Protégé as a Bridge Between the Terminology and Information Model Boundary

Presentation to the 6th Annual Protégé User’s Group

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Aspects of Information

• Terminology
• Information Model
• Processing Model
• Implementation Model
‘Terminology’
From a Medical Context

• A list of code / values

• A classification scheme designed for a specialized purpose
  • ICD-9-CM
  • CPT-4
  • ...

• A full-fledged ‘ontology’ with associated terms, definitions, synonyms & the like
  • GALEN
  • SNOMED-CT
ICD-9-CM Sample

Example
SNOMED-CT Sample

Clue Browser
Terminology

• Represents a cross section of some ‘reality’

• Defines the meaning of the symbols or tokens used in various forms of discourse

• Information rich, fractal and expanding

• Managed with a variety of tools and techniques such as DL’s graphical browsers, lexical searches, etc.
Terminology
Information Model

• Selects the subset of the ‘real world’ to be discussed in a given context

• Utilizes elements in the terminology

• Tacit or explicit agreements on what is to be:
  • Ignored
  • Refined
  • Expanded and augmented

• Extends the terminology model with non-definitional characteristics
Information Model

Patient

Patient Id: <String>
Patient Name: <String>
Height: <Observation>
Weight: <Observation>

Order

Drug: <orderable drug>
Amount: <quantity>
Frequency: <time interval>

Pharmacy Orders

0..n

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Processing Model

• References Information Model Elements and Instances

• Extends the Terminology Model with non-definitional knowledge
  • Distinction is not clear
  • Continues to augment and build terminology

• Defines the rules for state changes in instances of the information model.
Implementation Model

• Defines how instances of the information model are represented

• Must be consistent with terminology, information and processing models

• Many possible ways to represent the same:
  • Symbols or tokens
  • Information
  • Processing rules
Dependencies
(Borrowing heavily from RM-ODP)
Linking Terminology and the Information Model
How Do We Link...

Patient

- Patient Id: <String>
- Patient Name: <String>
- Height: <Observation>
- Weight: <Observation>

Pharmacy Orders

- Drug: <orderable drug>
- Amount: <quantity>
- Frequency: <time interval>

Order
Linking at the Attribute Level

Patient
- Patient Id: <String>
- Patient Name: <String>
- Height: <Observation>
- Weight: <Observation>

Drug: <orderable drug>
Amount: <quantity>
Frequency: <time interval>

Order

Pharmacy Orders
Linking The Terminology and Information Model

full_immunization

See: Expression/Criterion/Presence_criterion/Intervention_presence_criterion

See: Terminological_concept/Procedure/Hep_B vs. First Hep_B
Linking Only at the Attribute Level

Issues

- Information model begins to resemble terminology model (surprise...)
- Structures may not align
- Nodes may be misinterpreted
- May make it impossible to correctly connect to the implementation...
Linking Only at the Attribute Level

Coded Concept: immunization consent
Value: refused

How does this correspond to: no consent - Hemophilus influenzae type B immunization?

How about not( full consent for immunizations)?
The Solution

• Terminology and the Information Model need to be “joined at the hip”
  • Terminology provides definitions for all parts of the information model
  • Information model and terminology definitions can be tested for compatibility
  • Information model serves to validate and extend the terminology
Linking at All Levels

Drug: <orderable drug>
Amount: <quantity>
Frequency: <time interval>

Patient Id: <String>
Patient Name: <String>
Height: <Observation>
Weight: <Observation>

Pharmacy Orders
Approach
Proposed Approach
Common Terminology Services (CTS)

- Proposed HL7 Standard
- Common Browsing and Runtime API to Terminology Content
- Enables heterogeneous implementations
The Opportunity

• Protégé provides a setting that allows the terminology model, the information model and the process model to co-exist in one common interface
  • Terminology model: Protégé / classifiers and other ontology editing tools
  • Information model: Protégé / UML
  • Processing model: Protégé / UML / ...
  • Implementation model: ?
Acknowledgements

NLM 1R01LM007319-01A1
"Development and Evaluation of Terminology Services"

NIST FAA 70NANB1H3049
“Standards-Based Sharable Active Guideline Environment”