

Mapping CRIM to HL7 vMR

Dr Robert Dunlop

InferMed Ltd

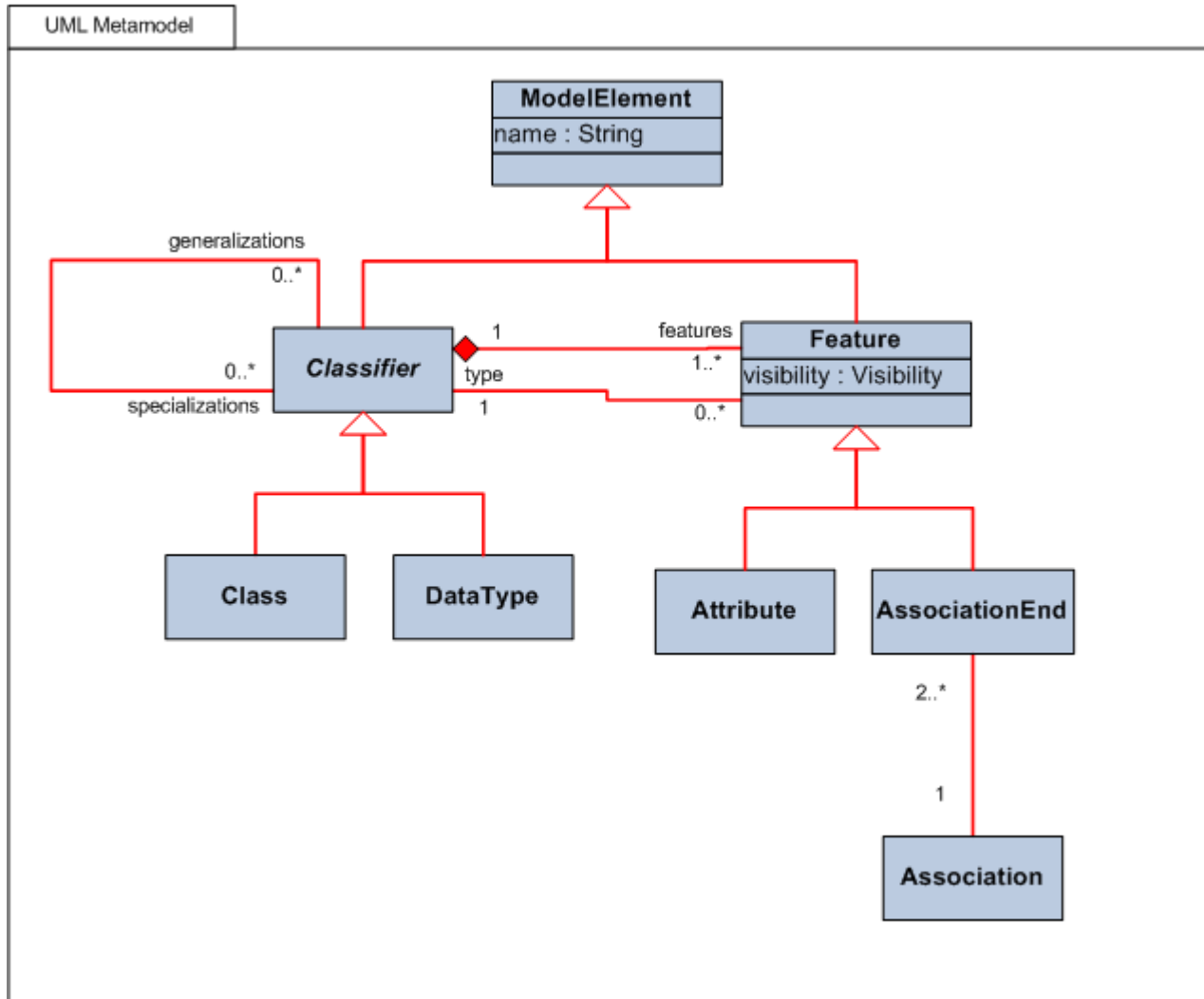
HL7 v3 Reference Information Model

- The RIM is a static model of health and health care information
 - Pertinent to HL7 standards development
 - Consensus view of information re HL7 working group and international affiliates.
- Ultimate source from which all HL7 version 3.0 protocol specification standards draw their information-related content

