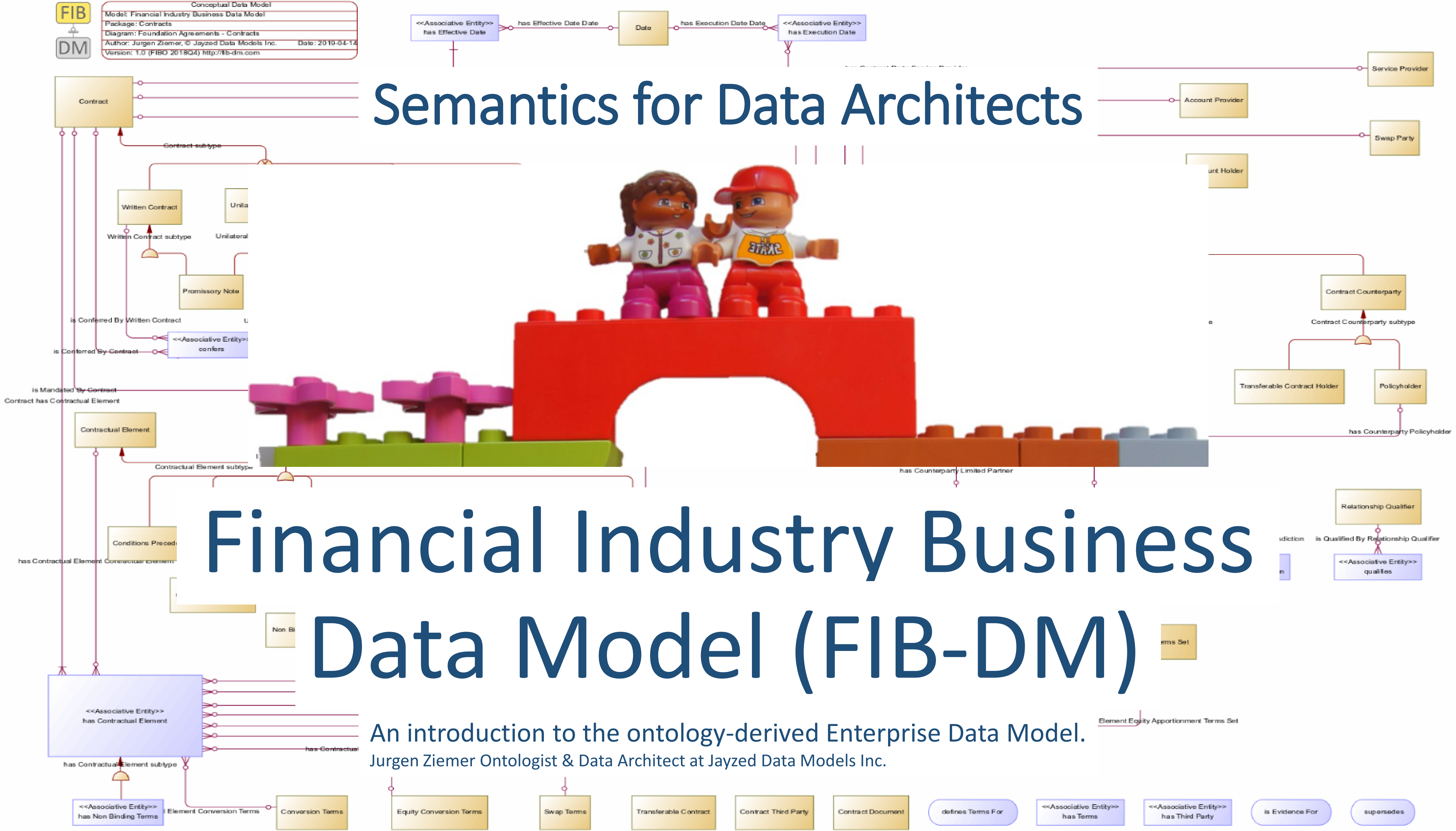
Semantics for Data Architects



FIB
DM
<<Associative Entity>> has Effective Date
has Effective Date Date
Date
has Execution Date Date
<<Associative Entity>> has Execution Date
Service Provider
Contract
Account Provider
Swap Party
Contract subtype
Written Contract
Written Contract subtype
Promissory Note
is Conferred By Written Contract
<<Associative Entity>> confers
is Conferred By Contract
is Mandated By Contract
Contract has Contractual Element
Contractual Element
Contractual Element subtype
Contract Counterparty
Contract Counterparty subtype
Transferable Contract Holder
Policyholder
has Counterparty Policyholder
has Counterparty Limited Partner
Relationship Qualifier
is Qualified By Relationship Qualifier
<<Associative Entity>> qualifies
has Contractual Element Contractual Element
<<Associative Entity>> has Contractual Element
has Contractual Element subtype
Element Equity Apportionment Terms Set
<<Associative Entity>> has Non Binding Terms
Element Conversion Terms
Conversion Terms
Equity Conversion Terms
Swap Terms
Transferable Contract
Contract Third Party
Contract Document
defines Terms For
<<Associative Entity>> has Terms
<<Associative Entity>> has Third Party
is Evidence For
supersedes

Conceptual Data Model
Model: Financial Industry Business Data Model
Package: Contracts
Diagram: Foundation Agreements - Contracts
Author: Jurgen Ziemer, © Jayzed Data Models Inc. Date: 2019-04-14
Version: 1.0 (FIBO 2018Q4) http://fib-dm.com

Financial Industry Business Data Model (FIB-DM)

An introduction to the ontology-derived Enterprise Data Model.

Jurgen Ziemer Ontologist & Data Architect at Jayzed Data Models Inc.

FIBO is the authoritative model of Financial Industry concepts, their definitions, and relations.

The Enterprise Data Management Council (EDMC) is the Global Association of over 200 Financial Institutions (FI).

- Data Management best practices
- Development and implementation of Data Standards.

EDMC members developed the Financial Industry Business Ontology (FIBO), a business conceptual model.
More than 1600 classes detail financial instruments, business entities and processes.

Finance key point

You work at a Financial Institution and already embrace model-driven development, industry standards, and reference models.

Finance business stakeholder and expert with a working knowledge of Entity-Relationship and Ontology diagrams.

Data or **Application Architect** experienced in Enterprise Reference models. You may have used FIBO design patterns and definitions.

As an **Ontologist** with an in-depth understanding of the FIBO, you already use the reference ontology for your design and want to spread adaptation across your enterprise.

Finance key point

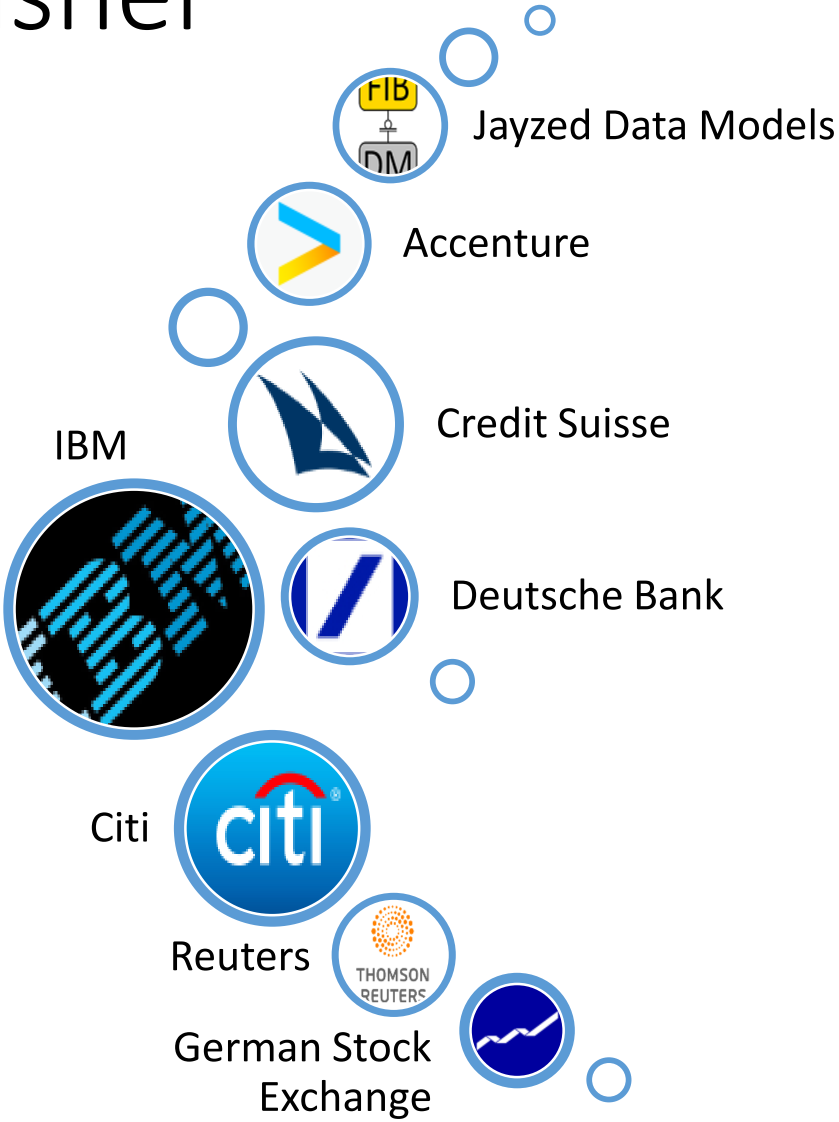
Introduction to author and publisher

Jurgen Ziemer has 20 years industry experience as a data architect and ontologist at leading Financial Institutions and service providers.

- Seven years as an IBM Software Group Consultant for the Banking and Financial Markets Data Warehouse (BFMDW) model at 45 banks in North America, Europe, and Asia.
- Four years implementing BFMDW at Citi and Deutsche Bank.
- Speaker at FIBO conferences

Jayzed Data Models Inc. is a US consulting company incorporated in 1999.

Jayzed holds the copyright to the Financial Regulation Ontologies offered under Semantic Compliance®; a USPTO registered Trademark.



Jayzed Data Models

Accenture

Credit Suisse

IBM

Deutsche Bank

Citi

Reuters

German Stock Exchange

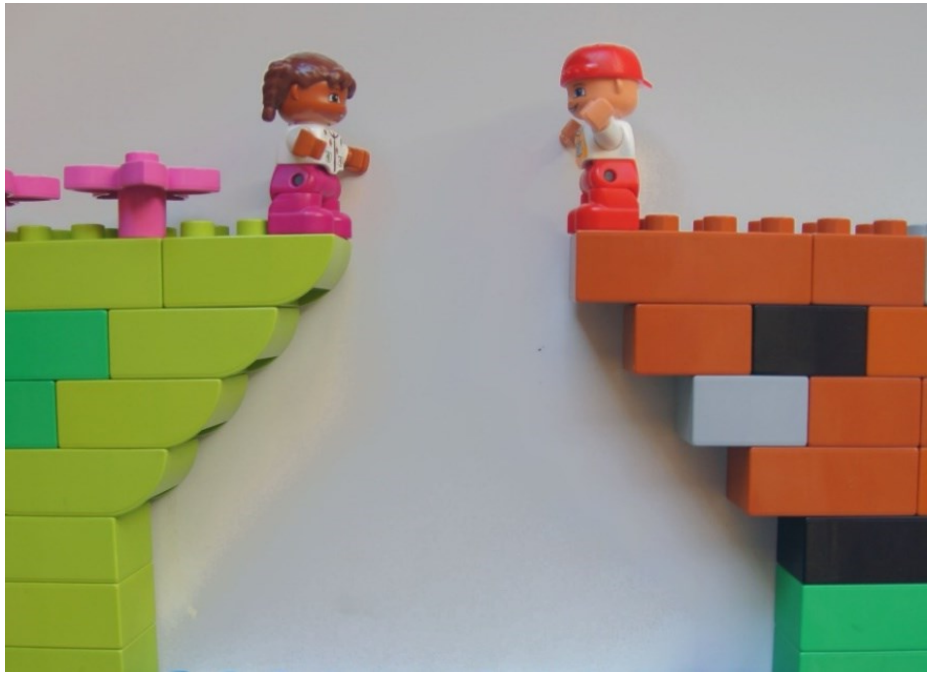
Finance key point

There is a chasm between semantic and conventional data management.

The EDMC specified FIBO in Ontology Web Language (OWL).

FIBO is comprehensive with detailed coverage of business entities, loans, securities, derivatives, and indicators.

Large financial institutions started implementations on RDF ("triple") stores



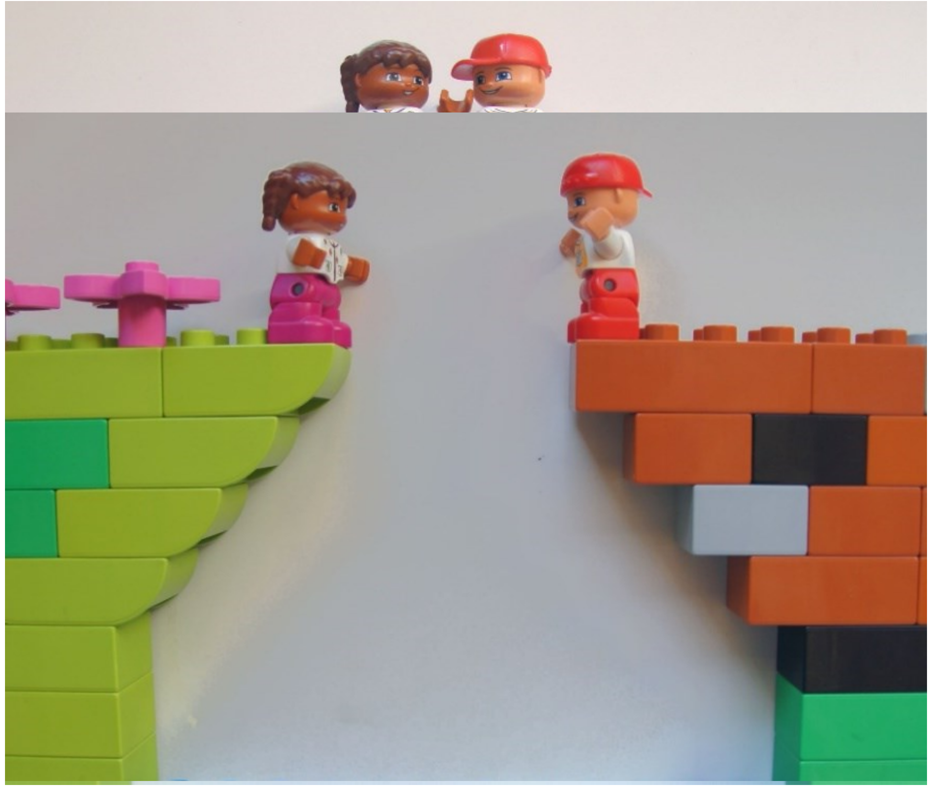
OWL needs highly specialized ontologists.

