

HL7 V3 Overview

What do I need to know vs. What can I ignore?



Topics

- V2 vs. V3
- The RIM – Modeling, DMIMs, RMIMs
- Terminology
- Storyboards
- Datatypes
- OIDs
- Wrappers
- Vocabulary
- Schemas
- CMETs
- Message Transport
- Tools

Why a new version? V2 has problems

Weakness with V2

- Ad Hoc Design methodology
- Too much optionality
- Ambiguous – lacking definition (lack of agreement to where data is)
- Conformance testing problems
- Complex Markup (non-standard parsers)
- Lacking standardized vocabulary

Example V2 Message

```
MSH|^~\&|GHH LAB|ELAB-3|GHH OE|BLDG4|200202150930||ORU^R01
|CNTRL-3456|P|2.4<cr>
PID|||555-44-4444||EVERYWOMAN^EVE^E^^^L|JONES
|196203520|F|||153 FERNWOOD DR.^^STATESVILLE^OH^35292||
(206)3345232|(206)752-121|||
AC555444444||67-A4335^OH^20030520<cr>
OBR|1|845439^GHH OE|1045813^GHH LAB|1554-
5^GLUCOSE|||200202150730|||||||
555-55-5555^PRIMARY^PATRICIA P^^^^MD^^LEVEL SEVEN
HEALTHCARE, INC.
|||||||F|||||444-44-4444^HIPPOCRATES^HOWARD H^^^^MD<cr>
OBX|1|SN|1554-5^GLUCOSE^POST 12H
CFST:MCNC:PT:SER/PLAS:QN||^182|mg/dl|
70_105|H|||F<cr>
```

