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The Financial Industry Business Ontology

FIBO
Financial Industry Business Ontology

Ontology Summit 2013:

Ontology Evaluation Across the Ontology Lifecycle

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ENTERPRISE DATA MANAGEMENT
EDM COUNCIL

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Together we'll go far

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2008 Global Financial Crisis Stimulated Need for Improved Financial Data Standards

- Financial industry needs better data standards for:
  - identification of legal entities, their jurisdictions and ownership control hierarchies
  - Identification of financial contracts and instruments
  - classification and data linkage for aggregation
  - actionable risk intelligence

The Basel Committee ON Banking Supervision

"One of the most significant lessons learned from the global financial crisis that began in 2007 was that banks' information technology (IT) and data architectures were inadequate to support the broad management of financial risks. Many banks lacked the ability to aggregate risk exposures and concentrations quickly and accurately at the bank group level, across business lines and between legal entities. "

Principles for effective risk data aggregation and risk reporting
Basel Committee on Banking Supervision, June 2012

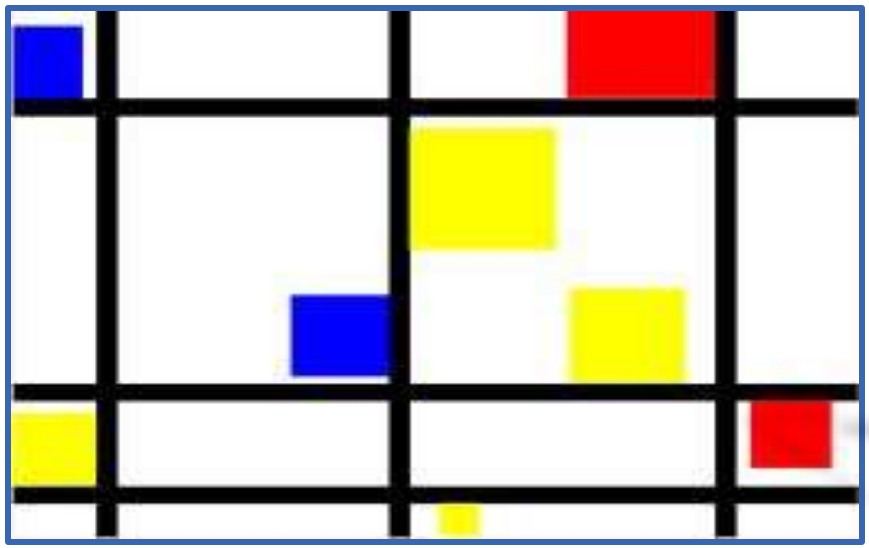
Regulatory Data Challenges

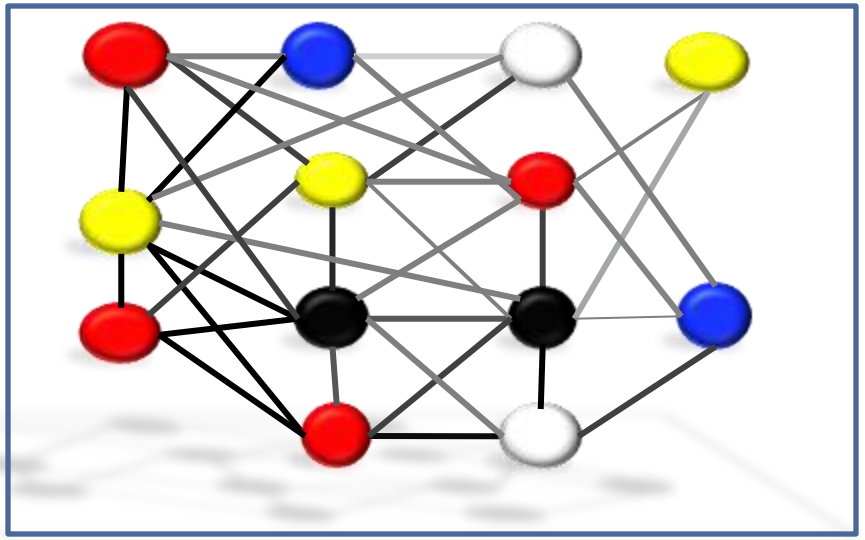
- Per FSB and Basel, global SIFIs must comply with risk data aggregation requirements by early 2016.
  - ✓ A bank should establish integrated data taxonomies across the banking group, which includes information on the characteristics of the data (metadata)
  - ✓ Risk data must be complete and captured/aggregated across the enterprise
  - ✓ Risk data must be accurate and the firm must be able to reconcile/validate reports

FSB FINANCIAL STABILITY BOARD

BANK FOR INTERNATIONAL SETTLEMENTS

Business Data Challenges





Current State of Business Data

- Data incongruity and fragmentation often found across silos
- Limited data standards
- Data rationalization problems
- Costly application program logic required to process data into concepts
- Brittle schemas are costly to change
- Rigid and limited taxonomies

Desired State of Business Data

- Data linkage and integration *despite* silos
- Open global *reusable* data standards
- Alignment based on *meaning*
- Highly expressive data schemas with built in *rules* that reflect *concepts*
- Flexible changeable schemas
- Rich multi-level taxonomies

How Should These Data Challenges Be Resolved?

- ✓ *How should financial data standards be defined?*
- ✓ *How should the financial industry tackle these risk data management, aggregation and reporting challenges?*
- ✓ *What technologies should be employed to fulfill these requirements?*

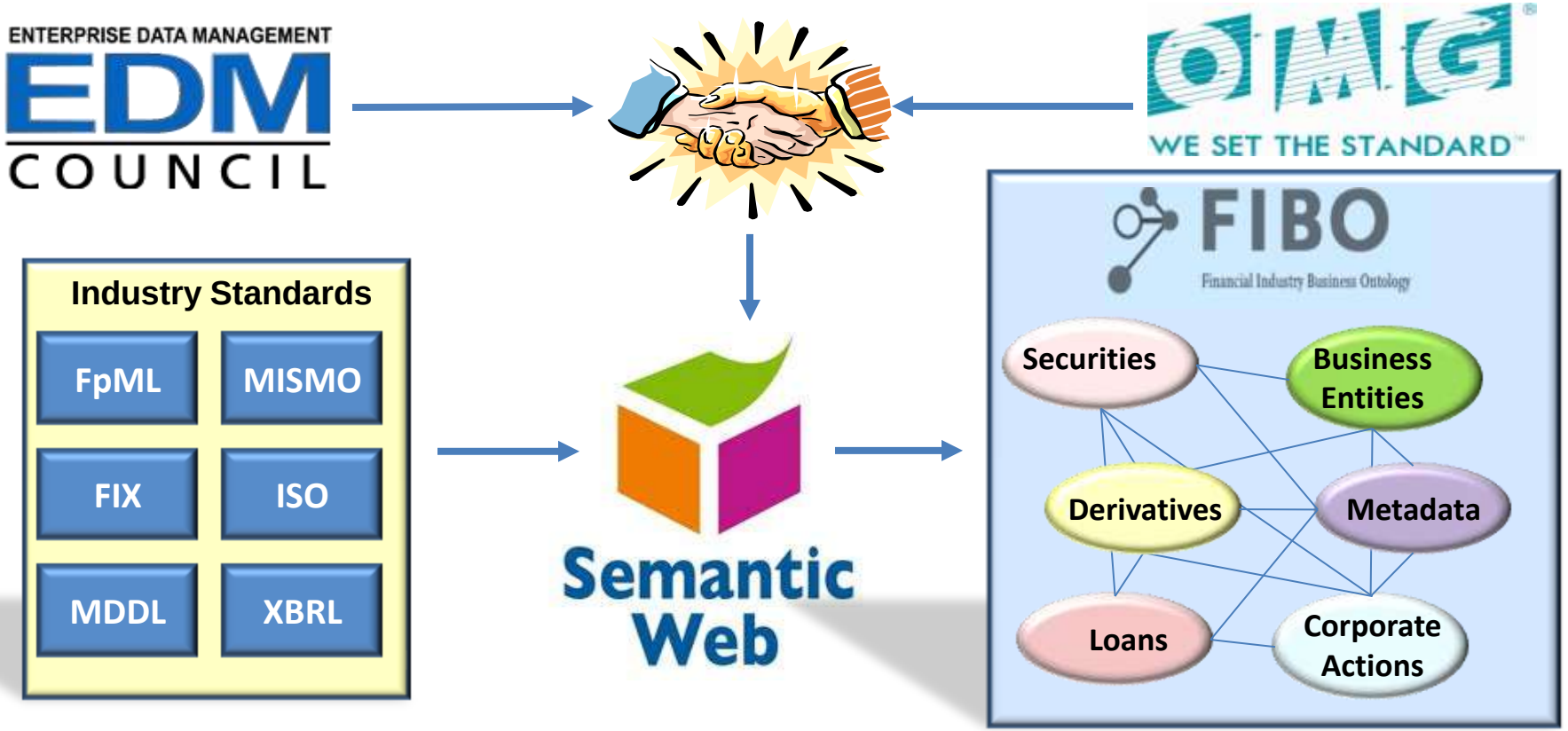
Semantic Web Technology can be Used to Resolve These Data Challenges

