

Shortcomings of HL7 Reference Information Model (RIM)

Eric Browne

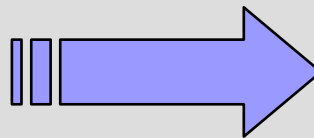
context

- The right information to the right person at the right time

Clinical Information

Exchange

*HL7 RIM-based
Models*



Web Services
+
HL7 CDA R2

V3 World

non-technical message

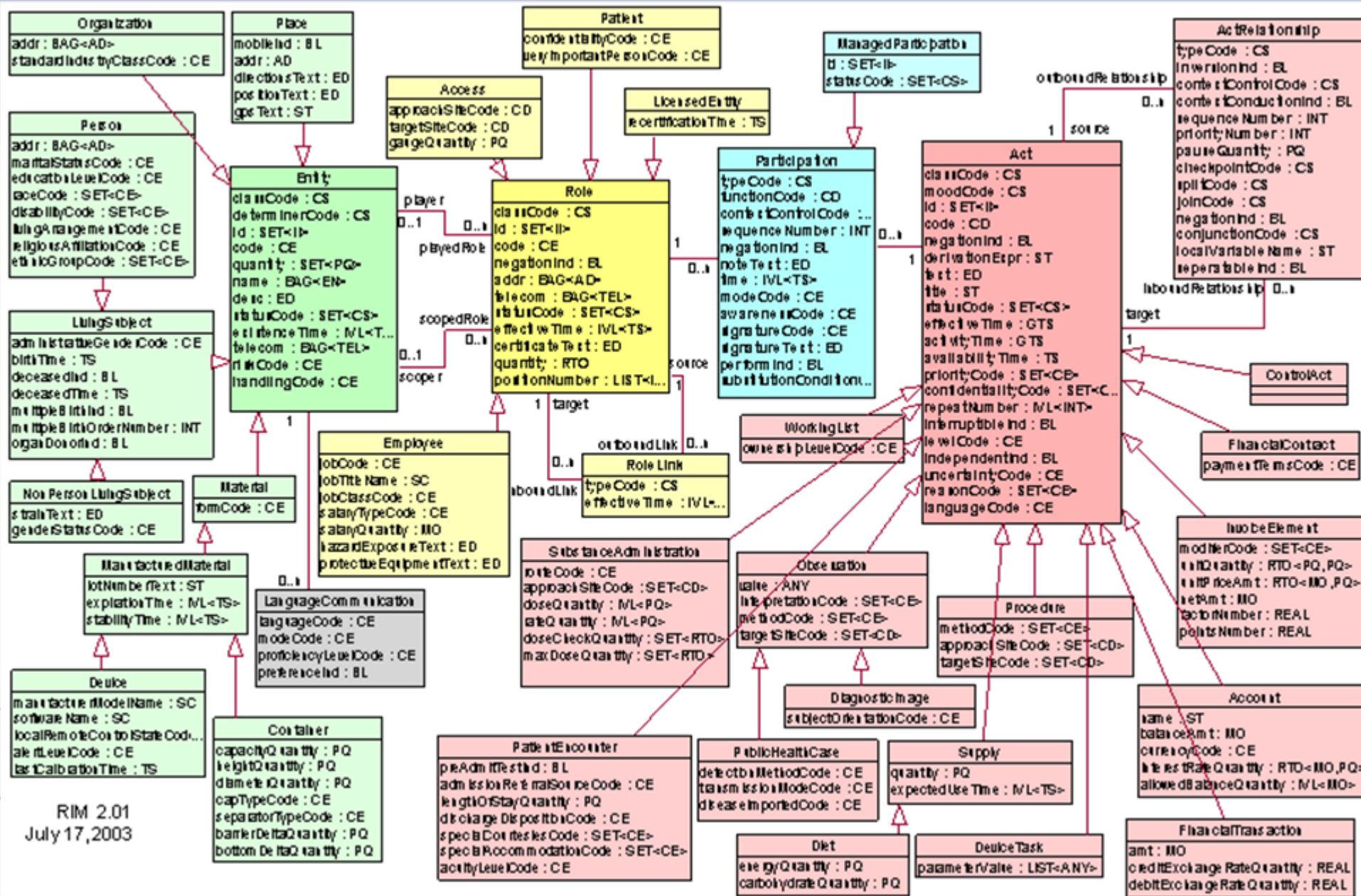
- If you intend to use the HL7 V3 RIM as a basis for semantic interoperability, then

Don't !!

Some RIM Issues

- Abstract and fixed semantic model
- Complexity of specifications
- Incompleteness of V3 specifications
- Specification maintenance problem
- Can't do clinical modelling without understanding the RIM

Safety and Quality compromised !!



RIM 2.01
 July 17, 2003

Abstract and fixed semantic model

- Fundamental RIM principle:
 - *The RIM is sufficient to represent and exchange all health information in a systematic, coherent and unambiguous fashion between systems. This is achieved through the RIM classes, their attributes, the V3 datatypes and their values, including the attribute and value vocabularies.*

No other specification artefacts are required to add or interpret information based on the RIM.

paraphrase

Abstract and fixed semantic model

- Quotes:
 - *The RIM **specifically** and **unambiguously** articulates both the explicit definitions of healthcare concepts - the "things of interest" to the world of healthcare information systems - and the relationships (aka "associations") between these concepts-of-interest.*

Abstract and fixed semantic model

- Semantic ambiguity ??
 - *“The whole point of the RIM is that information is consistent across all jurisdictions. That's what we're doing v3 for. ... the idea that you can communicate exactly the same concept in two completely semantically distinct attributes just because you're in a different country is a huge problem. It can only mean one of two things:*
 - 1. The RIM is semantically ambiguous*
 - 2. One of the jurisdictions is misusing the RIM”*

Lloyd McKenzie (HL7 mailing list), 2005
on observation.code vs observation.value

Semantic Ambiguity!!