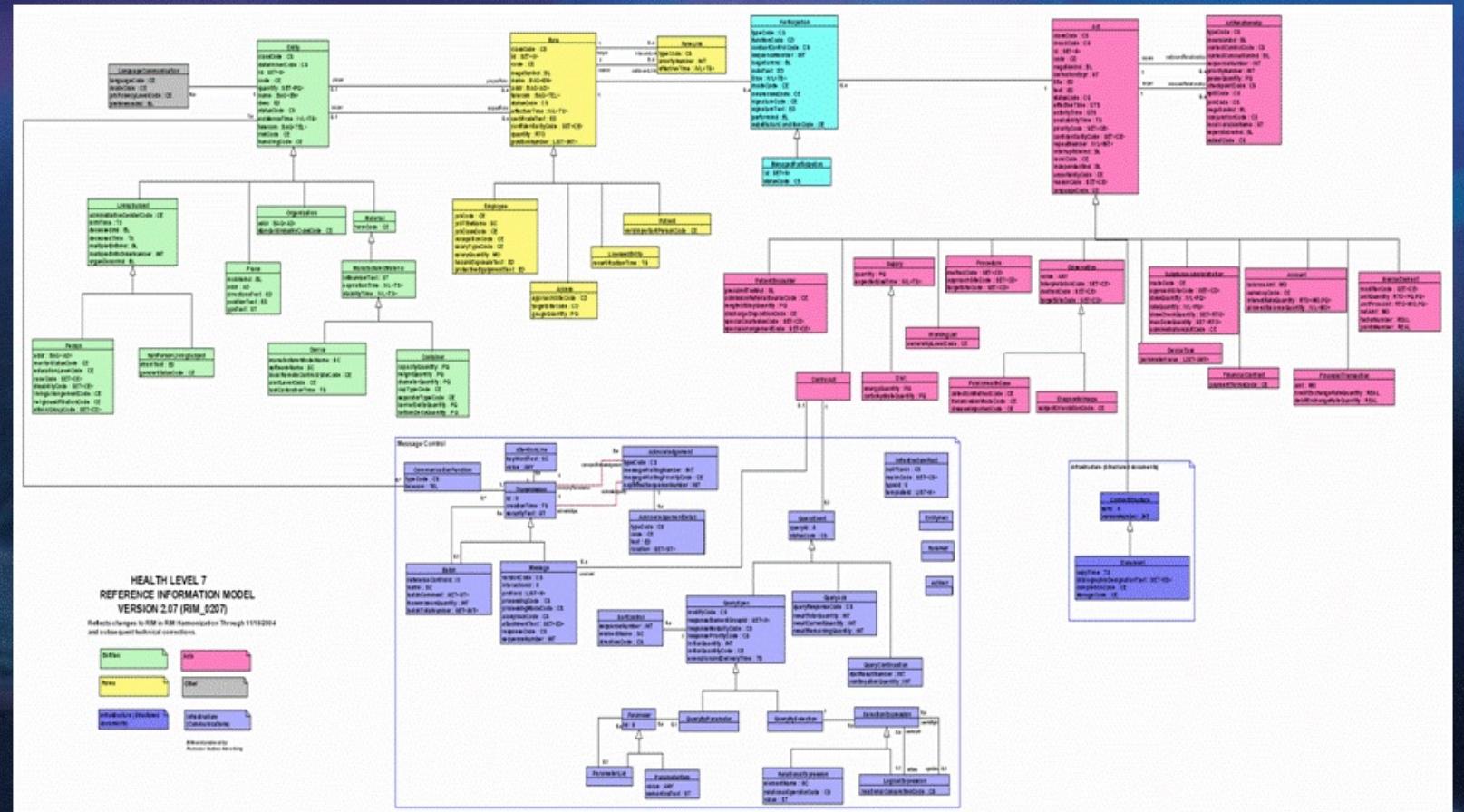
What's new with V3

- Formal OO Design Methodology
- Goal of being able to test conformance (schema)
- Rigorous Vocabulary Definition (CNE, CWE)
- Reduced optionality
- Industry standard markup (XML)
- Big, Scary Messages
- The Ballot: <http://www.hl7.org/v3ballot/html/welcome/environment/index.htm>

The RIM

- RIM – Reference Information Model
- What is it? A set of base classes that can be used to model any entity in the health domain
- As a developer, architect or BA, do I really need to care? RIM – SHMIM....bah humbug...

The RIM



RIM - Modeling

- So what do modelers do with the RIM?
- Create DMIM's – domain message information model
- Basically, a set of instances of the RIM classes for a specific domain area (i.e. pharmacy)