The Enterprise Data Management (EDM) Council and the Object Management Group (OMG) believe that semantic web technology

- is a *transformational* technology for defining financial data standards
- can map to and supplement existing legacy financial data standards
- is a prudent investment to better enable risk data aggregation and analytics
- can be implemented unobtrusively and incrementally with legacy data

FIBO: An Emerging Open Financial Industry Data Standard

Collaborative industry initiative to describe financial data standards using *semantics*



Open semantic financial data standards are exchangeable across financial institutions and regulatory authorities for data confidence, consistency and transparency

Multiple Financial Institutions are Contributing to the FIBO Standard

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✓ Wells Fargo chairs the EDM Council's Semantic Technology Program, interfaces directly with regulatory authorities and leads the working group that is responsible for constructing the operational capabilities of FIBO

✓ Institutions providing business and/or technical resources to define and develop FIBO

Bank of America

citibank

CHASE

UBS

CREDIT SUISSE

HSBC

Manulife Financial

Morgan Stanley

Fidelity INVESTMENTS

RBC

STATE STREET.

FannieMae.

Northern Trust

BARCLAYS

Goldman Sachs

Regulatory Agencies Interested in FIBO

has expressed strong interest in FIBO's instrument taxonomy and data definitions for swap rules

CFTC

have expressed interest in FIBO's taxonomy and data definitions for liquidity, stress test reporting, and living will

OFR

✓Other regulatory agencies expressing direct interest in semantic financial data standards via FIBO

SEC

OCC

FRB

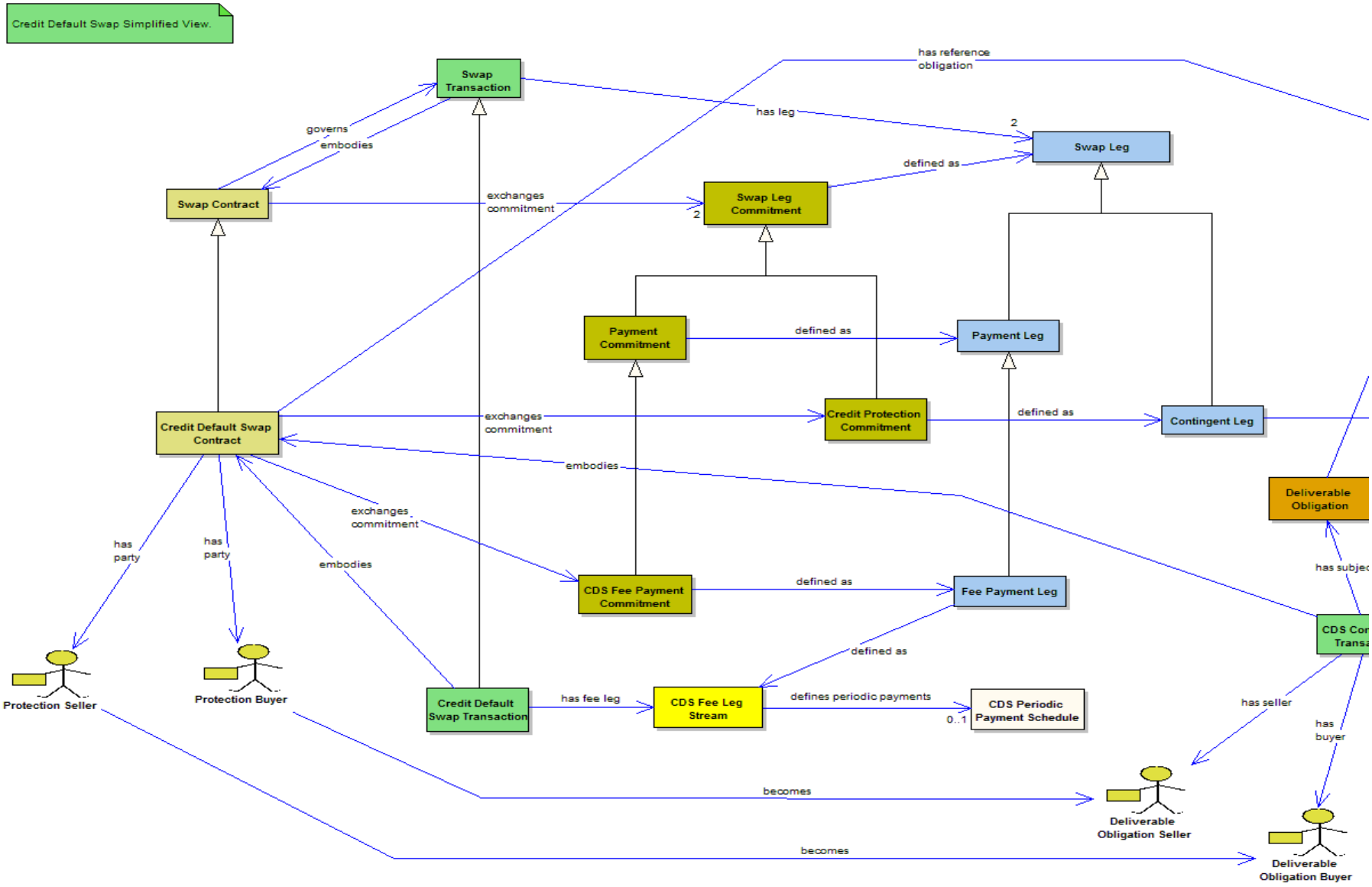
ECB

FIBO Business Conceptual and Operational Ontologies are Two Sides of the Same Coin

- **FIBO Business Conceptual Ontologies**
  - Human facing
  - Visual blueprint
  - Standard terms and definitions for business concepts
  - Broad based expressions of conceptual specifications, provenance, linkage and context of business constructs

