Case Study: Semantics
Repository for Financial Services

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Ontology Summit 2011: Making the Case for Ontology
Standardization of Terms and Definitions for Financial Services

CHALLENGE
• Industry standardization of terms and definitions
• Integration of multiple sources and feeds into disparate database structures
• Even a small financial firm has 50 – 100 separate systems each with its own data model
• Tried: XML (MDDL); UML data models (ISO 20022)
• Industry response: “We need semantics”

SOLUTION
• Semantic (conceptual) model of terms, definitions
• OWL/ODM metamodel with UML tool
• Adapted for readability
• Present draft to business SMEs for input
• Explained format to SMEs as set theory
• Reviewed via webcast, direct input to model

BENEFITS
• SMEs understood the format and contributed new knowledge on e.g. exotic structured finance
• Answered industry call for standardization of meaning
• Industry applications including mapping, master data models, messaging
• Atomic building blocks means flexibility in defining novel financial products
• Traction from regulators, for tagging of documents at source, reporting, systemic risk oversight
What went before?

- **Market Data Definition Language (MDDL)**
  - Physical messaging (XML)
    - Reaction: “Very good, but where is the semantics?”

- **ISO 20022 Financial Instrument Business Information Model (FIBIM)**
  - Logical Data Model (UML Class Model)
    - Reaction: “Very good, but where is the semantics?”

- **DTCC / Muni Bonds standard definitions**
  - Vocabulary exercise
  - Fights about words
  - Peace broke out when focused on meanings instead
    - Reaction: “Very good, but where do we book it?”
Ontology Application

- The model is a business conceptual model
- Did people understand this?
  - Some stakeholders have mature development process and understand modeling levels of abstraction
  - Some stakeholders were used to message models and would treat it as a logical data model
- Over 5+ years, industry became aware of the importance of business semantics and of having a conceptual, business facing model of facts
Modeling Tool: Enterprise Architect
Model Notation

• Decided to use OWL constructs
  – Needed decisive move away from data model-like formats
    • Define everything as a “Thing”
    • Class = set theory construct not OO class
  – This is both explainable, and understandably different to ERM or UML data model notations, thereby reducing potential misunderstandings
• BUT: OWL Tooling even more techie looking and inflexible (at the time)
  – So opted to use UML Tooling with UML language visuals off
  – Used OMG’s Ontology Definition Metamodel (early draft)
  – Needed some extension for this audience and tooling
• Added own concept of “Archetype” on top of this
Explanatory Webcast Screenshot
Review Detail Screenshot
Findings

- SMEs get the format
  - One hour presentation
- Some people coming to it cold would miss the point
  - Including data modelers
- Derivatives in particular benefited from formal semantics of contracts, transactions and commitments
- Greater appreciation of semantics in later stages of our activities

- Business SMEs can be consulted on semantics:
  - Not being a data geek does not equal inability to engage with formal model representations
MBS Proof of Concept

• Separate project
• EDM Council, ECB, IBM Research and others
• Goal: Demonstrate feasibility of tagging securities documentation semantically at source
• Motivations:
  – Financial crisis exposed gap between data and what people actually knew
  – Systemic Risk
  – Regulatory reform
    • OFR (Dodd Frank);
    • ESRB (Europe)
MBS Proof of Concept

- Semantics Repository content for MBS
- IBM Research created “Semantic Data Model” from this
- Identified equivalences between OWL constructs and data model format
- Reviewed MBS issuance processes, cashflow waterfalls
- Obtained data elements required for risk analysis systems
  - Reverse engineered into SDM
  - Reverse engineered into new SR section for Loans
  - Needed to extend this beyond one context
  - Recruited business SMEs in Loans – reviews ongoing
- Work is ongoing on Loans via SME Reviews
- Also collaborative project around the PoC deliverables
Benefits Realized

- Business Engagement
- Integration across systems
- Integration across the supply chain
- Semantic tagging as tool for systemic risk
- Future possibilities for MBS PoC works
  - Bond calculation applications using semantics
  - Systemic risk applications
  - Data centric environment for applications, enabled by semantics
Questions?