Many banks and investment managers don't have the expertise inhouse.

IT-departments must still support and design conventional databases.

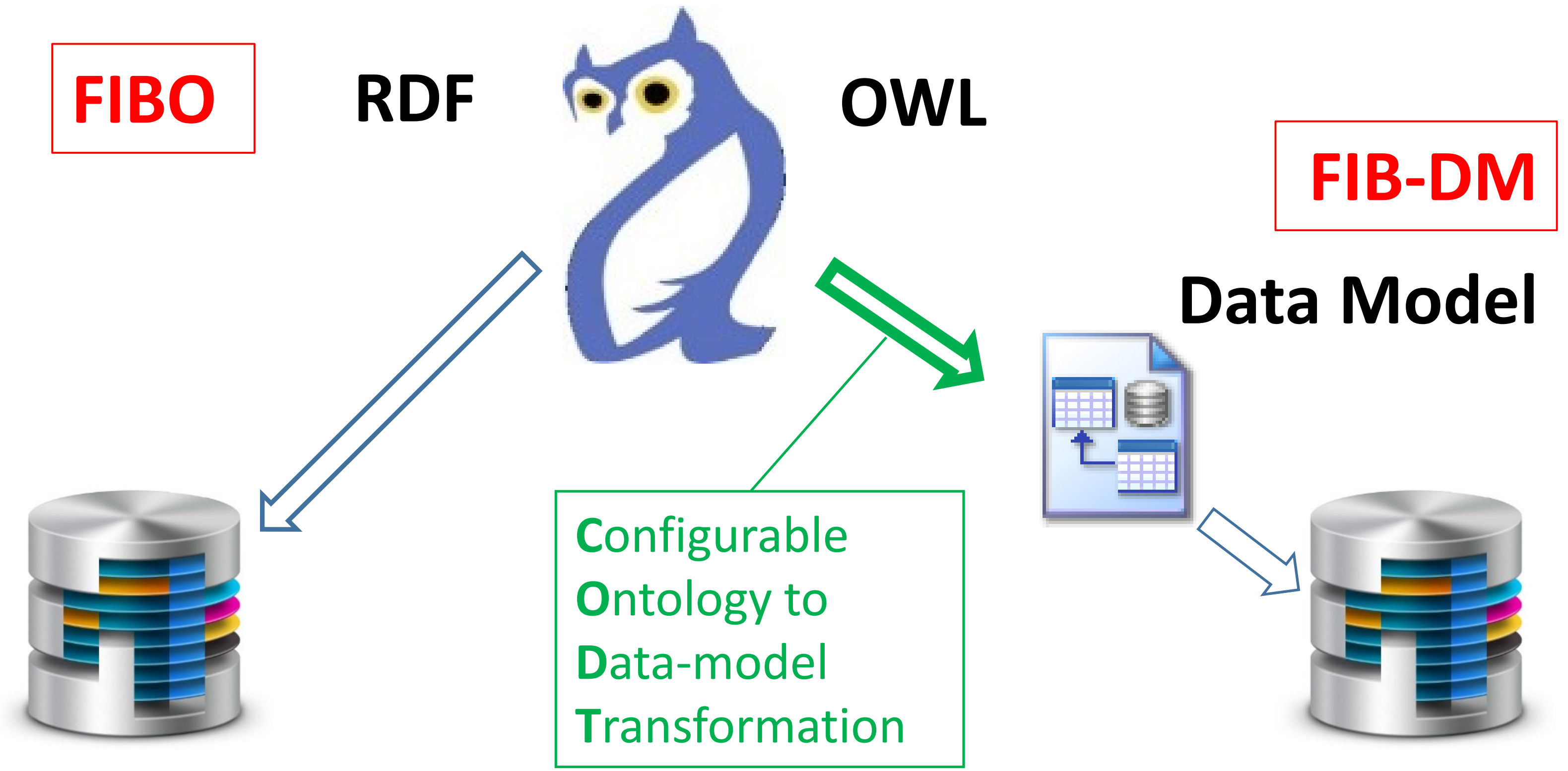
Finance key point

FIB-DM is the bridge across the chasm.



Finance key point

The ontology transformed into a data model leverages the design for relational databases.



FIBO

RDF

OWL

FIB-DM

Data Model

Configurable
Ontology to
Data-model
Transformation

Semantic Triple Store

Relational Database

Finance key point

What is the challenge? (stories)

NY Bank needs Schema for new Security Master System; trying to leverage FIBO for Logical Data Model..

Challenge: Data Architects are not familiar with RDF/OWL and have no experience in Protégé or Topbraid
Workaround: Ontologist writes SPARQL queries to extract metadata into MS-Excel spreadsheets.

Update: **In September, the NYC bank downloaded FIB-DM core.**

CT AIM with Hedge Fund Ontology SEC Form PF assessments needs a relational platform

Challenge: Converting operational ontology of some 200 FIBO and hedge fund specific classes
Workaround: Manual transcription of graphs into ERWin diagrams. Some metadata extract and import.

- Looking for tooling, Protégé and Topbraid do not export LDMs.
- ERWin and PowerDesigner have no import for RDF/OWL.
- Only two less widely used data modeling tools, Sparx Enterprise Architect and IBM Infosphere Data Architect import RDF XML.

Current tooling imports are not fit for purpose

The first FIBO versions were in Sparx EA. Sparx may be used to create ontology diagrams.

URIs as entity names

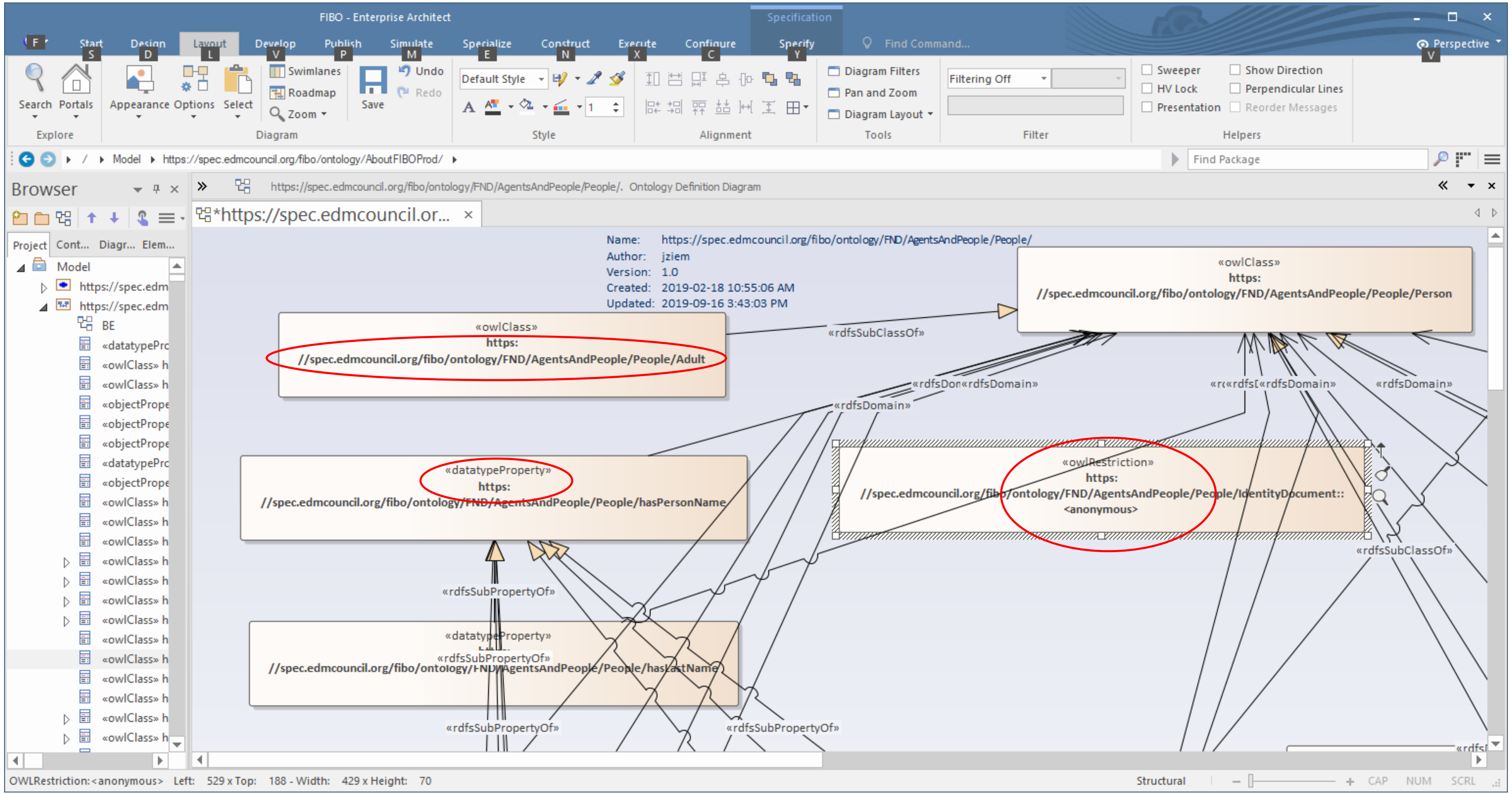
Datatype properties become classes

Class restrictions become anonymous pseudo classes

No import of annotation properties

Infosphere Data Architect aborted.

So I encoded my own custom transformation process.



Name: https://spec.edmcouncil.org/fibo/ontology/FND/AgentsAndPeople/People/
Author: jziem
Version: 1.0
Created: 2019-02-18 10:55:06 AM
Updated: 2019-09-16 3:43:03 PM

OWLRestriction:<anonymous> Left: 529 x Top: 188 - Width: 429 x Height: 70

Data Architect

Ontologist

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Financial Industry Business Data Model

FIB DM = FIBO Financial Industry Business Ontology *in* SAP POWERDESIGNER

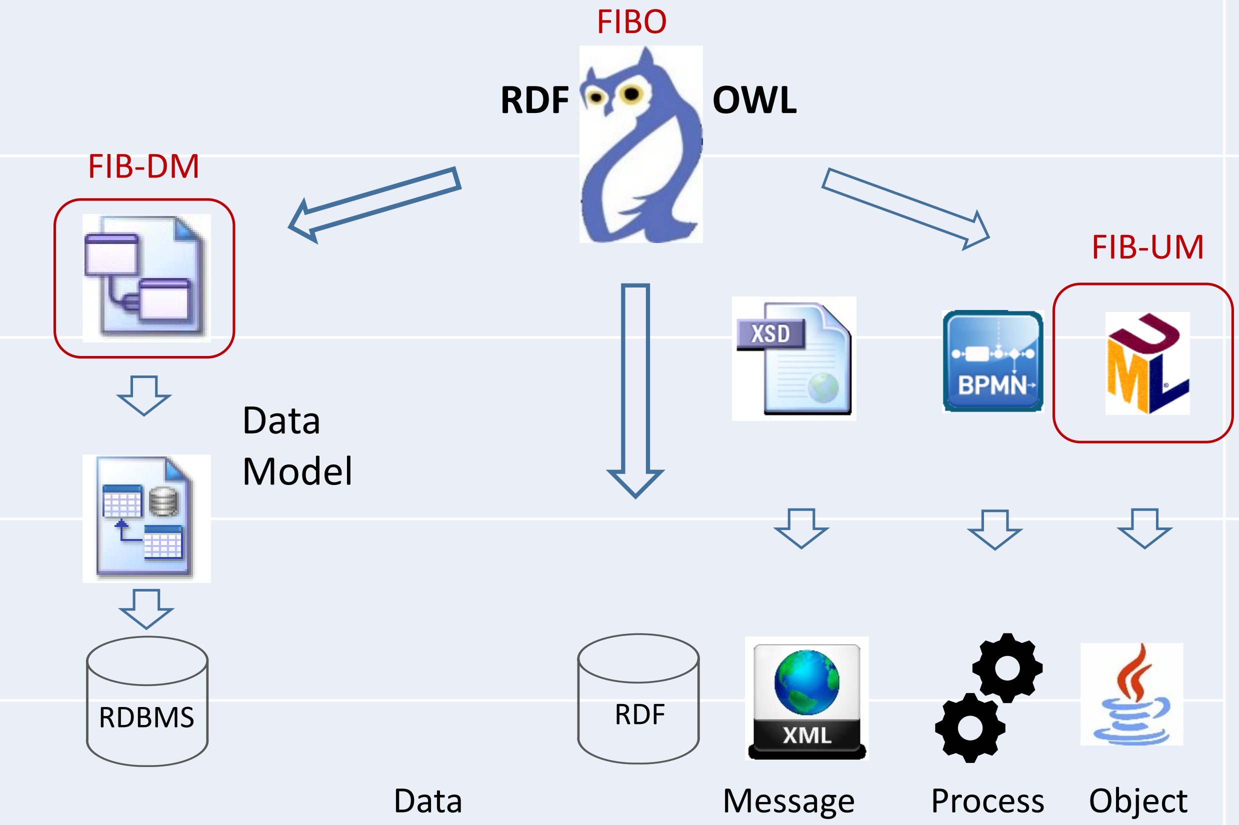
(and other data modeling tools)

- Financial Industry Business Data Model of 1875 Entities, complete definitions, annotations, and axioms (business rules).
- Data Architects leverage the full content of the Industry Standard.
- **Common Language and design patterns for Semantic & Relational databases.**