HL7 v3 Reference Information Model

- RIM is modeled using a subset of the semantics embodied in UML (see next slide for simplified UML Metamodel)
- Comprises a set of UML classes
 - Each class contains one or more attributes
 - Each attribute is assigned a data type based on an independent specification of Version 3 data types
 - Classes are linked either by a set of association relationships, identified by unique role names, or by generalization relationships

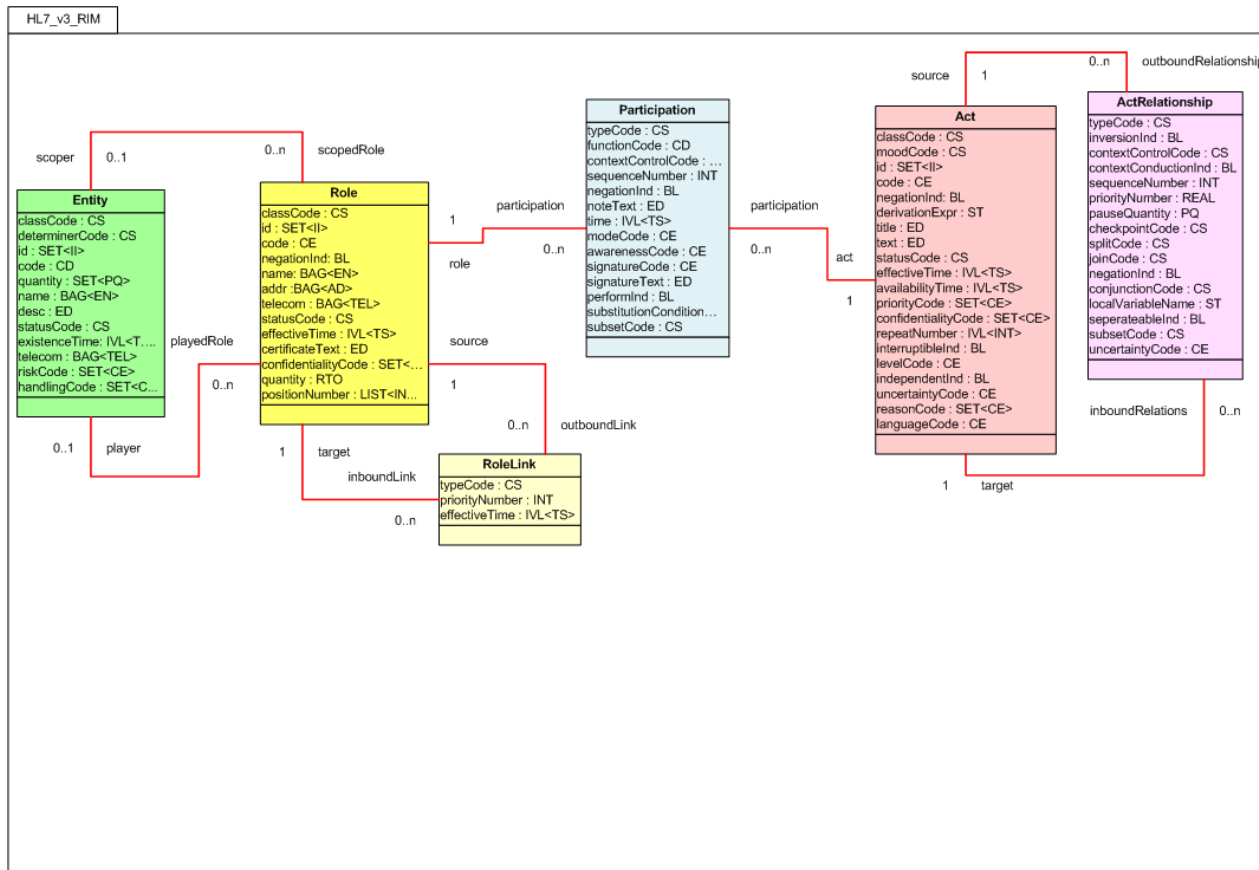
UML Metamodel (simplified)



HL7 v3 Foundation Classes

- There are 3 Foundation Classes in the HL7 RIM
 - Acts
 - A collection of classes that relate to the **actions** and **events** that constitute health care services.
 - Entities
 - A collection of classes that represent **health care stakeholders** and other **things** of interest to health care.
 - Roles
 - A collection of classes that focus on the **roles** participants may play in health care.