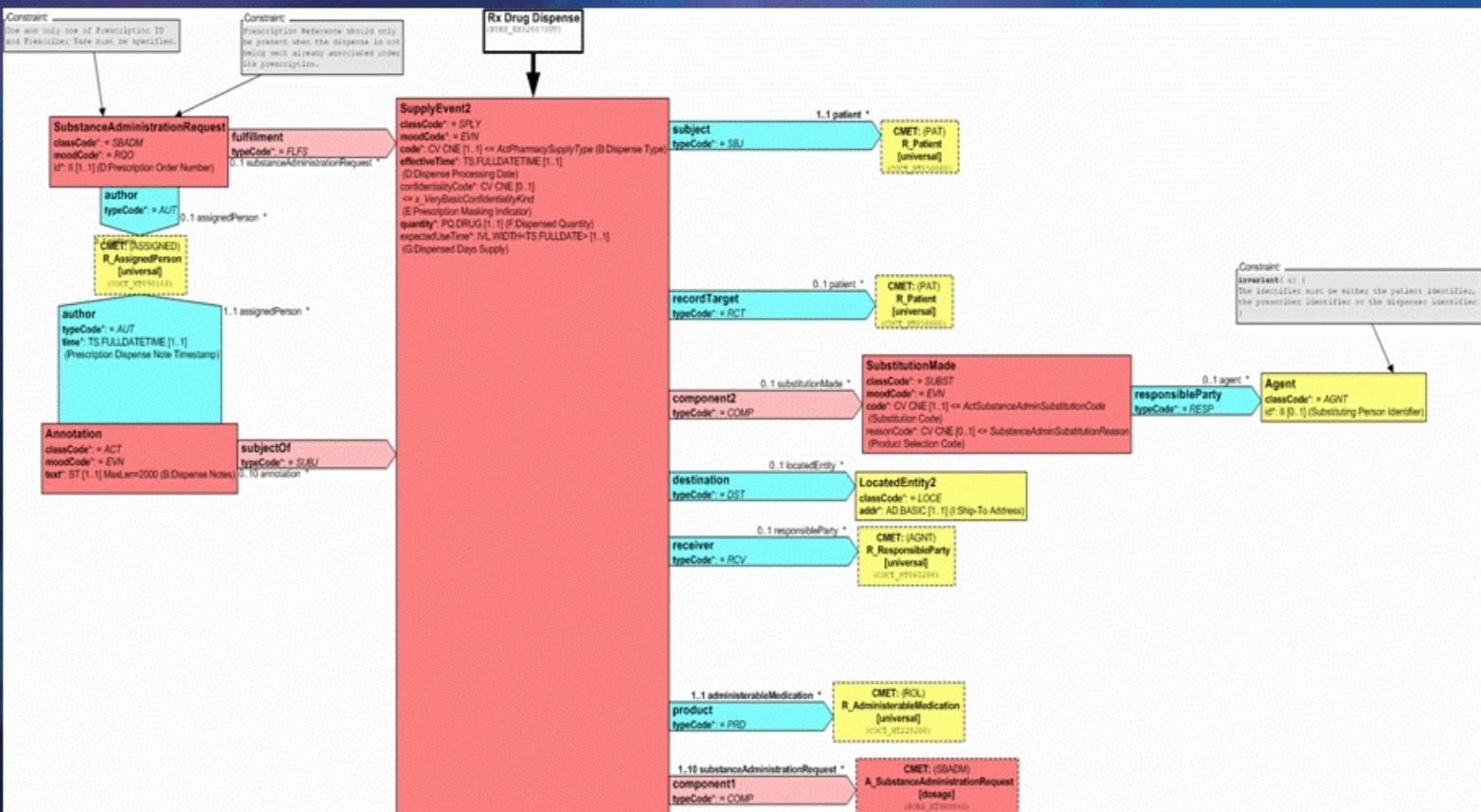
DMIM's

- Do I care about DMIM's? – a little.
- What do modeler's do with DMIMs?
- Constrain them to RMIM's.

RMIM's

- What's an RMIM?
- Refined Message Information Model
- Derived from a "Parent" DMIM – subset
- Information model that shows all the data for a particular message.

Dispense RMIM



RMIM's

- Do I care yet?
- Developer – nope.
- BA/Architect – starting to. This is the stuff that's in the messages. If it's not in the RMIM, it's not going to be in the message.

Some HL7 Terminology

- HL7 v3 has a ton of terminology
- Ballot – current release (3 times a yr?)
- Interaction – basically a message
- Application Roles – (senders and receivers)
- Trigger Events – what causes a message to be sent
- Normative – voted on and agreed to – part of standard
- DSTU – draft standard for trial use – use at your own peril.
- Message Type – really a fragment of a message (payload)

Storyboards: The V3 Drama



- Karl Kid
- Eric Emergency
- Sue Script
- Boris Bleeder

Datatypes

- Developer 'need to know' area
- Complex vs. Simple Types
- Simplest: Coded Simple Value (CS)
`<statusCode code="active"/>`
- Most complex: General Timing Specification (GTS)
- E.g. "3 times/day beginning August 3rd for 3 weeks"
would be specified as:

GTS

```
<effectiveTime xsi:type= "SXPR_TS">
  <comp xsi:type="IVL_TS" operator="I">
    <low value= "20050803"/>
    <width value="3" unit="wk"/>
  </comp>
  <comp xsi:type="PIVL_TS">
    <frequency>
      <numerator value="3"/>
      <denominator value="1" unit="d"/>
    </frequency>
  </comp>
</effectiveTime>
```

Datatypes - All developers

- need to read the XML Implementation Technology Specification - Data Types
- Need to read the data type CeRx, CR, NeCST data type constraints
- What are constraints?

COMPLEX:

```
<name use="L">
  <prefix qualifier='AC'>Dr. phil. </prefix>
  <given>Regina</given>
  <given>Johanna</given>
  <given>Maria</given>
  <prefix qualifier='NB'>Grafin </prefix>
  <family qualifier='BR'>Hochheim</family>
  <family qualifier='SP'>Weilenfels</family>
  <suffix qualifier='PR'>NCFSA</suffix>
</name>
```

SIMPLE:

```
<name use="L">
  <given>Joe</given>
  <family>Smith</family>
</name>
```