Finance key point

Semantic Enterprise Architecture

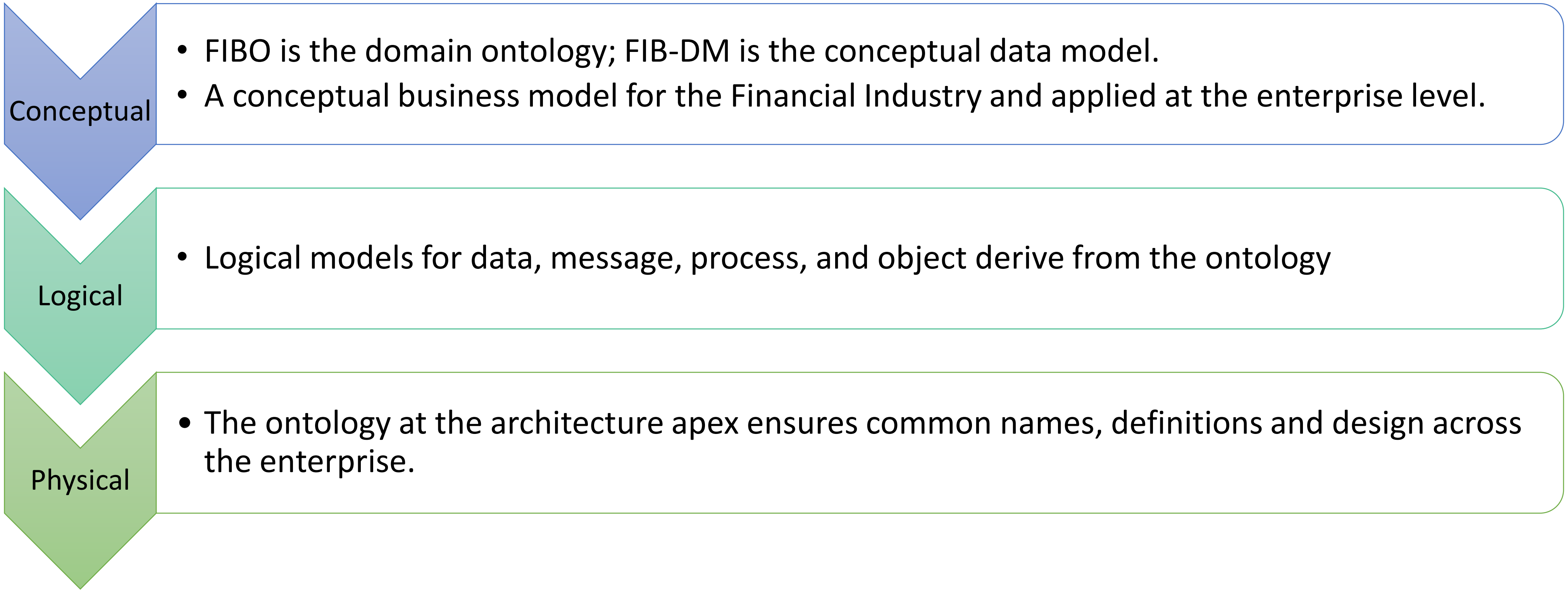
Use	Type	Level
Business	**Conceptual**	**Enterprise**
Design	Logical	Department
Development	Physical	Project
	Implementation	



Finance key point

https://fib-dm.com

Semantic Model-Driven Development



Conceptual

- FIBO is the domain ontology; FIB-DM is the conceptual data model.
- A conceptual business model for the Financial Industry and applied at the enterprise level.

Logical

- Logical models for data, message, process, and object derive from the ontology

Physical

- The ontology at the architecture apex ensures common names, definitions and design across the enterprise.

- Midsize Financial Institution without Semantic Technologies yet, adopt FIB-DM, a compatible enterprise model.
- Large institutions use CODT to transform their inhouse ontologies into data models for downstream implementation.

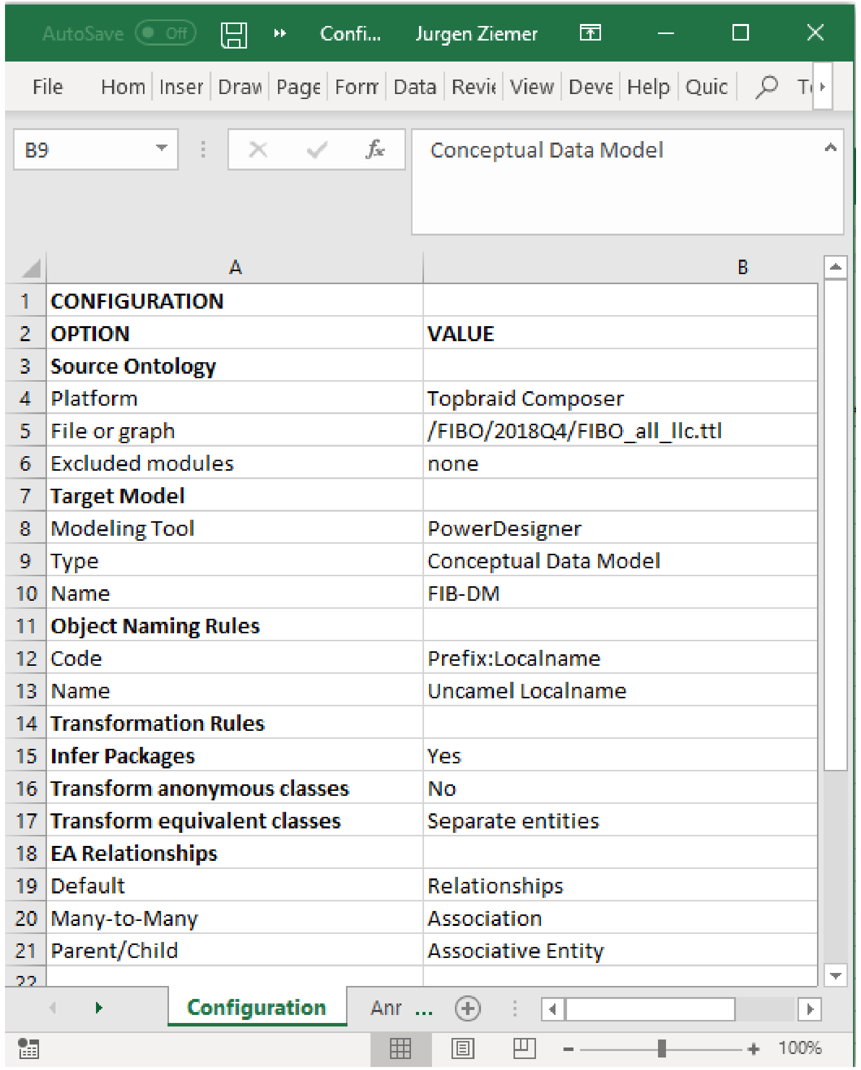
Finance key point

Transformation principles & considerations for the derived data model

1. The model must be **practical**.
   Overly normalized designs become too abstract for business users and developers.
2. The model must be **complete**.
   We don’t want to miss information from the ontology
3. The model has complete **documentation**. The **diagrams** depict all subject areas and design patterns.
4. The model **maps** back to its source, the ontology

Configurable Ontology to Data-model Transformation

- Source Ontology with connection parameters
- Target tool and model
- Name translation rules
- Ontology module
- Anonymous and equivalent classes
- Object properties
- Data properties
- Annotation List
- Inverse property list.



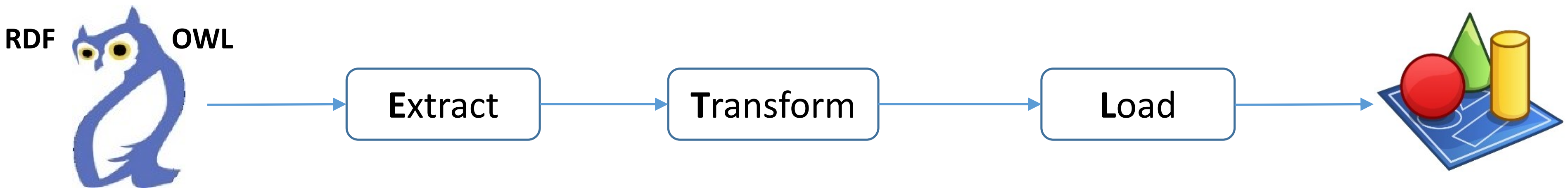
B9: Conceptual Data Model

	A	B
1	**CONFIGURATION**	
2	**OPTION**	**VALUE**
3	**Source Ontology**	
4	Platform	Topbraid Composer
5	File or graph	/FIBO/2018Q4/FIBO_all_llc.ttl
6	Excluded modules	none
7	**Target Model**	
8	Modeling Tool	PowerDesigner
9	Type	Conceptual Data Model
10	Name	FIB-DM
11	**Object Naming Rules**	
12	Code	Prefix:Localname
13	Name	Uncamel Localname
14	**Transformation Rules**	
15	**Infer Packages**	Yes
16	**Transform anonymous classes**	No
17	**Transform equivalent classes**	Separate entities
18	**EA Relationships**	
19	Default	Relationships
20	Many-to-Many	Association
21	Parent/Child	Associative Entity

Finance key point

From FIBO to FIB-DM, to FIBUM – how does CODT work?

The Configurable Ontology to Data-Model Transformation is basic ETL.

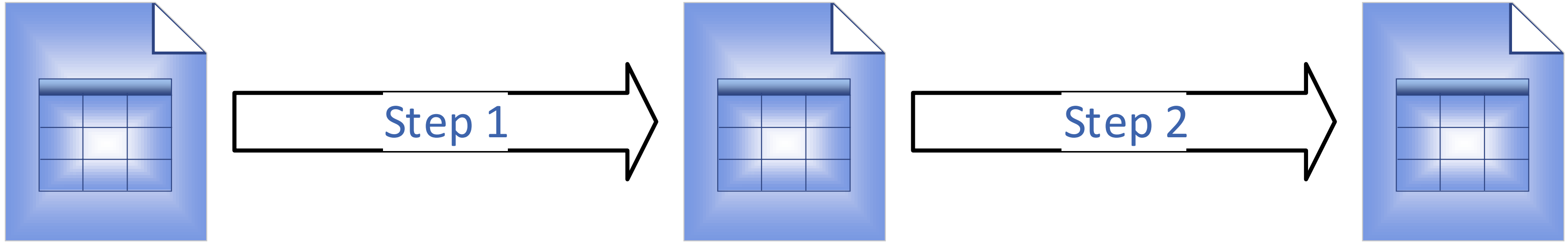


We extract metadata from the source ontology, transform ontology metadata into conceptual data model metadata, and load into the data modeling tool, PowerDesigner.

The extract process runs SPARQL on the ontology to get the metadata. PowerDesigner imports MS-Excel workbooks. The Transformation in between is a 2-step process using the patent-pending *Metadata Sets*.

The CODT Metadata Sets.

The Extract process populates the Ontology Metadata Sets for classes, object-, data properties, and annotations.



Ontology
Metadata Set

Generic
Entity Relationship
Metadata Set

Tool-specific
Metadata Set

Step one transforms the ontology metadata and populates the generic ER representation. The Tool-specific metadata set is in PowerDesigner format. We serialize as MS-Excel and directly load it into the tool. Step two is a simple conversion from generic ER to PowerDesigner objects, properties, and extended attributes.

Transformation settings for Domain Ontologies

CODT, the patent-pending **C**onfigurable **O**ntology to **D**ata Model **T**ransformation enables the ontologist and data architect to control the process and mapping.

Configurable
Ontology to
Data-model
Transformation

PATENT
PENDING

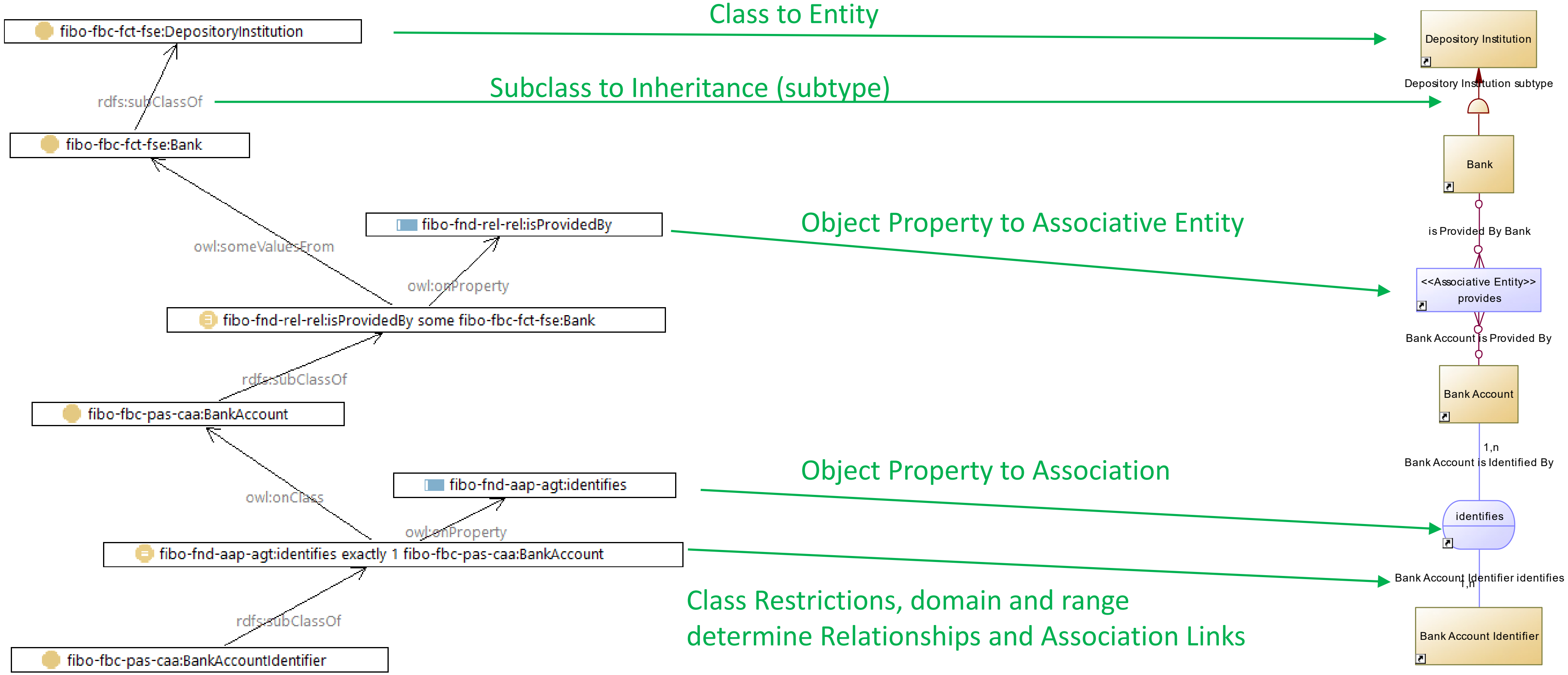
To transform a domain ontology into a practical enterprise data model, we set:

- Anonymous classes do not transform into entities.
  The setting is to remove the clutter of entities that never become physical from the model. FIB-DM preserves anonymous classes used in class restrictions in the documentation.
- Names transform from OWL Camel Case to LDM English Names (capitalization and spaces). E.g. `fibo-fbc-fct-fse:DepositoryInstitution` becomes *Depository Institution*
- Object Properties transform to PD Associations and Associative Entities (not simple relationships). This preserves the semantically important object property hierarchy and resolves open-world properties. Domain and Range, Class Restrictions determine parent and child entities related to the association/ associative entity.

