feeding rate. E.g., 75ml/hour.
dosingRateIncrement IVL_PQ [0..1]	Change in the dosing rate; usually an increase for a patient who is initiating tube feeding. E.g., 20 mL.
dosingRateIncrementInterval IVL_PQ [0..1]	Period of time after which the dosingRateIncrement should be attempted. E.g., 4 hours.

3.1.1.4.58 UnconductedObservation

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

A statement that an observation was not made. E.g., a statement that smoking status was not assessed.

Attributes

Attribute	Notes
reason CD [0..1]	The reason the observation was not made. E.g., inadequate time, patient refused.
subjectEffectiveTime IVL_TS [0..1]	Time when the observation might have been done, but was not. Optional, as may wish to simply note that an observation was never done.
documentationTime IVL_TS [0..1]	Time when the provider noted that the observation was not made.

3.1.1.4.59 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
reason CD [0..1]	The reason the procedure was not performed. E.g., patient refused, inadequate time.
subjectEffectiveTime 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.
documentationTime IVL_TS [0..1]	Time when the non-delivery of the procedure was documented.

3.1.1.4.60 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
reason CD [0..1]	Reason why the substance was not administered.
subjectEffectiveTime 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.
documentationTime IVL_TS [0..1]	Time when the non-delivery of the substance was documented.

3.1.1.4.61 UndeliveredSupply

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

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

Attributes

Attribute	Notes
reason CD [0..1]	The reason the supply was not provided. E.g., patient refused, inadequate time.
subjectEffectiveTime 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.
documentationTime IVL_TS [0..1]	Time when the non-delivery of the supply was documented.

3.1.1.4.62 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
templateId CodedIdentifier [1..*]	The identifier of a set of constraints placed on a vMR.