- Date of last gout attack?
 - observation.code = 170736004|"Date of last gout attack"
 - observation.value = 2008-07-31
- OR -
- observation.code = "clinical finding"
 - observation.value = "gout attack"
 - effectiveTime = 2008-07-31
- OR -
- observation.code = "last episode"
 - observation.value = "gout"
 - effectiveTime = 2008-07-31
- OR -

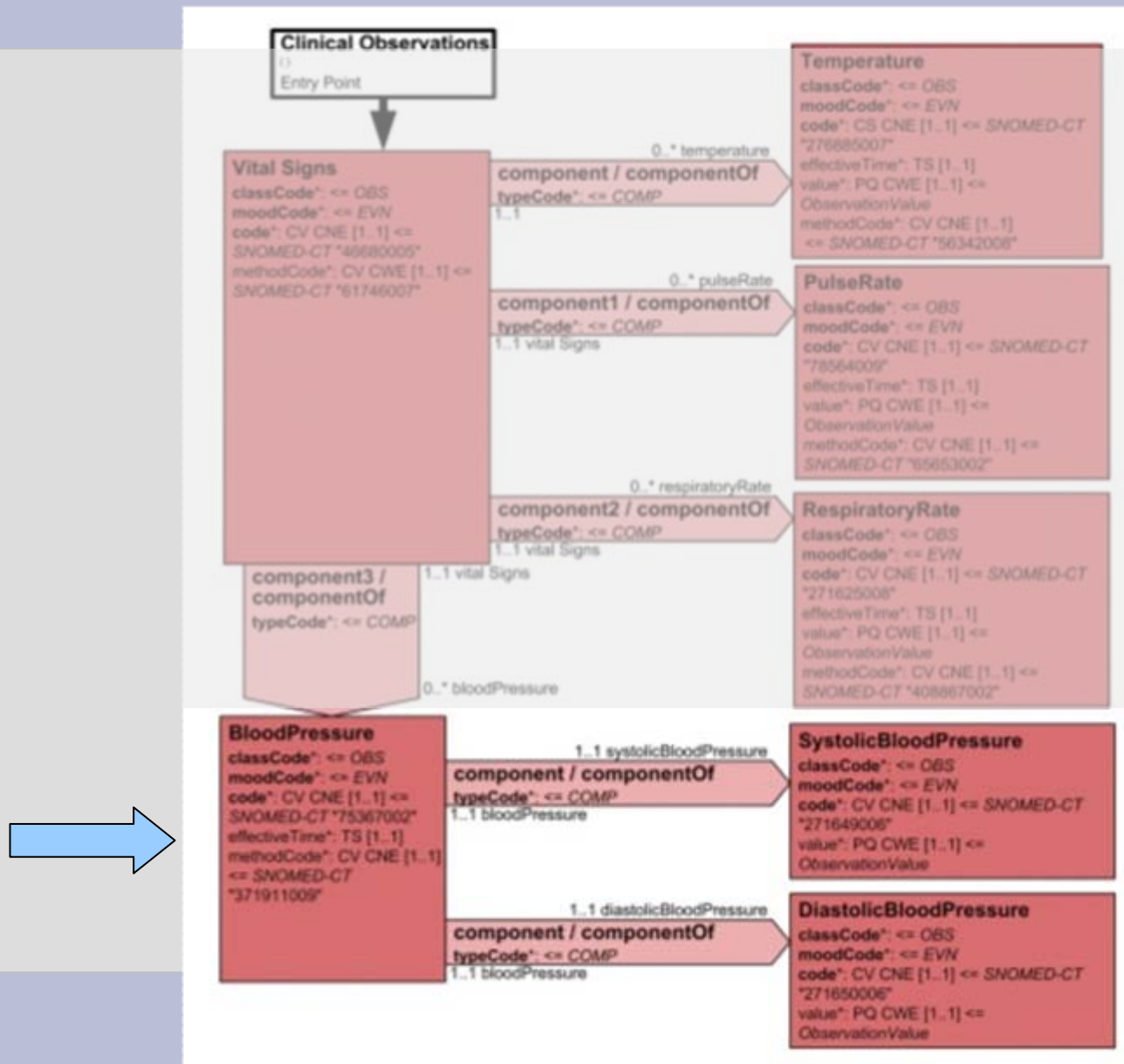
Taming the ambiguity

- Continuity of Care Document has 545 conformance statements,
- but still can't even represent **blood pressure** !!

Ambiguity

- After 10 years, have very few clinical concepts modelled.
- Let's look at :
 - Blood pressure
 - Barthels Index

Semantic Ambiguity - BP (v1)



Semantic ambiguity - BP (v2)

```
<observation classCode="OBS" moodCode="EVN">
  <id root="1.2.3.4.20"/>
  <code code="18684-1" codeSystem="2.16.840.1.113883.6.1"
    codeSystemName="LOINC" displayName="BLOOD PRESSURE"/>
  <effectiveTime value="20050407"/>
  <entryRelationship typeCode="COMP">
    <observation classCode="OBS" moodCode="EVN">
      <code code="8480-6" codeSystem="2.16.840.1.113883.6.1"
        codeSystemName="LOINC" displayName="INTRAVASCULAR SYSTOLIC">
      </code>
      <effectiveTime value="20050407"/>
      <value xsi:type="PQ" value="132" unit="mm[Hg]"/>
    </observation>
  </entryRelationship>
  <entryRelationship typeCode="COMP">
    <observation classCode="OBS" moodCode="EVN">
      <code code="8462-4" codeSystem="2.16.840.1.113883.6.1"
        codeSystemName="LOINC" displayName="INTRAVASCULAR DIASTOLIC">
      </code>
      <effectiveTime value="20050407"/>
      <value xsi:type="PQ" value="86" unit="mm[Hg]"/>
    </observation>
  </entryRelationship>
</observation>
```

Semantic ambiguity - BP (v2)

```
<observation classCode="OBS" moodCode="EVN">
  <id root="1.2.3.4.20"/>
  <code code="18684-1" codeSystem="2.16.840.1.113883.6.1"
    codeSystemName="LOINC" displayName="BLOOD PRESSURE"/>
  <effectiveTime value="20050407"/>
  <entryRelationship typeCode="COMP">
    <observation classCode="OBS" moodCode="EVN">
      <code code="8480-6" codeSystem="2.16.840.1.113883.6.1"
        codeSystemName="LOINC" displayName="INTRAVASCULAR SYSTOLIC">
      </code>
      <effectiveTime value="20050407"/>
      <value xsi:type="PQ" value="132" unit="mm[Hg]"/>
    </observation>
  </entryRelationship>
  <entryRelationship typeCode="COMP">
    <observation classCode="OBS" moodCode="EVN">
      <code code="8462-4" codeSystem="2.16.840.1.113883.6.1"
        codeSystemName="LOINC" displayName="INTRAVASCULAR DIASTOLIC">
      </code>
      <effectiveTime value="20050407"/>
      <value xsi:type="PQ" value="86" unit="mm[Hg]"/>
    </observation>
  </entryRelationship>
</observation>
```