Ontologist

From FIBO to FIB-DM

Ontology graph **Transformation/mapping** **Conceptual Data Model**



fibo-fbc-fct-fse:DepositoryInstitution

rdfs:subClassOf

fibo-fbc-fct-fse:Bank

owl:someValuesFrom

fibo-fnd-rel-rel:isProvidedBy

owl:onProperty

fibo-fnd-rel-rel:isProvidedBy some fibo-fbc-fct-fse:Bank

rdfs:subClassOf

fibo-fbc-pas-caa:BankAccount

owl:onClass

fibo-fnd-aap-agt:identifies

owl:onProperty

fibo-fnd-aap-agt:identifies exactly 1 fibo-fbc-pas-caa:BankAccount

rdfs:subClassOf

fibo-fbc-pas-caa:BankAccountIdentifier

Class to Entity

Subclass to Inheritance (subtype)

Object Property to Associative Entity

Object Property to Association

Class Restrictions, domain and range determine Relationships and Association Links

Depository Institution

Depository Institution subtype

Bank

is Provided By Bank

<<Associative Entity>> provides

Bank Account is Provided By

Bank Account

1,n

Bank Account is Identified By

identifies

Bank Account Identifier identifies

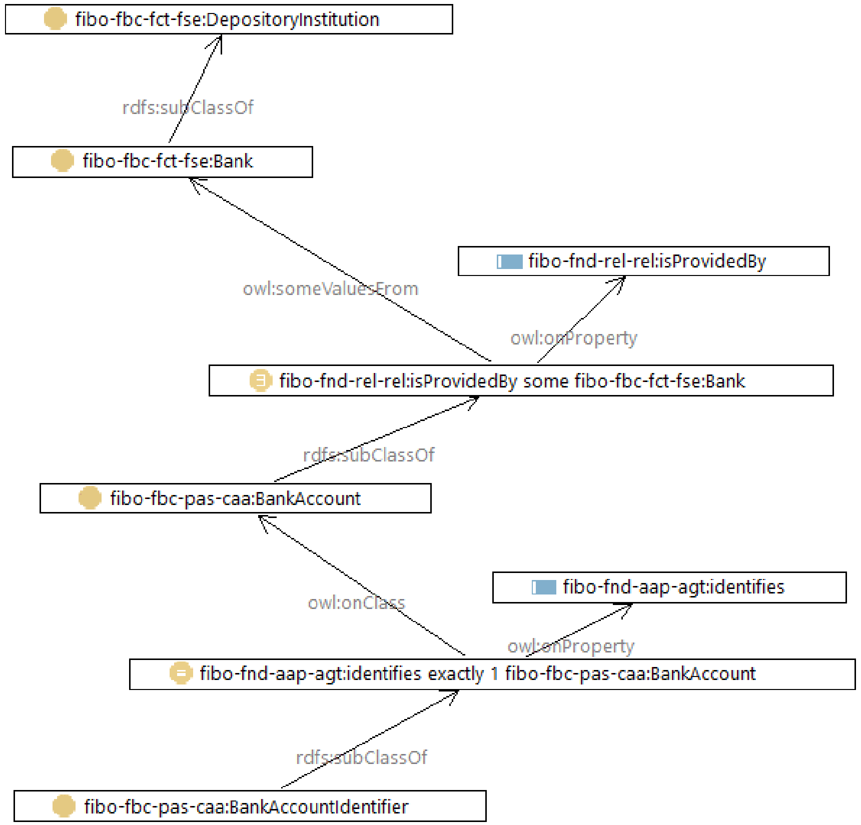
1,n

Bank Account Identifier

Ontologist

Domain ontology generates a perfect CDM

Ontology graph

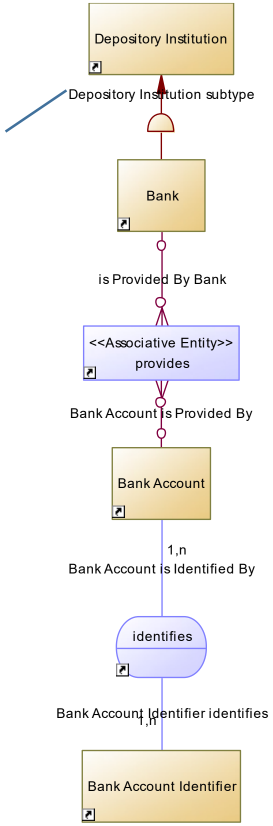

fibo-fbc-fct-fse:DepositoryInstitution
rdfs:subClassOf
fibo-fbc-fct-fse:Bank
fibo-fnd-rel-rel:isProvidedBy
owl:someValuesFrom
owl:onProperty
fibo-fnd-rel-rel:isProvidedBy some fibo-fbc-fct-fse:Bank
rdfs:subClassOf
fibo-fbc-pas-caa:BankAccount
fibo-fnd-aap-agt:identifies
owl:onClass
owl:onProperty
fibo-fnd-aap-agt:identifies exactly 1 fibo-fbc-pas-caa:BankAccount
rdfs:subClassOf
fibo-fbc-pas-caa:BankAccountIdentifier

This entity-relationship diagram is the best representation of the Bank Account, its provider, and ID.

≅

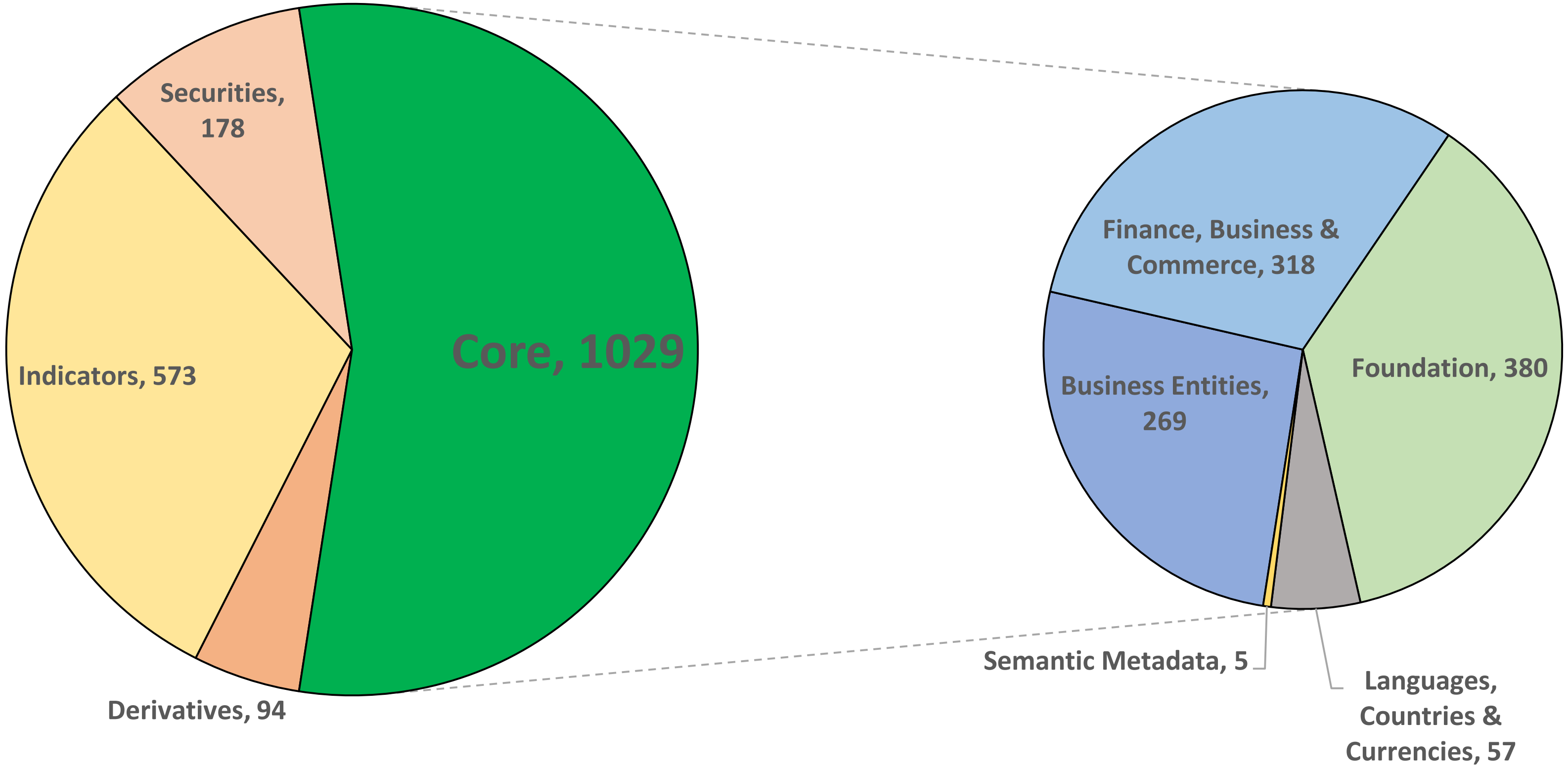
There are no missing and no superfluous entities and relationships in the design.

Conceptual Data Model



Finance key point

A one thousand entity open-source model



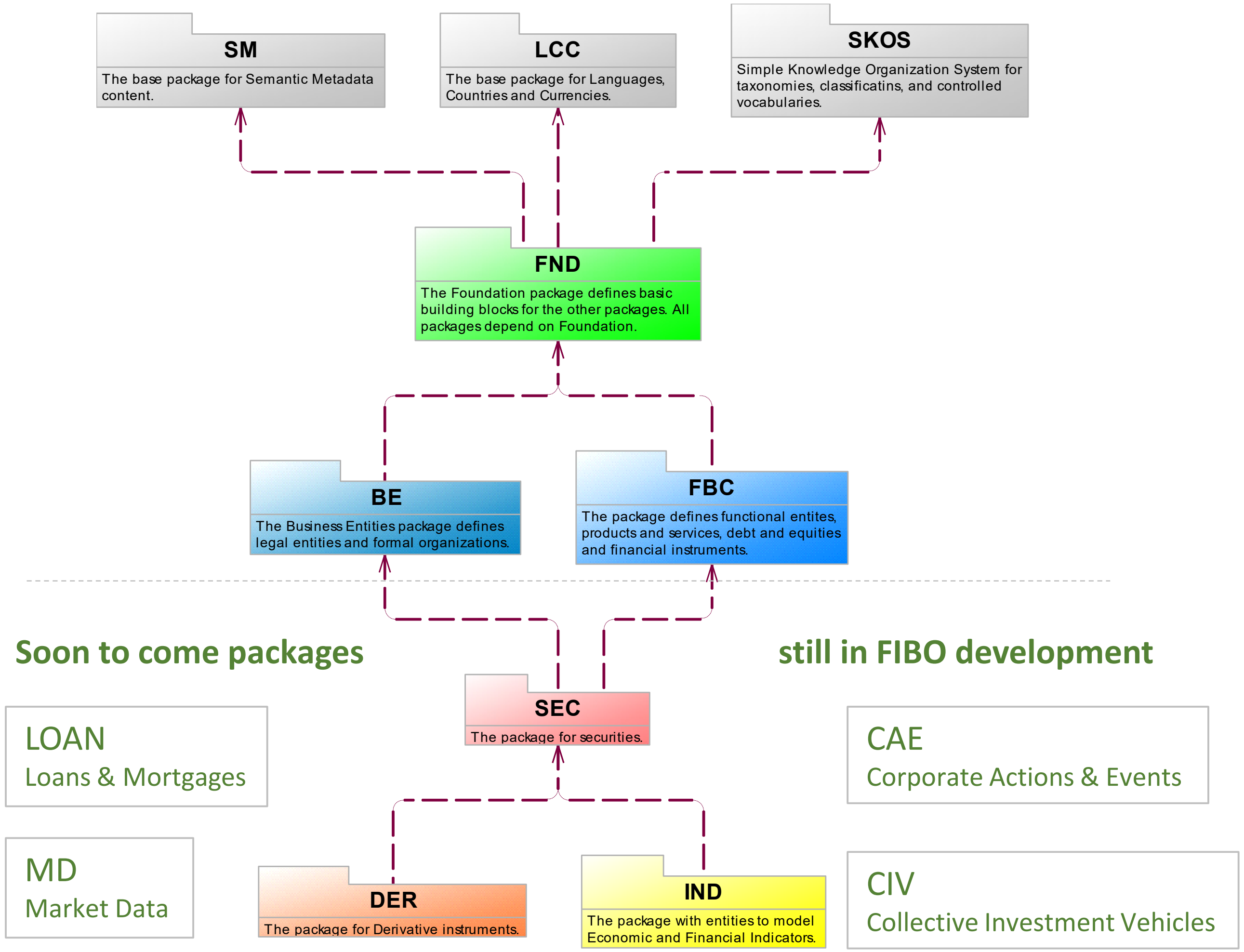
Finance key point

A self-contained standalone data model.

Generic

Domain Core

Extensions



SM

The base package for Semantic Metadata content.

LCC

The base package for Languages, Countries and Currencies.

SKOS

Simple Knowledge Organization System for taxonomies, classificatins, and controlled vocabularies.

FND

The Foundation package defines basic building blocks for the other packages. All packages depend on Foundation.

BE

The Business Entities package defines legal entities and formal organizations.

FBC

The package defines functional entites, products and services, debt and equities and financial instruments.

Soon to come packages

still in FIBO development

SEC

The package for securities.

LOAN
Loans & Mortgages

MD
Market Data

DER

The package for Derivative instruments.

IND

The package with entities to model Economic and Financial Indicators.