3.1.1.5 dataTypes

Type: **Package**
Package: modelParent

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

dataTypes - *(Class diagram)*

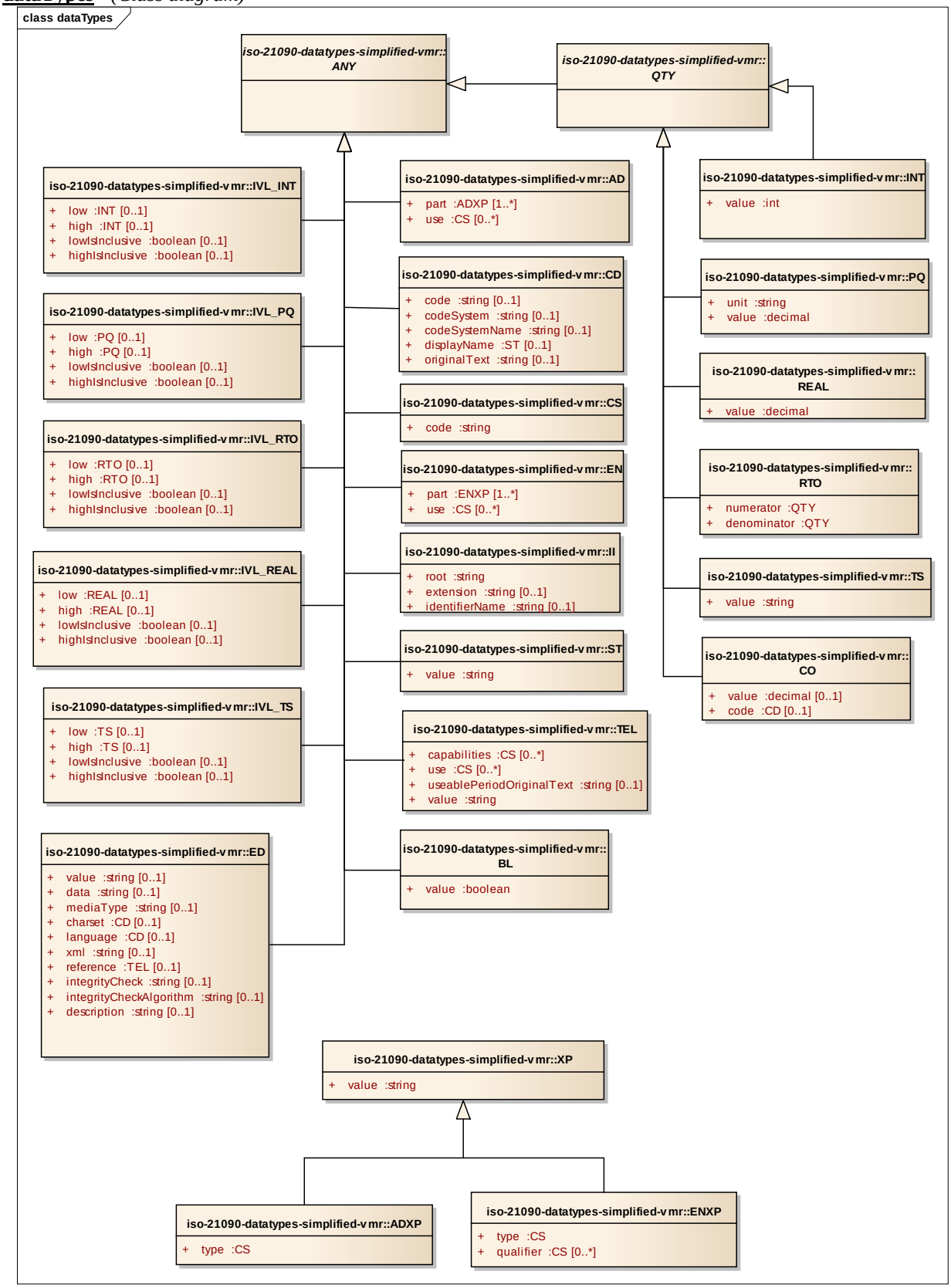

Figure: 17

3.1.1.5.1 iso-21090-datatypes-simplified-vmr

Type: **Class**
Package: dataTypes

3.1.1.5.1.1 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
part ADXP [1..*]	A sequence of address parts, such as street or post office Box, city, postal code, country, etc.
use CS [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.

3.1.1.5.1.2 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
type CS	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.

3.1.1.5.1.3 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.

3.1.1.5.1.4 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
value boolean	The value of the BL.

3.1.1.5.1.5 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
code string [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

Attribute	Notes
	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.
codeSystem string [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.
codeSystemName string [0..1]	The common name of the coding system. The code system name has no computational value. codeSystemName can never modify the meaning of codeSystem and cannot exist without codeSystem. 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. Note: The purpose of a code system name is to assist an unaided human interpreter of a code value to interpret codeSystem.
displayName ST [0..1]	A name, title, or representation for the code or expression as it exists in the code system. 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. 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.
originalText string [0..1]	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.

Attribute	Notes
	Note: Local implementations may influence what is required to represent that original text. 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. 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. 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 circumstances, when clearly descirbed the context of use, the originalText may be a reference to some other text artefact for which the resolution scope is clearly described. 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.

3.1.1.5.1.6 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. It 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 mathemetical 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
value 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

Attribute	Notes
	code is nonNull, value SHALL only be nonNull if the code system explicitly assigns a value to the concept.
code CD [0..1]	A code representing the definition of the ordinal item

3.1.1.5.1.7 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
code 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.

3.1.1.5.1.8 ED

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

Attributes

Attribute	Notes
value string [0..1]	A simple sequence of characters that contains the content. 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
data string [0..1]	A simple sequence of byte values that contains the content. (Base64 Encoded String).
mediaType string [0..1]	Identifies the type of the encapsulated data and can be used to determine a method to interpret or render the content. 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 <i>mediaType</i> attribute SHALL be populated. If the content is compressed using a specified compression algorithm, the mediaType SHALL refer the mediaType of the uncompressed data,

Attribute	Notes
	whether the data is accessed by reference or not.
charset CD [0..1]	An Internet Assigned Numbers Authority (IANA) Charset Registered character set and character encoding for character-based encoding types. 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 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
language CD [0..1]	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. Conformance profiles SHOULD define defaulting rules for language for a given usage environment of this specification. 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.
xml string [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.
reference 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 provded in the value, data or xml attributes, the reference SHALL 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 SHALL 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 SHALL be fixed for all time. Any application using the reference SHALL always receive the same data, or an error. The reference cannot be reused to send a different version of the same data, or different data
integrityCheck string [0..1]	A checksum calculated over the binary data

Attribute	Notes
	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. It is an error if the data resolved through the reference does not match the integrity check. 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. 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.
integrityCheckAlgorithm string [0..1]	The algorithm used to compute the integrityCheck value. If populated, the value of this attribute SHALL be taken from the HL7 IntegrityCheckAlgorithm code system.
description string [0..1]	An alternative description of the media where the media is not able to be rendered. 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 "translation" property. The intent of this property is to allow compliance with disability requirements such as those expressed in American's with Disability Act (also known as "Section 508"), 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.