Semantic ambiguity - BP (v3)

```
<observation classCode="OBS" moodCode="EVN">
  <id root="1.2.3.4.20"/>
  <code code="18684-1" codeSystem="2.16.840.1.113883.6.1" codeSystemName="LOINC" displayName="BLOOD PRESSURE"/>
  <effectiveTime value="20050407"/>
  <component>
    <observation classCode="OBS" moodCode="EVN">
      <templateId root="2.16.840.1.113883.10.20.1.31"/>
      <!-- Result observation template -->
      <id root="c6f88323-67ad-11db-bd13-0800200c9a66"/>
      <code code="271649006" codeSystem="2.16.840.1.113883.6.96" displayName="Systolic BP"/>
      <statusCode code="completed"/>
      <effectiveTime value="19991114"/>
      <value xsi:type="PQ" value="132" unit="mm[Hg]"/>
    </observation>
  </component>
  <component>
    <observation classCode="OBS" moodCode="EVN">
      <templateId root="2.16.840.1.113883.10.20.1.31"/>
      <!-- Result observation template -->
      <id root="c6f88324-67ad-11db-bd13-0800200c9a66"/>
      <code code="271650006" codeSystem="2.16.840.1.113883.6.96" displayName="Diastolic BP"/>
      <statusCode code="completed"/>
      <effectiveTime value="19991114"/>
      <value xsi:type="PQ" value="86" unit="mm[Hg]"/>
    </observation>
  </component>
</observation>
```

Semantic ambiguity - BP (v4)

```
<observation classCode="OBS" moodCode="EVN">
  <code code="251076008" codeSystem="2.16.840.1.113883.6.96" codeSystemName="SNOMED CT" displayName="Cuff blood
    pressure"/>
  <statusCode code="completed"/>
  <effectiveTime>
    <high value="200004071430"/>
    <low value="200004071430"/>
  </effectiveTime>
  <entryRelationship typeCode="COMP">
    <observation classCode="OBS" moodCode="EVN">
      <code code="271649006" codeSystem="2.16.840.1.113883.6.96" codeSystemName="SNOMED CT" displayName="Systolic BP"/>
      <statusCode code="completed"/>
      <effectiveTime>
        <high value="200004071530"/>
        <low value="200004071530"/>
      </effectiveTime>
      <value xsi:type="PQ" value="132" unit="mm[Hg]"/>
    </observation>
  </entryRelationship>
  <entryRelationship typeCode="COMP">
    <observation classCode="OBS" moodCode="EVN">
      <code code="271650006" codeSystem="2.16.840.1.113883.6.96" codeSystemName="SNOMED CT" displayName="Diastolic BP"/>
      <statusCode code="completed"/>
      <effectiveTime>
        <high value="200004071530"/>
        <low value="200004071530"/>
      </effectiveTime>
      <value xsi:type="PQ" value="86" unit="mm[Hg]"/>
    </observation>
  </entryRelationship>
</observation>
```

Semantic ambiguity - BP (v5 e-MS)

```
<observation classCode="OBS" moodCode="EVN">
  <code code="004" codeSystem="7BA9BFFD-D25F-44e8-A7B0-0DF214D6845B" codeSystemName="e-MS Data Element Code"
    displayName="Blood Pressure"/>
  <effectiveTime value="20010318"/>
  <entryRelationship typeCode="COMP">
    <observation classCode="OBS" moodCode="EVN">
      <code code="005" codeSystem="7BA9BFFD-D25F-44e8-A7B0-0DF214D6845B" codeSystemName="e-MS Data Element Code"
        displayName="Systolic Blood Pressure"/>
      <value xsi:type="PQ" value="145" unit="mm[Hg]"/>
    </observation>
  </entryRelationship>
  <entryRelationship typeCode="COMP">
    <observation classCode="OBS" moodCode="EVN">
      <code code="006" codeSystem="7BA9BFFD-D25F-44e8-A7B0-0DF214D6845B" codeSystemName="e-MS Data Element Code"
        displayName="Diastolic Blood Pressure"/>
      <value xsi:type="PQ" value="95" unit="mm[Hg]"/>
    </observation>
  </entryRelationship>
</observation>
```

Semantic ambiguity - BP (v6 CCD)

```
<organizer classCode="CLUSTER" moodCode="EVN">
  <templateId root="2.16.840.1.113883.10.20.1.35"/> <!-- Vital signs organizer template -->
  <id root="d11275e0-67ae-11db-bd13-0800200c9a66"/>
  <code code="46680005" codeSystem="2.16.840.1.113883.6.96" displayName="Vital signs"/>
  <statusCode code="completed"/>
  <effectiveTime value="20000407"/>
  ...
  <component>
    <observation classCode="OBS" moodCode="EVN">
      <templateId root="2.16.840.1.113883.10.20.1.31"/> <!-- Result observation template -->
      <id root="d11275e3-67ae-11db-bd13-0800200c9a66"/>
      <code code="271649006" codeSystem="2.16.840.1.113883.6.96" displayName="Systolic BP"/>
      <statusCode code="completed"/>
      <effectiveTime value="20000407"/>
      <value xsi:type="PQ" value="145" unit="mm[Hg]"/>
    </observation>
  </component>
  <component>
    <observation classCode="OBS" moodCode="EVN">
      <templateId root="2.16.840.1.113883.10.20.1.31"/> <!-- Result observation template -->
      <id root="d11275e4-67ae-11db-bd13-0800200c9a66"/>
      <code code="271650006" codeSystem="2.16.840.1.113883.6.96" displayName="Diastolic BP"/>
      <statusCode code="completed"/>
      <effectiveTime value="20000407"/>
      <value xsi:type="PQ" value="88" unit="mm[Hg]"/>
    </observation>
  </component>
</organizer>
```

Container's “barrierDeltaQuantity”

- Containers may have:

- capacity
- diameter
- height
- barrierDeltaQuantity
- cap types
- phone number
- fax number

- they can't have:

- opacity
- use-by-date
- seals
- seal check
- ...



Container's “barrierDeltaQuantity”

- *Definition:* The distance from the Point of Reference to the separator material (barrier) within a container.
- *Rationale:* This distance may be provided by a laboratory automation system to an instrument and/or specimen processing/handling device to facilitate the insertion of a sampling probe into the specimen without touching the separator. See the Point of Reference definition or in NCCLS standard AUTO5 Laboratory Automation: Electromechanical Interfaces.

Semantic Incoherency!!

- Consistency in representation and location of semantic entities? **HL7 V3 RIM fails!**
- Surely we want a Diet's salt/sodium/glucose constraints to be placed the same way as a Diet's carbohydrate constraint?
- Surely we want a Container's opacity to be placed the same way as it's capacity or barrierDeltaQuantity?
- Surely we want blood pressure to be represented in a consistent form?

