



# Facilitating the Creation of Semantic Health Information models from XML Contents



## Introduction

Biomedical semantic computation and interoperability are enabled by using standard formats. Further constraining these formats unifies the exchanged data into a semantically unambiguous format that improves interoperability and makes operations on the data straightforward from a technological standpoint.

- ✓ **Using widely accepted healthcare standards**  
The HL7 v3 Reference Information Model (RIM), an ANSI and ISO-approved standard, provides a unified health data 'language' to represent complex associations between entities who play roles that participate in acts.
- ✓ **Clinical Document Architecture**  
CDA is a constrained subset of the RIM that specifies terminology-encoded structure and semantics for clinical documents. These can be serialized to XML that conforms to a published W3C XML schema.
- ✓ **Template Model**  
The CDA model is still generic in the sense that it can capture versatile clinical content ranging from discharge summaries to referral letters and operative notes. Thus, the general CDA structure is further constrained by a set of templates that are standardized by creating a template model.

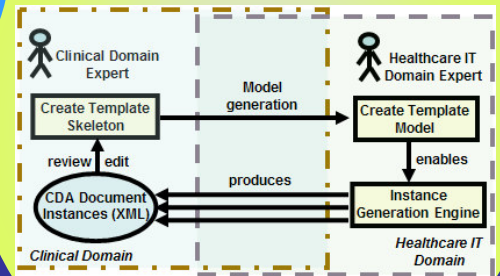
## The Challenge

A healthcare IT expert familiar with healthcare data representation standards is capable of creating health interoperability models and generating instances conforming to those models. A clinical domain expert is mostly familiar with the data instances and terminologies, and is less comfortable with representation models. Differences in orientation and skills form a gap where the clinical domain expert cannot review and edit the models, and the healthcare IT domain expert cannot get feedback for the created models.

## Our Goal

Create an effective method for allowing a feedback cycle between experts from the clinical domain and healthcare IT domain via the creation of a template model (i.e., the set of constraints used to specify a generic standard to a problem domain).

## Overview of Processes and Feedback Cycle



## Clinical Instance

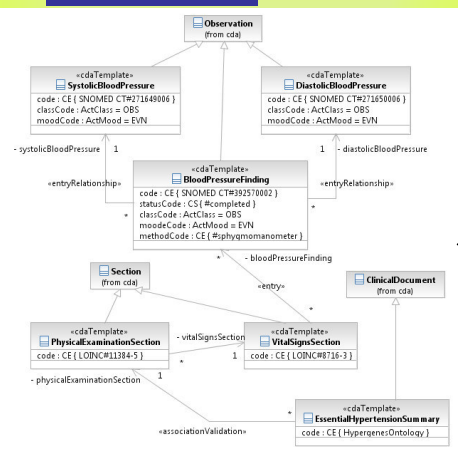
```

<observation classCode="OBS" moodCode="EVN">
  <templateId root="2.16.840.1.113883.3.18.99.1.1.8.2"/>
  <code code="392570002" codeSystemName="SNOMED CT" displayName="Blood pressure finding"/>
  <effectiveTime value="28/11/94"/>
  <methodCode displayName="sphygmomanometer"/>
  <entryRelationship typeCode="COMP">
    <observation classCode="OBS" moodCode="EVN">
      <templateId root="2.16.840.1.113883.3.18.99.1.1.8.3"/>
      <code code="271649006" codeSystemName="SNOMED CT" displayName="Systolic BP"/>
      <value xsi:type="PQ" value="159" unit="mmHg"/>
    </observation>
  </entryRelationship>
  <entryRelationship typeCode="COMP">
    <observation classCode="OBS" moodCode="EVN">
      <templateId root="2.16.840.1.113883.3.18.99.1.1.8.4"/>
      <code code="271650006" codeSystemName="SNOMED CT" displayName="Diastolic BP"/>
      <value xsi:type="PQ" value="100.5" unit="mmHg"/>
    </observation>
  </entryRelationship>
</observation>
  
```

Using a common XML editor, the clinical domain expert can modify an example instance and create an annotated minimal complete instance

## Template Model

A standard data instance is generated from the template model using a common instance generation mechanism



## Template Skeleton

```

<observation classCode="OBS" moodCode="EVN">
  <templateId root="2.16.840.1.113883.3.18.99.1.1.8.2"/>
  <code code="392570002" codeSystemName="SNOMED CT" displayName="Blood pressure finding"/>
  <effectiveTime value="@hasDate##BloodPressure"/>
  <methodCode displayName="sphygmomanometer"/>
  <entryRelationship typeCode="COMP">
    <observation classCode="OBS" moodCode="EVN" model:minCardinality="1" model:maxCardinality="1">
      <templateId root="2.16.840.1.113883.3.18.99.1.1.8.3"/>
      <code code="271649006" codeSystemName="SNOMED CT" displayName="Systolic BP"/>
      <value xsi:type="PQ" value="@SystolicBloodPressure" unit="@@units"/>
    </observation>
  </entryRelationship>
  <entryRelationship typeCode="COMP">
    <observation classCode="OBS" moodCode="EVN" model:minCardinality="1" model:maxCardinality="1">
      <templateId root="2.16.840.1.113883.3.18.99.1.1.8.4"/>
      <code code="271650006" codeSystemName="SNOMED CT" displayName="Diastolic BP"/>
      <value xsi:type="PQ" value="@DiastolicBloodPressure" unit="@@units"/>
    </observation>
  </entryRelationship>
</observation>
  
```

The transformation engine is based on an Eclipse UML2 library coupled with an API supplied by the MDHT project in open source Eclipse OHT

Contact information:  
Ariel Farkash  
IBM Haifa Research Lab  
E-mail: arielf@il.ibm.com