

# 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

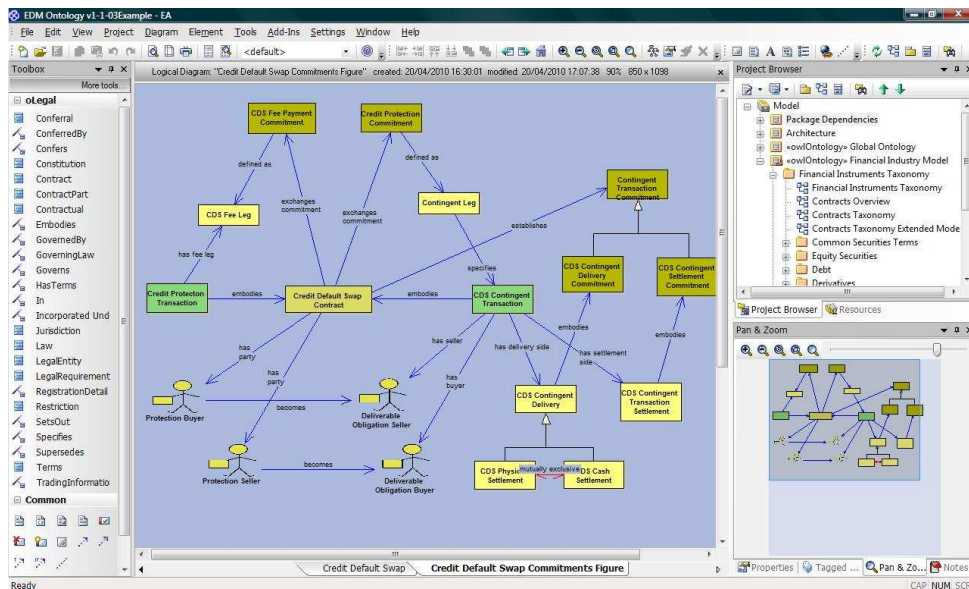
- Industry standardization of terms and definitions
- Integration of multiple sources and feeds into disparate database structures
- Even a small financial firm has 50 – 100 separate systems each with its own data model
- Tried: XML (MDDL); UML data models (ISO 2002)
- Industry response: “We need semantics”

## 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



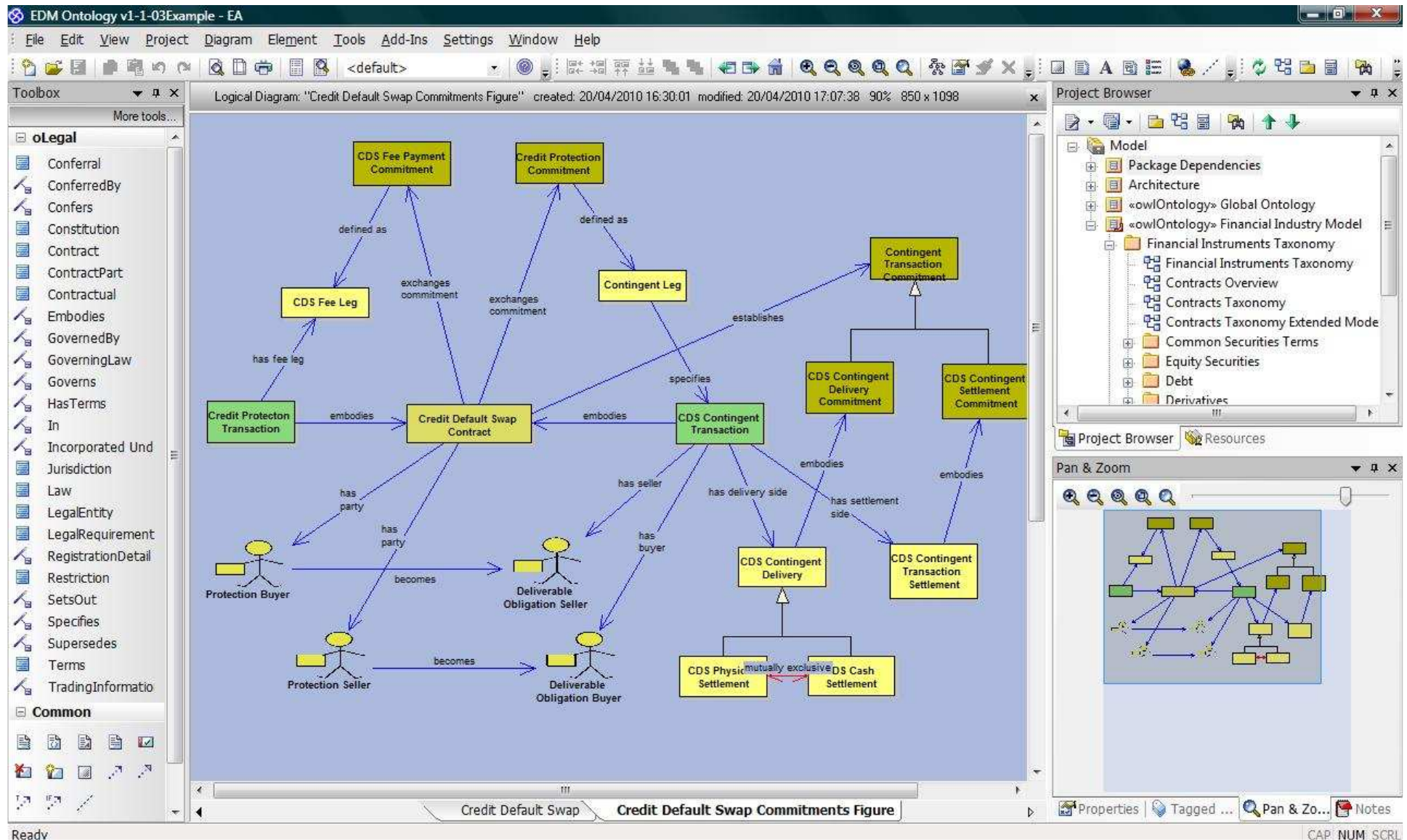
# What went before?