Complexity of Specification

- results in:
 - Flawed modelling
 - Difficulty in modelling
 - protracted timescales

Complexity byproducts

- After 10 years, have very few clinical concepts modelled.
- Let's look at :
 - Barthel Index - assessment of functions of daily living

Barthel Index - UK-a (part 1)

Activity	Score
Feeding 0 = unable 5 = needs help cutting, spreading butter, etc., or requires modified diet 10 = independent	0 5 10
Bathing 0 = dependent 5 = independent (or in shower)	0 5
Grooming 0 = needs to help with personal care 5 = independent face/hair/teeth/shaving (implements provided)	0 5
Dressing 0 = dependent 5 = needs help but can do about half unaided 10 = independent (including buttons, zips, laces, etc.)	0 5 10
Bowels 0 = incontinent (or needs to be given enemas) 5 = occasional accident 10 = continent	0 5 10
Bladder 0 = incontinent, or catheterized and unable to manage alone 5 = occasional accident 10 = continent	0 5 10

Barthel Index - UK-a (part 2)

Activity	Score
Toilet Use 0 = dependent 5 = needs some help, but can do something alone 10 = independent (on and off, dressing, wiping)	0 5 10
Transfers (bed to chair and back) 0 = unable, no sitting balance 5 = major help (one or two people, physical), can sit 10 = minor help (verbal or physical) 15 = independent	0 5 10 15
Mobility (on level surfaces) 0 = immobile or < 50 yards 5 = wheelchair independent, including corners, > 50 yards 10 = walks with help of one person (verbal or physical) > 50 yards 15 = independent (but may use any aid; for example, stick) > 50 yards	0 5 10 15
Stairs 0 = unable 5 = needs help (verbal, physical, carrying aid) 10 = independent	0 5 10
TOTAL	0 .. 100

Barthel Index

(NREC_RMG00103)
Barthel Index v1E

Barthel_Index
classCode*: <= OBS
moodCode*: <= EVN
code: <= ActCode "Barthel-index"
derivationExpr*: "Sumscore"
effectiveTime: TS
value*: INT [1..1]
interpretationCode:
<= ObservationInterpretation "0-9
seriously limited, 10-19 moderately
limited, =>20 independent"

Bathing
classCode*: <= OBS
moodCode*: <= EVN
code: <= ActCode "BrtID510"
effectiveTime: GTS [0..1]
value*: INT [1..1]
methodCode: <= ObservationMethod (0 = dependent;
1 = independent)

1..1 bathing
component10
typeCode*: <= COMP

Stairs
classCode*: <= OBS
moodCode*: <= EVN
code: <= ActCode "BrtID460"
effectiveTime: GTS [0..1]
value*: INT [1..1]
methodCode: , CWE [0..1]
(0 = unable; 1 = needs help (verbal, physical, carrying
aid) (□))

1..1 stairs
component9
typeCode*: <= COMP

Dressing/Undressing
classCode*: <= OBS
moodCode*: <= EVN
code: <= ActCode "BrtID540"
effectiveTime: GTS [0..1]
value*: INT [1..1]
methodCode: <= ObservationMethod
((0 = dependent; 1 = needs help but can do about
50%
himself; 2 = independent.)

1..1 dressing/Undressing
component8
typeCode*: <= COMP

Mobility
classCode*: <= OBS
moodCode*: <= EVN
code: <= ActCode "BrtID450"
effectiveTime: GTS [0..1]
value*: INT [1..1] (□)
methodCode: <= ObservationMethod
(0 = immobile or < 50 yards; 1 = wheelchair independent
including corners, > 50 yards; 2 = walks with help of one
person (verbal or physical); 3 = independent
(but may use any aid; for example, stick) > 50 yards)

1..1 mobility
component7
typeCode*: <= COMP

Transfer
classCode*: <= OBS
moodCode*: <= EVN
code: <= ActCode "BrtID420"
effectiveTime: GTS [0..1]
value*: INT [1..1]
methodCode: , CWE [0..1] = independent. (□)
(0 = not able to (not independent) (1-2 people
physical)
(physical or with words)

1..1 transfer
component6
typeCode*: <= COMP

1..1 continence of Bowels
component1
typeCode*: <= COMP

Continence of Bowels
classCode*: <= OBS
moodCode*: <= EVN
code: <= ActCode "BrtIB525"
effectiveTime: GTS [0..1]
value*: INT [1..1]
methodCode: <= ObservationMethod
((0 = Incontinent; 1 = Needs help /
accidents; 2 = Able to control and no
accidents.)

1..1 controlling Bladder
component2
typeCode*: <= COMP

Controlling Bladder
classCode*: <= OBS
moodCode*: <= EVN
code: <= ActCode "BrtIB6202"
effectiveTime: GTS [0..1]
value*: INT [1..1]
methodCode: , CWE [0..1] = continent
(((0 = incontinent or catheter; 1 = Occasional
accidents (max. 1 time per 24 hours)
(for more than 7 days)

1..1 personal Toilet
component3
typeCode*: <= COMP

Personal Toilet
classCode*: <= OBS
moodCode*: <= EVN
code: <= ActCode "BrtID520"
effectiveTime: GTS [0..1]
value*: INT [1..1]
methodCode:) CWE [0..1] <=
ObservationMethod
(0 = needs help; 1 = independent (face, hair,
teeth, shaving)