CAE
Corporate Actions & Events

CIV
Collective Investment Vehicles

Free Open Source

Commercial License

Finance key point

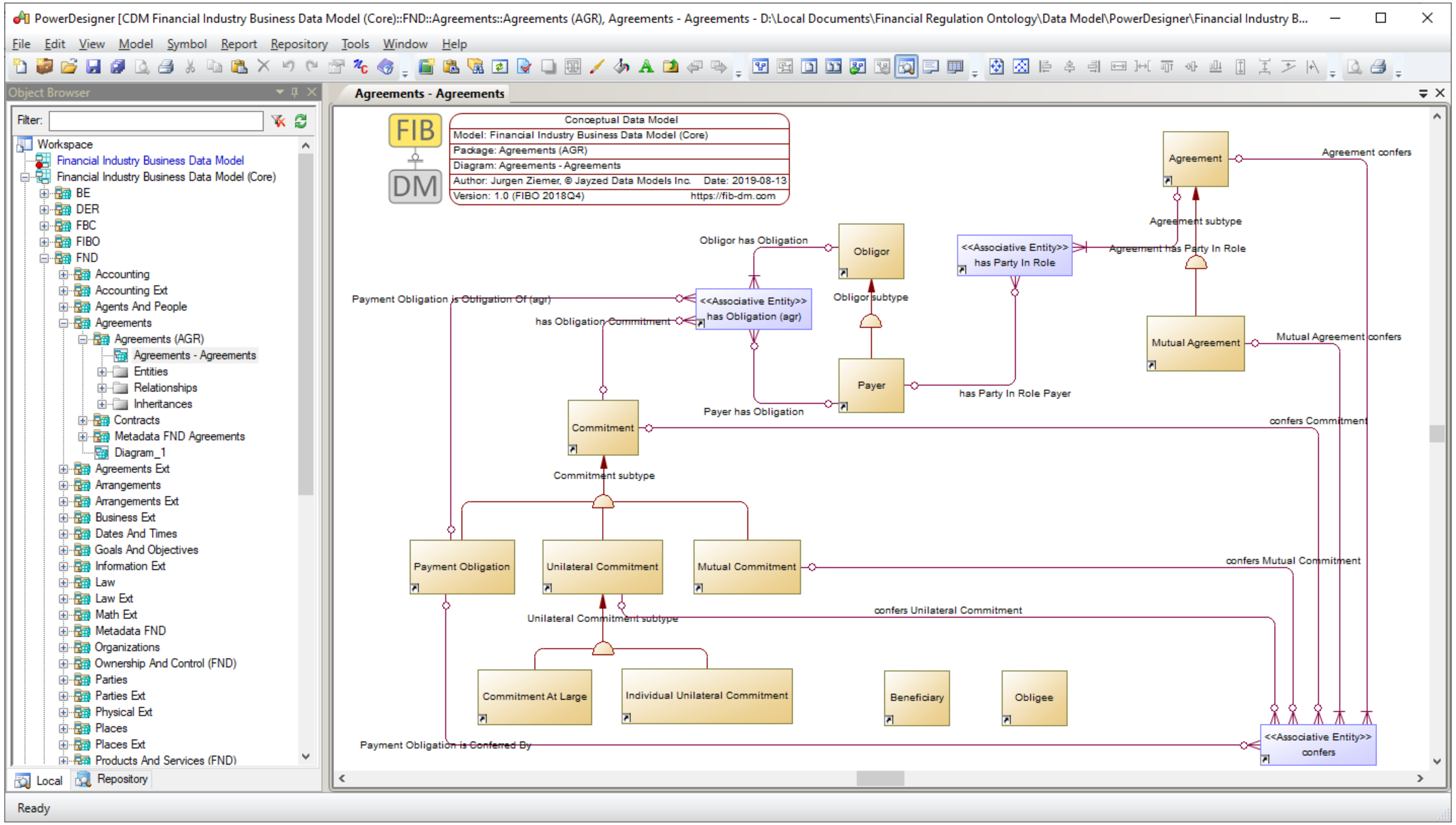
Quick tour and validation

Expand the packages and navigate to FND Agreements – Agreements.
Open the diagram.

Leaf-level packages transformed from FIBO ontologies.
Higher-level packages are containers to structure the leaf-level packages.

For FIB-DM core, the root-level packages are:

- FND (Foundation)
- BE (Business Entities)
- FBC (Finance Business and Commerce)



PowerDesigner [CDM Financial Industry Business Data Model (Core)::FND::Agreements::Agreements (AGR), Agreements - Agreements - D:\Local Documents\Financial Regulation Ontology\Data Model\PowerDesigner\Financial Industry B...

File Edit View Model Symbol Report Repository Tools Window Help

Object Browser

Filter:

- Workspace
  - Financial Industry Business Data Model
  - Financial Industry Business Data Model (Core)
    - BE
    - DER
    - FBC
    - FIBO
    - FND
      - Accounting
      - Accounting Ext
      - Agents And People
      - Agreements
        - Agreements (AGR)
          - Agreements - Agreements
          - Entities
          - Relationships
          - Inheritances
        - Contracts
        - Metadata FND Agreements
        - Diagram_1
      - Agreements Ext
      - Arrangements
      - Arrangements Ext
      - Business Ext
      - Dates And Times
      - Goals And Objectives
      - Information Ext
      - Law
      - Law Ext
      - Math Ext
      - Metadata FND
      - Organizations
      - Ownership And Control (FND)
      - Parties
      - Parties Ext
      - Physical Ext
      - Places
      - Places Ext
      - Products And Services (FND)

Local Repository

Agreements - Agreements

Conceptual Data Model
Model: Financial Industry Business Data Model (Core)
Package: Agreements (AGR)
Diagram: Agreements - Agreements
Author: Jurgen Ziemer, © Jayzed Data Models Inc. Date: 2019-08-13
Version: 1.0 (FIBO 2018Q4) https://fib-dm.com

Ready

Data Architect

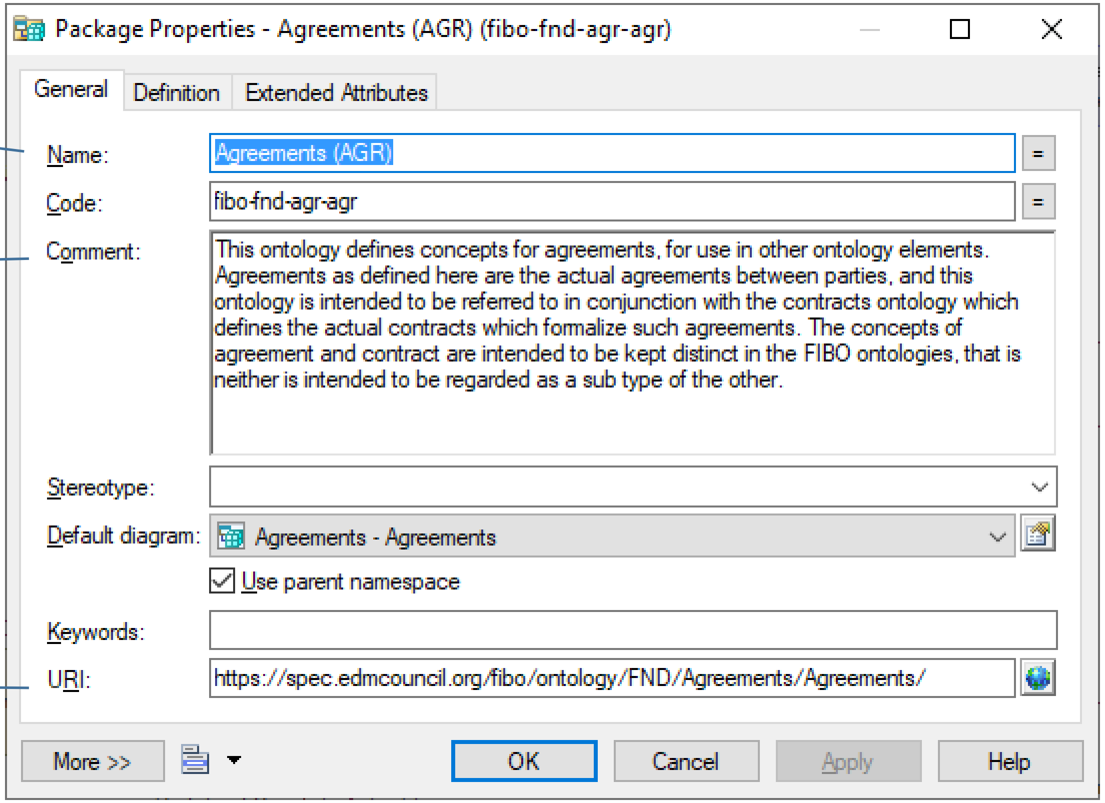
Package Properties

The Package Name is the rightmost string in the ontology namespace.

CODT transforms the ontology prefix as the unique code of the package.

Note: All ontology classes, properties with the prefix `fibo-fnd-agr-agr` become model objects of the Agreements package.

The URI is the Uniform Resource Identifier of the ontology. It is a traceability link to the source of the model object.



Package Properties - Agreements (AGR) (fibo-fnd-agr-agr)

General | Definition | Extended Attributes

Name: Agreements (AGR)

Code: fibo-fnd-agr-agr

Comment: This ontology defines concepts for agreements, for use in other ontology elements. Agreements as defined here are the actual agreements between parties, and this ontology is intended to be refered to in conjunction with the contracts ontology which defines the actual contracts which formalize such agreements. The concepts of agreement and contract are intended to be kept distinct in the FIBO ontologies, that is neither is intended to be regarded as a sub type of the other.

Stereotype:

Default diagram: Agreements - Agreements

☑ Use parent namespace

Keywords:

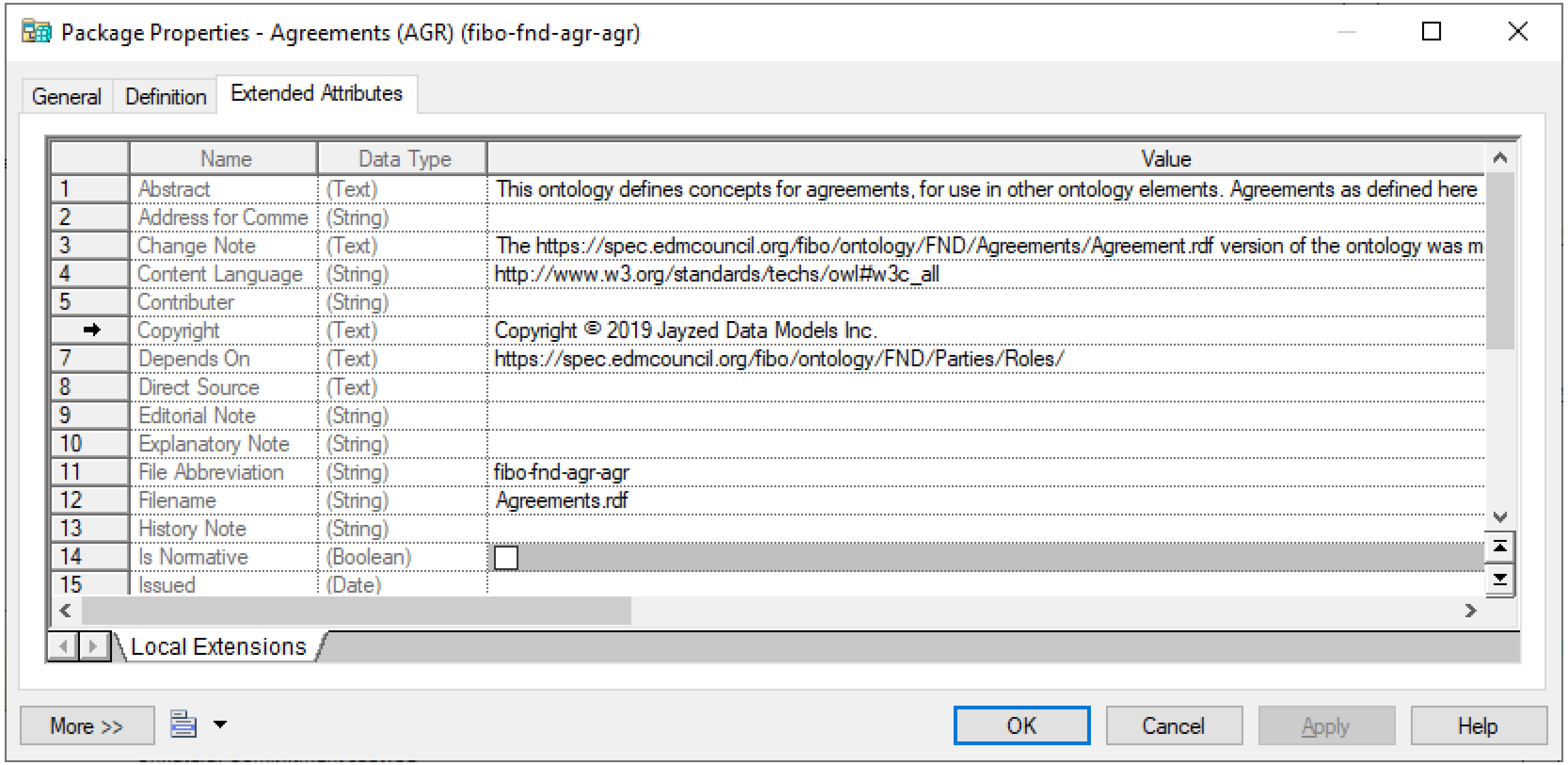
URI: https://spec.edmcouncil.org/fibo/ontology/FND/Agreements/Agreements/

Package extended attributes

The Extended Attributes tab has a list of ontology annotations.

The default transformation configuration uses the Abstract to populate the Package Comment.

Extended attributes of Data Type Text are multi-line.
For example, the Copyright attribute lists the Object Management Group and EDM Council copyrights and the License attribute lists the FIBO MIT license besides Jayzed and GPL-3.0.