- **FIBO Operational Ontologies**
  - Machine facing (OWL)
  - Derived from FIBO Conceptual Ontologies
  - Optimized for performance and scalability. Fewer abstractions. Inferred relations, mappings.
  - Classification, data linkage, validation and semantic query.
  - Deliver executable functionality to regulators and firms to enable data linkage, transparency and risk analytics

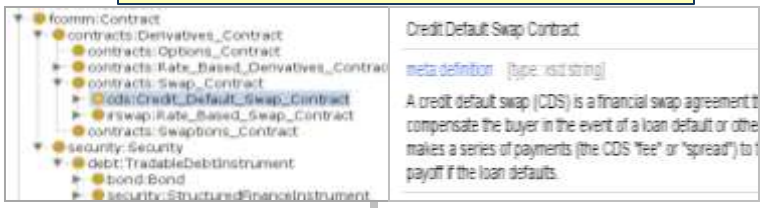
FIBO Conceptual Ontology



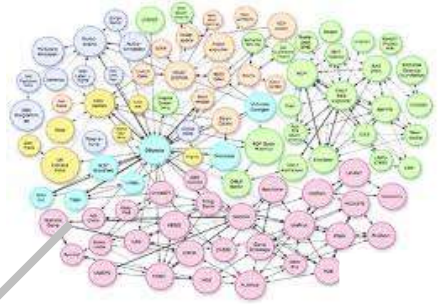
Target Operational Capabilities of FIBO

Provide risk intelligence e.g. identifying risk exposures across legal entity ownership hierarchies and their counterparties 7

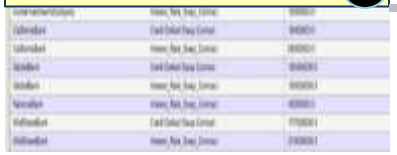
Provide standard definitions of financial contracts, concepts and business rules; financial instrument taxonomies, integrated metadata and links to related data e.g. policy and compliance rules; for human and machine consumption 1



Integrate with other global data standards to maximize commonality and reuse 2

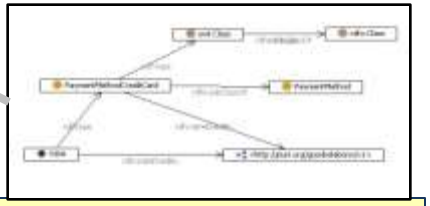


Enable risk data aggregations across multiple dimensions and taxonomies 6



FIBO

Financial Industry Business Ontology

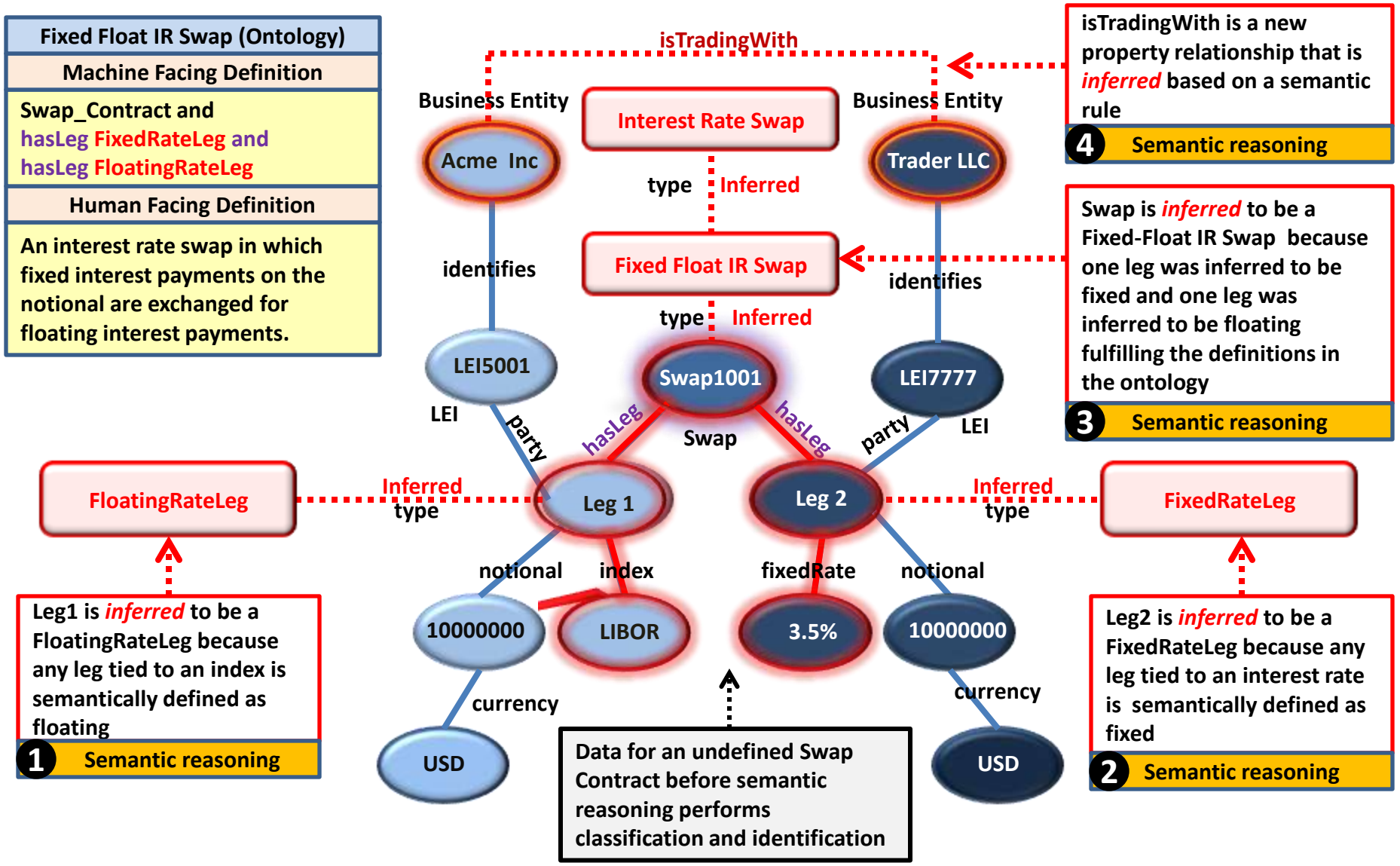


Classify financial instruments into categories and flags instruments that lack compliance to data standards to better ensure reliability and conformity 3