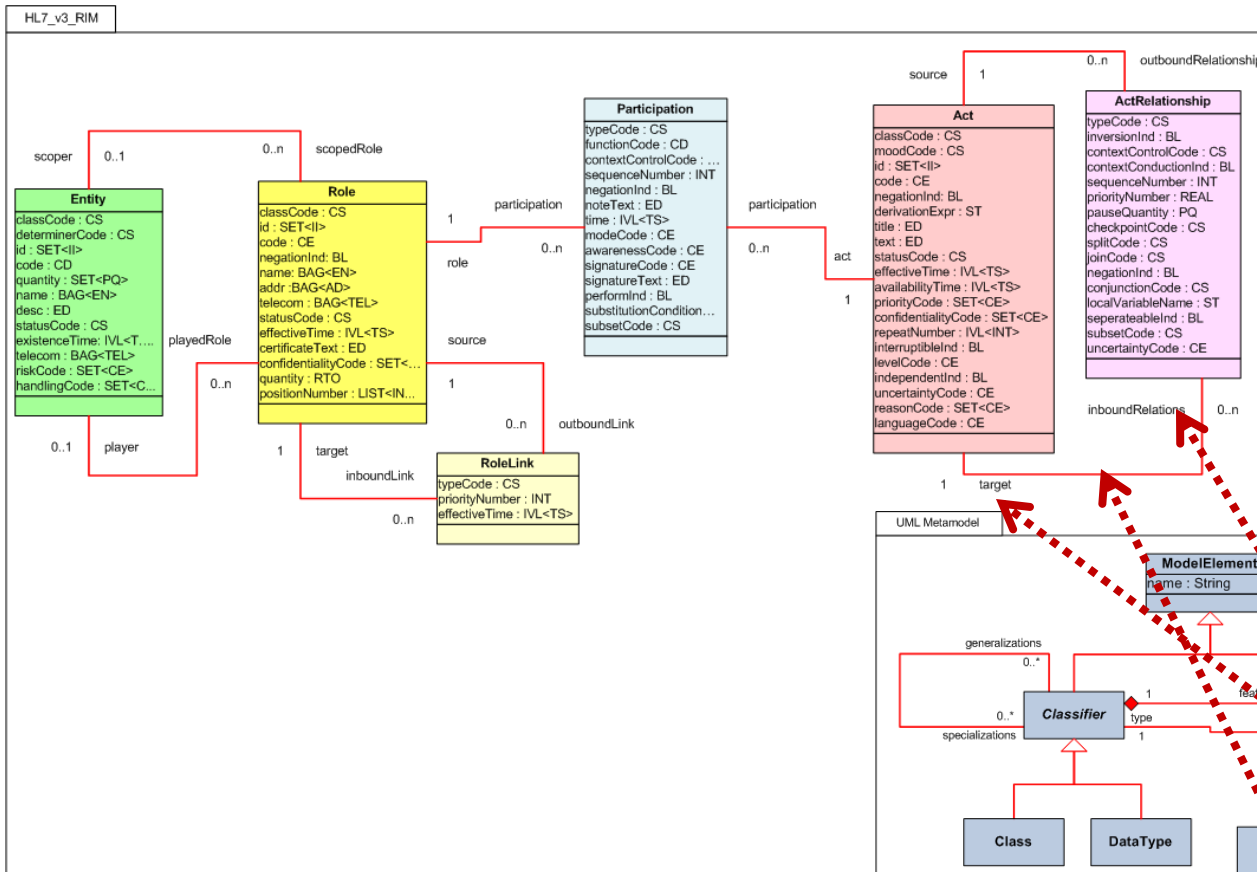
HL7 v3 RIM “Back-bone” Classes



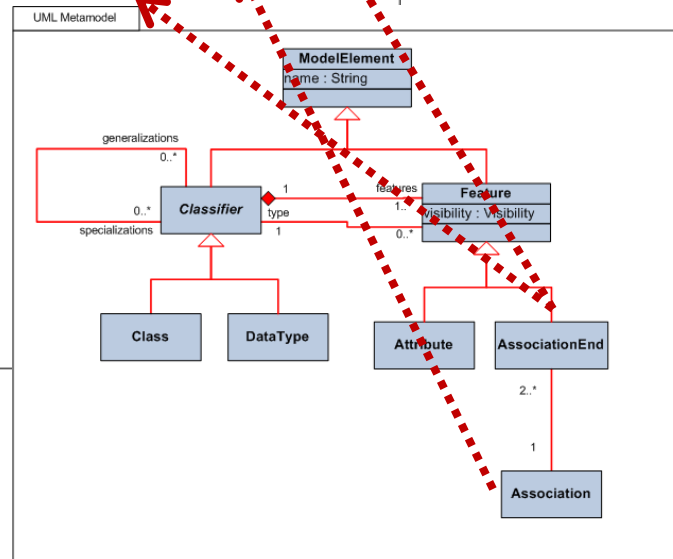
The RIM comprises six ‘back-bone’ classes (coloured boxes) that are linked by associations (illustrated by the red lines):

- **Act**
 - Specialising Acts
- **Participation**
 - Specialising Acts
- **ActRelationship**
 - Specialising Acts
- **Entity**
 - Specialising Entities
- **Role**
 - Specialising Roles
- **RoleLink**
 - Specialising Roles