	Name	Data Type	Value
1	Abstract	(Text)	This ontology defines concepts for agreements, for use in other ontology elements. Agreements as defined here
2	Address for Comme	(String)	
3	Change Note	(Text)	The https://spec.edmcouncil.org/fibo/ontology/FND/Agreements/Agreement.rdf version of the ontology was m
4	Content Language	(String)	http://www.w3.org/standards/techs/owl#w3c_all
5	Contributer	(String)	
➜	Copyright	(Text)	Copyright © 2019 Jayzed Data Models Inc.
7	Depends On	(Text)	https://spec.edmcouncil.org/fibo/ontology/FND/Parties/Roles/
8	Direct Source	(Text)	
9	Editorial Note	(String)	
10	Explanatory Note	(String)	
11	File Abbreviation	(String)	fibo-fnd-agr-agr
12	Filename	(String)	Agreements.rdf
13	History Note	(String)	
14	Is Normative	(Boolean)	□
15	Issued	(Date)	

Data Architect

Ontologist

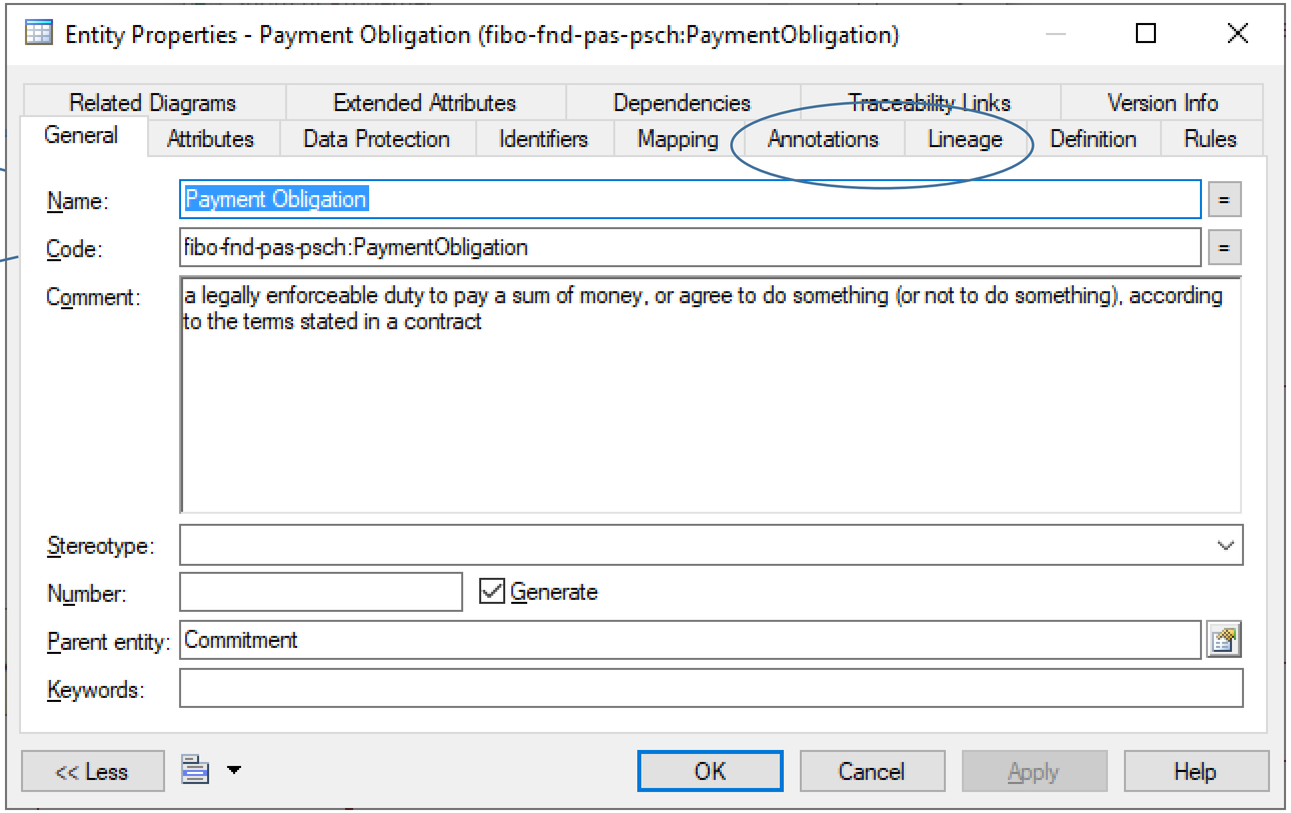
Entity properties

The Name is the ontology class *Localname,* converted from Camel Case to LDM naming convention (capitalized with space between words).

The Code transforms from the ontology class *Prefix*: *Localname*.

The Comment populates from the class annotation RDFS comment and SKOS definition.

There are two particular tabs for ontology derived data models, Annotations and Lineage.



Name: Payment Obligation

Code: fibo-fnd-pas-psch:PaymentObligation

Comment: a legally enforceable duty to pay a sum of money, or agree to do something (or not to do something), according to the terms stated in a contract

Stereotype:

Number: ☑ Generate

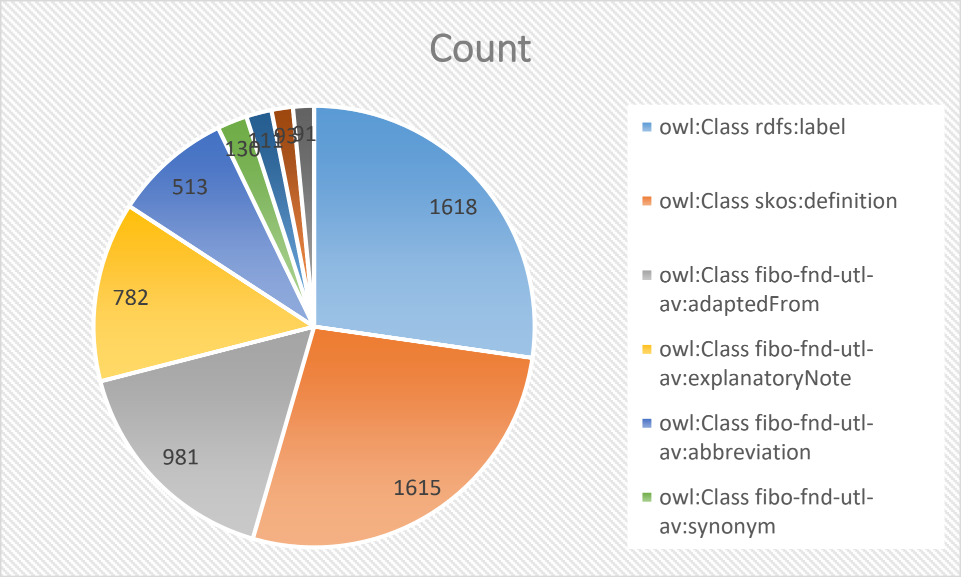
Parent entity: Commitment

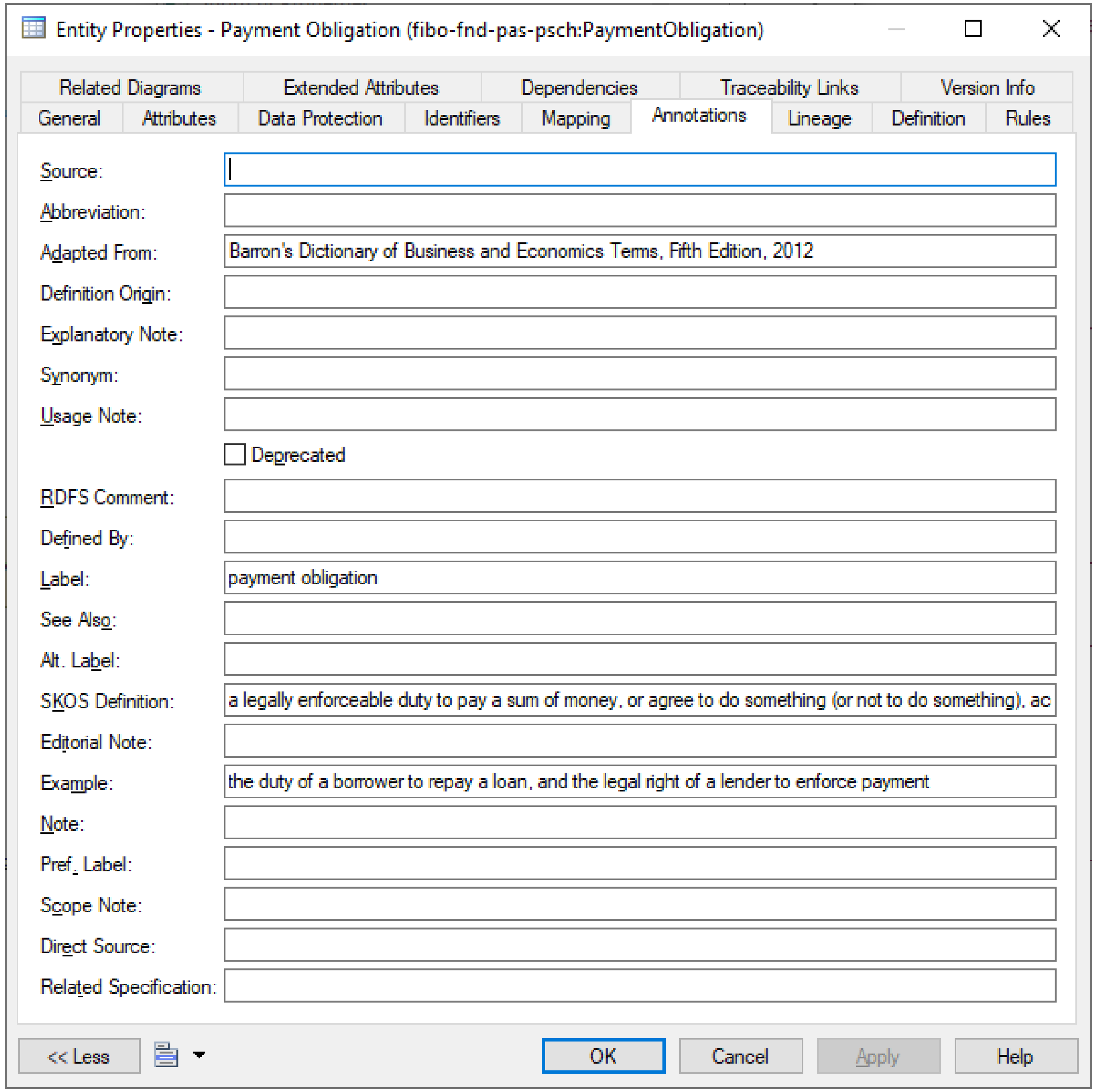
Keywords:

Entity annotations

FIBO has extensive documentation captured in annotation properties.

The chart shows the number of classes with annotated documentation.




Entity Properties - Payment Obligation (fibo-fnd-pas-psch:PaymentObligation)

Source:	
Abbreviation:	
Adapted From:	Barron's Dictionary of Business and Economics Terms, Fifth Edition, 2012
Definition Origin:	
Explanatory Note:	
Synonym:	
Usage Note:	
	□ Deprecated
RDFS Comment:	
Defined By:	
Label:	payment obligation
See Also:	
Alt. Label:	
SKOS Definition:	a legally enforceable duty to pay a sum of money, or agree to do something (or not to do something), ac
Editorial Note:	
Example:	the duty of a borrower to repay a loan, and the legal right of a lender to enforce payment
Note:	
Pref. Label:	
Scope Note:	
Direct Source:	
Related Specification:	

Entity lineage

The Lineage tab captures ontology metadata of the source class. The extended attributes provide traceability into the ontology and preserve semantics beyond the entity-relationship model.

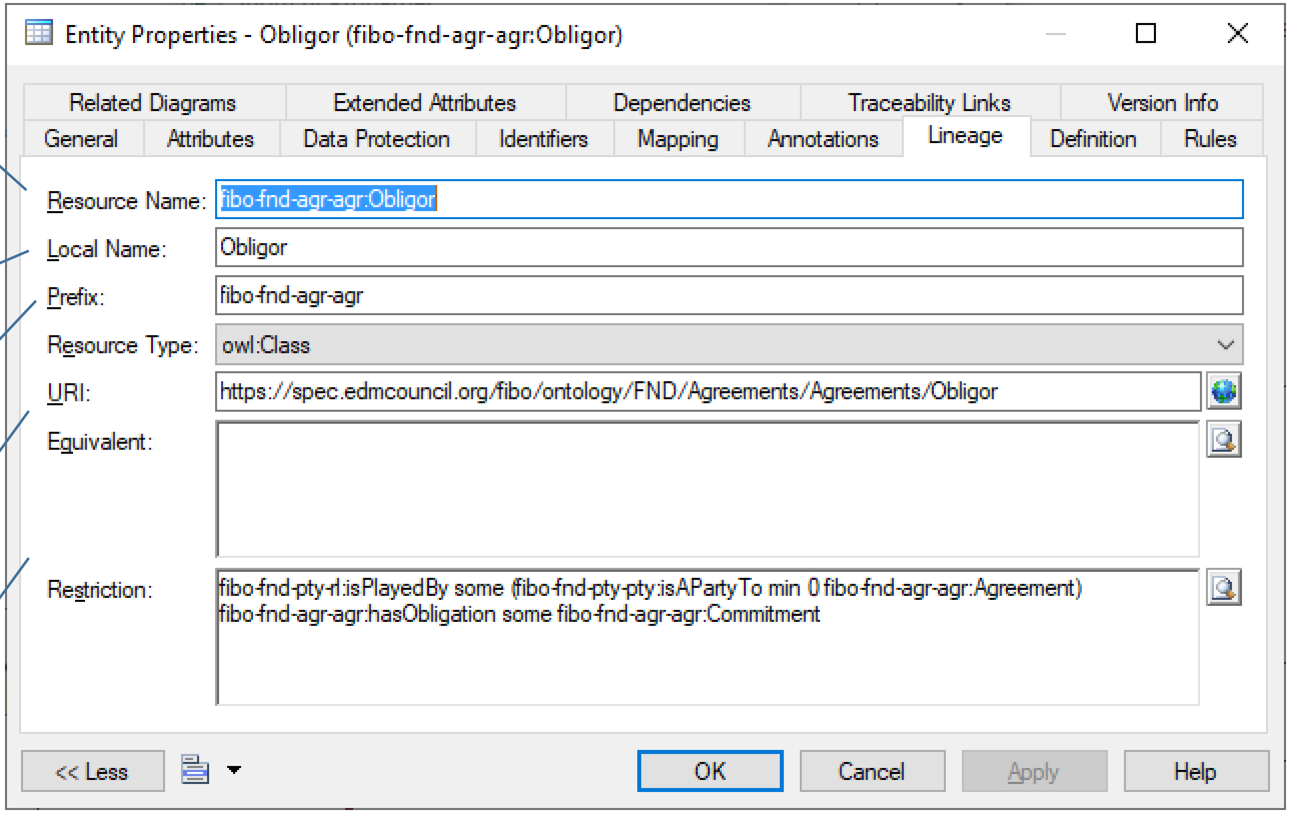
The Resource Name is class *Prefix* and *Localname*. FIB-DM uses the resource name as the entity code, but you can generate your codes in the modeling tool.