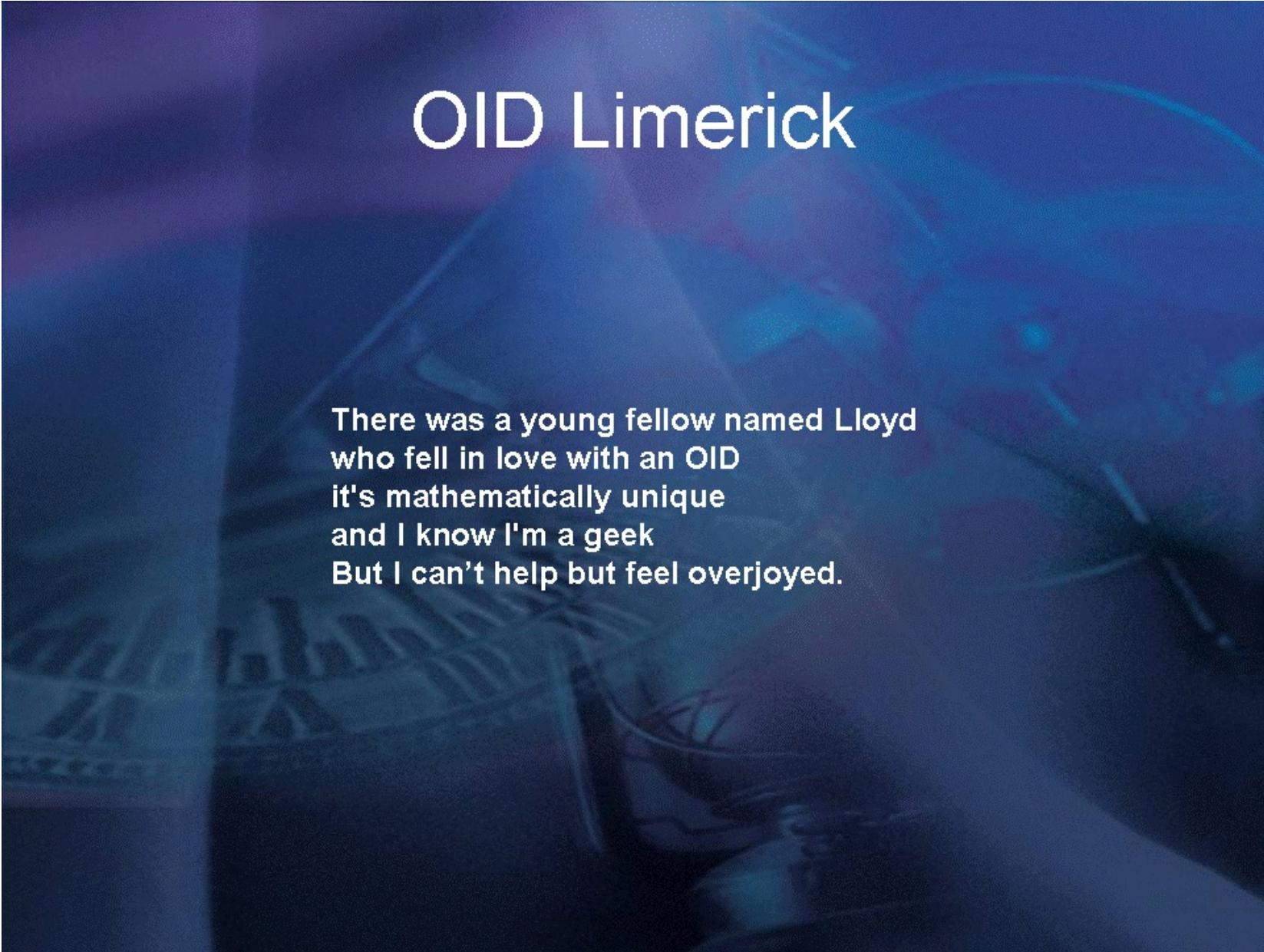
Some Other Datatypes

- II (instance identifier) – i.e. a PHN (OIDs)
`<id root="2.16.124.9.101.1.1.4" extension="00123456"/>`
- CS (coded value) `<code code="FF"/>`
- PQ (physical quantity) `<quantity value="90" unit="g"/>`
- TS (Time stamp) `<effectiveTime value="20050101"/>`
- IVL_TS (Interval of time stamp)
`<effectiveTime>`
 `<low value="20040101"/>`
 `<high value="20050101"/>`
`</effectiveTime>`

