Ontology-Based Dimensional Data Warehouse Design

International Workshop on Ontology-Driven Software Engineering (ODiSE)

Orlando, Florida, USA - 25 October 2009
Evolution of the “Star”

(a) Sales Data

(b) Clinical Data
Clinical Data Warehouses
based on star schema dimensional models
Dimensional Anatomy Pattern (Structure)

- **Dimension Context**
  - Owner
  - Label1
  - Label2
  - Label3
  - Label4
  - Label5

- **Dimension Reference**
  - Composite
  - Code1
  - Code2
  - Code3
  - Code4
  - Code5

- **Dimension Definition**
  - Category
  - Description
  - Parent
  - Descendent
  - Type
    - Perspective
    - Origin (Top Most)
    - Depth from Parent
    - Terminus (Bottom Most)
  - Network
    - Directed Acyclic Graph
    - Hierarchy (Fiat)

- **Dimension Bridge**
  - Role
  - Rank
  - Weight

- **Dimension Group**
  - Composite

- **Fact**
  - Value
Data Warehouse Architectural Maturity Pathway

Evolution Path 1
Instantiation of additional dimensions out of the abstract generic structure.

Evolution Path 2
Reduction in fact volume enabled by expansion of dimensional capabilities (e.g. groups & bridges, hierarchies)
Basic Formal Ontology (BFO)

SNAP Continuant

Spatial Region
- 3D, 2D, 1D, 0D

Independent Continuant
- Site
- Object
- Object Aggregate
- Fiat Part of Object
- Boundary of Object

Dependent Continuant
- Quality
- Realizable Entity
- Function
- Role
- Disposition

SPAN Occurrent

Processual Entity
- Processual Context
- Process Aggregate
- Process
- Fiat Part of Process
- Boundary of Process

Spatiotemporal Region
- Scattered Spatiotemporal Region
- Connected Spatiotemporal Region
- Spatiotemporal Interval
- Spatiotemporal Instant

Temporal Region
- Scattered Temporal Region
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Clinical Data Warehouse (CDW)
- Geopolitics
- Organization
- Caregiver
- Patient
- Anatomy
- Diagnosis
- Procedure
- Material
- Facility
- Accounting
- Calendar
- Clock
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Basic Foundational Ontology (BFO)

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SPAN Occurrent

Diseases

Human Disease Ontology

Relations
Is a
Part of / Has part
Disjoint from
Union of
Inverse of

Facts

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