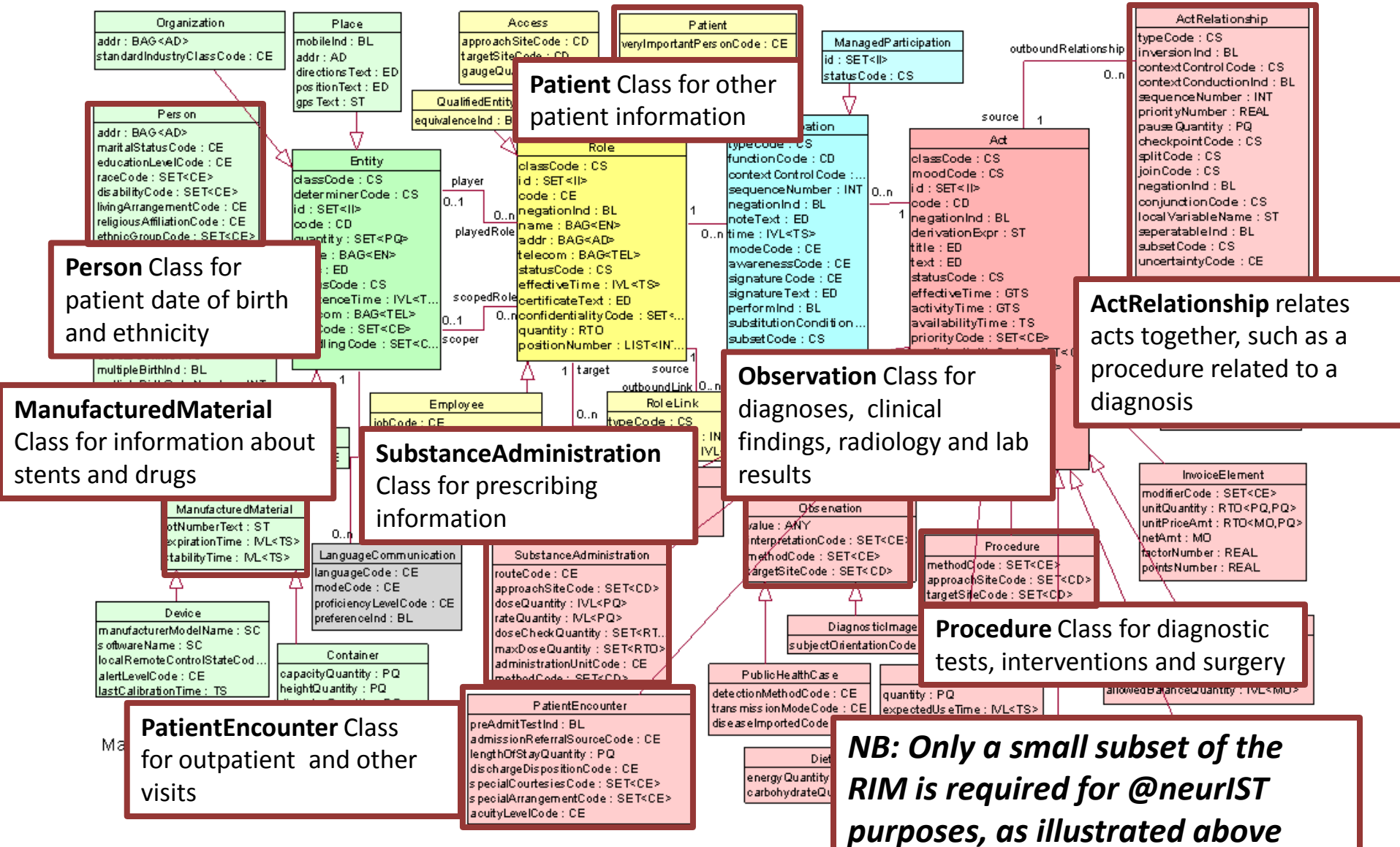
UML Basis for HL7 v3 Classes



The associations are instances of the Association and AssociationEnd elements in the UML Metamodel.



HL7 v3 RIM Classes



Implications of RIM for @neurIST

- HL7 v3 RIM represents an internationally standardised way for modelling @neurIST clinical data
 - Enable wider exploitation of @neurIST, not just for unruptured cerebral aneurysms
- Most significant impact is on @neuRisk
 - Messaging data to and from the clinical decision support tool requires standardisation

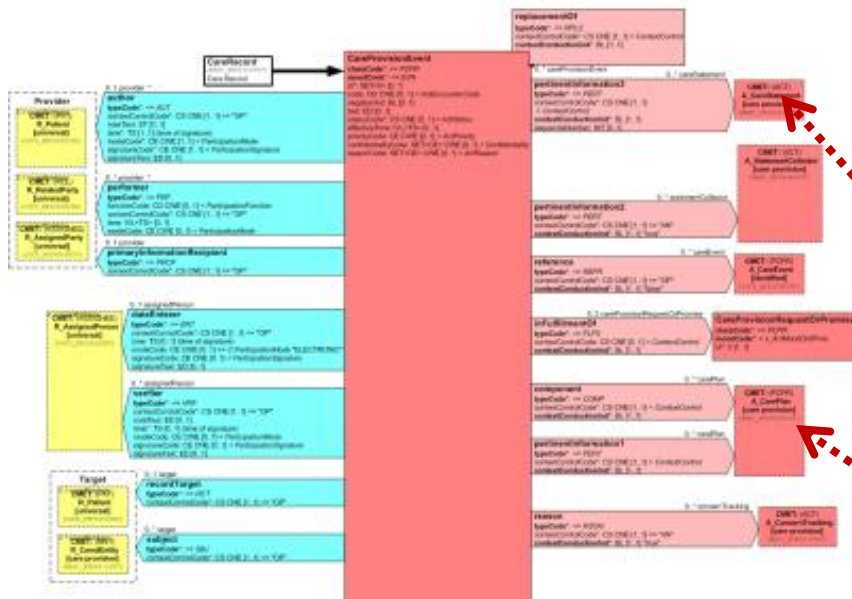
HL7 Message Models

- The RIM is an abstract model
 - Not implementable
 - Forms basis for Refined Message Information Models (R-MIMs), which are implementable
- @neurlST Project has been defining an R-MIM for transporting CDS data inputs & outputs
 - Standard is known as the Virtual Medical Record (vMR)
 - HL7 Development Framework Project #184

vMR Project

- Developed a set of use cases, including @neurlST risk assessment
- Modelled the data inputs and outputs from the @neuRisk decision support tool
- Took advice on which existing HL7 R-MIMs might be suitable
- Successfully balloted a recommendation to use the HL7 CareRecord R-MIM for the vMR