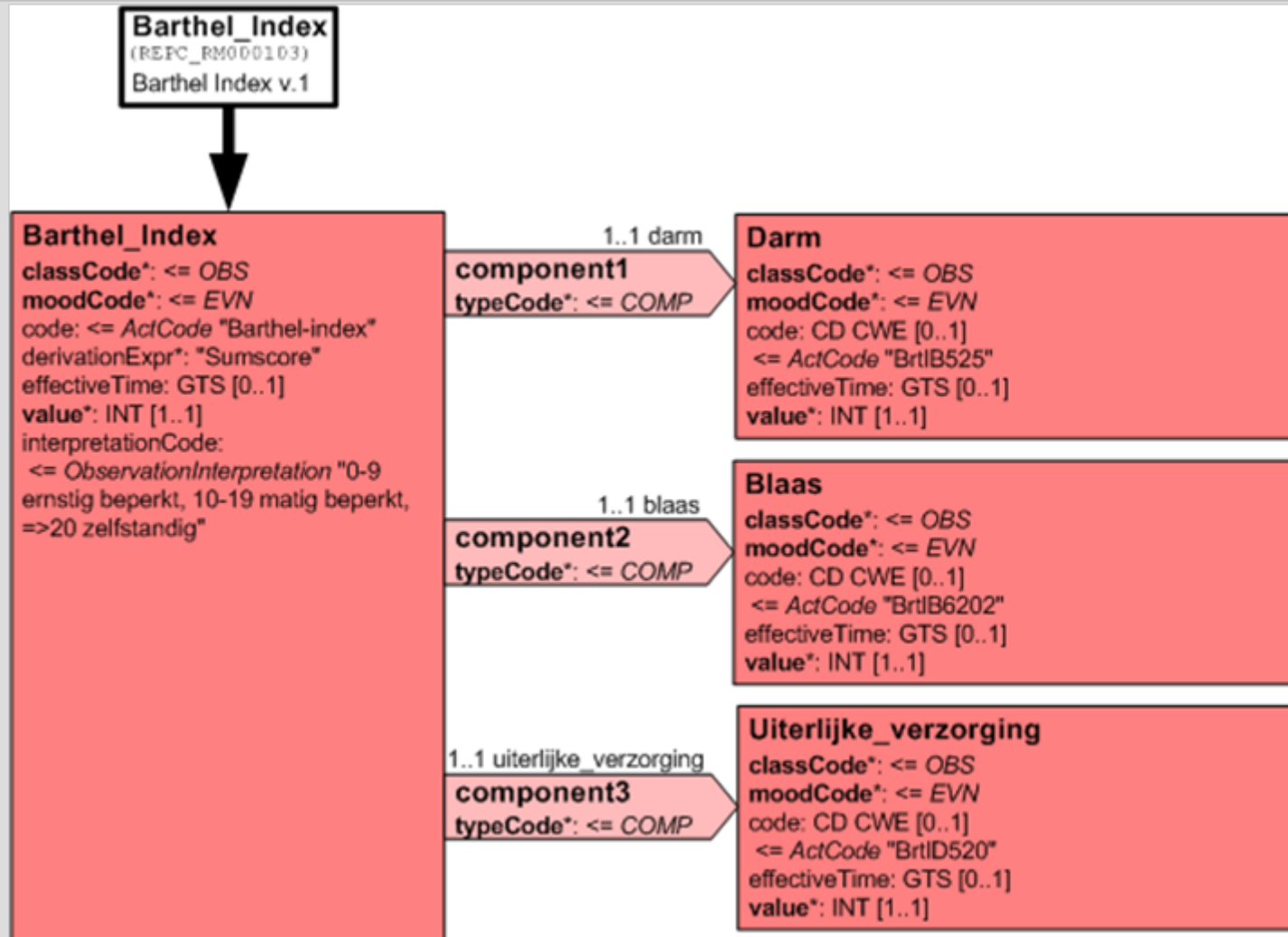
1..1 toilet
component4
typeCode*: <= COMP

Toilet use
classCode*: <= OBS
moodCode*: <= EVN
code: <= ActCode "BrtID530"
effectiveTime: GTS [0..1]
value*: INT [1..1]
methodCode:) CWE [0..1] <=
ObservationMethod
((0 = dependent; 1 = needs help but can do
some parts on his
own; 2 = independent (can get on and off,
dressing and
undressing, wipe)

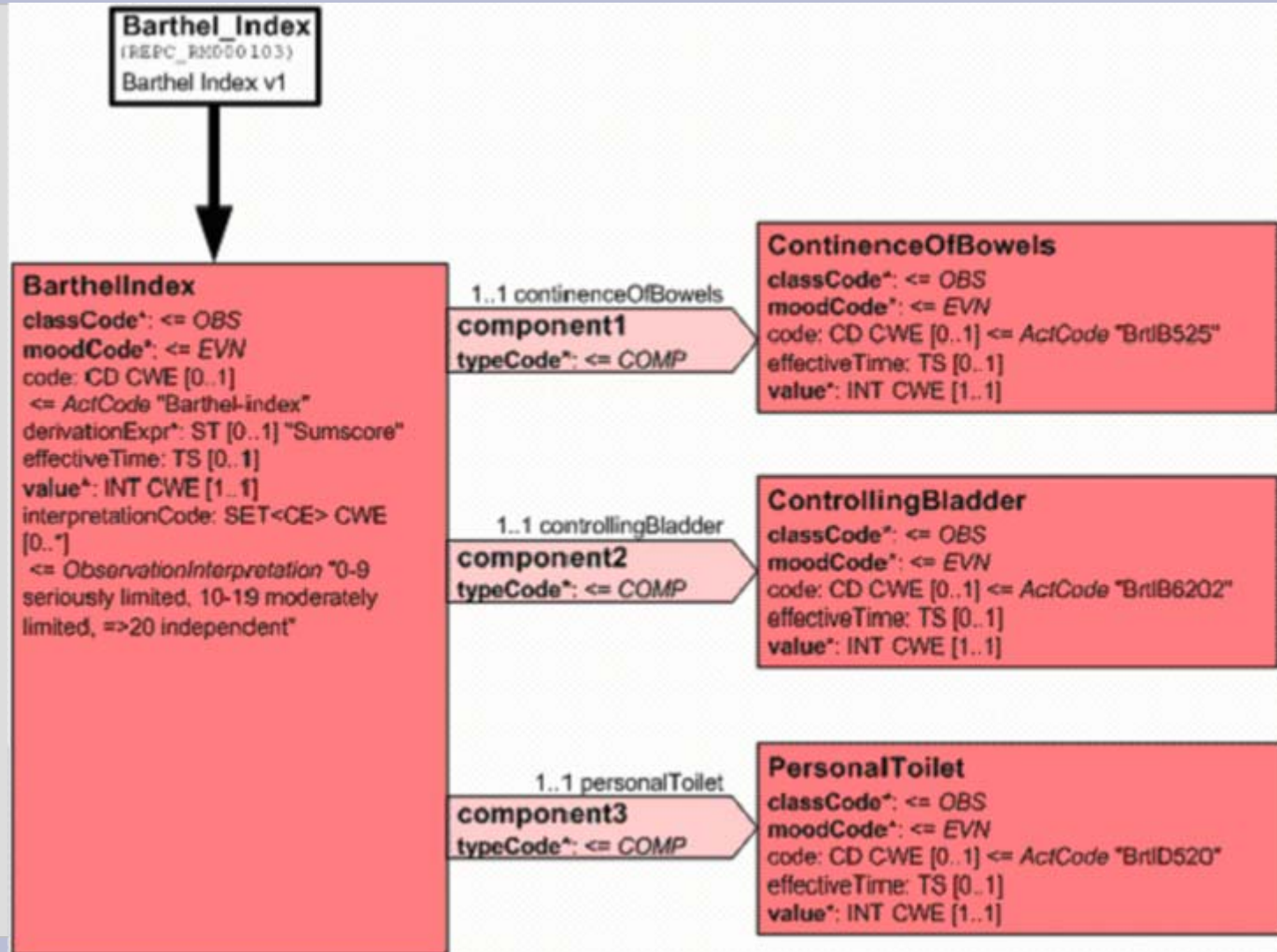
1..1 feeding
component5
typeCode*: <= COMP