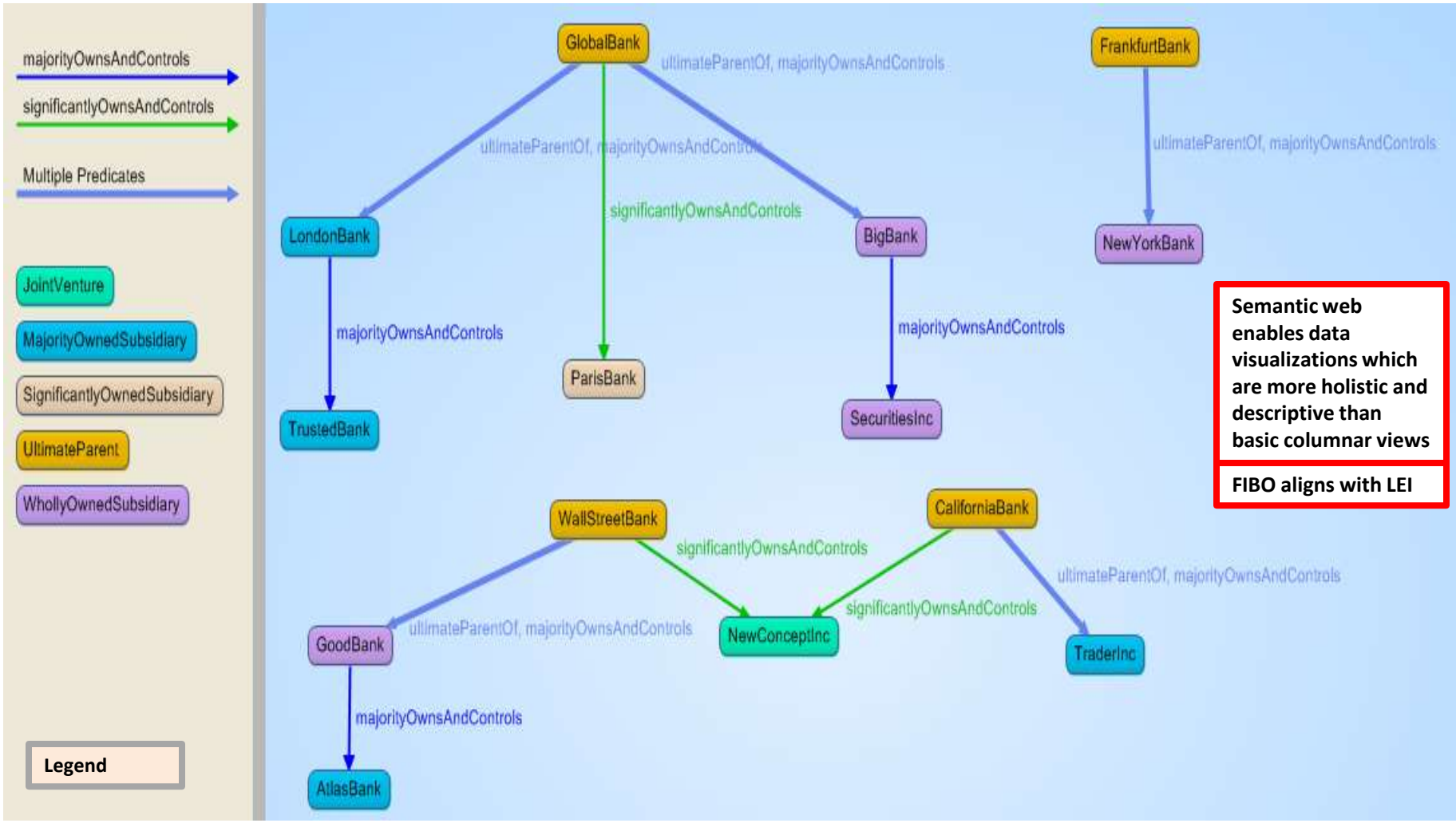
Enable visualizations for taxonomies, financial instruments, all forms of data relationships 5

Provide semantic mapping from disparate siloed data to a common business data standard for integration 4

Semantic Processing *Reasons* over Data to Infer New Meanings and Relationships

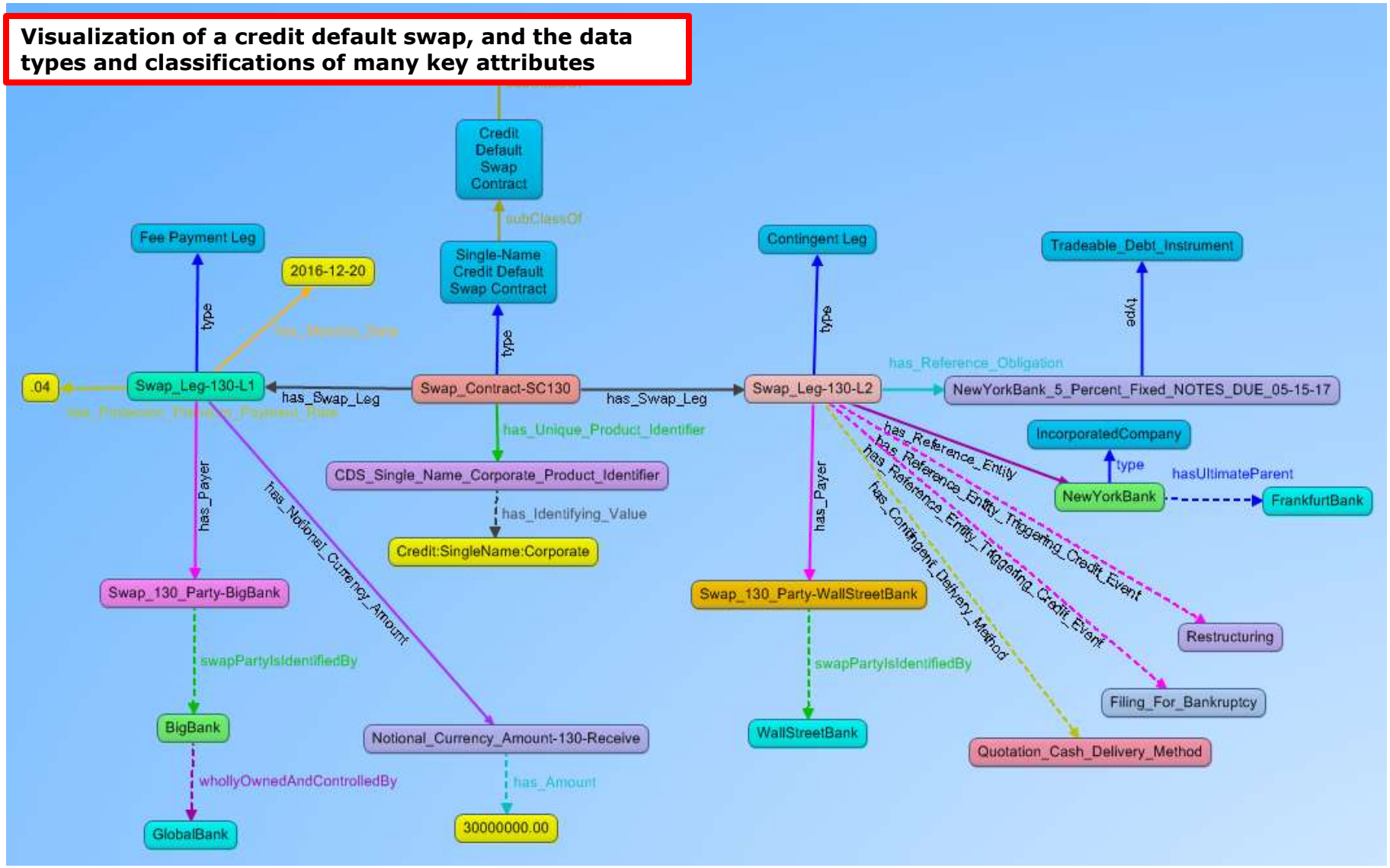


Legal Entity Ownership and Control Relationships can be Queried and Displayed



FIBO Identifies Instrument Contractual Terms and Attributes: Signature of a CDS

Visualization of a credit default swap, and the data types and classifications of many key attributes



FIBO Identifies Ultimate Parents, their Descendents and Trading Counterparties

This capability allows for the rollup of both positions and exposures of the subsidiaries to the level of the ultimate parent for risk analysis