The Localname is the rightmost string in the Resource Name and URI.

The Prefix is an abbreviation of the URI defined in the ontology.

The Uniform Resource Identifier of the class is a link into the FIBO source ontology.

Restriction and Equivalent class axioms formulate OWL semantics.



Entity Properties - Obligor (fibo-fnd-agr-agr:Obligor)

Resource Name: fibo-fnd-agr-agr:Obligor

Local Name: Obligor

Prefix: fibo-fnd-agr-agr

Resource Type: owl:Class

URI: https://spec.edmcouncil.org/fibo/ontology/FND/Agreements/Agreements/Obligor

Equivalent:

Restriction: fibo-fnd-pty-rl:isPlayedBy some (fibo-fnd-pty-pty:isAPartyTo min 0 fibo-fnd-agr-agr:Agreement)
fibo-fnd-agr-agr:hasObligation some fibo-fnd-agr-agr:Commitment

Entity Restriction

Class restrictions limit the set of allowable instances. For example, the Obligor on the previous page must have an Obligation to some Commitment.

```
fibo-fnd-agr-agr:hasObligation some fibo-fnd-agr-agr:Commitment
```

Note that the ontology object property hasObligation transformed into an Associative Entity in the diagram. The transformation processes the class restriction and creates Relationships from Obligor to the associative entity *hasObligation*. Class restrictions also determine relationship cardinality. Here, the Obligor must have at least one obligation.

Class restriction can be very complex logical expressions. Even the Obligor restriction below is beyond ERM expressivity. The Obligor plays a role as a party to an agreement.

```
fibo-fnd-pty-rl:isPlayedBy some (fibo-fnd-pty-pty:isAPartyTo min 0
fibo-fnd-agr-agr:Agreement)
```

FIB-DM does not transform anonymous classes (= restrictions) into pseudo entities.
However, FIB-DM preserves these business rules for the benefit of downstream physical modelers and application developers.

Entity Equivalent

Defined Classes in OWL formulate conditions for the set of members. Unlike for the Primitive Class, we don't construct (~ SQL INSERT) instances of the class. The inference engine, a.k.a. Reasoner determines the instances that match the equivalent condition. For example, the FIBO Foundation Code Set is equivalent to the LCC code set: `lcc-lr:CodeSet.`

That means that every instance in `lcc-lr:CodeSet` is also a member of `fibo-fnd-arr-cd:CodeSet.`

FIB-DM has entities transformed from equivalent classes. The Equivalent Lineage attribute is a hint for the physical modeler to consider an ALIAS.

Defined classes may have more complex conditions. For example, the Affiliate entity is a union of Majority Controlling Party and Controlled Company.

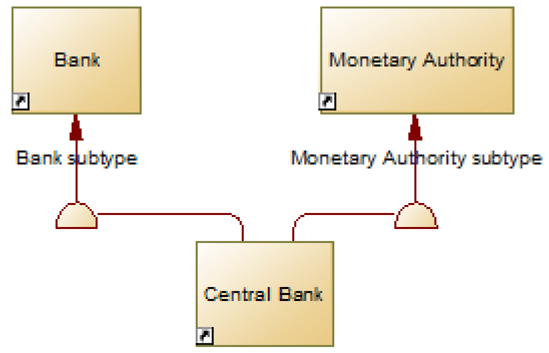
```
fibo-be-oac-cpty:MajorityControllingParty  or fibo-be-oac-cctl:ControlledCompany
```

The Equivalent Lineage attribute is a hint for the physical modeler to consider a VIEW.

Multiple Inheritance

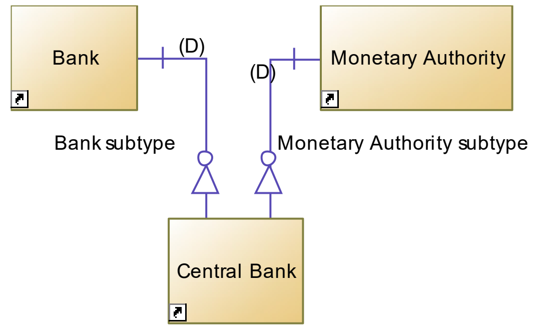
An ontology class can be a subclass of more than one parent class. For example, the Central Bank is both a Bank and a Monetary Authority.

Multiple Inheritance makes sense from a business perspective, and as a conceptual model, FIB-DM keeps multiple supertypes.



However, the LDM permits only one supertype. Note that object models also allow multiple inheritances. The Logical Data Modeler can use the same techniques to resolve multiple inheritances:

1. The issue goes away. A logical project model derived from FIB-DM may not scope the Monetary Authority. Then the Central Bank has only one supertype, the Bank.
2. The Logical Modeler changes one or both subtypes into dependent relationships. In the diagram, both Bank and Monetary Authority identifiers constitute the key for the bank.



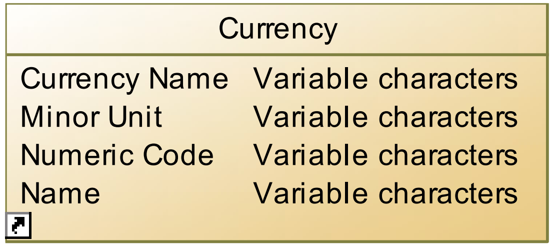
Entity Attributes

FIBO is a domain ontology defining business concepts with classes and object properties. There are only 160 data properties in the source ontology.

Hence, FIB-DM is an entity-level conceptual data model, sparsely attributed and has no keys.

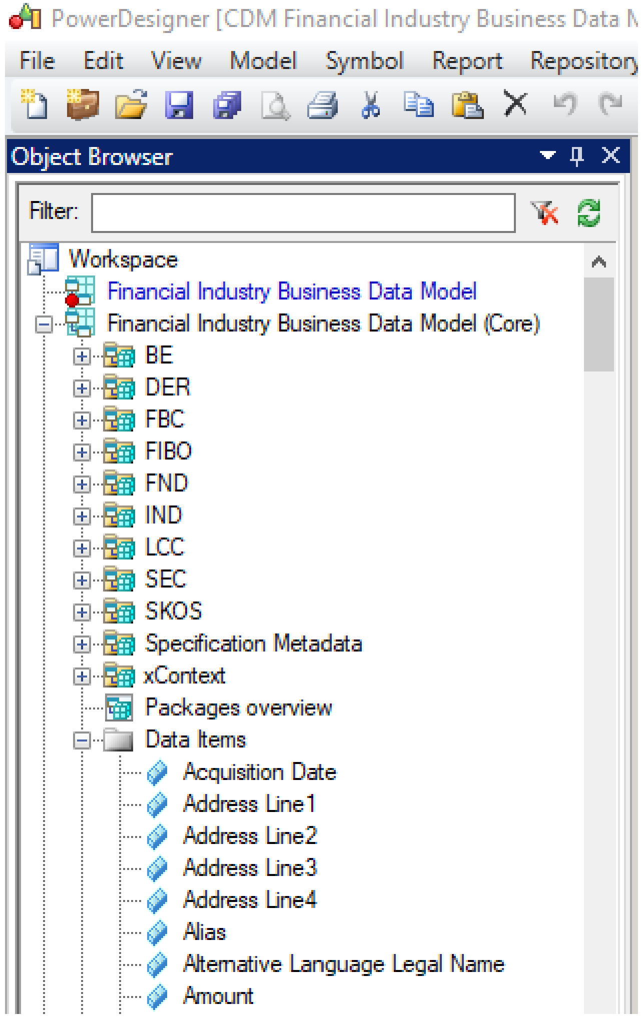
The PowerDesigner CDM has Data Items. These are model objects independent of the entity. The Data Item then gets attached to the entity as an attribute. Data Items as a model object disappear when the modeler derives an LDM from the CDM.

The transformation creates Data Items from source ontology data properties. The property domain and class restrictions determine attributes on an entity.



Currency

Currency Name	Variable characters
Minor Unit	Variable characters
Numeric Code	Variable characters
Name	Variable characters



PowerDesigner [CDM Financial Industry Business Data

- Workspace
  - Financial Industry Business Data Model
  - Financial Industry Business Data Model (Core)
    - BE
    - DER
    - FBC
    - FIBO
    - FND
    - IND
    - LCC
    - SEC
    - SKOS
    - Specification Metadata
    - xContext
    - Packages overview
    - Data Items
      - Acquisition Date
      - Address Line1
      - Address Line2
      - Address Line3
      - Address Line4
      - Alias
      - Alternative Language Legal Name
      - Amount

Data Architect

Ontologist

https://fib-dm.com

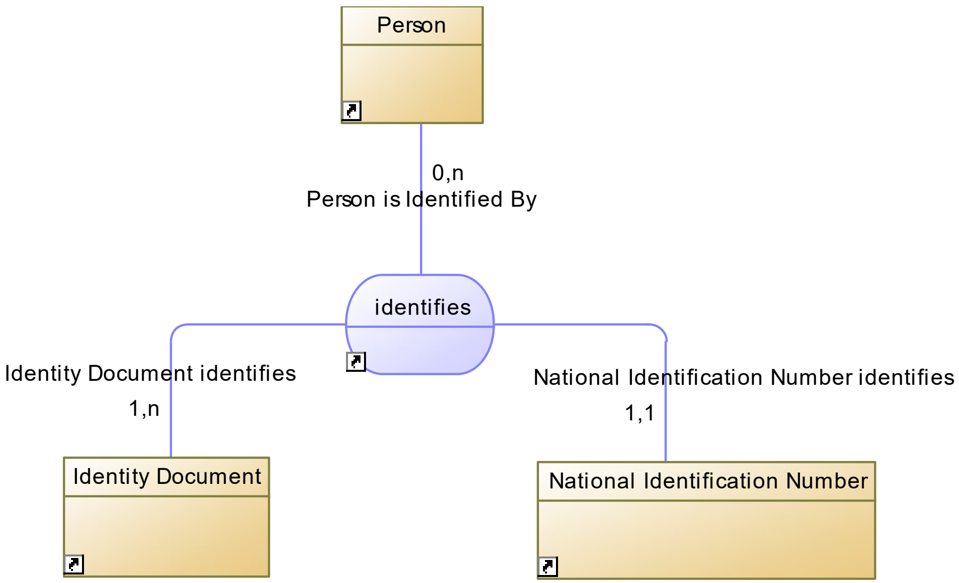
Associations

The PowerDesigner CDM introduces the Association as a model object. Associations stand on their own, rather than depending on two entities. In the example diagram, one or more Identity Documents, such as Passport or Driver's License, identify a person. The Person can also have precisely one National ID, e.g., Social Security Number.

Association Links connect the Association to participating entities. Unlike the relationship, the Association can link to more than two entities.

The CODT process transforms object properties into associations and determines Association Links from the domain, range, and class restrictions.

Associations become Associative Entities, and the Association Links become relationships when the modeler derives an LDM from the CDM.

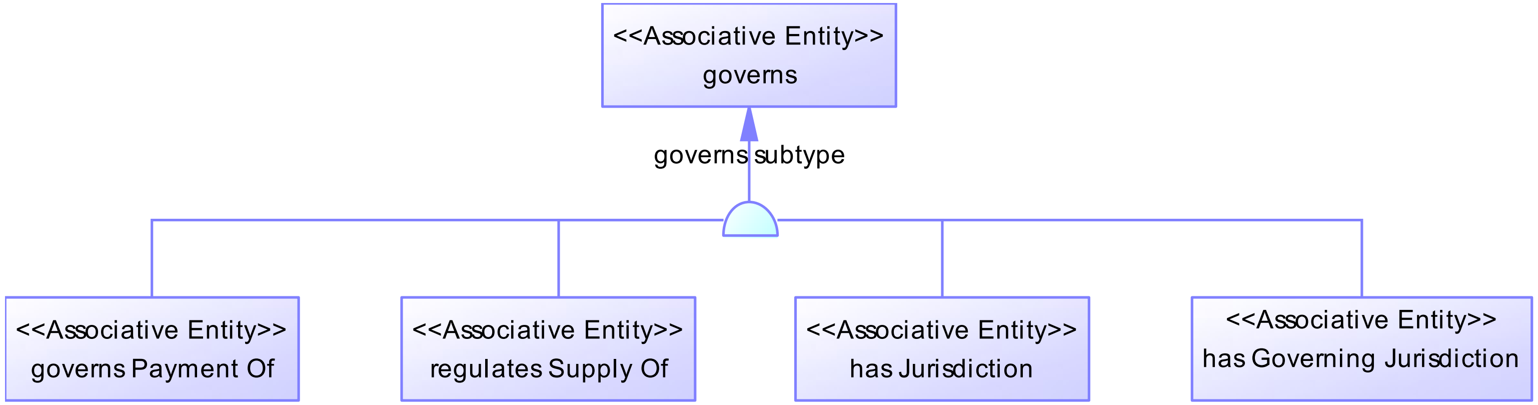

Person
0,n
Person is Identified By
identifies
Identity Document identifies
1,n
National Identification Number identifies
1,1
Identity Document
National Identification Number

Data Architect Ontologist

Associative Entities

Unfortunately, PowerDesigner CDM Associations do not support inheritance. Hierarchies of object properties are an essential OWL construct and widely used in the FIBO.

The default configuration to transform a domain ontology into an EDM, therefore, creates Associative Entities from object properties that are or have sub-properties.