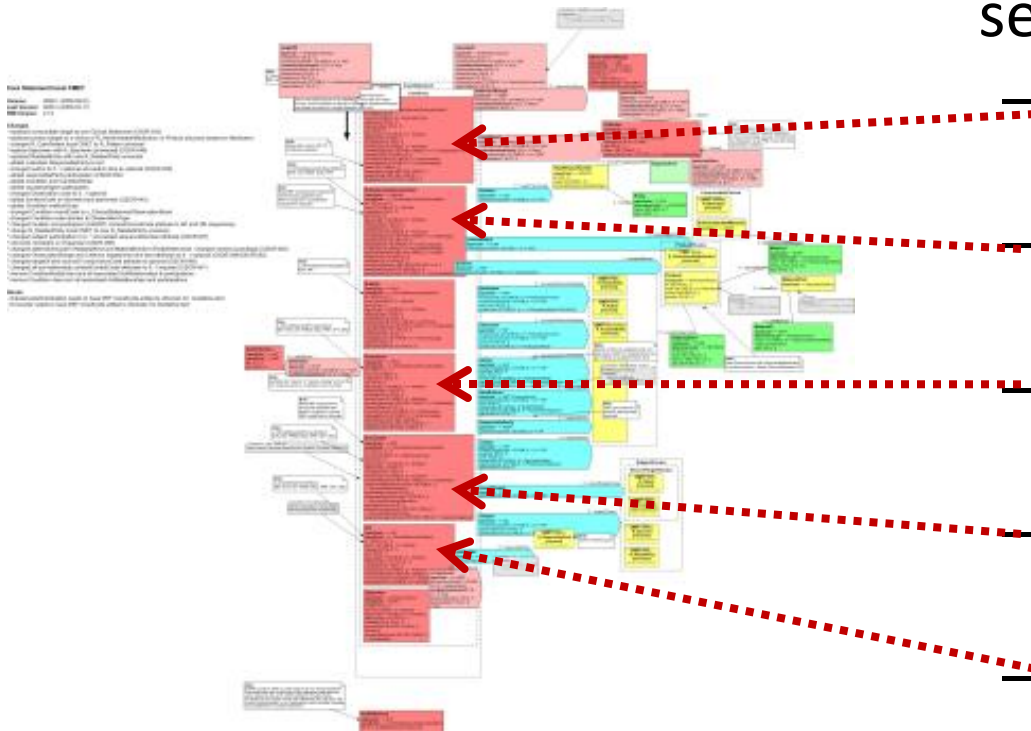
HL7 CareRecord R-MIM



- The diagram illustrates the CareRecord Class Model
- Two elements of the CareRecord are relevant to the vMR
 - CareStatement
 - Carries patient data, eg from the CRIM
 - CarePlan
 - Carries CDS recommendations

vMR CareStatement Components

- CareStatement contains several relevant classes
 - Observation
 - Diagnoses; findings; results
 - SubstanceAdministration
 - Prescribing information
 - Procedure
 - Operation; intervention
 - Encounter
 - Outpatient visit; admission
 - Act
 - Other types of actions



vMR Classes & Associations

- CareEntry (A)
 - classCode (CS)
 - moodCode (CS)
 - id (SET<II>)
 - code (CD)
 - negationInd (BL)
 - text (ED)
 - effectiveTime (GTS)
 - reasonCode (SET<CE> CWE)
 - pertinentInformation3 [0..*] (PertinentInformation5)
- pertinentInformation5 (AR)
 - typeCode (CS)
 - contextConductionInd (BL)
 - careStatement [1..1] (A_CareStatementCare provision)
- A_CareStatement [care provision] (A)
 - CareStatement (A)

vMR Classes & Associations

- CareStatement (A)
 - CareEntry (A)
- CareEntry (A)
 - recordTarget [0..1] (RecordTarget)
 - Observation (class)
 - SubstanceAdministration (class)
 - Procedure (class)
 - Encounter (class)
 - Act (class)
- RecordTarget (P)
 - typeCode (CS)
 - negationInd (BL)
 - contextConductionInd (BL)
 - recordTargetChoice [1..1] (RecordTargetChoice)
- RecordTargetChoice
 - R_PatientUniversal (Patient)
 - or R_CaredEntityCare provision