Enter a SPARQL select or describe query in the text widget to the left, then press the Do Query button. All known namespace abbreviations will be in effect. Or

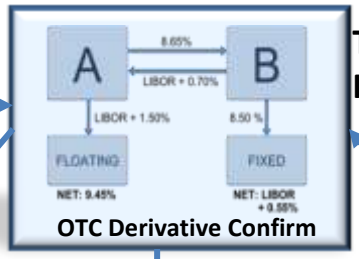
34 Results

Create Visual Graph | Add to Visual Graph | Write Text Report | Save as CSV

?ultimateParent	?descendents	?counterparty	?classification	?UPI	?USI	?notionalAmount	?currency
AcmeInvestmentsCompany		WallStreetBank	Credit Default Swap Contract	Credit:SingleName:Corporate	Swap_Contract-SC123	30000000.00	USD
AcmeInvestmentsCompany		GoodBank	Interest_Rate_Swap_Contract	InterestRate:IRSwap:OIS	Swap_Contract-SC09	10000000.00	USD
CaliforniaBank		LondonBank	Credit Default Swap Contract	Credit:SingleName:Corporate	Swap_Contract-SC143	16000000.00	USD
CaliforniaBank		AtlasBank	Interest_Rate_Swap_Contract	InterestRate:IRSwap:Basis	Swap_Contract-SC01	20000000.00	USD
CaliforniaBank		AtlasBank	Interest_Rate_Swap_Contract	InterestRate:IRSwap:Basis	Swap_Contract-SC03	25000000.00	EUR
CaliforniaBank		LondonBank	Interest_Rate_Swap_Contract	InterestRate:IRSwap:FixedFloat	Swap_Contract-SC06	10000000.00	USD
CaliforniaBank	TraderInc	AtlasBank	Interest_Rate_Swap_Contract	InterestRate:IRSwap:Inflation	Swap_Contract-SC07	30000000.00	USD
GlobalBank		WallStreetBank	Credit Default Swap Contract	Credit:SingleName:Muni	Swap_Contract-SC119	19000000.00	USD
GlobalBank	BigBank	WallStreetBank	Credit Default Swap Contract	Credit:SingleName:Corporate	Swap_Contract-SC130	30000000.00	USD
GlobalBank	BigBank	WallStreetBank	Credit Default Swap Contract	Credit:SingleName:Muni	Swap_Contract-SC122	65250000.00	USD
GlobalBank	LondonBank	WallStreetBank	Credit Default Swap Contract	Credit:SingleName:Corporate	Swap_Contract-SC121	15250000.00	USD
GlobalBank	LondonBank	CaliforniaBank	Credit Default Swap Contract	Credit:SingleName:Corporate	Swap_Contract-SC143	16000000.00	USD
GlobalBank	LondonBank	AtlasBank	Credit Default Swap Contract	Credit:SingleName:Muni	Swap_Contract-SC118	14500000.00	USD
GlobalBank	LondonBank	GoodBank	Interest_Rate_Swap_Contract	InterestRate:CrossCurrency:Basis	Swap_Contract-SC04	30000000.00	EUR
GlobalBank	LondonBank	GoodBank	Interest_Rate_Swap_Contract	InterestRate:CrossCurrency:FixedFloat	Swap_Contract-SC02	25000000.00	EUR
GlobalBank	LondonBank	CaliforniaBank	Interest_Rate_Swap_Contract	InterestRate:IRSwap:FixedFloat	Swap_Contract-SC06	10000000.00	USD
GlobalBank	SecuritiesInc	WallStreetBank	Interest_Rate_Swap_Contract	InterestRate:IRSwap:FixedFloat	Swap_Contract-SC08	20000000.00	USD
GlobalBank	TrustedBank	WallStreetBank	Interest_Rate_Swap_Contract	InterestRate:CrossCurrency:FixedFixed	Swap_Contract-SC05	15000000.00	EUR
NationalBank		WallStreetBank	Interest_Rate_Swap_Contract	InterestRate:IRSwap:FixedFloat	Swap_Contract-SC10	40000000.00	USD
WallStreetBank		LondonBank	Credit Default Swap Contract	Credit:SingleName:Corporate	Swap_Contract-SC121	15250000.00	USD

FIBO Can Play a Useful Role in Risk Intelligence

- ISDA Master Agreement
  - Schedules
- Credit Support Annex
  - Schedules



Transaction Repository, et.al.

FpML

Capture Semantics of Contractual Provisions

FIBO Ontologies

Counterparties

Events

Downgrade Counterparty Credit

Reduce Value of Collateral

Credit Rating Agency

Financial Shocks

Market Reference Data

Axioms and Rules

Identify Key Contractual Events

Classify Contract Type by Cash Flow

Identify Key Contractual Actions

Default Events

Termination Events

Increase Collateral

Transfer Payments

Infer Counterparty Transitive Exposures

Infer Capital, Liquidity Risks et al.