OIDs

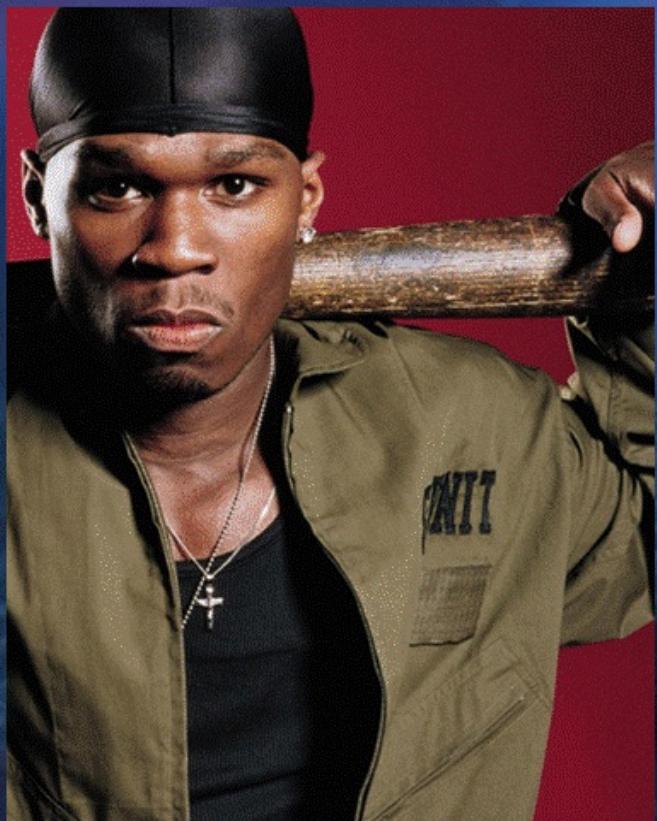
- What's an OID – object identifier.
- Unique way of identifying anything via string composed of numbers and periods.
- COSIRA assigned Health the OID: 2.16.124.9.101.1
- Health assigned to Allergy-IDs the OID:
2.16.124.9.101.1.1.10
- We represent an allergy id of 123 as:
`<id root="2.16.124.9.101.1.1.10" extension="123"/>`
- Register an OID with HL7 OID Registry – you can assign sub-OIDs whatever you want – share with partners/HL7 Canada
- OID registrar for Canada: Canada Realm Localization committee
- OID puns: Ann-OID, Hemmhor-OIDs....

OID Limerick



**There was a young fellow named Lloyd
who fell in love with an OID
it's mathematically unique
and I know I'm a geek
But I can't help but feel overjoyed.**

Wrappers



- No – not rappers!
- Transmission wrapper
- Control Act wrapper
- Payload
- Interaction – the multipart message.

Transmission Wrapper

- Identifies sender and receiver of the message
- Kind of message (interaction id)
- Balloted version of the message that is supported
- Identifies the conditions under which acks are required to be returned in response to this message.
(<acceptAckCode code="ER"/> for errors)
- Packages the Control Act Wrapper and the payload.
- Same between all messages (in my experience...)
- Message unique identifier