3.1.1.5.1.9 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
part ENXP [1..*]	A sequence of name parts, such as given name or family name, prefix, suffix, etc.
use CS [0..*]	A set of codes advising a system or user which name in a set of names to select for a given purpose.

Attribute	Notes
	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. If populated, the values contained in this attribute SHALL be taken from the HL7 EntityNameUse2 code system.

3.1.1.5.1.10 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
type CS	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.
qualifier CS [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.

3.1.1.5.1.11 II

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
root string	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.
extension 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 *extension* attribute is provided in a non-null *II*, then the root is the complete unique identifier.
identifierName string [0..1]	A human readable description for this identifier.

3.1.1.5.1.12 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
value 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.

3.1.1.5.1.13 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
low 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.
high 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.
lowIsInclusive boolean [0..1]	This attribute is called lowIsClosed in the ISO 21090 specification. Whether low is included in the IVL (is closed) or excluded from the IVL (is open).
highIsInclusive boolean [0..1]	This attribute is called highIsClosed in the ISO 21090 specification. Whether high is included in the IVL (is closed) or excluded from the IVL (is open).

3.1.1.5.1.14 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
low 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.
high 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.
lowIsInclusive boolean [0..1]	This attribute is called lowIsClosed in the ISO 21090 specification. Whether low is included in the IVL (is closed) or excluded from the IVL (is open).

Attribute	Notes
highIsInclusive boolean [0..1]	This attribute is called highIsClosed in the ISO 21090 specification. Whether high is included in the IVL (is closed) or excluded from the IVL (is open).

3.1.1.5.1.15 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
low 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.
high 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.
lowIsInclusive boolean [0..1]	This attribute is called lowIsClosed in the ISO 21090 specification. Whether low is included in the IVL (is closed) or excluded from the IVL (is open).
highIsInclusive boolean [0..1]	This attribute is called highIsClosed in the ISO 21090 specification. Whether high is included in the IVL (is closed) or excluded from the IVL (is open).

3.1.1.5.1.16 IVL_RTO

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

Attribute	Notes
low RTO [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.
high RTO [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.
lowIsInclusive boolean [0..1]	This attribute is called lowIsClosed in the ISO 21090 specification. Whether low is included in the IVL (is closed) or excluded from the IVL (is open).
highIsInclusive boolean [0..1]	This attribute is called highIsClosed in the ISO 21090 specification. Whether high is included in the IVL (is closed) or excluded from the IVL (is open).

3.1.1.5.1.17 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
low 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.
high 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.
lowIsInclusive boolean [0..1]	This attribute is called lowIsClosed in the ISO 21090 specification. Whether low is included in the IVL (is closed) or excluded from the IVL (is open).
highIsInclusive boolean [0..1]	This attribute is called highIsClosed in the ISO 21090 specification. Whether high is included in the IVL (is closed) or excluded from the IVL (is open).

3.1.1.5.1.18 PQ

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

A dimensioned quantity expressing the result of measuring.

Attributes

Attribute	Notes
unit string	The unit of measure specified in the Unified Code for Units of Measure (UCUM). UCUM defines two forms of expression, case sensitive and case insensitive. *PQ* 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). 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. 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. Note: The general pattern for a measurement is *value* unit of **Thing**. In this scheme, the PQ represents the *value* and the unit, and the **Thing** 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 **Patient Body Temperature** of *37* Celsius, and *250* mg/day of **Salicylate**. 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* drinks of **Beer** and *3* **Acetaminophen** tablets. The problem with this is that UCUM does not support units of "beer", "tablets" or "scoops". 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* 1 **Acetaminophen** tablets, where 1 is the UCUM unit for unity, and the **Thing** has a qualifier. The context of use will need to provide the extra qualifying information.
value decimal	The number which is multiplied by the unit to make the PQ.

3.1.1.5.1.19 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.

3.1.1.5.1.20 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

Attribute	Notes
value decimal	The value of the REAL.

3.1.1.5.1.21 RTO

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
numerator QTY	The quantity that is being divided in the ratio
denominator QTY	The quantity that divides the numerator in the ratio. The denominator SHALL not be zero.

3.1.1.5.1.22 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
value string	The actual content of the string.

3.1.1.5.1.23 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
capabilities CS [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
use CS [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

Attribute	Notes
useablePeriodOriginalText 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.
value string	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.

3.1.1.5.1.24 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
value string	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.

3.1.1.5.1.25 XP

Type: **Class**
Package: dataTypes

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

Attributes

Attribute	Notes
value string	The actual string value of the part.