Classify Counterparties into Risk Categories for Analytics

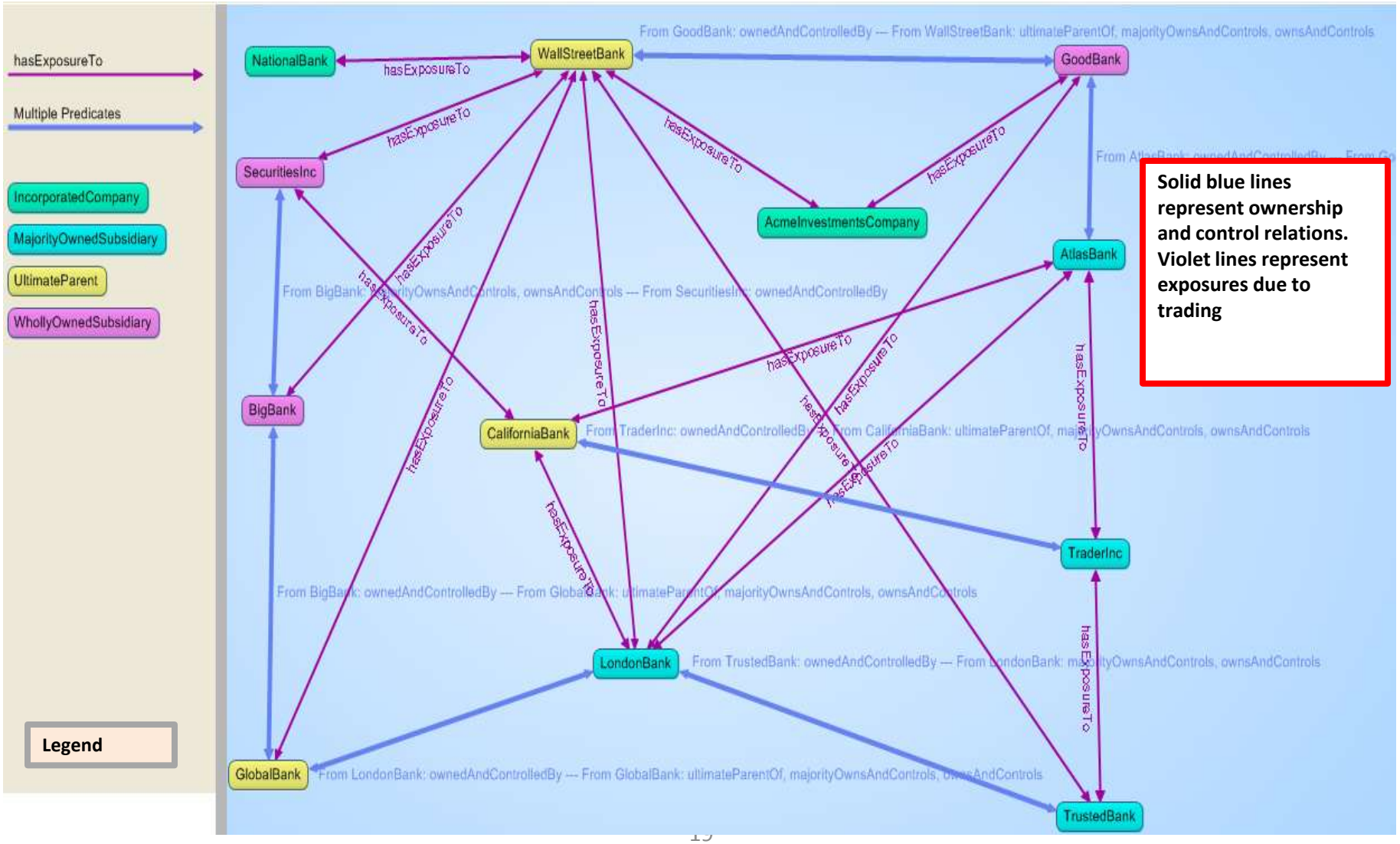
Risk Analyst

* W. Brammertz, "Unified Financial Analysis: The Missing Links of Finance", 2009

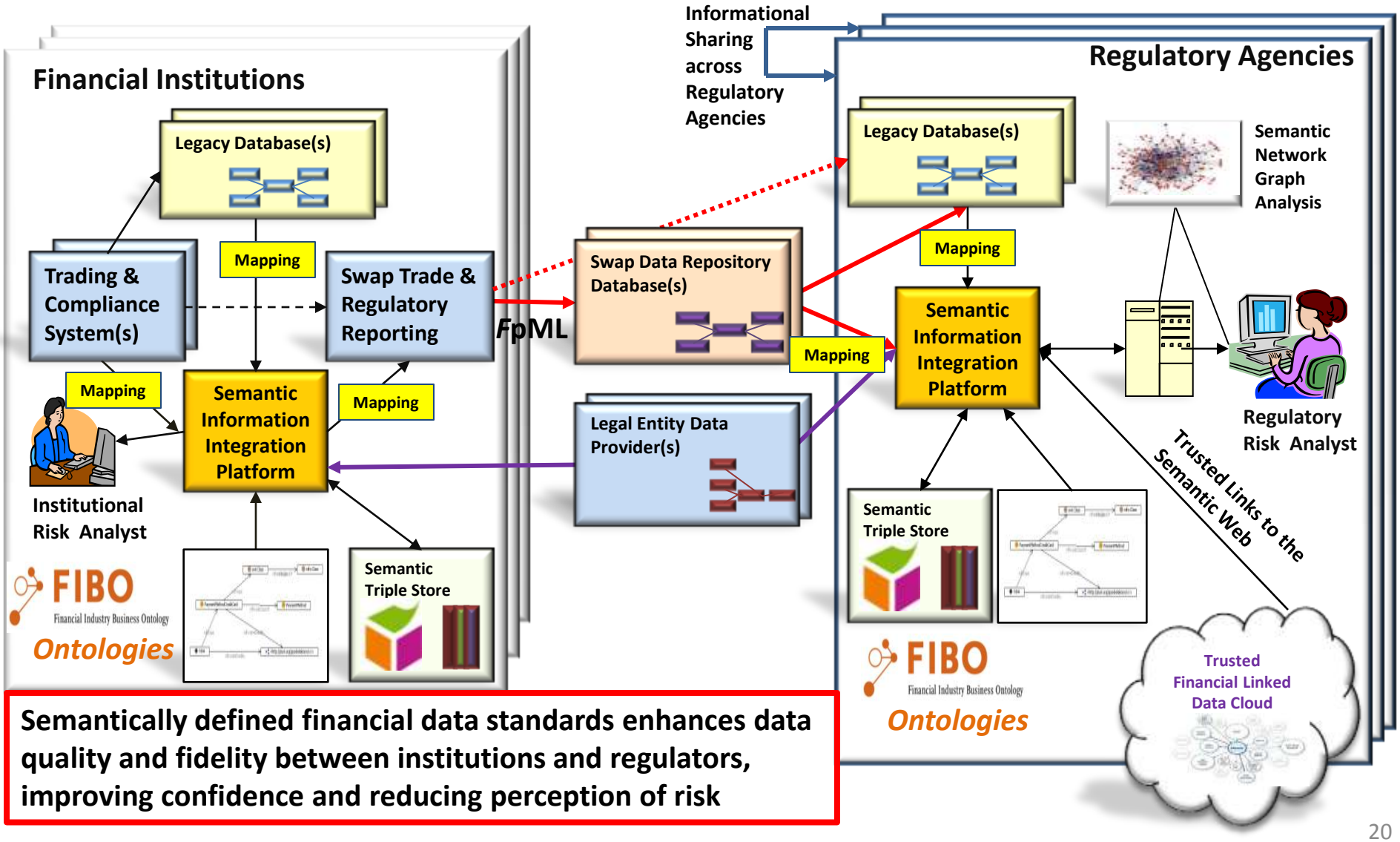
**Report on OTC Derivatives Data Reporting and Aggregation Requirements, the International Organization of Securities Commissioners (IOSCO), August 2011