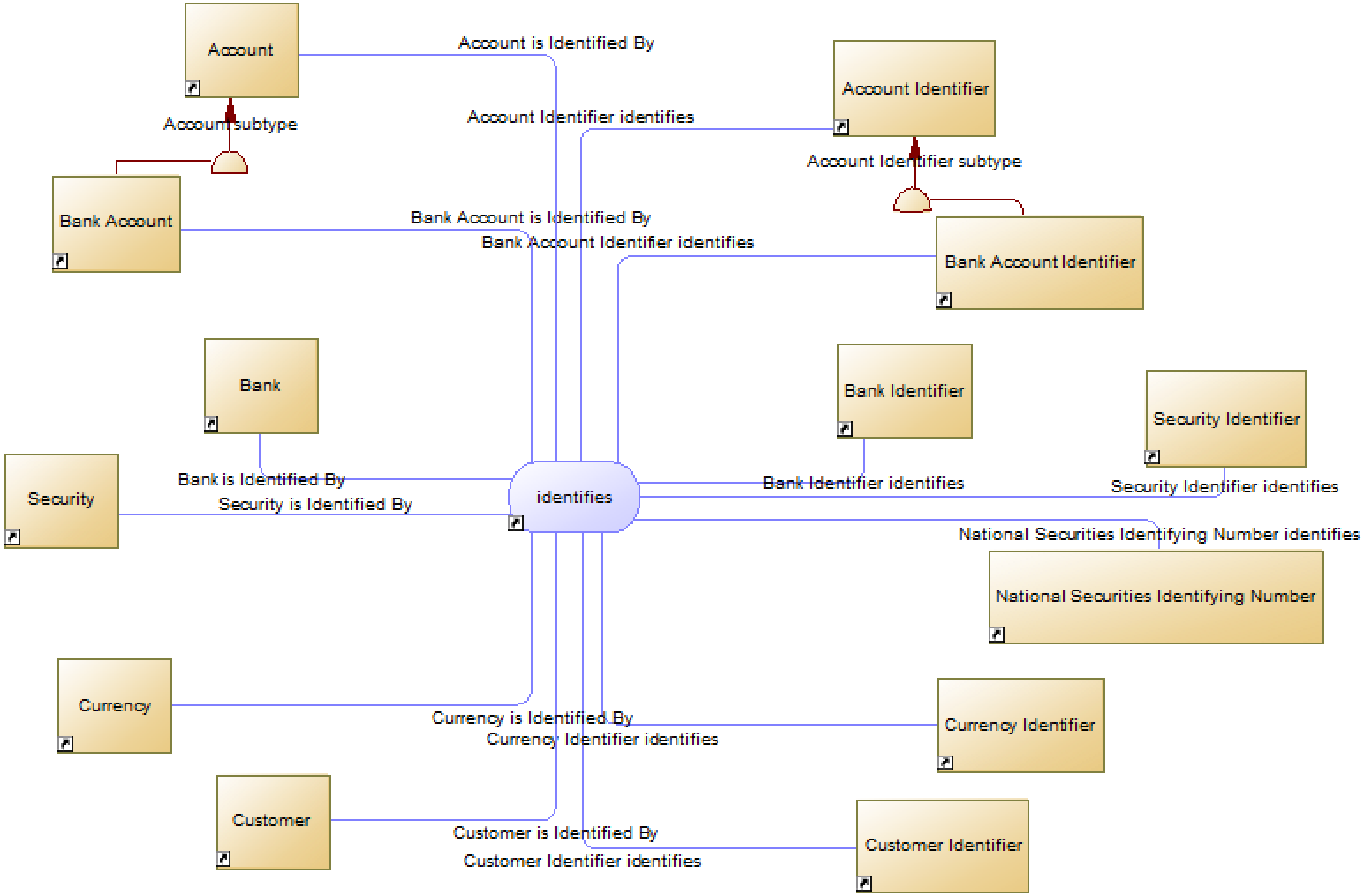


Associations, a Star Schema?

The context diagram below shows the identifies Association and some participating entities.

Indeed, the diagram looks like a Star Schema (with a “factless” fact table in the center). While this is perfectly fine for a dimensional data model, and the model check doesn’t complain, the denormalized design would not be appropriate in a logical data model.

However, as previously done for multiple inheritances, we prioritize the clarity for business users of the design over 4th Normal Form correctness.

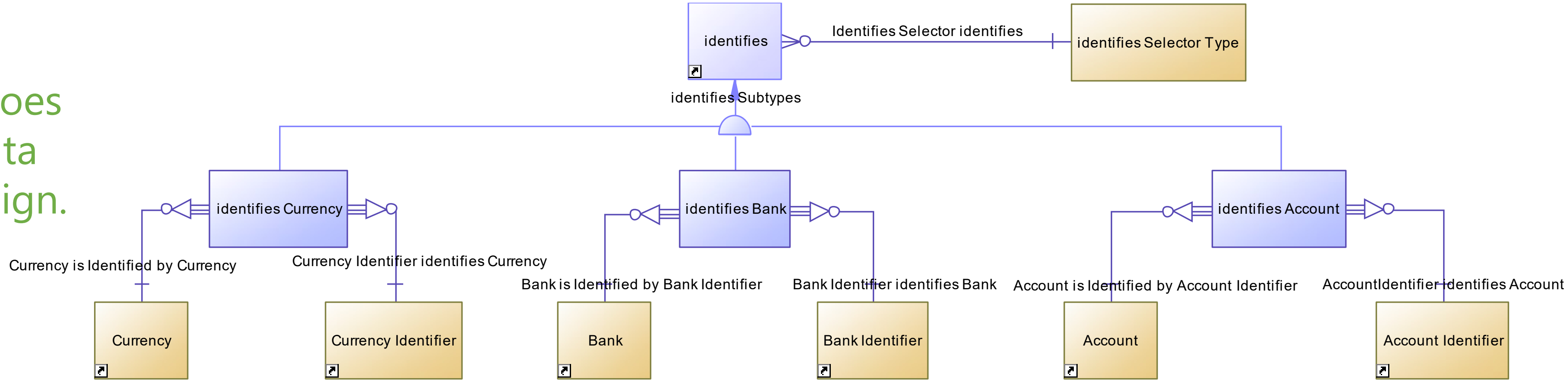

Account
Account is Identified By
Account Identifier
Account Identifier identifies
Account subtype
Account Identifier subtype
Bank Account
Bank Account is Identified By
Bank Account Identifier identifies
Bank Account Identifier
Bank
Bank Identifier
Security Identifier
Security
Bank is Identified By
Security is Identified By
identifies
Bank Identifier identifies
Security Identifier identifies
National Securities Identifying Number identifies
National Securities Identifying Number
Currency
Currency is Identified By
Currency Identifier identifies
Currency Identifier
Customer
Customer is Identified By
Customer Identifier identifies
Customer Identifier

Multi-valued association resolved.

After scoping and attribution, the logical data modeler can resolve to 4NF:

1. Once the modeler removes entities without attributes,
   the issue may disappear.
2. The standard 4NF resolution breaks down the *identifies* association with role-named associations (a subtype of identifies). E.g., *Bank Identifier identifies Bank*. The entity Lineage tab Restriction on Bank Identifier shows the class restriction.
3. A relationship Role can be added to stipulate the identifier. For example, a *Security Identifier Type* can tell the application whether to look for *a Security Identifier* or *National Securities Identifying Number*.
4. The Physical modeler can decide to roll-up or roll-down the identifies subtypes.

As said before, FIB-DM does not prescribe how the data modeler resolves the design.


identifies
Identifies Selector identifies
identifies Selector Type
identifies Subtypes
identifies Currency
identifies Bank
identifies Account
Currency is Identified by Currency
Currency Identifier identifies Currency
Bank is Identified by Bank Identifier
Bank Identifier identifies Bank
Account is Identified by Account Identifier
AccountIdentifier identifies Account
Currency
Currency Identifier
Bank
Bank Identifier
Account
Account Identifier

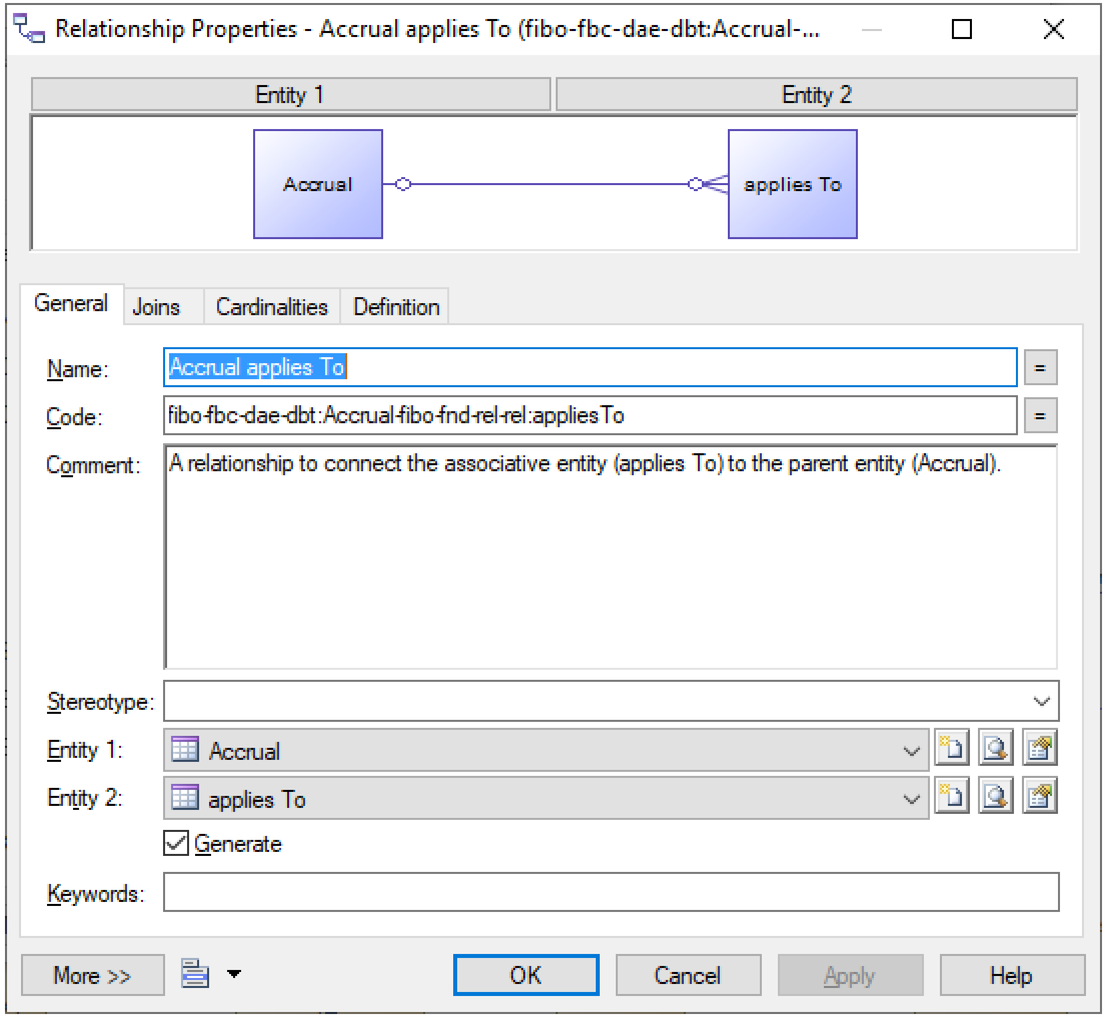
Relationships

FIB-DM uses Associations and Associative entities to model relationships between entities.
Hence, Relationship model objects are merely connecting entities to associative entities. They transform from object property domains and class restrictions.

The naming conventions for the code is "parent entity – child entity." For example:
`fibo-fbc-dae-dbt:Accrual-fibo-fnd-rel-rel:appliesTo`

Likewise, Relationship Name and Comment generate as per CODT configuration settings.

This concludes the structural overview of the model. The next tutorial introduces FIB-DM business content and design patterns.



Relationship Properties - Accrual applies To (fibo-fbc-dae-dbt:Accrual-...

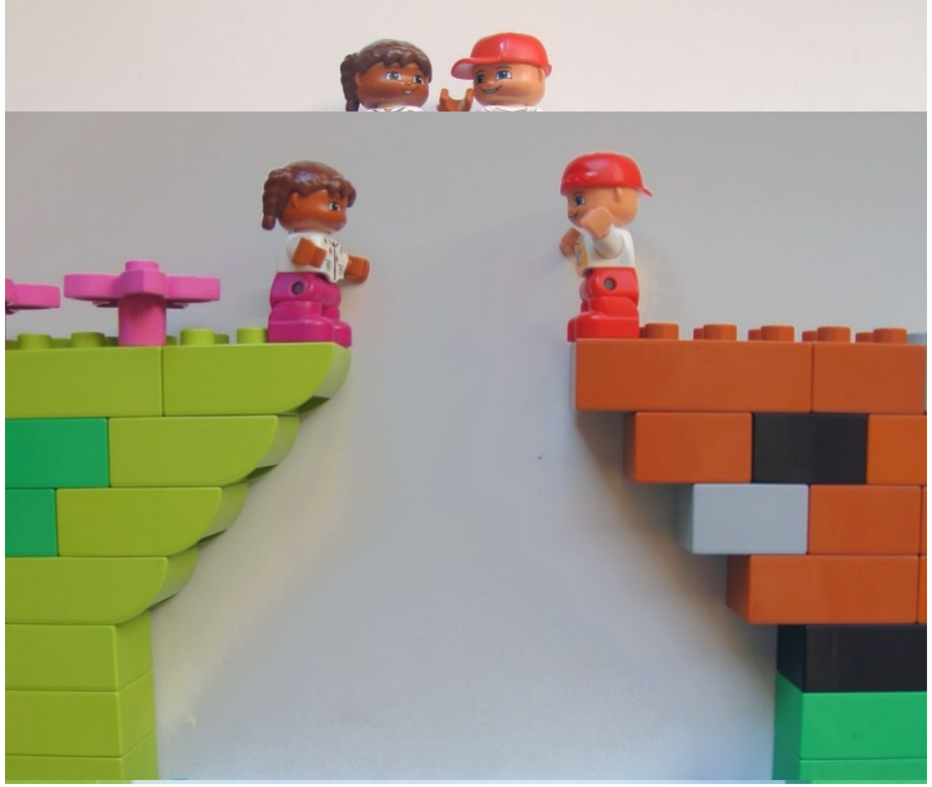
Entity 1: Accrual
Entity 2: applies To

General | Joins | Cardinalities | Definition

Name: Accrual applies To
Code: fibo-fbc-dae-dbt:Accrual-fibo-fnd-rel-rel:appliesTo
Comment: A relationship to connect the associative entity (applies To) to the parent entity (Accrual).
Stereotype:
Entity 1: Accrual
Entity 2: applies To
☑ Generate
Keywords:

Chasm between semantic and conventional data management.

FIB-DM is the bridge across the chasm.



Finance key point

FIB Core DM

open source initiative®

FIBO Financial Industry Business Ontology

in

SAP® POWERDESIGNER

(and other data modeling tools)

https://fib-dm.com/data-model-download/

http://fib-dm.com