Eating
classCode*: <= OBS
moodCode*: <= EVN
code: <= ActCode "BrtID550"
effectiveTime: GTS [0..1]
value*: INT [1..1]
methodCode: 1 CWE [0..1]
(0 = unable; 1 = needs help cutting, spreading
butter, etc., or requires modified diet; 2 =
independent. (□)) (□)

Barthel Index (fragment)



Barthel Index (fragment)



Barthel Index (fragment)

```
<Observation>
  <templateId root="2.16.840.1.113883.2.1.3.2.4.12" extension="REPC_MT000103.Barthel_Index">
  <code codeSystem="2.16.840.1.113883.2.6.15.1" code="Barthel-index"/>
  <derivationExpr>Sumscore</derivationExpr>
  <effectiveTime value="200601191211"/>
  <value value="3"/>
    <component templateId="REPC_MT000103.component1">
      <Observation templateId="REPC_MT000103.Darm">
        <code codeSystem="2.16.840.1.113883.2.6.15.1.ICFXXX" code="BrtlB525"/>
        <effectiveTime value="200601191211"/>
        <value value="1"/>
      </Observation>
    </component>
    <component templateId="REPC_MT000103.component2">
      <Observation templateId="REPC_MT000103.Blaas">
        <code codeSystem="2.16.840.1.113883.2.6.15.1.ICFXXX" code="BrtlB6202"/>
        <effectiveTime value="200601191211"/>
        <value value="1"/>
      </Observation>
    </component>
    <component templateId="REPC_MT000103.component3">
      <Observation templateId="REPC_MT000103.Uiterlijke_verzorging">
        <code codeSystem="2.16.840.1.113883.2.6.15.1.ICFXXX" code="BrtlD520"/>
        <effectiveTime value="200601191211"/>
        <value value="1"/>
      </Observation>
    </component>
  </Observation>
```

Barthel Index (fragment)

```
<Observation>
  <templateId root="2.16.840.1.113883.2.1.3.2.4.12" extension="REPC_MT000103.Barthel_Index">
  <code codeSystem="2.16.840.1.113883.2.6.15.1" code="Barthel-index"/>
  <derivationExpr>Sumscore</derivationExpr>
  <effectiveTime value="200601191211"/>
  <value value="3"/>
    <component templateId="REPC_MT000103.component1">
      <Observation templateId="REPC_MT000103.Darm">
        <code codeSystem="2.16.840.1.113883.2.6.15.1.ICFXXX" code="BrtIB525"/>
        <effectiveTime value="200601191211"/>
        <value value="1"/> <value value="needs considerable help">
      </Observation>
    </component>
    <component templateId="REPC_MT000103.component2">
      <Observation templateId="REPC_MT000103.Blaas">
        <code codeSystem="2.16.840.1.113883.2.6.15.1.ICFXXX" code="BrtIB6202"/>
        <effectiveTime value="200601191211"/>
        <value value="1"/>
      </Observation>
    </component>
    <component templateId="REPC_MT000103.component3">
      <Observation templateId="REPC_MT000103.Uiterlijke_verzorging">
        <code codeSystem="2.16.840.1.113883.2.6.15.1.ICFXXX" code="BrtID520"/>
        <effectiveTime value="200601191211"/>
        <value value="1"/>
      </Observation>
    </component>
  </Observation>
```

Complexity

*“The documentation is beyond human capacity ...
to write or to understand”*

Alan Rector (presentation)

- Documentation is not properly versioned
- Documentation is written in code.
- >40,000 occurrences of the word code or its variants (ActCode, moodeCode, etc) in the 2006 balloted v3 documentation.

Complexity: manifestations and Acronyms

- CMET
- RMIM
- DMIM
- DIM
- DAM
- CIM
- LIM - shallow
- LIM - deep
- template

Incompleteness of specifications

- Profound dependency on terminologies that are flawed or incomplete.
 - Data nodes (statements of what is being recorded) are mainly coded values, relying on vocabularies that are:-
 - not agreed,
 - not complete
 - not consistent in syntax, nor semantics, versioning
- If systems start collecting data now i.e. within next 10years, then how will that data ever be reliably queriable?

.. in fact ..

- If CDA entries are based on RIM templates, then it is virtually impossible to automate the generation of the associated text !! (or vice versa)

WHY?

- because the RIM abstracts away the context-specific language used by clinicians to describe each concept.
 - e.g. every Date/time is called “effective time”, instead of “date of onset” or “cease date” or “date of diagnosis”
 - the names of observations, procedures etc. are too hard to access.



Organization
 classCode* == ORG
 determinantCode* == INSTANCE
 id SET+> [0..1]
 name BAG+CN> [0..1]
 telecom BAG+TEL> [0..1]
 addr BAG+AD> [0..1]

1 representedOrganization

AuthorChoice
 classCode* == PSN
 determinantCode* == INSTANCE
 name BAG+PN> [0..1]

Device
 classCode* == DEV
 determinantCode* == INSTANCE
 code CE ONE [0..1] == EntryCode
 softwareName SC ONE [0..1] == SoftwareName

AssignedAuthor
 classCode* == ASSIGNED
 id SET+> [1..1]
 code CE ONE [0..1] == RoleCode
 addr BAG+AD> [0..1]
 telecom BAG+TEL> [0..1]

Author
 typeCode* == AUT
 functionCode CE ONE [0..1] == ParticipationFunction
 codesetControlCode CS ONE [0..1] == TOP
 telecom TS [0..1]

Person

MaintainedEntity
 classCode* == MNT
 effectiveTime NVL+TS> [0..1]

Organization

InformantRole
 classCode* == ROL
 id SET+> [0..1]
 addr SET+AD> [0..1]
 telecom SET+TEL> [0..1]
 effectiveTime NVL+TS> [0..1]

InformantPerson
 classCode* == PSN
 determinantCode* == INSTANCE
 name BAG+PN> [0..1]

Organization

SubjectRole
 classCode* == x_DocumentEntrySubject
 id SET+> [0..1]
 code CE ONE [0..1] == RoleCode
 addr BAG+AD> [0..1]
 telecom BAG+TEL> [0..1]