- 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

EDM Council Semantics Repository - Windows Internet Explorer  
http://www.hypercube.co.uk/edmcouncil/

File Edit View Favorites Tools Help  
Favorites EDM Council Semantics Repository

ENTERPRISE DATA MANAGEMENT  
**EDM COUNCIL** Semantics Repository **BETA**

## Financial Instruments Semantic Model

Overview

- Financial Instruments
  - Common Instruments
  - Equities
  - Debt
  - Rights
  - Traded Options
  - Futures
  - CIV (Funds)
  - Indices and Indicators
  - OTC Derivatives
  - Components
  - Dated Terms
  - Process Terms
  - Basic Types
  - Loans
  - Global Terms

Prepared by:  
**Hypercube**  
www.hypercube.co.uk

Money Market Future

International Depository Receipt

Share

Issued Share

Ordinary Share

Preference Share

Convertible Share

Convertible Preference Share

Participating Preference Share

Limited Partnership Unit

Bond with Warrant

Convertible Bond

Medium Term Note

CDO Note

Mortgage Backed Security Instrument

senior to

has underlying

convertible into

0..\*

mutually exclusive

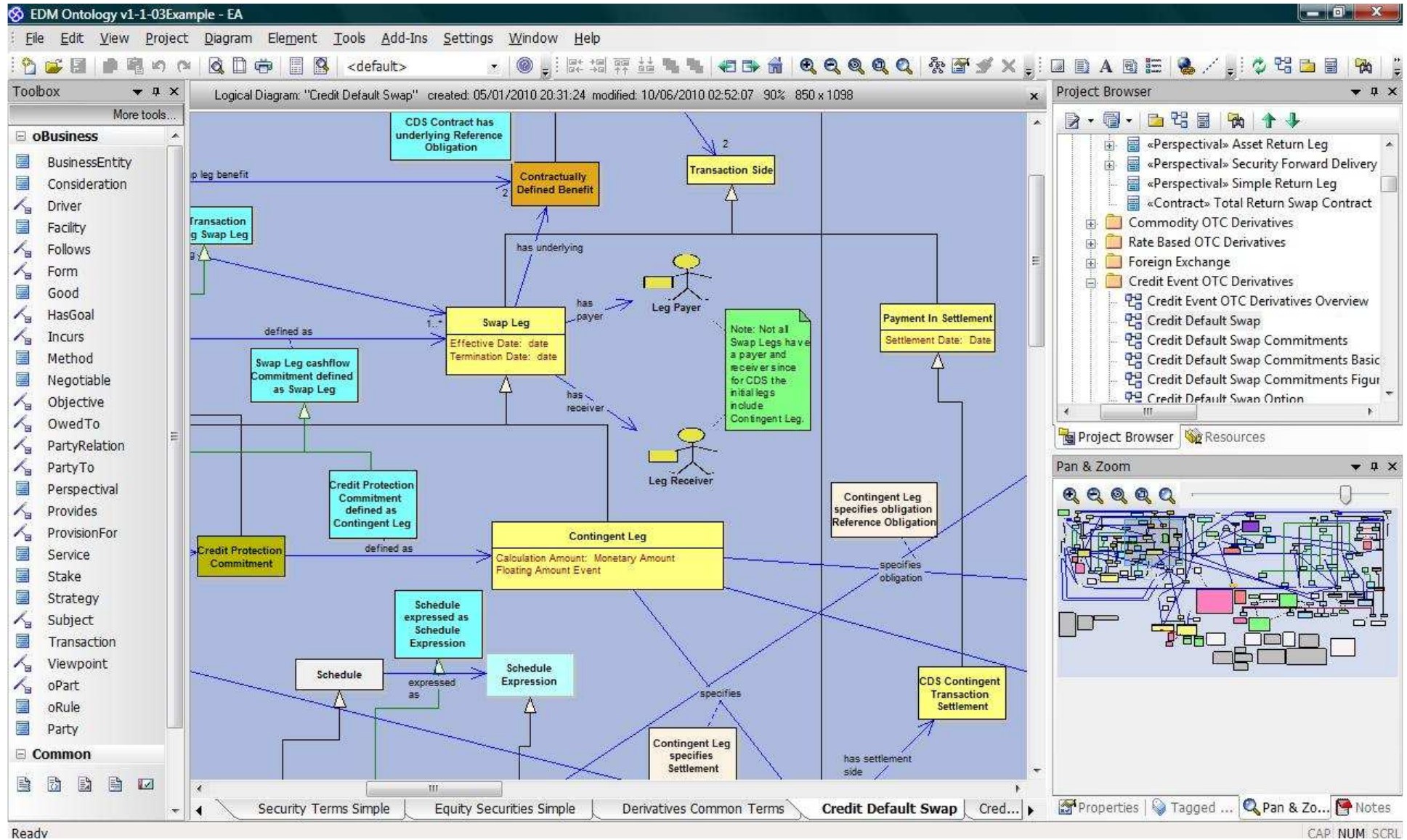
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See Debt section for further breakdown of these types of instrument.

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# 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?