***Joint Study on the Feasibility of Mandating Algorithmic Descriptions for Derivatives, SEC/CFTC, April 2011

Visualization of Ownership Hierarchies and Exposures to Counterparties

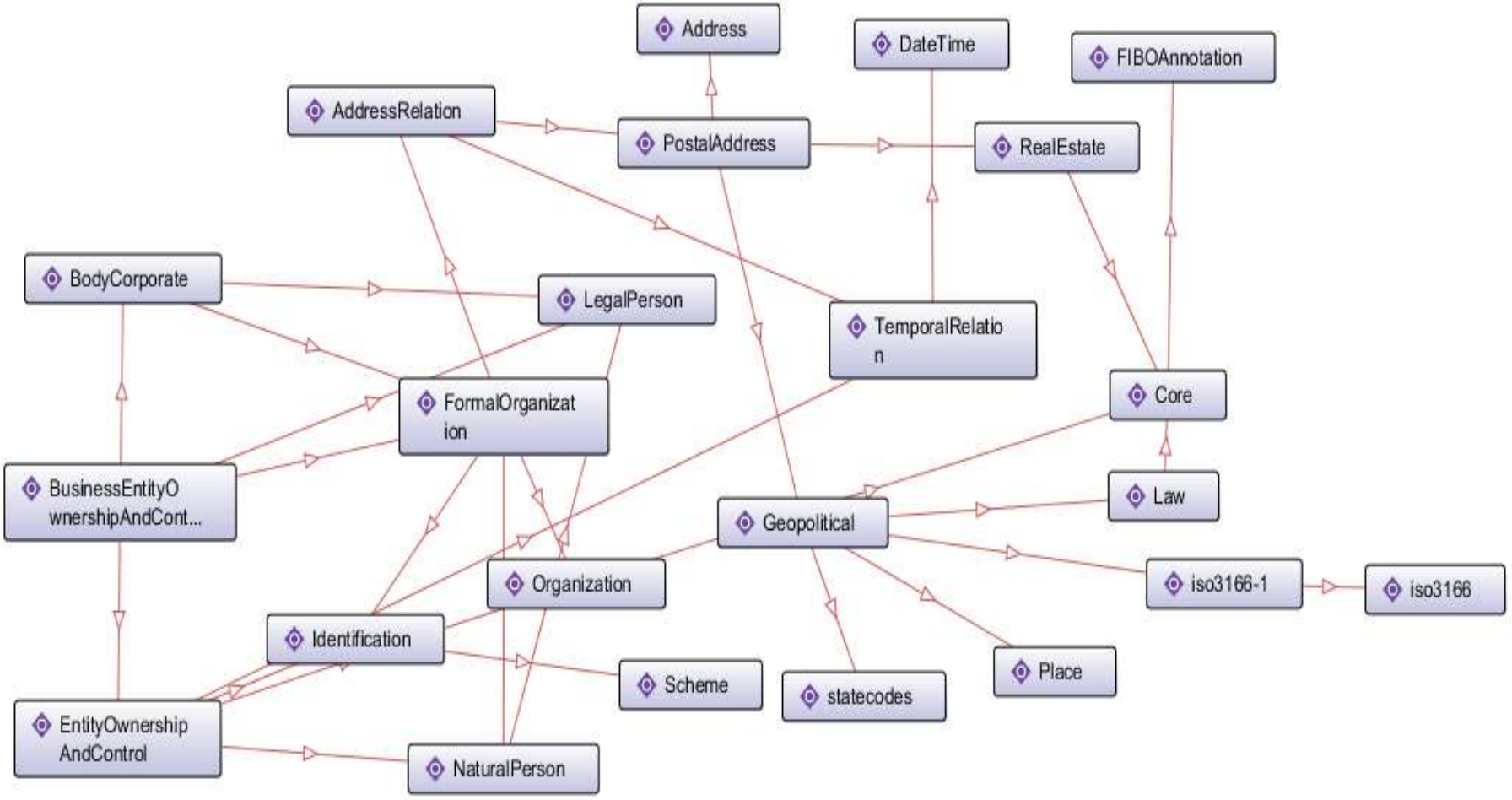


Proposed FIBO Architecture for Institutional and Macroprudential Oversight

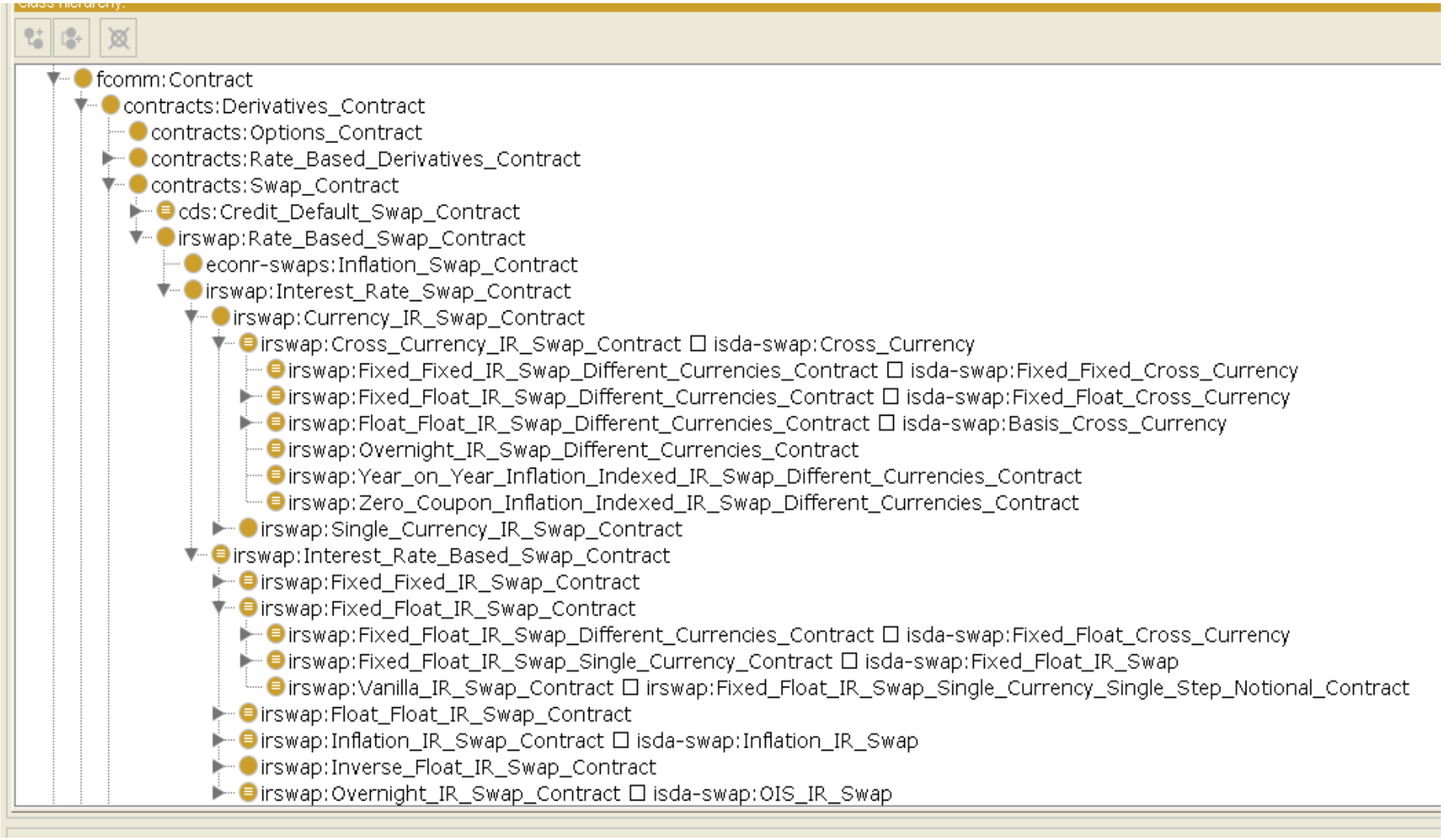


Semantically defined financial data standards enhances data quality and fidelity between institutions and regulators, improving confidence and reducing perception of risk