Person
 classCode* == PSN
 determinantCode* == INSTANCE
 id [0..1]
 name BAG+PN> [0..1]
 senderCode CE ONE [0..1] == AdministrativeGender
 id [0..1]

Subject
 typeCode* == SU
 codesetControlCode CS ONE [0..1] == TOP
 extensionCode CE ONE [0..1] == TargetExtension

entryRelationship
 typeCode* == x_ActRelationshipEntryRelationship
 contextControlCode BL [0..1] == TRUE

entryChoice
Observation
 classCode* == OBS
 moodCode* == x_ActMoodDocumentObservation
 id SET+> [0..1]
 code CD ONE [0..1] == ObservationType
 registration BL [0..1]
 versionCode ST [0..1]
 text ED [0..1]
 statusCode SET+CS> ONE [0..1] == ActStatus
 effectiveTime NVL+TS> [0..1]
 priorityCode SET+CE> ONE [0..1] == ActPriority
 repeatNumber NVL+INT> [0..1]
 uncertaintyCode CE ONE [0..1] == ActUncertainty
 languageCode CS ONE [0..1] == HumanLanguage
 value ANY [0..1]
 interpretationCode SET+CS> ONE [0..1]
 methodCode CE ONE [0..1]
 targetSiteCode CD ONE [0..1]

RegionOfInterest
 classCode* == ROIOVL
 moodCode* == EVN
 id SET+> [1..1]
 code CE ONE [0..1] == ROIOVLShape
 value LIST+INT> [1..1]

ObservationMedia
 classCode* == OBS
 moodCode* == EVN
 id SET+> [1..1]
 languageCode CS ONE [0..1] == HumanLanguage
 value ED [0..1]

SubstanceAdministration
 classCode* == SADM
 moodCode* == x_DocumentSubstanceMood
 id SET+> [0..1]
 text ED [0..1]
 statusCode SET+CS> ONE [0..1] == ActStatus
 effectiveTime NVL+TS> [0..1]
 priorityCode CE ONE [0..1] == ActPriority
 repeatNumber NVL+INT> [0..1]
 code CE ONE [0..1] == RouteOfAdministration
 approachSiteCode CD ONE [0..1] == ActSite
 doseQuantity NVL+QD> [0..1]
 rateQuantity NVL+QD> [0..1]
 maxDoseQuantity RTO+QD+GTV> [0..1]

Act
 classCode* == ACT
 moodCode* == x_ActMoodDocumentActMood
 id SET+> [0..1]
 code CD ONE [0..1] == ActCode
 registration BL [0..1]
 text ED [0..1]
 statusCode SET+CS> ONE [0..1] == ActStatus
 effectiveTime NVL+TS> [0..1]
 priorityCode SET+CE> ONE [0..1] == ActPriority
 uncertaintyCode CE ONE [0..1] == ActUncertainty
 languageCode CS ONE [0..1] == HumanLanguage

Procedure
 classCode* == PROC
 moodCode* == x_DocumentProcedureMood
 id SET+> [0..1]
 text ED [0..1]
 statusCode SET+CS> ONE [0..1] == ActStatus
 effectiveTime NVL+TS> [0..1]
 activityTime NVL+TS> [0..1]
 priorityCode SET+CE> ONE [0..1] == ActPriority
 languageCode CS ONE [0..1] == HumanLanguage
 methodCode CE ONE [0..1]
 approachSiteCode CD ONE [0..1]
 targetSiteCode CD ONE [0..1]

FutureEncounter
 classCode* == ENC
 moodCode* == x_DocumentEncounterMood
 code CD ONE [0..1] == ActEncounterCode
 text ED [0..1]
 statusCode SET+CS> ONE [0..1] == ActStatus
 effectiveTime NVL+TS> [0..1]

constant ObservationMedia value
 ObservationMedia can only be expressed by reference, and not by value. Thus, ED 300 cannot be used.

Note: SubstanceAdministration effectiveTime data type is PVL. This is reflected in HMDand schema but can't be shown as such in the R4AEM.

LabeledDrug
 classCode* == MLDT
 determinantCode* == RND
 code CE ONE [0..1] == DrugEntity
 value BAG+D2N> [0..1]

consumable
 typeCode* == COM
ManufacturedProduct
 classCode* == MANU

PRNCriterion
 classCode* == OBS
 moodCode* == EVN CRT
 code CD ONE [0..1]
 text ED [0..1]
 value ANY [0..1]

reference
 typeCode* == x_ActRelationshipExternalReference
 representation BL [0..1] == TRUE

externalActChoice
ExternalAct
 classCode* == ACT
 moodCode* == EVN
 id SET+> [0..1]
 code CD ONE [0..1] == ActCode
 text ED [0..1]

ExternalObservation
 classCode* == OBS
 moodCode* == EVN
 id SET+> [0..1]
 code CD ONE [0..1] == ActCode
 text ED [0..1]

ExternalProcedure
 classCode* == PROC
 moodCode* == EVN
 id SET+> [0..1]
 code CD ONE [0..1] == ActCode
 text ED [0..1]

