Simplifying HL7 Version 3 messages
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Background

- HL7 v3 offers a semantically robust paradigm for healthcare interoperability
- All models and messages derived from the HL7 Reference Information Model (RIM)
- Clinical Document Architecture (CDA) provides a standard model to define meaning of documents
- HL7 v3 has been perceived as overly complex
Obligatory design pattern of RIM-based modelling adds complexity to the ‘natural’ model
RIM-based model has typically 2-3 times more classes and associations than a conventional model
CDA has the extra complexity of templates to define meaning of discrete elements
Result is deeply-nested XML with high ratio of fixed attribute ‘overhead’ to actual information payload
Aims and objectives

- Improve semantic interoperability by simplifying deployment and reducing costs of using HL7 v3
- Shallower XML nesting, fewer fixed attributes
- Convey the payload as precisely as full v3
- Reliable two-way transforms to canonical format
- Vendors enabled to interface to simplified form
Methods

- Map disparate structures to common UML model
- Defined as XML schemas
- Tools built on Eclipse framework
- RMIM MIF imported as Ecore model
- Analyst annotates RMIM
  - Mandatory nodes
  - Nodes to flatten
  - Meaningful names for retained nodes
- Two-way transforms generated automatically
Methods

V3 RMIM (.mif) → Templated RMIM (.ecore) → Select → Rename → Annotated RMIM (.ecore)

Simple message structure (.xsd) → Simple message mappings (.mapper) → Simplified Class model (.ecore) → Full V3 message mappings (.mapper) → Full V3 message structure (.xsd)

Transform simple => full
Transform full => simple
Results

- Message simplification applied in UK project to support health and social care integration
- NHS has defined five CDA-based messages for the Care Assessment Framework (CAF)
- Simplified messages are typically about three times smaller than canonical v3 messages
Results

Canonical HL7 V3 fragment

- <entry typeCode="COMP"
  contextConductionInd="true">
  <nlpitlc:contentId
  root="2.16.840.1.113883.2.1.3.2.4.18.16"
  extension="COCD_TP146021UK06#Service" />
- <COCD_TP146021UK06.Service classCode="PCPR">
  <templateld
  extension="COCD_TP146021UK06#Service"
  root="2.16.840.1.113883.2.1.3.2.4.18.2" />
  - <code code="306238000"
     codeSystemName="2.16.840.1.113883.2.1.3.2.4.15"
     displayName="Domiciliary service need">
    - <reference value="#a3" />
  </code>
  - <effectiveTime>
    <center value="200708011420" />
  </effectiveTime>
</COCD_TP146021UK06.Service>
</entry>

Simplified HL7 V3 fragment

-<service code="306238000"
  displayName="Domiciliary service need"
  time="200708011420">
  <originalText value="#a3" />
</service>
Conclusions

- The semantic mapping approach offers a viable route to wider HL7 v3 deployment
  - Applicable to any message or document type
  - Demonstrably reliable auto-generated two-way transforms
  - Maintains RIM-based semantic precision
  - Improves ease-of-use for general interfacing
  - Extensible to model-based software development and message definitions
Future directions

- Completion of the CAF project
- Use in NHS Interoperability Toolkit (ITK) to lower barriers to CDA adoption
- Potential use to simplify the CDA-based patient summary specified in the US ‘meaningful use’ criteria for electronic health records
- Simplified model-based application architecture (‘SIMBAA’)

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Thank you – Questions please

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