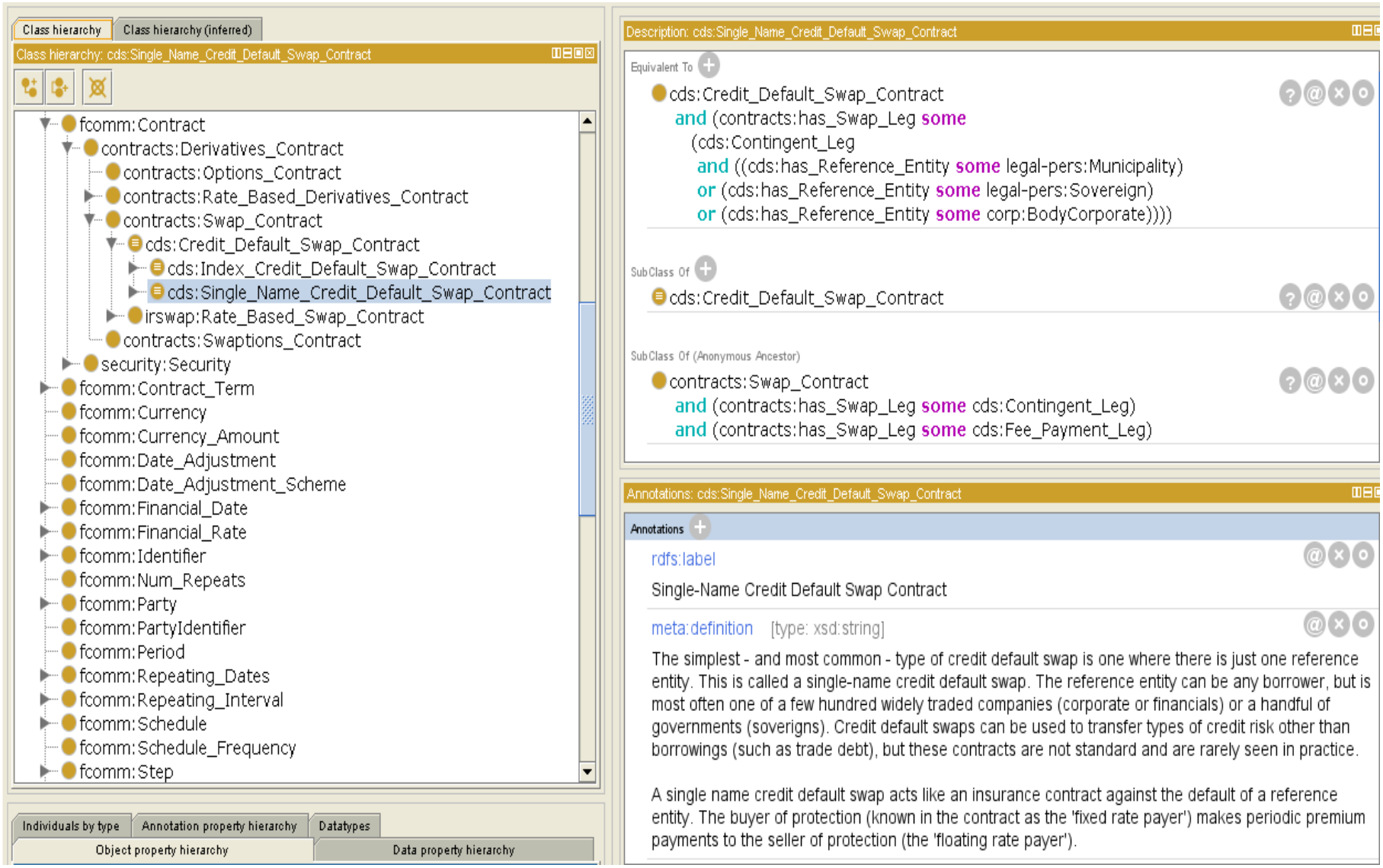
FIBO Operational Ontologies are Highly Modular and Reusable



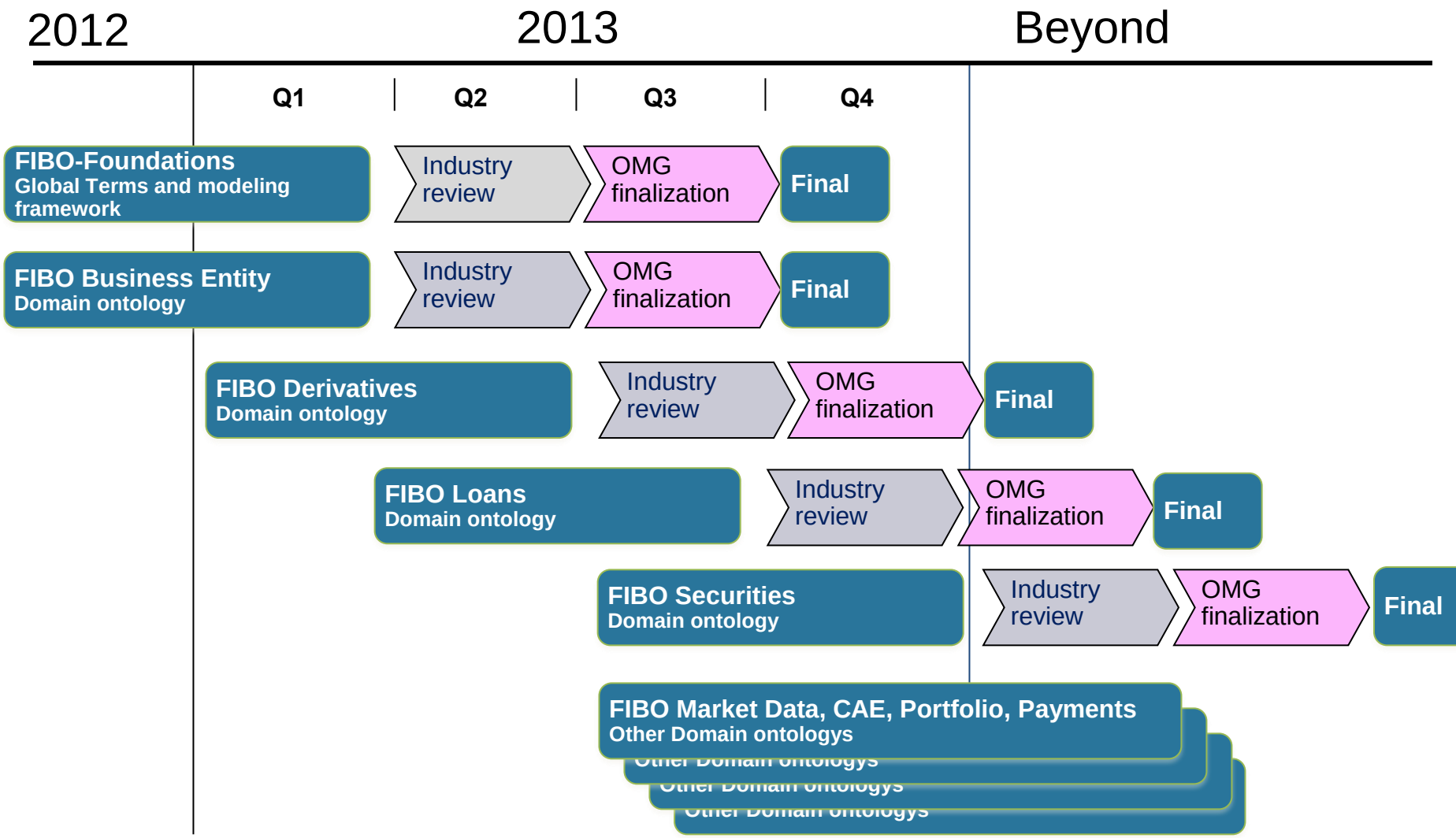
FIBO Defines Multi-faceted Poly-hierarchical Classifications of Swap Contracts



FIBO Uses OWL 2 DL to Describe Necessary and Sufficient Conditions for Contracts



FIBO Provisional Roadmap



Current Quality Measures for FIBO

- Conceptual Ontologies
  - Visual Modeling
  - Consensus input and extrinsic validation by business domain SMEs from the financial industry
  - Formal and rigorous standardization and review processes via OMG
- Operational Ontologies
  - Consensus input and extrinsic validation by technology and ontology SMEs from the financial and vendor communities
  - Validation of executable reference operational ontologies developed as prototypes of specific use cases

Intrinsic Quality Control Direction for FIBO Ontologies

- Intent is to analyze FIBO using intrinsic ontology evaluation tools depending upon availability:
  - OOPS! (OntOlogy Pitfall Scanner!) – sample tested already
  - OntoQA
  - OQuaRE
  - OntoClean
  - Other tools as they emerge