ExternalDocument
 classCode* == DOC
 moodCode* == EVN
 id SET+> [0..1]
 code CD ONE [0..1] == DocumentType
 text ED [0..1]
 versionNumber INT [0..1]

```

<observation classCode="OBS" moodCode="INT">
<code code="24320-4" codeSystem="2.16.840.1.113883.6.1" codeSystemName="LOINC">
<originalText mediaType="text/plain">Chem-7</originalText>
<translation code="aYU7t6" codeSystem="2.16.840.1.113883.19.278.47" codeSystemName="MyLocalCodeSystem" displayName="Chem7"/>
</code>
<text mediaType="text/plain">Chem-7 tomorrow</text>
<effectiveTime>
<high value="20000408"/>
<low value="20000408"/>
</effectiveTime>
</observation>
</entry>
<entry>
<act classCode="ACT" moodCode="INT">
<!-- <id/>
<code code="223468009" codeSystem="2.16.840.1.113883.6.96" codeSystemName="SNOMED CT" displayName="Teaching of skills">
<qualifier>
<name code="363702006" codeSystem="2.16.840.1.113883.6.96" codeSystemName="SNOMED CT" displayName="has focus"/>
<value code="29893006" codeSystem="2.16.840.1.113883.6.96" codeSystemName="SNOMED CT" displayName="Peak flow rate measurement"/>
</qualifier>
</code> -->
</act>
</entry>
<entry>
<substanceAdministration classCode="SBADM" moodCode="RQO">
<text mediaType="text/plain">prednisone 20qOD alternating with 18qOD.</text>
<routeCode code="PO" codeSystem="2.16.840.1.113883.5.112" codeSystemName="RouteOfAdministration"/>
<consumable>
<manufacturedProduct>
<manufacturedLabeledDrug>
<code code="10312003" codeSystem="2.16.840.1.113883.6.96" codeSystemName="SNOMED CT" displayName="Prednisone preparation"/>
</manufacturedLabeledDrug>
</manufacturedProduct>
</consumable>
</substanceAdministration>
</entry>
<entry>
<substanceAdministration classCode="SBADM" moodCode="RQO">
<text mediaType="text/plain">Hydrocortisone cream to finger BID.</text>
<!-- <effectiveTime xsi:type="PIVL_TS" institutionSpecified="true">
<period value="12" unit="h"/>
</effectiveTime> -->
<routeCode code="SKIN" codeSystem="2.16.840.1.113883.5.112" codeSystemName="RouteOfAdministration" displayName="Topical application, skin"/>
<!-- <approachSiteCode code="48856004" codeSystem="2.16.840.1.113883.6.96" codeSystemName="SNOMED CT" displayName="Skin of palmer surface of index finger">
<qualifier>
<name code="78615007" codeSystem="2.16.840.1.113883.6.96" codeSystemName="SNOMED CT" displayName="with laterality"/>
<value code="7771000" codeSystem="2.16.840.1.113883.6.96" codeSystemName="SNOMED CT" displayName="left"/>
</qualifier>
</approachSiteCode> -->
<consumable>
<manufacturedProduct>
<manufacturedLabeledDrug>
<code code="331646005" codeSystem="2.16.840.1.113883.6.96" codeSystemName="SNOMED CT" displayName="Hydrocortisone cream"/>
</manufacturedLabeledDrug>
</manufacturedProduct>
<!-- <effectiveTime>
</effectiveTime>
</encounter>

```

Conclusion - informal

look mummy ! ...

... the emperor has no clothes !

Conclusion - the gloomy

- Basing clinical information interoperability on the HL7 v3 RIM is severely flawed. It is too complex; the underlying principles are unproved and highly suspect.
- The complexity leads to bad models, glacial progress, compromised quality and safety.

BUT...

Conclusion - the not so gloomy

- By using openEHR archetypes as the authoritative description of detailed clinical concepts we can:
 - give IHTSDO a work program for terminology development,
 - have a sound basis for interoperable EHR systems;
 - and by using archetype-based CDA entries, provide for the generation of:
 - standardised human-readable renditions of e-referrals, discharge summaries, notifications, e-prescriptions etc.
 - +
 - compatible machine-processable entries in these documents that match the human readable content.

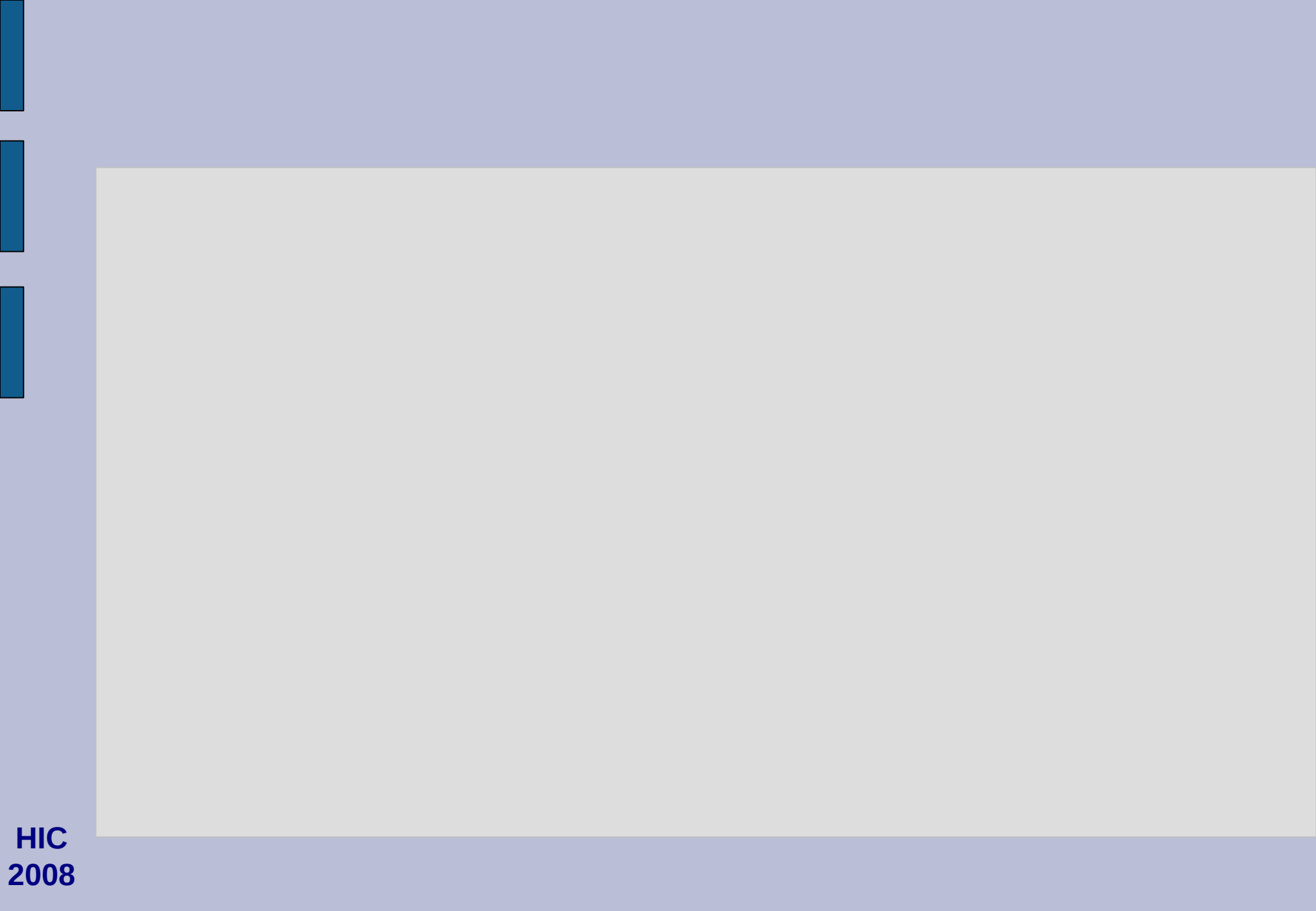


Thank you

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2008