Semantic Interoperability between Health Communication Standards through Formal Ontologies

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About Me

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Problem

- Extended communication with
- Incompatible Communication Standards
  - HL7 v2.x
  - HL7 V3
  - ...

=> find a way out!
=> Ontologies?
GCM: Generic Component Model

Domain 1
Domain 2
Domain n

Business Concepts
Relations Network
Aggregations (Basic Services/ Functions)
Details (Basic Concepts)

Domain Perspective
Development
Process Perspective
System’s Architectural Perspective

System Component Composition

System Domains
System Viewpoints

Reference Architecture
GDM: domain selection

Communication standard / formal ontology

Business Concepts
Relations Network
Aggregations (Basic Services/ Functions)
Details (Basic Concepts)

Enterprise View
Information View
Computational View
Engineering View
Technology View

Development Process Perspective

Domain Perspective

System’s Architectural Perspective

Domain n
Domain 2
Domain 1

Communication standard / formal ontology

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GSM: domain selection

enterprise View
information View
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Domains

Composition/ Decomposition

HL7 v2.1
HL7 v2.2
HL7 v3 MB #19
HL7 v3 MB #20
HL7 v3 Ed. 2005
HL7 v3 Ed. 2006
HL7 v3 Ed. 2008

Reference-Ortology
Top-Level Ontology: Reference

Diagram showing the relationship between Top Level Ontology, HL7 V2.x, and HL7 V3 through Mapping.
Top-Level Ontology: Reference

Basic Concepts for Completeness

HL7 V3 + v2.x

Mapping Details

HL7 v2.x + V3

ACGT, BFO
Tooling: automatic Conversion

HL7 v2.x DB

V2.x Ontology

conversion by program

HL7 V3 MIF Files

- D-MIMs
- CMETs
- RIM
- DataTypes
- Vocabulary

conversion by scripts/programs

Ontologies (OWL Files)

- V3
- D-MIMs
- CMETs
- RIM
- DataTypes
- Concept Domain
- Codesystem
- Value Set

OWL imports
Ontology for „Message Constituents“

- Automatic generation (by programs)
Formal Ontologies

- Provision of Reference Structure
  - Helpful: better than creating one from scratch
- Lack of granularity
  - Addition of Concepts required
Mapping Aspects

- Manual definition of mapping details
- Hierarchy
  - MapStart = anchor
  - MapPart
- Conditions
- Constraints on basic relationships
Relationships

- Ontological structure for relations is essential for success:
  - Intelligent agents!

- No such structure in BFO/ACGT
Resumee

- Conversion into Ontologies by programs
  - Possible
  - Requires overall approach: top-level ontology
- Formal Ontologies
  - Require addition of concepts
  - Lack structure for relations
- Mapping
  - Manual process (tedious)
  - Hooks in at foundation, not for message instances (XML schema mapping)
  - Prepared for intelligent agents
Thank You

for your Attention!