Transmission Wrapper Example

```
<PORX_IN000023CA>
    <!-- A unique identifier for the message -->
    <id root="2.16.124.9.101.1.2.1" extension="122"/>
    <creationTime value="20050101102001"/>
    <versionCode code="V3-2005-05"/>
    <interactionId root="2.16.840.1.113883" extension="PORX_IN000023CA"/>
    <processingCode code="P"/>
    <processingModeCode code="T"/>
    <acceptAckCode code="ER"/>

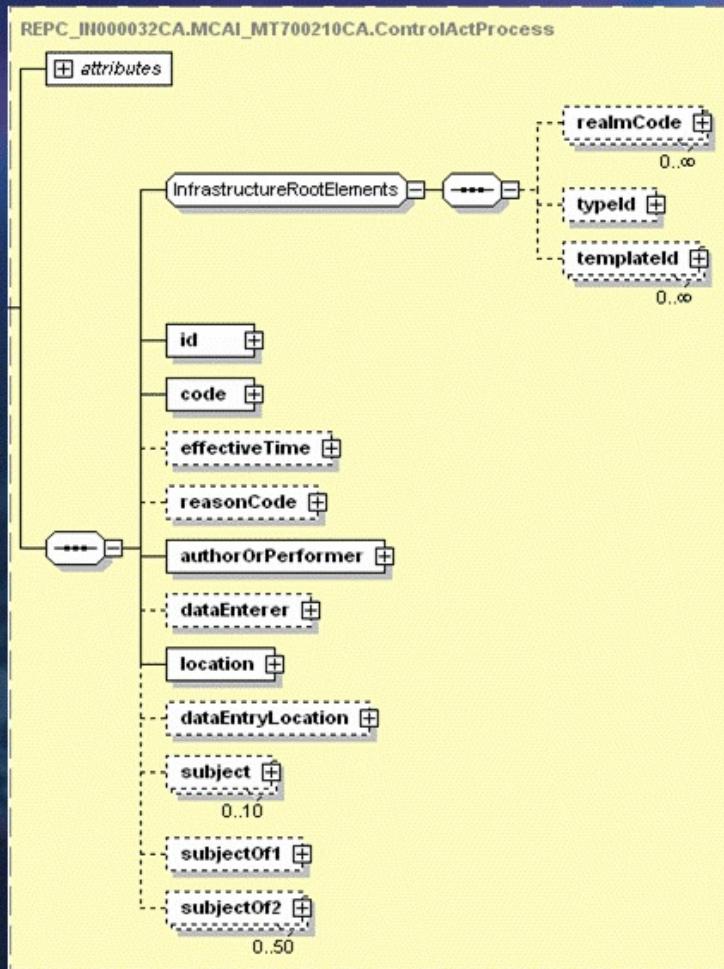
    ...the rest of the message...

    <receiver>
        <telecom use="H" value="uri:198.203.1.23"/>
        <device>
            <id root="2.16.840.1.113883.1.2"/>
            <asAgent>
                <representedOrganization>
                    <id root="2.16.124.9.101.1.2"/>
                </representedOrganization>
            </asAgent>
        </device>
    </receiver>
    <sender>
        <telecom use="H" value="uri:198.203.1.23"/>
        <device>
            <id root="2.16.124.9.101.1.2.1" extension="00"/>
            <asLocatedEntity classCode="LOCE">
                <location classCode="PLC" determinerCode="INSTANCE">
                    <id root="2.16.124.9.101.1.2" extension="11111112"/>
                </location>
            </asLocatedEntity>
        </device>
    </sender>
</PORX_IN000023CA>
```

Control Act Wrapper

- Identification of sending and receiving entities (pharmacist, docs, nurses, pharmacy technicians)
- Issues
- Packaging of the payload
- Use of id for undo
- Not always same between domains – CeRx has defined own Control Act with specialized issue structure.

Control Act Wrapper Example



- `id` – for undo
- `Code` – the trigger event
- `authorOrPerformer` – the pharmacist
- `location` – the pharmacy
- `subject` (the dispense)
- `subjectOf2` - issues

Vocabulary - CNE

- CNE – coded no exceptions – have to stick to the vocabulary.

```
<xs:element name="code" type="CV">
  <xs:annotation>
    <xs:appinfo>
      <mif:attribute name="code"
        minimumMultiplicity="1"
        maximumMultiplicity="1"
        conformance="R"
        isMandatory="true">
        <mif:businessName name="B:Dispense Type"/>
        ...
        <mif:supplierDomainSpecification codingStrength="CNE" domainName="ActPharmacySupplyType"/>
      </mif:attribute>
    </xs:appinfo>
  </xs:annotation>
</xs:element>
```

ActPharmacySupplyType

EM	Emergency Supply
SO	Script Owing
FF	First Fill
DF	Daily Fill
FFC	First Fill - Complete
FFP	First Fill - Part Fill
TF	Trial Fill
UD	Unit Dose
RF	Refill
DF	Daily Fill
RFC	Refill - Complete
RFF	Refill (First fill this facility)
RFP	Refill - Part Fill
TB	Trial Balance
UD	Unit Dose
FS	Floor stock
MS	Manufacturer Sample

Vocabulary - CWE

- CWE – coded with equivalents
- Use the supplied vocabulary or roll your own.
- The exception rather than the rule – most things are CNE

Project Vocabulary – How to find

- HL7 Foundation document (HL7 website)
- Some CeRx/NeCST specialized vocabulary not yet published to HL7 (spreadsheet)

Schemas

- Multipart schemas – key is the interaction name
- Find the interaction name of the message.
- This is the schema that validates your message (not the message type schema which may be actually easier to find in the docs)
- Allergy Example with CeRx
- Extremely complex schemas – break some tools even though the schemas are legal – current versions of XMLSpy and Oxygen okay.