vMR Classes & Associations

- Observation (A)
 - classCode (CS)
 - moodCode (CS)
 - id (SET<II>)
 - code (CD)
 - negationInd (BL)
 - text (ED)
 - effectiveTime (GTS)
 - value (ANY)
 - methodCode (SET<CE>)
 - targetSiteCode (SET<CD>)
 - referenceRange
[0..*] (ReferenceRange2)
- ReferenceRange2 (AR)
 - typeCode (CS)
 - contextConductionInd (BL)
 - observationRange
[1..1] (ObservationRange)
- ObservationRange (O)
 - classCode (CS)
 - moodCode (CS)
 - negationInd (BL)
 - text (ED)
 - value (ANY)

vMR Classes & Associations

- Procedure (A)
 - classCode (CS)
 - moodCode (CS)
 - id (SET<II>)
 - code (CD)
 - negationInd (BL)
 - text (ED)
 - effectiveTime (GTS)
 - methodCode (SET<CE>)
 - approachSiteCode (SET<CD>)
 - targetSiteCode (SET<CD>)
- Encounter (A)
 - classCode (CS)
 - moodCode (CS)
 - id (SET<II>)
 - code (CD)
 - text (ED)
 - effectiveTime (GTS)
 - lengthOfStayQuantity (PQ)

vMR Classes & Associations

- SubstanceAdministration (A)
 - classCode (CS)
 - moodCode (CS)
 - id (SET<II>)
 - code (CD)
 - negationInd (BL)
 - text (ED)
 - effectiveTime (GTS)
 - routeCode (CE)
 - approachSiteCode (SET<CD>)
 - doseQuantity (IVL<PQ>)
 - rateQuantity (IVL<PQ>)
 - *association*: consumable [1..1] (Consumable)
- Consumable (P)
 - typeCode (CS)
 - contextControlCode (CS)
 - consumableChoice [1..1] (ConsumableChoice)
- ConsumableChoice
 - R_MedicationUniversal
 - or AdministrableMaterial (P)
- Material
 - classCode (CS)
 - determinerCode (CS)
 - code (CE)
 - desc (ST)

vMR Classes & Associations

- R_MedicationUniversal
 - Medication (R)
- Medication (R)
 - classCode (CS)
 - administerableMedicine [1..1] (Medicine)
- Medicine (E)
 - classCode (CS)
 - determinerCode (CS)
 - code (CE)
 - name (SET<TN>)
- AdministrableMaterial (P)
 - classCode (CS)
 - administerableMaterial [1..1] (Material)
- Material (E)
 - classCode (CS)
 - determinerCode (CS)
 - code (CE)
 - desc (ST)
 - materialPart [0..*] (MaterialPart)
- MaterialPart (R)
 - classCode (CS)
 - partMaterial [1..1] (Material2)

vMR Classes & Associations

- Patient (R)
 - classCode (CS)
 - id (SET<II>)
 - patientEntityChoiceSubject [1..1] (EntityChoiceSubject)
- EntityChoiceSubject (E)
 - Person (E)
 - birthPlace [0..1] (BirthPlace)
- Employee (R)
 - classCode (CS)
 - statusCode (CS CNE)
- Person (E)
 - classCode (CS)
 - determinerCode (CS)
 - birthTime (TS)
 - deceasedInd (BL)
 - raceCode (SET<CE>)
 - ethnicGroupCode (SET<CE>)
 - birthPlace [0..1] (BirthPlace)
 - asEmployee [0..*] (Employee)
- BirthPlace (R)
 - classCode (CS)
 - birthplace [0..1] (E_PlaceUniversal)

vMR Classes & Associations

- E_PlaceUniversal (E)
 - Place (E)
- Place (E)
 - classCode (CS)
 - determinerCode (CS)
 - id (SET<II>)
 - code (CE CWE)
 - name (BAG<EN>)
 - desc (ED)
- Act
 - classCode (CS)
 - moodCode (CS)
 - id (SET<II>)
 - code (CD)
 - negationInd (BL)
 - text (ED)
 - effectiveTime (GTS)

vMR DataTypes

- Basic Types

- ANY
- CS
- BL
- CD
- ED
- GTS
- ST
- PQ
- TS
- EN
- II
- CE

- Generic Collections

- IVL<PQ>
- SET<TN>
- BAG<EN>
- SET<II>
- SET<CE>
- SET<CD>