Schemas (cont'd)

- Schemas: developer's best tool for understanding the messages – can be very detailed.
- XML Tools: XML Spy or Oxygen (demo)
- All the experts say “don't use schemas to validate in prod”
- Validation for conformance? MIF and some kind of custom validation... ?
- Schematron, Relax NG ... others
- Schema: non-normative – HL7 doesn't really care about schemas – it's a service.

CMETs

- CMET – common message element type
- a reusable message fragment.
- i.e. Patient is present in every message
- CMETS in there own schemas which are included in the message.
- Across domains – the most vulnerable to change in the standard. – i.e. if lab says patient needs IQ, then pharmacy gets it to.
- Hides the true size of a message in the docs ([example with invoice](#))

CMETS - Example

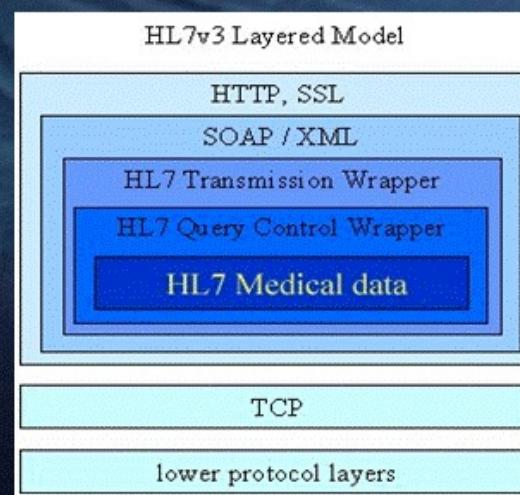
```
<?xml version="1.0" encoding="UTF-8"?>
<!-- COCT_MT090101CA.AssignedPerson - Describes a healthcare provider
     involved in the delivery of healthcare services.
  -->
<assignedPerson>
    <!-- A unique identifier for a provider -->
    <id root="2.16.124.9.101.1.1.5" extension="214"/>
    <representedPerson>
        <!-- The name by which the provider is known -->
        <name use="L">
            <given>Drake</given>
            <family>Ramoray</family>
            <prefix>Dr.</prefix>
        </name>
    </representedPerson>
</assignedPerson>
```

Message Transport

- We've created these monster messages, how do we send them?
- Two options: ebXML and SOAP/web services
- ebXML seems complex, incomplete?, lack of tools...
- ebXML is based upon SOAP
- Status of Microsoft/IBM WS-* protocols is uncertain
- What are other jurisdictions planning?
- Web services more in alignment with tools we use... (Microsoft flavour)

Message Transport

- What to do?
- Guidance from Dutch HL7 Pharmacy project:
http://www.ringholm.de/docs/03030_en.htm
- Plan is to adopt SOAP at least superficially
- Easier transition to ebXML or WS-* web services
- SOAP just serves as another wrapper for the message



Message Transport

```
<soap:Envelope xmlns:soap="..." xmlns:wsa="...">
  <soap:Header>
    <wsa:Action>urn:hl7-org:v3/PRPA_IN101201</wsa:Action>
    <wsa:To>http://servicelocation/PRPA_AR101202</wsa:To>
  </soap:Header>
  <soap:Body>
    <PRPA_IN101201 xmlns="urn:hl7-org:v3" ...>
      .... HL7 Message ...
    </PRPA_IN101201>
  </soap:Body>
</soap:Envelope>
```

Tools - XML

- XML – XMLSpy or Oxygen
- Invaluable to examine schemas for message documentation purposes
- Project will involve heavy use of XSLT – need for XSLT coding/debugging

Questions/Discussion?

